NPS-AM-19-199

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Technology Trust: The Impact of System Information on the Adoption of Autonomous Systems Used in High-Risk Applications

1 October 2019

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Prepared for the Naval Postgraduate School, Monterey, CA 93943.

The research presented in this report was supported by the Acquisition Research Program of the Graduate School of Business & Public Policy at the Naval Postgraduate School.

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Abstract

As autonomous systems become more capable, end users must make decisions about how and when to deploy such technology. The use and adoption of a technology to replace a human actor depends on its ability to perform a desired task and on the user's experience-based trust that it will do so. The development of experience-based trust in autonomous systems is expensive and high risk. This work focuses on identifying a methodology for technology discovery that reduces the need for experience-based trust and contributes to increased adoption of autonomous systems. Initial research reveals two problems associated with the adoption of high-risk technologies: (1) end user refusal to accept new systems without high levels of initial trust and (2) lost or uncollected experience-based trust data. The main research hypothesis is that manipulations to the presentation of technical information can influence the initial formation of trust by functioning as a surrogate for experience-based trust, and that trust in technology can be captured through an anthropomorphic hierarchy of system attributes.

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Table of Contents

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List of Acronyms

ANOVA	Analysis of Variance
BLUE	Best linear unbiased estimator
DoD	Department of Defense
HAL	Hardware Algorithms Links
IRB	Institutional Review Board
IID	Identically and independently distributed
MW	Mann–Whitney test
PFT	Physical Fitness Test
SUS	System Usability Score
TAM	Technology Acceptance Model

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List of Figures

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I. INTRODUCTION

We had better be quite sure that the purpose put into the machine
is the purpose which we desire.

- Norbert Wiener, 1960

The use of technology by the Department of Defense (DoD) depends on its ability to perform a desired task. There are many issues associated with trust in technology that are increasing in importance as the U.S. military begins to acquire and deploy autonomous systems. In order to ensure the effective adoption of innovations in technology, there is a need to establish a system of metrics that justifies a level of technology trust. This proposed research has the explicit goal of investigating and recommending trust metrics by applying advanced analytical methodologies to increase the speed and effectiveness of the adoption of new technologies. This investigation proceeds by participating in an evaluation of technologies for use in evolving high-risk military applications. The trust metrics are measured in terms of the technology acceptance versus system control.

A. Technology Trust

Devitt (2018) implies that in order to meet the DoD requirements for increased speed of adoption for new technologies, there is a need to replace the current model of developing trust over longer periods of time with a justifiable metric of trust. This research studies the potential for introducing trust metrics on the evaluation and selection of technologies. The work participates in an ongoing assessment of autonomous systems for use in high-risk military applications throughout fiscal year 2019. A model is developed that optimizes the cognitive impacts of these trust metrics as they relate to the technology selection and adoption process. The approach is extensible and adoptable into private industry.

B. Research Problem

The recent increase in the use and deployment of commercial technologies by other countries is a disruptive threat to the United States' technological superiority. The rapidly changing technology landscape requires DoD laboratories to increase the speed at which they adopt new technologies (David & Nielsen, 2016). With declining budgets in research, it is imperative that the DoD establish new methods for rapidly adopting and effectively deploying new and emerging technologies whenever possible.

1. Research Purpose

As autonomous systems begin to surpass the capabilities of humans, there is a need to establish a level of confidence in a technology's ability to perform as expected. The complexity of modern systems makes it difficult to establish a comprehensive metric of trust. Past research in technology trust focused on automation and methods to measure interpersonal person-to-firm relations, such as trust in a Web vendor or a virtual team member (McKnight, Carter, Thatcher, & Clay, 2011). This research has the goal of establishing and measuring a comprehensive trust metric for individual pieces of technologies, such as autonomous systems, used in high-risk military applications. The development of a trust metric serves two purposes: first, as a surrogate for experience-based trust by contributing to the formation of initial trust and, second, as a collection tool for capturing experience-based trust data.

Research into a "trust-discovery" methodology contributes to improved understanding of human–machine trust formation and the development of a technology-literate workforce capable of accurately assessing new technology for a given operational scenario. This work first establishes a baseline definition of what it means to "trust" technology. It concludes with the development of a methodology leading to trusting relations between humans and technology. This work contributes to the literature in areas of trust in autonomous systems, technology adoption, and technologies intended for use in high-risk applications where failure or improper application can lead to severe consequences.

2. Research Questions

This dissertation emerges from the general question, "Can humans develop trust in complex systems without direct experience and a complete understanding of the technology?" Theories in anthropomorphism and system hierarchy hold promise in their ability to reduce complexity and improve the acceptance of complex systems. Thus, the specific research question studied in this dissertation is, "How does system information affect the adoption of autonomous systems used in high-risk military applications?"

This study attempts to answer the following questions:

(1) How does the anthropomorphic categorization and presentation of technology affect the development of trust in technologies used in high-risk military applications? The constructs researched include

- (i) Hardware
- (ii) Algorithms
- (iii) Links

(2) How do varying levels of system control affect the development of trust in technologies used in high-risk military applications? The constructs researched include

- (i) Perceived ease of use
- (ii) Perceived usefulness
- (iii) Intent to use

(3) Does a causal relationship exist between an anthropomorphic hierarchy of system information and the acceptance of autonomous systems?

3. Research Approach

The following research approach is used:

1. Study the evaluation process of autonomous systems for use in high-risk military applications.
2. Develop a conceptual framework for technology trust that optimizes the technology evaluation process.
3. Observe and record the results of both laboratory and field experimentation.

The basic tenets of the experimental design are realized through a 2 x 3 factorial design (Table 1). This experiment considers the effect of various conditions of system information and level of system control on the risk associated with system attributes and the technology acceptance model (TAM).

Table 1. Experimental Factorial Design

		SYSTEM CONTROL		
		LOW	MID	HIGH
ANTHROPOMORPHIC CATEGORY SYSTEM PRESENTATION	NO	Risk TAM	Risk TAM	Risk TAM
	YES	Risk TAM	Risk TAM	Risk TAM

C. Contribution

The concept of technology trust has applicability beyond the DoD. Private industry can greatly benefit from the concepts and methodologies developed in this research by applying trust metrics to the research and development of existing or new consumer technologies such as machine learning, artificial intelligence systems, smart algorithms, and embedded technologies. These intelligent systems are transformative areas that will eventually integrate into all industries (e.g., self-driving cars, delivery drones, big data analytics, and the Internet of Things, where algorithms, machines, and computer systems are continually learning and evolving).

This research also contributes to trust theory and provides an increased understanding of military technology acceptance. The recommendations provide a conceptual framework for how a military community develops trust in technologies for high-risk missions and how varying factors influence the development of such a relationship. Currently, there is an ongoing effort to perform such trust analytics within the DoD in which this research will participate.

D. Organization

Section II of this dissertation investigates and reviews existing literature that includes terms such as *technology trust and risk, decision making,* and *technology-adoption models*. A review of current and past theory on technology trust and decision making is developed, which is then used to develop a comprehensive metric for assessing technology trust within the DoD. A proposed framework for a comprehensive trust metric is identified and introduced to the technology evaluation process.

Section III explains the experimental design. Both lab and field experiments are conducted to identify trust metrics. This research intends to leverage an ongoing DoD experiment reviewing and selecting a series of new autonomous systems. The existing data is collected from DoD active duty technology end users as well as civilian scientist support staff. The study investigates how varying levels of trust influence cognitive decision making as well as technology adoption. The primary product of this investigation is the experimental data obtained.

Section IV provides a summary of the data received and the analytical methodologies applied to analyze said data, while Section V provides a summary of the key results. The research concludes in Section VI, where the key finding and recommendations are presented.

E. Summary

This introduction provided a brief background on the issues associated with trust and the adoption of autonomous systems within the DoD. For this study, *technology trust* is defined as a psychological state in which a prediction about the use of technology entails risk and is based on expectations of a positive outcome. *Risk* is defined as a scenario where misplaced trust may lead to physical harm. *Trust factors* are anything that can influence or contribute to trust/distrust in a technology (i.e., operating conditions), and *trust attributes* are inherent characteristics of a technology that also contribute to trust/distrust (i.e., system speed, weight).

II. LITERATURE REVIEW

The purpose of this section is to develop an understanding of the formation of trust, as well as to analyze the constructs of a trust relationship. The idea of technology trust is broken down into quantifiable sections based on leading theories. This research concludes by presenting a conceptual framework for technology trust based on existing literature, as well as highlighting any related gaps the literature.

This research was initiated through informal interviews that attempted to identify the factors that contribute to the use of technology in high-risk environments. The participants were a small group of active-duty military and veterans who deploy, or have deployed, with technology that posed great risk of physical harm should it fail. A number in this group experienced significant injury due to the failure of technology, and the potential for bias was noted. A series of open-ended questions was provided to discuss what the users did or did not like about using technology in high-risk scenarios. The initial coding of interviews revealed the following themes:

1. Hands-on experience with technology is critical for establishing trust, and team-based reputation for a technology is as important as personal experience.
2. Personal investment in a mission is key to learning and accepting new and complex technology.
3. Users operating in high-risk environments favor simple technology containing only the features needed to accomplish a mission and may reject new and complex technology in favor of older and more trusted systems.

These themes all have implications for the adoption of autonomous systems within the DoD. Advanced robotic systems have the ability to improve performance in a number of military roles while reducing risk to humans, and it is important to understand how to improve the adoption of such systems within the DoD. This initial research focused on technology in dangerous environments and reveals that adoption is highly dependent on the ability of the user to obtain the knowledge necessary to develop trust. This theme led to our initial literature review on understanding trust and how it applies to technology adoption.

The literature review was developed through searches on both Web of Science and Google Scholar using combinations of search terms such as *trust*, *knowledge-trust*, *technology trust*, *human-computer*, *human-robot*, *technology acceptance*, *trust attribute*, *trust risk*, and *risk score*. The literature results were narrowed to 93 relevant articles.

A. Knowledge

The process of obtaining knowledge is fundamental to understanding the development of trust. We therefore briefly review the epistemologies, or the processes for how a person comes to know something, as concepts important to this work. Early philosophers presented the two opposing views of the source of knowledge: rationalism and empiricism.

The French philosopher Rene Descartes was an early rationalist who believed that we can only know something through reason, and that the only thing we can truly know is that we have consciousness. Descartes presented a methodology for knowing what is real that minimizes a construct needed for the establishment of technology trust. He established a dualism that reduces our understanding to distinct areas of consciousness and matter but does not emphasize the senses. Our sense perception, he believed, is easily prone to error due to subjective interpretation. He believed that the senses are meant to simply get us around in the world rather than lead us to truth. In order to test our hypothesis of trust in technology, we identify constructs that permit measurement of both human interaction with technology and technology interaction with its surroundings.

John Locke later introduced empiricism, which, contrary to rationalism, stated that all knowledge must be obtained through experience. The empiricists claimed that the senses were the only way to true knowledge and that experience is much more accurate than anything the mind could ever reproduce through memory or reason. The theories presented by rationalism and empiricism both stand to contribute to the formation of trust through the application of reason-based knowledge and experience-based knowledge. (However, there is a limitation in that we lack a method for integrating these two forms of obtaining knowledge.)

Further review reveals that modern philosophers reject the idea that knowledge is obtained exclusively through either rationalism or empiricism. The philosopher Immanuel Kant is often credited as providing a synthesis between the two opposing theories. First, he noted that reason lacks the ability to create sensory experience, and it is only through reason that we are able to accurately analyze the stimuli received through the senses. This theory represents a foundation for understanding the development of trust. Figure 1 represents a causal diagram based on our findings in the literature that includes a synthesizing feedback loop representing how we come to know something.

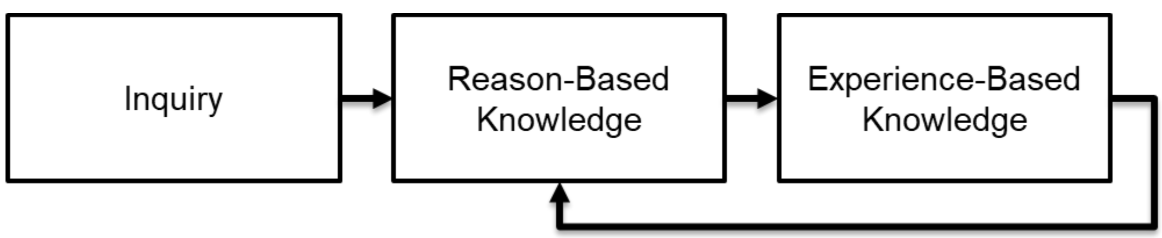

Figure 1. A Model of Inquiry Leading to Knowledge

B. Trust

Castelfranchi and Falcone (2010) review over 72 definitions of what it means to know something well enough to trust, and their work reveals a great deal of confusion and ambiguity surrounding the use of the term. The concept of trust appears to be subjective in nature, and the literature does not provide a commonly accepted definition across research disciplines. Agreement in the literature was found for the definition of trust in two areas: (1) the basic premise of trust involves two actors, and (2) trust is a relationship in which one entity relies on someone, or something, based on a given criterion. Research into the meaning of a "given criterion" reveals an interchangeable use of the terms *trust* and *confidence*. The only noticeable difference in the use of these terms is that trust is based on decisions involving risk, whereas confidence involves decisions devoid of consequence.

This literature review furthers its investigation into trust through researching interpersonal relationships. Leading theories on interpersonal trust present vulnerability and risk as the contributing factors unique to the development of such a relationship. Cho, Chan, and Adali (2015) surveyed the meaning of trust across academic disciplines and identified that it follows a basic premise involving risk. For example, they found that academic researchers of trust in psychology assess the probability that individual behaviors are repeatable in situations that entail risk, and in sociology, researchers of trust assess the probability that one party will perform an action that will not hurt the interests of a dependent party or expose it to risk due to ignorance or uncertainty.

Rousseau, Sitkin, Burt, and Camerer (1998) define interpersonal trust as a psychological state of a trustor accepting vulnerability in a situation involving risk and based on positive expectations of the intentions or behavior of the trustee. Boon, Holmes, Hinde, and Groebel (1991) simplify the definition of trust as a state involving confident predictions about another's motives in situations entailing risk. The majority of early research on trust involves person–person relationships and provides a starting point for our understanding of the process of developing trust. Figure 2 presents an operational model of interpersonal trust formation based on reviewed literature.

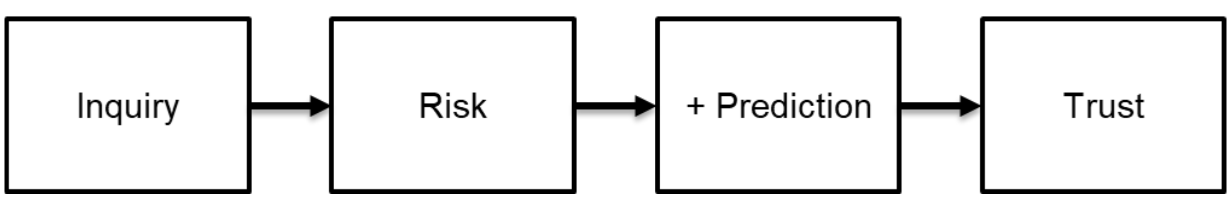

Figure 2. A Model of Interpersonal Trust Formation

Adams and Webb (2002) describe two broad processes of developing trust between two individuals. The first is defined as “person-based trust,” which develops through repeated engagements, and the second is called “category-based trust,” which develops in the absence of direct experience. These definitions parallel the theories identified in our previous research into the epistemologies. Consequently, we modify interpersonal trust terminology to match our research by replacing “category-based” with “reason-based” and “person-based” with “experience-based.”

Kramer and Tyler (1996) assess reason-based trust and present it as useful for understanding how one develops a trusting relationship when personal or social interaction is not possible. This type of trust often develops through someone's membership in a familiar group or category. The factors contributing to reason-based trust can be social roles, training, or experience. In reason-based trust, the relationship is most commonly developed through a reputation that serves as a proxy for personalized knowledge and direct experience. These concepts lead to our first research hypothesis regarding experience-based trust relationships:

H1: An experience-based proxy will influence the tendency to trust or distrust.

Rempel, Holmes, and Zanna (1985) assess that experience-based trust relationships develop over a long period of time through personal interaction. In their early research on trust, they describe three factors that influence the development of trust as competence, benevolence, and integrity. Their work also discusses the significance of the mental motivation behind the desires to establish a relationship and they find that it was strongly correlated to the factors that influence trust. Their work confirms a theme identified in our early interviews with users of technology in risk-application that emphasized the importance of personal investment. It also leads to our second hypothesis relating motivation to technology acceptance:

H2: Increased personal motivation will increase technology acceptance.

There appears general agreement in the literature reviewed that two features characterize interpersonal trust: first, that trust is both reason-based and experience-based, and second, the strength of the trust bonds may differ. The concept of initial trust involves the development of a relationship based purely on reason and represents a weaker connection that can be explained by first impressions. Experience-based trust involves direct knowledge and regular interaction. This type of trust represents a stronger connection and is explained by relationships that develop over a longer period of time through an experience–reason feedback loop. Figure 3 presents a model of interpersonal trust.

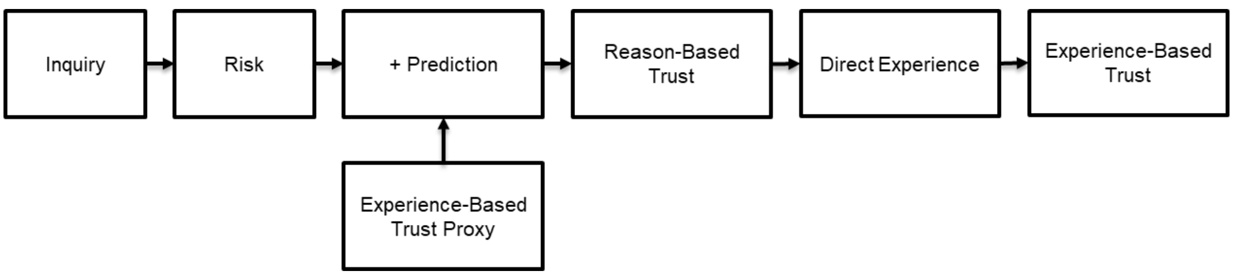

Figure 3. Interpersonal Trust Lifecycle

C. Technology

The past research on interpersonal trust applies in many ways to trust in technology. This study sought out literature that contributes to the development of a methodology of technology discovery leading to person–technology trust. The potential for integrating interpersonal trust research into technology trust was discussed by McKnight et al. (2011). This research found that interpersonal trust is based on a trustee's expectations and reliance on a trustor to perform as expected through benevolence, even though the trustor possesses the volition to choose to do what is right or what is wrong. Since technology does not possess volition (ability to choose), some researchers went as far as to dismiss the idea of trust in technology as irrelevant; however, recent advances in artificial intelligence refute the claims that technology lacks volition. This is confirmed in the vast amount of current research into how autonomous systems make decisions that can either harm or protect human life.

Technology trust research is further represented in multiple disciplines of engineering and science. The major fields of technology trust research include, but are not limited to, artificial intelligence, command and control, human–computer interaction (HCI), data fusion, human–machine fusion, cyber security, and automation. Multiple models for researching trust are presented in the literature that combine both human-like and system-like terminology. Technology trust is a multifaceted area of research that integrates both human-like measures and system-like measures. Three of the most frequently used human-like terms used to model technology are *competence, benevolence,* and *integrity*. The work by McKnight et al. (2011) and Lankton, McKnight, and Tripp (2015) consider the system-like alternate terms for technology trust as *reliability*, *functionality*, and *helpfulness*. A number of system-like measures of technology trust, such as supply chain management, past vendor performance, hardware/software-oriented security, and network security, were identified that are outside the scope of this work but still important to ongoing trust research.

The majority of the language used to describe interpersonal trust can apply to technology trust. For example, the word *benevolence* is a very human-like attribute and likely to appear in literature on the decision-making capabilities of self-driving cars. A total of 86 factors and attributes related to interpersonal and technology trust were collected from the literature for use in developing a nomological network of trust terms. A *factor* is described as situational consideration of technology use that has the potential to influence trust, such as risk and time to operate. An *attribute* is a characteristic inherent to the technology such as its speed, power, and processing capability. The combined and unsorted list is presented in Table 2. Future experimentation outside the scope of this study could involve establishing the relationships and understanding the influence of each term in the following areas:

1. Factors that measure reason-based and experience-based technology trust
2. Attributes that characterize technology trust as a proxy for experience

Table 2. Contributing Terms of a Nomological Network for Technology Trust. Adapted from Cho et al. (2015); DeVitt (2018); Hoff & Bashir (2015); McKnight et al. (2011); Schaefer, Chen, Szalma, & Hancock (2016)

Ability	Character	Disappointment	Importance	Process	Skills
Adaptive	Communication	Disposition	Incompetent	Protect	Stability
Adoption	Competence	Dynamic	Integrity	Purpose	Supportive
Adversarial	Completeness	Easy	Intelligibility	Rationality	Teammate
Altruism	Confidence	Expectation	Intent	Recency	Trainable
Attractive	Contract	Experience	Knowledge	Reciprocation	Transparency
Autonomous	Control	Faith	Learning	Regret	Uncertain
Availability	Cooperation	Faults	Likeable	Relational	Understandability
Awareness	Credibility	Fear	Monitored	Relevance	Unstructured
Belief	Credit	Feeling	Motives	Reliability	Utility
Benevolence	Decisive	Frequency	Perception	Relief	Validity
Capability	Delegation	Frustration	Performance	Responsive	
Capital	Dependability	Helpfulness	Popular	Risk	
Centrality	Difficult	Honesty	Power	Robust	
Certainty	Directability	Hope	Predictability	Similarity	

Figure 4 represents the synthesis of technology trust and interpersonal trust factors and attributes as identified in the nomological network of terms.

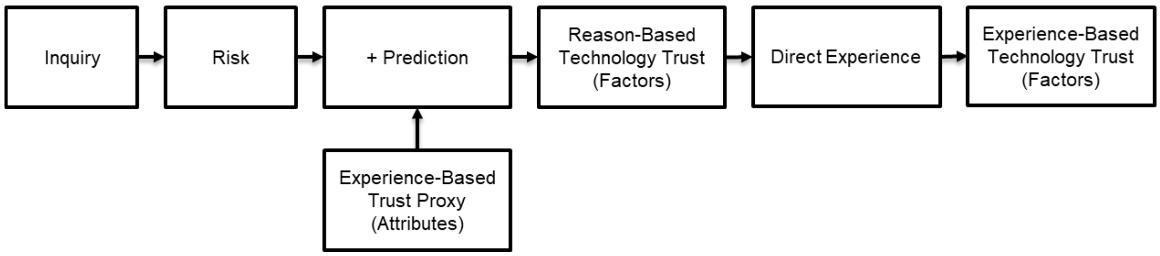

Figure 4. Technology Trust Lifecycle

A theory relevant to measuring and characterizing trust is found in the technology acceptance model (TAM) developed by Fred Davis nearly 30 years ago. This model plays a significant role in the majority of research investigating the factors and attributes that influence the acceptance of a technology. Venkatesh and Bala (2008) present the TAM's ability to predict individual adoption and use of technology. The TAM assesses the behavioral intention to use a technology through two constructs: perceived usefulness (PU), which is defined as the extent to which a person believes that using a technology will enhance his or her job performance, and perceived ease of use (PEOU), which is defined as the degree to which a person believes that using a technology will be free of effort. These two variables are used to establish a relationship between external influences and potential system usage (Gefen, Karahanna, & Straub, 2003). In the work by McKnight, Choudhury, and Kacmar (2002), it was experimentally determined that the TAM variables do not predict continued use of a technology outside of initial acceptance and that trust in a vendor's past technology does not translate to acceptance of subsequent technologies.

Tétard and Collan (2009) address the challenges of adopting new technology in their work on the lazy-user theory. This theory states that a user will select the technology that demands the least amount of effort to do the job. This theory also addresses one of the themes identified in our early grounded theory study interviewing operators of technology in high-risk scenarios. The application of this theory places technology users at a disadvantage, particularly in high-risk military applications where trustors are known to avoid more capable technology for systems that are easier to understand. If an experience-based proxy can improve the accuracy of developing trust through increased technology literacy, it may lead to increased acceptance of more complex and capable technologies, thereby reducing the influence of the lazy-user theory. This leads to our third research hypothesis:

H3: An experience-based proxy will decrease the influence of the lazy-user theory on technology acceptance.

D. Conclusions

The intent of this section was to define technology trust and identify gaps in research as it relates to trust in autonomous systems. It appears that a methodology for technology discovery leading to trust does not exist in literature. This review reveals a clear distinction between reason-based trust and experience-based trust. It also suggests that users are willing to trust technology in high-risk environments and that an experience-based proxy may increase the quality of such a relationship and the pace at which it is established. Based on the findings in literature, Figure 5 illustrates a conceptual framework for a causal methodology of technology adoption by introducing an experience-based proxy that is hypothesized to improve technology adoption. The impact of a proxy introducing inaccurate information is noted as significant but is outside the scope of this work.

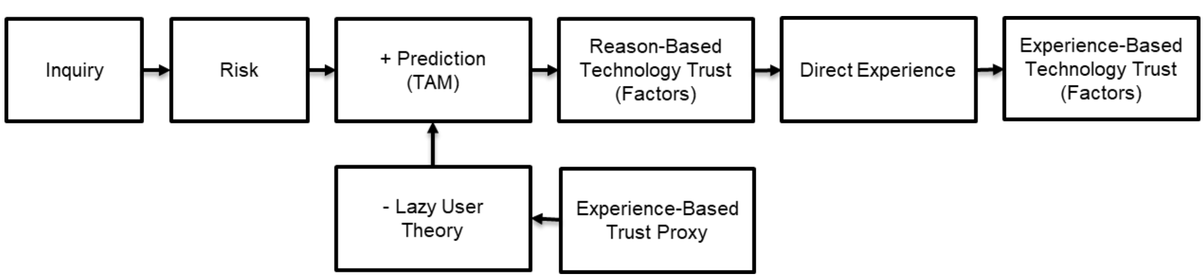

Figure 5. Conceptual Framework for Technology Trust

III. EXPERIMENTAL DESIGN

Section I discusses how a "trust-discovery" methodology could contribute to improved understanding of human–machine trust formation and the development of a technology-literate workforce capable of accurately assessing new technology for a given operational scenario. The literature reviewed in Chapter II strongly suggests that the manipulation of system information may influence technology trust. Chapter II also presents operational definitions of the concepts of reason-based and experience-based trust and how they influence the acceptance of autonomous systems.

This chapter presents a research design that provides an empirical test for the hypotheses that emerged from the literature review. The experiment participant selection, laboratory experiment procedure, survey instruments, and experiment apparatus are explained. The chapter concludes with the rationale for the hands-on experimentation.

This experiment investigates the formation of trust in technology and how it influences the adoption of autonomous systems for use in high-risk military applications. The formation of trust in technology is governed by two constructs: reason-based trust and experience-based trust. Existing literature presents the case for increased accuracy in technology selection through the development of experience-based trust. However, the development of experience-based trust is financially burdensome and takes much longer to form. In most military scenarios, developing experience-based trust presents high levels of risk for physical injury and harm.

A. Experiment Introduction

This experiment is designed to research the manipulation of system information and study any influence on the formation of reason-based trust in autonomous systems used in high-risk military applications. The desired outcome of this work is the identification of causal relationships between system attributes and technology acceptance that can replace some of the burden required to develop experience-based trust. This research does not intend to demonstrate the validity of the theories behind technology acceptance; rather, this work investigates any potential causal relationships between the manipulation of information and its effect on trust in technologies.

The experiment is designed in two phases. Phase one is a group-administered experimental survey that employs manipulations of multiple theories of system information and technology acceptance in order to collect data on reason-based trust in systems with varying levels of control. Phase two consists of administering the same survey following extensive field testing and experimentation of the phase one systems to collect data on experience-based trust.

B. Anthropomorphism

This research aims to study the impact of manipulating system information on reason-based trust and how it influences the acceptance of autonomous systems used in high-risk applications. The complexity of modern technology makes it difficult to establish generalizable system categories capable of functioning as a proxy for experience-based trust. One area of research relevant to the establishment of technology categories involves anthropomorphism, the attribution of human traits to nonhuman entities, to increase a trustor's ability to understand and accept complex technology. Waytz et al. (2014) discussed the need for human-like mental models to consider technology as a trustworthy teammate. There are reported cases (Pak et al., 2012) where the tendency to anthropomorphize technology leads to situations in which humans give a higher degree of trust to a technology than is warranted. The inverse of this situation also exists in the development of a lack of trust in a human teammate caused by the introduction of technology with more capability and reliability. The work conducted by Waytz et al. (2014) includes a study that found test subjects were quicker to forgive a trustee's mistakes and stay calm in high-stress situations when the trustee was a technology with human-like attributes. This work contributes to a hypothesis that the manipulation of system information may contribute as a technology trust metric and proxy for experience-based trust.

C. System Hierarchy

In this work, we hypothesize that statistically significant differences will result in technology trust by introducing system information through an anthropomorphic hierarchy. This hypothesis is based on leading theory used to increase cognition in students enrolled in a computer architecture course. Over a period of 10 years, the researchers provided instruction to university year-three engineering students on the topics of digital design and computer architecture. The predominant challenge reported by students in end-of-year course evaluations was difficulty synthesizing the highly complex components of a computer into a usable system. Based on student feedback, an anthropomorphic hierarchy was developed to reduce the complexity of the components of computer architecture. This hierarchy provided students with the context needed to understand how the pieces of a computer function together to create a whole system. The work resulted in increased student comprehension and an ability to describe a computer from the elemental circuits up to the most advanced concepts of computer engineering such as compilers and operating systems. To establish an overarching system hierarchy for use in measuring both reason-based and experience-based technology trust, we introduce the anthropomorphic categories of hardware, algorithms, and links (HAL) as illustrated in Figure 6.

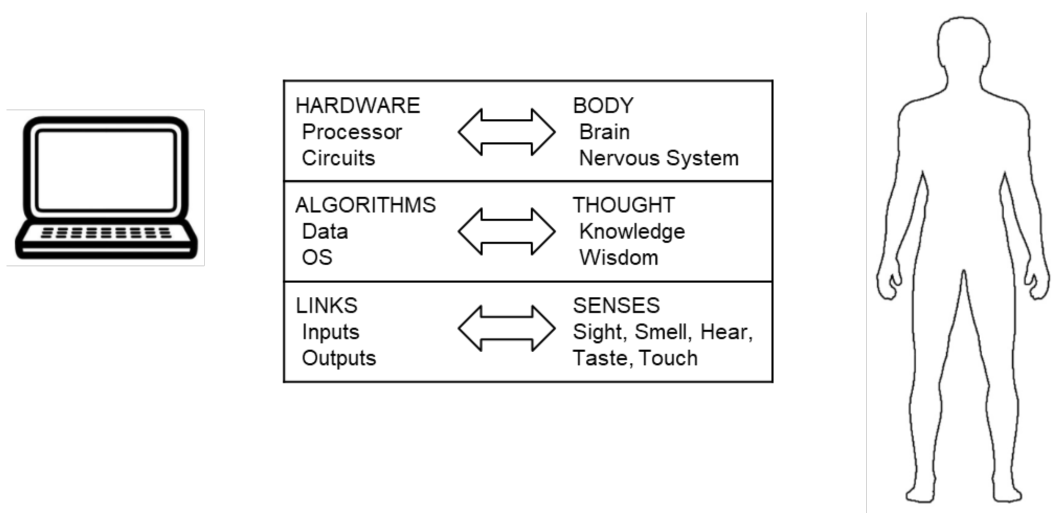

Figure 6. Anthropomorphic Technology Hierarchy

In order to increase the technology familiarity for military end-users, the hierarchy is established as a HAL scoring metric. The values of each HAL metric are proposed to range from 0 to 100 and lead to an equally weighted maximum score of 300. This scoring system is identical to the Physical Fitness Test (PFT) employed by the U.S. Marine Corps. The PFT scores three physical fitness tests, each scored from 0 to 100. The individual tests are pull-ups, crunches, and a 3-mile run, which result in a maximum combined score of 300. Future research is needed to identify the weights for the HAL score to accurately reflect the overall impact on trust. Since field experimentation has not been conducted, we introduce the HAL categories in the experiment without any associated "score." The HAL hierarchy is used to organize system information and provide a framework for a future experience-based trust proxy research shown in Figure 7.

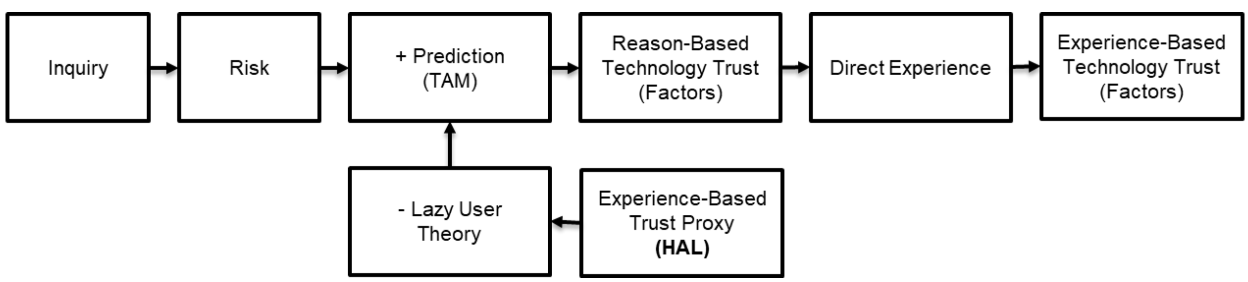

Figure 7. HAL Score Experimental Model

D. The Experiment

The experiment was conducted using a 2 x 3 factorial design. Two independent variables are used: system information and level of system control. The level of system information is varied between two conditions: less and more. The system control is varied between three levels: low, mid, and high. There are two dependent variables made up of level of risk associated with the loss of a system attribute, and the acceptance of the technology as measured through the technology acceptance model. This research design is presented in Table 3.

Table 3: 2 x 3 Factorial Design

		SYSTEM CONTROL		
		LOW	MID	HIGH
ANTHROPOMORPHIC CATEGORY SYSTEM PRESENTATION	NO	Risk TAM	Risk TAM	Risk TAM
	YES	Risk TAM	Risk TAM	Risk TAM

E. Procedures

This research uses data provided by an ongoing external experiment. Phase one of that experiment is a group-administered survey that employs manipulations of system presentation. Phase two consists of administering the same survey following extensive field testing.

Phase one of the experiment was conducted in a controlled and distraction-free classroom environment and involved the participation of two randomly selected groups of active-duty military from a single unit tasked with a high-risk mission. The two groups participated in separate morning sessions lasting one hour each. The second session started immediately following completion of the first session. Both groups were provided with identical overviews of a high-risk military scenario that would be completed by deploying three technology systems rather than human operators. The independent variable "system presentation" was manipulated between the first and second groups. The second independent variable, "system control," was provided to each participant in both groups in the form of three different technologies. The procedures during phase one of the experiment follow:

Group One

1. Group one arrives in classroom and is provided with the paper survey and pencils.
2. Participants are provided with a PowerPoint presentation on a high-risk military scenario.
3. Participants are instructed that the mission is to be accomplished using technology.
4. Participants are presented with the technology system information as provided by the vendor.
5. The first technology briefed is a system that is directly controlled by the user.
6. The second technology briefed is a system that is remotely controlled by the user.
7. The third and final technology briefed is an autonomous system.
8. Participants are next asked to complete two paper surveys.
9. The first survey records the overall risk associated with the technology's attributes.
10. Participants are instructed to wait until the entire group completes the first survey.
11. The second survey is administered and records the technology acceptance model questions for all three technology systems.
12. Participants are instructed to wait until the entire group completes the second survey.
13. Group one participants hand in the completed surveys and exit the classroom.

Group Two

1. Group two participants enter the classroom within 15–30 minutes of group two's departure.
2. Participants are provided with the same paper surveys as group one.
3. Participants are provided the identical high-risk mission scenario as group one.
4. Participants are instructed that the mission is be accomplished using technology.
5. Participants are presented with the technology system information standardized into the HAL hierarchy.

6. The first technology briefed is the system directly controlled by the user.
7. The second technology briefed is the system remotely controlled by the user.
8. The third and final technology briefed is the autonomous system.
9. Participants are next asked to complete two paper surveys.
10. The first survey records the overall risk associated with the technology's attributes.
11. Participants are instructed to wait until the entire group completes the survey.
12. The second survey is administered and records the technology acceptance model questions for all three technology systems.
13. Participants are instructed to wait until the entire group completes the second survey.
14. Group two participants hand in the completed surveys and exit the classroom.

Phase two of the experiment was conducted in the field and involved the hands-on testing of the three technologies introduced during the phase one survey. Phase two of the experiment was conducted six months after the classroom survey of phase one. A total of 15 participants were selected from the same military unit as in the phase one survey. This experiment was conducted over a 12-day period. The first three days were reserved for training, and the subsequent nine days were used to test the operational capabilities of the systems in the high-risk scenario presented in phase one. The day after the field experimentation concluded, all participants gathered in a controlled classroom environment to complete a total of three surveys. The procedures during phase two of the experiment follow:

1. Participants are divided into three teams (A, B, C) consisting of five operators and one additional observer (O) from an external military unit.
2. Participants arrive at the field-testing facility and are provided training and familiarization on all three systems over a three-day period until proficient.
3. Participants are presented the identical high-risk mission scenario as in phase one.
4. Participants are instructed to use all three technologies to accomplish the mission.

5. One team is provided all three systems over a 24-hour period to accomplish the task.
6. Each team is provided three opportunities for a total of nine days of experimentation.
7. Following completion of field testing, all participants gather in a classroom.
8. Participants are provided with the same two paper surveys as in phase one.
9. Participants are instructed to complete the two surveys based on the potential of the technologies under ideal conditions and to disregard technical failures.
10. Participants are instructed to wait until the entire group completes the survey.
11. Participants are next provided with an additional paper survey to record the system usability score.
12. Participants are instructed to complete this survey based on the current state of the technology including technical failures.
13. Participants are instructed to wait until everyone is done.
14. Participants hand in the surveys and exit the classroom.

Phase one of the experiment employed two surveys asking questions about both the system risk (survey 1) and the technology acceptance (survey 2). The second phase of the experiment employed the same surveys as phase one (survey 1, survey 2) following extensive field testing and experimentation. The second phase employed an additional survey asking the participants to provide feedback on the current state of the technology using the system usability score (survey 3). This survey intends to capture bias due to varying levels of technology readiness between the three systems. The response scales for the questions are discussed later in the data analytics chapter. The surveys captured responses for the following topics.

code	SURVEY 1 – Risk of System Failure
HA1	Loss of system endurance (decreased operating time)
HA2	Loss of power (unable to overcome large obstacles)
HA3	Loss of agility (limited range of motion)
HA4	Loss of speed (operates slowly)
AL1	Only have direct control (radio/autonomous have failed)
AL2	Only have radio control (direct/autonomous have failed)
AL3	Only have autonomous operation (direct/radio have failed)
AL4	Loss of ability to store data (bad memory)
AL5	Slow response to commands (bad processor)
LN1	Loss of ability to obtain imagery (video/sonar/radar)
LN2	Loss of ability to obtain environmental data (CBRNE)
LN3	Loss of ability to geolocate/navigate (GPS/Intertidal)
LN4	Loss of comms needed to send sensor data (no system transmission)
LN5	Loss of comms needed to receive control (no system received)

code	SURVEY 2 – Technology Acceptance Model (TAM)
PU1	This system would improve my performance clearing a lane.
PU2	This system would increase my accuracy identifying targets.
PU3	This system would enhance my effectiveness completing the mission.
PU4	Overall, this system would be useful.
PEOU1	The operational use of this system is clear and understandable.
PEOU2	Using this system should not require a lot of my mental effort.
PEOU3	It should be easy to get this system to do what I want it to do.
PEOU4	Overall, this system would be easy to use.
IU1	Given the chance, I would use this system.
IU2	It is likely that I would recommend this system.
IU3	I have been exposed to this technology in the past.

code	SURVEY 3 – System Usability Score (SUS)
Q1	I think that I would like to use this system frequently.
Q2	I found this system unnecessarily complex.

Q3	I thought this system was easy to use.
Q4	I think that I would need the support of a technical person to be able to use this system.
Q5	I found the various functions in this system were well integrated.
Q6	I thought there was too much inconsistency in this system.
Q7	I would imagine that most people would learn to use this system very quickly.
Q8	I found this system very cumbersome to use.
Q9	I felt very confident using this system.
Q10	I needed to learn a lot of things before I could get going with this system.

F. Justification for Experimentation

The circumstances of this research required the participation of active-duty military involved with the high-risk deployment of technology. Pursuant to SECNAVINST 3900.39, the Naval Postgraduate School (NPS) requires institutional review board (IRB) approval for human-subjects research, as employed in this research. DoD Instruction 3216.02 prohibits monetary compensation to federal employees as a method of participant coercion. This research did not provide monetary compensation in the research design or as a recruitment contrivance. Approval was obtained for this research, as provided in Appendix A.

G. Summary

This chapter presented the research experimentation methods and procedures. The next chapters present the data analysis approach, followed by a summary of the key results and interpretation, and conclude with the key takeaways and recommendations for future research.

IV. DATA ANALYTICS

This chapter describes the analytical framework of the research design, including main and supporting inquiries. This work first statistically addresses the primary research questions with ancillary questions via several descriptive and inferential statistical methods. Some of the tests include the justification of the selection of parametric versus nonparametric tests, the assessment of internal and external validity, as well as the framework of the research analytics employed.

A. Analytical Framework

This research demonstrates a multiple part analysis to answer the following primary research questions. The research questions compel specific analytical methods to evaluate the effects of the predictor variables. This work addresses each primary research question with several specific ancillary research questions.

1. *Primary Research Questions*

The primary research questions are as follows:

(1) How does the anthropomorphic categorization and presentation of technology affect the development of trust in technologies used in high-risk military applications?

(2) How do varying levels of system control affect the development of trust in technologies used in high-risk military applications?

(3) Does a causal relationship exist between an anthropomorphic hierarchy of system information and the acceptance of autonomous systems?

These primary research questions can be answered directly or inferred from the following analytical questions:

- Is the data considered sufficiently normal?
- Can we apply conventional parametric methods, or do we need more advanced nonparametric methods to analyze the data?
- When all the survey responses for each subgroup are taken together as a whole, are there statistical differences in the responses?

- In other words, are the perceptions of the Direct-Controlled system different when Less Information is provided, More Information is available, or a hands-on Experiment is conducted?
- In other words, are the perceptions of the Remote-Controlled system different when Less Information is provided, More Information is available, or a hands-on Experiment is conducted?
- In other words, are the perceptions of the Autonomous system different when Less Information is provided, More Information is available, or a hands-on Experiment is conducted?

- When all the survey responses for each subgroup are taken individually, are there statistical differences in the responses?
- Are the three systems statistically different in their characteristics?
- Do the added information and hands-on experimentation provide additional value-added insights?
- Will different users of the technology with different backgrounds affect the results? That is, are there any controllable or blocking variables that need additional attention?
- Does a nonparametric approach yield different results than a parametric model?
- Are the collected data reliable and valid for the research?
- Are the three systems somehow correlated in terms of their value to the warfighter?
- Within each experimentation stage, are the three systems perceived to be different (Direct vs. Remote Controlled, Direct vs. Autonomous, and Remote Controlled vs. Autonomous systems)?
- Between the three levels of experimentation (Less Information, More Information, Live Experiments), are each of the subsections of the technology considered similar or different?
- Can the final outcome of a detailed experiment be predicted by performing some basic pre-experimental survey?

B. Survey Data

Figures 8–12 illustrate the survey data collected. The data is distributed into three segments, Groups A, B, and C. The first group, Group A data, is from the pre-experiment survey where the users have little or limited information. Group B is from the pre-experiment survey where the users are provided more information. Finally, Group C is data from the survey post-experimentation, where the most information is available to the users.

GROUP ONE - LESS INFO (CODE 1): PRE-EXPERIMENT																																																
	SURVEY ONE (Risk of failure)														SURVEY TWO (system comparison)																																	
															SYSTEM A (direct)											System B (remote)											System C (autonomous)											FORM
USER	HA1	HA2	HA3	HA4	AL1	AL2	AL3	AL4	AL5	LN1	LN2	LN3	LN4	LN5	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	1/2/3
1	4	5	4	3	3	2	2	2	4	5	3	4	5	5	3	4	3	5	4	3	3	3	4	4	1	2	1	3	3	3	2	3	3	3	3	1	4	5	3	5	5	5	5	5	5	5	1	2
2	3	4	2	2	3	1	2	3	2	3	3	2	4	3	4	4	4	4	4	2	3	3	4	3	3	4	4	4	4	4	3	4	4	4	4	3	3	3	4	4	3	3	3	3	3	3	3	1
3	3	4	3	3	4	3	3	4	5	5	4	4	4	4	4	5	4	4	4	2	4	4	4	4	3	3	4	3	3	4	3	4	4	3	3	3	4	4	3	4	5	4	4	4	4	4	2	2
4	2	3	3	1	4	2	3	1	2	4	2	3	2	3	4	4	4	4	4	4	4	4	4	4	1	3	3	3	4	4	4	4	4	3	3	1	3	5	3	4	4	4	4	4	4	4	1	1
5	4	4	3	3	5	3	4	3	3	4	5	4	4	4	4	4	3	3	4	4	3	3	3	3	1	4	4	3	3	4	4	3	3	3	3	1	4	4	3	3	4	4	3	3	3	3	1	2
6	5	3	2	2	5	2	1	1	2	3	1	1	5	5	2	4	2	2	2	2	4	3	1	1	1	2	4	2	2	3	3	4	4	1	1	1	2	4	1	1	5	5	4	4	1	1	1	2
7	3	4	3	3	3	3	3	3	4	3	3	4	4	5	4	4	4	4	4	4	4	4	4	4	2	3	4	3	3	4	2	3	3	4	4	2	2	4	2	2	4	2	2	2	3	2	2	2
8	5	4	3	3	4	2	4	2	4	5	3	3	4	4	3	4	3	3	3	3	3	4	3	3	3	4	4	4	4	4	3	4	5	5	4	3	3	4	2	2	2	5	3	3	2	2	3	2
9	5	5	4	3	3	2	2	4	5	5	2	4	5	4	5	5	5	5	5	3	4	5	5	3	1	4	4	4	4	4	2	5	5	4	3	1	4	5	4	4	3	4	2	5	4	3	1	1
10	3	3	3	2	4	2	3	2	3	4	4	5	4	4	4	4	5	3	4	4	4	4	4	3	1	2	2	2	1	3	3	1	3	2	2	1	4	4	4	3	4	4	2	4	4	3	1	1
11	2	3	3	2	3	2	4	5	4	3	2	4	5	5	4	4	4	3	4	4	4	3	5	3	5	4	4	3	3	4	4	4	4	5	3	5	5	4	4	4	4	5	5	5	5	3	3	2
12	2	4	3	1	3	3	3	4	4	5	4	5	5	5	4	4	4	4	4	3	4	3	5	3	1	3	3	3	3	4	2	4	4	5	3	1	2	2	2	2	5	5	3	3	4	3	1	1
13	4	3	3	2	2	2	3	4	4	5	5	4	5	5	3	3	4	3	5	2	3	3	3	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4	2	2	2	2	3	4	3
14	4	4	3	3	4	3	3	3	4	5	3	4	4	4	4	4	4	4	4	2	3	3	4	4	2	4	4	4	4	3	2	3	3	4	4	2	4	4	4	4	4	2	3	4	4	4	5	3
15	3	5	4	2	4	3	4	2	4	5	2	3	5	5	5	5	4	4	4	2	4	2	4	4	1	4	3	4	4	3	3	3	4	4	4	4	4	4	4	4	4	4	3	5	3	4	1	3
16	5	2	4	2	3	2	4	5	5	5	3	5	3	5	5	5	5	5	5	3	4	4	5	5	3	5	5	2	2	5	2	4	4	5	2	3	3	5	3	3	5	5	2	5	5	4	3	3
17	4	3	3	2	5	3	4	2	5	4	1	4	3	5	3	3	3	3	3	2	4	2	2	2	1	4	4	4	4	5	3	4	4	4	4	1	4	3	3	4	4	5	4	3	4	3	1	3
18	4	3	2	3	3	2	3	2	4	5	3	4	5	5	4	4	4	4	4	3	4	4	4	4	3	4	4	4	4	4	3	4	4	4	4	2	3	4	3	3	4	4	3	4	3	3	2	3
19	5	4	3	4	4	1	3	5	3	4	1	5	5	5	5	4	4	4	4	3	5	4	4	4	1	4	4	3	3	4	4	3	4	3	3	1	4	5	3	4	4	4	2	3	3	3	1	3
20	3	4	3	3	4	3	5	4	4	5	2	5	5	5	1	1	1	3	3	2	3	2	1	2	1	4	4	4	3	3	2	3	2	1	2	1	4	4	4	3	3	2	3	2	1	2	1	1
21	3	3	2	2	2	1	5	4	2	4	3	5	4	5	4	3	3	3	4	4	5	4	4	3	3	3	4	2	3	4	4	4	4	2	2	2	4	4	4	4	4	4	4	4	4	4	3	1
22	5	4	2	2	5	2	3	3	4	5	2	4	4	4	5	5	3	3	4	4	5	4	5	4	1	5	5	3	2	4	4	5	4	5	2	1	5	5	4	4	4	4	5	2	5	4	1	1
23	5	4	3	3	5	4	4	5	4	5	3	5	5	4	4	4	3	4	4	4	3	3	4	3	3	3	3	3	3	4	4	2	2	3	2	2	4	4	3	4	4	5	3	3	4	3	1	1

Figure 8. Group A: Pre-Experiment Survey Data with Less Info

GROUP TWO - MORE INFO (CODE 2): PRE-EXPERIMENT

SURVEY ONE (Risk of failure)

USER	HA1	HA2	HA3	HA4	AL1	AL2	AL3	AL4	AL5	LN1	LN2	LN3	LN4	LN5
1	4	3	1	4	4	1	5	4	3	5	3	5	5	5
2	3	4	4	3	3	3	3	4	3	5	4	5	4	4
3	4	4	3	3	4	2	2	3	3	5	3	2	4	3
4	4	5	4	2	4	3	2	4	4	4	4	5	4	4
5	5	3	3	2	5	1	3	5	4	5	4	5	5	5
6	3	4	4	3	3	4	2	5	5	5	5	5	3	5
7	3	3	3	2	4	2	3	3	3	4	4	4	4	4
8	3	4	2	3	5	2	2	2	3	5	4	4	5	5
9	2	3	3	2	2	2	4	2	3	5	2	2	5	5
10	3	4	3	2	5	3	3	4	4	5	3	5	4	4
11	4	3	4	2	3	2	3	2	4	5	1	3	4	5
12	4	5	4	4	4	3	2	4	4	5	3	5	5	5
13	2	3	4	4	4	3	3	4	4	5	5	4	4	4
14	2	3	3	2	4	1	3	3	5	4	5	5	2	4
15	3	4	4	2	3	2	2	1	3	5	4	4	5	5
16	2	3	2	3	3	3	3	4	4	4	4	4	4	3
17	3	2	4	2	2	2	4	1	5	5	2	3	5	5
18	5	4	4	3	5	3	3	4	5	5	3	4	4	5
19	3	3	2	2	2	5	5	2	4	5	4	4	5	5
20	3	5	3	3	2	1	1	1	4	2	2	2	5	5

SURVEY TWO (system comparison)

SYSTEM A (direct)

USER	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3
1	3	4	3	4	4	4	4	4	4	3	5
2	5	5	4	4	3	3	5	4	5	4	4
3	2	4	3	3	2	3	3	3	3	2	1
4	3	4	3	2	3	2	3	3	2	1	2
5	4	4	4	4	4	3	4	4	4	4	2
6	5	4	4	4	4	4	4	4	4	3	1
7	4	4	4	4	3	1	4	3	4	3	1
8	3	4	2	2	3	3	3	3	3	2	1
9	4	4	4	4	4	3	4	2	3	3	2
10	5	5	4	4	4	3	5	5	4	4	1
11	5	5	1	5	5	5	3	3	3	3	1
12	3	4	3	3	3	3	2	3	3	3	2
13	4	4	3	4	4	4	4	4	3	2	1
14	5	4	4	4	5	3	3	3	3	3	1
15	4	3	4	4	4	2	4	3	5	3	1
16	4	5	5	4	5	4	5	5	4	4	2
17	3	4	5	4	3	2	3	3	3	3	1
18	2	2	2	1	4	4	3	3	1	1	1
19	3	3	3	3	3	3	3	3	3	3	3
20	2	5	3	2	2	2	5	3	3	2	4

USER	System B (remote)											System C (autonomous)											FORM
	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	1/2/3
1	4	4	3	4	4	4	4	4	4	3	5	3	3	3	3	4	4	3	3	4	3	3	3
2	4	4	4	4	4	3	5	3	4	4	5	5	4	4	4	4	5	5	4	4	4	3	3
3	2	3	3	2	2	4	3	3	3	3	1	4	4	4	4	4	4	3	4	3	4	1	3
4	4	4	4	4	3	2	3	3	4	3	2	4	4	4	4	3	4	3	3	4	3	2	1
5	4	4	4	4	4	2	4	4	4	4	2	4	4	4	4	3	4	2	3	4	4	2	1
6	4	3	3	4	4	4	3	3	2	2	1	5	5	5	3	4	3	3	4	2	3	5	1
7	4	4	4	4	3	1	4	3	4	3	1	4	4	4	4	3	2	3	3	4	2	1	1
8	4	4	3	4	4	5	4	4	4	3	1	4	4	3	3	3	3	3	3	4	3	1	1
9	3	4	3	3	4	3	4	3	2	3	1	4	3	4	3	2	4	4	2	4	3	2	2
10	5	4	4	4	4	3	4	4	4	4	1	3	3	3	4	4	3	4	3	3	3	1	2
11	5	5	5	5	5	5	3	3	5	3	1	5	5	5	5	5	5	3	2	5	5	1	2
12	4	3	3	3	3	2	3	3	4	3	5	3	3	2	2	3	4	4	4	2	2	1	3
13	4	4	4	4	4	4	4	4	4	4	1	4	4	4	4	4	4	4	4	4	4	1	3
14	4	3	4	4	5	4	4	4	4	4	1	3	3	3	3	5	4	5	3	2	2	1	1
15	4	4	4	4	4	4	4	4	5	4	1	4	4	4	4	4	4	4	4	5	4	1	1
16	4	4	4	4	5	4	5	4	4	4	3	3	4	5	3	4	4	3	4	3	3	2	3
17	4	5	5	5	4	3	4	4	5	5	1	3	4	4	4	5	5	5	5	4	3	1	2
18	3	3	3	3	4	4	4	4	3	3	2	4	3	4	3	5	4	3	4	4	3	2	2
19	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
20	4	5	4	3	4	3	4	4	4	4	4	4	5	5	4	4	4	3	5	4	4	4	2

Figure 9. Group B: Pre-Experiment Survey Data with More Info

POST EXPERIENCE SURVEY

SURVEY ONE (Risk of failure)

USER	RANK "C1"														SCORE "C2"													
	HA1	HA2	HA3	HA4	AL1	AL2	AL3	AL4	AL5	LN1	LN2	LN3	LN4	LN5	HA1	HA2	HA3	HA4	AL1	AL2	AL3	AL4	AL5	LN1	LN2	LN3	LN4	LN5
A1	6	13	12	11	8	9	10	1	7	3	14	2	4	5	75	35	40	50	65	60	55	100	70	90	20	95	85	80
A2	5	10	11	13	7	9	3	2	14	1	15	4	6	8	40	30	30	10	50	50	60	70	40	60	30	50	40	40
A3	8	11	9	15	2	3	4	13	10	1	14	5	6	7	60	40	50	10	50	50	50	70	60	100	90	90	80	80
A4	5	6	7	8	12	14	11	10	4	1	15	9	3	2	63	70	65	60	20	80	68	55	90	100	50	99	95	98
A5	1	4	2	15	10	10	1	3	4	2	15	3	2	2	90	80	70	20	30	50	90	90	80	90	20	100	100	100
B1	3	4	10	5	11	15	12	7	6	1	13	2	8	9	80	80	40	60	70	0	60	60	60	100	20	100	70	70
B2	5	13	10	9	12	14	11	4	8	1	3	2	7	6	80	15	45	50	25	10	35	85	50	100	90	95	55	60
B3	10	13	12	14	6	5	7	8	9	1	15	2	3	4	30	20	20	20	50	50	50	50	30	100	5	90	70	70
B4	8	11	9	10	12	13	7	6	5	1	15	4	2	3	70	40	50	40	20	20	60	100	80	100	10	90	100	100
B5	8	13	7	12	9	10	3	11	6	1	14	2	5	4	65	50	65	60	65	65	90	65	70	100	50	95	90	90
C1	9	11	4	10	12	13	5	3	8	1	14	2	6	7	50	40	80	50	10	10	70	90	60	100	10	90	65	65
C2	7	9	8	13	15	14	6	5	11	3	10	4	2	1	60	60	60	40	10	30	70	70	50	80	60	70	80	80
C3	8	5	9	14	10	11	6	12	7	1	13	2	3	4	25	75	25	50	10	25	75	50	50	100	25	100	100	100
C4	10	12	13	15	12	13	7	4	8	1	9	2	5	6	50	50	30	0	50	50	62	75	55	100	50	90	70	70
C5	9	10	8	12	6	11	14	7	5	1	13	2	3	4	40	20	75	50	33	33	33	40	50	100	10	95	100	100
O1	5	6	7	8	14	13	15	12	11	2	9	1	4	3	75	100	75	90	75	75	75	90	90	100	20	100	40	50
O2	1	14	13	11	6	10	15	5	12	2	3	4	8	9	90	70	50	50	30	70	30	90	50	50	50	90	50	50
O3	7	9	8	10	15	13	14	3	11	5	6	4	2	1	50	50	40	20	30	30	30	80	40	70	70	80	90	90
O4	12	6	14	13	9	8	7	5	10	4	11	3	1	2	40	75	20	40	20	40	70	85	30	95	20	95	100	100

SURVEY TWO (system comparison)

USER	SYSTEM A (direct) "C3"											System B (remote) "C4"											System C (autonomous) "C5"										
	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3
A1	100	100	100	100	85	80	90	100	100	100	0	50	30	50	60	100	100	90	100	80	80	0	80	100	90	100	90	100	100	100	50	80	75
A2	70	90	80	80	60	70	70	70	40	60	10	30	10	30	20	40	10	10	20	10	10	5	40	50	40	50	30	30	40	40	20	40	10
A3	100	100	100	100	70	80	90	80	100	100	0	30	30	20	10	80	90	80	90	10	10	50	90	90	80	80	60	70	90	80	70	80	0
A4	100	100	100	100	90	90	80	90	90	98	0	50	40	50	50	60	90	40	50	30	50	0	70	80	75	100	90	90	90	90	90	98	0
A5	100	100	100	100	70	80	50	50	100	100	0	60	40	60	60	60	60	60	60	50	60	0	80	90	90	90	80	100	90	90	100	100	80
B1	100	100	100	100	90	80	90	85	100	100	0	100	80	90	90	80	80	70	80	80	80	0	30	30	20	20	80	80	90	80	0	0	50
B2	100	100	100	100	90	100	95	95	95	95	0	85	85	85	85	85	95	90	90	90	90	0	75	75	75	75	80	90	85	85	85	85	0
B3	100	100	100	100	80	30	100	80	100	90	0	100	100	100	100	40	40	100	30	100	70	0	100	100	100	100	50	70	100	50	100	20	0
B4	100	100	100	100	70	70	90	100	100	100	0	80	70	80	90	100	90	90	100	100	100	70	60	30	50	50	80	80	80	80	50	30	0
B5	100	100	100	100	90	80	85	90	100	100	0	100	80	70	75	80	70	85	70	90	80	20	60	60	60	60	70	70	90	85	50	40	0
C1	100	100	100	100	90	100	100	100	100	100	100	80	90	100	100	100	100	90	100	100	100	100	20	20	10	10	70	30	50	50	10	10	0
C2	90	95	90	90	100	90	85	85	100	95	0	80	70	75	80	95	70	75	75	90	85	0	75	80	75	70	90	75	60	70	75	60	0
C3	100	100	100	100	100	75	75	75	100	100	100	75	75	75	75	50	75	75	75	100	75	0	100	75	75	100	50	50	50	50	100	50	0
C4	100	100	100	100	80	75	90	80	100	100	0	80	60	70	70	80	75	60	70	70	70	0	60	60	30	30	50	70	40	50	50	40	0
C5	100	100	100	100	100	50	90	95	100	100	100	90	75	80	90	100	50	100	100	80	80	50	90	80	70	75	100	50	100	100	75	75	50
O1	100	100	100	100	100	80	100	100	100	100	0	100	100	100	100	100	80	100	100	100	100	0	40	40	40	50	100	80	100	100	25	25	0
O2	80	80	100	100	80	70	100	100	50	100	0	100	100	100	100	100	100	80	100	100	100	80	80	80	100	100	50	50	70	80	50	100	100
O3	90	100	100	100	70	50	70	65	90	80	50	90	70	80	100	75	60	70	70	80	75	80	25	40	20	10	50	70	30	20	0	10	20
O4	100	100	100	100	90	95	90	95	100	100	0	90	90	90	95	90	95	80	90	90	95	0	40	40	50	60	70	60	70	65	40	40	0

Figure 10. Group C: Post-Experiment Survey Data (Part 1)

SURVEY THREE (System Usability Score)																																
SYSTEM A (direct) "C7"										SYSTEM B (remote) "C8"										SYSTEM C (autonomous) "C9"										SCORE "C10"		
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	*SUSA*	*SUSB*	*SUSC*
5	1	5	1	5	1	5	2	4	1	3	2	4	1	2	4	4	2	5	1	4	2	3	1	3	3	5	3	4	1	95	70	73
4	1	4	2	3	2	5	3	3	2	1	2	3	5	1	5	1	4	1	4	3	2	2	4	3	4	3	3	2	3	73	18	43
5	2	4	4	4	3	3	2	5	2	1	1	5	1	2	4	5	2	1	1	5	3	3	4	4	5	3	5	4	3	70	63	48
5	2	4	1	4	2	3	3	5	3	2	1	3	2	2	5	5	3	2	2	4	2	5	2	3	4	3	5	3	3	75	53	55
5	2	4	4	5	2	4	2	5	3	4	4	4	4	2	5	4	4	3	4	1	3	3	3	3	3	4	3	1	3	75	40	43
5	2	4	2	5	1	4	3	5	2	5	3	4	1	5	2	4	2	4	3	1	2	5	5	2	5	5	3	2	2	83	78	45
5	3	4	2	4	2	4	3	4	4	4	3	4	2	4	2	4	3	4	4	3	3	4	2	4	2	4	4	4	4	68	65	60
5	2	5	2	4	2	5	3	5	3	4	4	3	4	2	4	3	2	4	3	2	3	2	5	1	5	3	5	1	3	80	48	20
5	2	4	3	4	2	4	2	5	3	4	1	5	2	3	3	5	1	5	2	2	2	4	3	2	4	4	5	4	2	75	83	50
5	2	4	2	5	2	4	4	5	4	4	4	4	2	2	4	4	4	4	4	2	2	3	4	2	5	3	4	3	3	73	50	38
5	2	4	2	4	2	5	1	5	4	5	2	4	2	4	2	5	1	5	4	1	3	4	4	4	5	4	5	1	5	80	80	30
5	1	4	1	5	2	5	5	5	1	5	2	5	2	5	3	4	5	4	2	2	3	4	2	2	5	4	3	2	2	85	73	48
4	2	4	2	4	2	4	2	5	4	4	4	3	2	2	3	4	3	3	4	4	4	2	4	4	4	4	4	2	4	73	50	40
5	2	4	1	5	1	5	2	5	4	3	4	4	1	5	4	5	2	4	4	2	1	3	3	4	5	5	4	4	4	85	65	53
5	1	5	1	4	2	4	1	5	3	5	1	5	1	3	3	4	1	4	3	2	2	4	2	2	4	3	4	3	3	88	80	48
5	3	4	3	4	2	3	3	3	5	5	3	4	3	4	2	3	3	3	5	2	4	4	3	4	5	3	4	2	5	58	58	35
4	3	5	3	4	3	4	4	4	1	5	1	5	3	4	2	5	2	5	1	3	5	3	3	2	5	3	5	3	3	68	88	33
4	2	4	2	4	2	4	4	5	3	4	2	4	2	4	2	5	4	5	3	1	3	2	3	2	5	1	2	1	3	70	73	28
5	2	5	1	4	2	5	1	4	4	4	3	4	2	3	3	4	1	4	4	2	4	2	5	1	5	2	5	3	5	83	65	15

Figure 11. Group C: Post-Experiment Survey Data (Part 2)

SCORE "C2a"														SYSTEM A (direct) "C3a"											System B (remote) "C4a"											System C (autonomous) "C5a"										
VAR401	VAR402	VAR403	VAR404	VAR405	VAR406	VAR407	VAR408	VAR409	VAR410	VAR411	VAR412	VAR413	VAR414	VAR415	VAR416	VAR417	VAR418	VAR419	VAR420	VAR421	VAR422	VAR423	VAR424	VAR425	VAR426	VAR427	VAR428	VAR429	VAR430	VAR431	VAR432	VAR433	VAR434	VAR435	VAR436	VAR437	VAR438	VAR439	VAR440	VAR441	VAR442	VAR443	VAR444	VAR445	VAR446	VAR447
HA1	HA2	HA3	HA4	AL1	AL2	AL3	AL4	AL5	LN1	LN2	LN3	LN4	LN5	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	IU1	IU2	IU3
4	2	2	3	4	3	3	5	4	5	1	5	5	4	5	5	5	5	5	4	5	5	5	5	1	3	2	3	3	5	5	5	5	4	4	1	4	5	5	5	5	5	5	5	3	4	4
2	2	2	1	3	3	3	4	2	3	2	3	2	2	4	5	4	4	3	4	4	4	2	3	1	2	1	2	1	2	1	1	1	1	1	1	2	3	2	3	2	2	2	2	1	2	1
3	2	3	1	3	3	3	4	3	5	5	5	4	4	5	5	5	5	4	4	5	4	5	5	1	2	2	1	1	4	5	4	5	1	1	3	5	5	4	4	3	4	5	4	4	4	1
4	4	4	3	1	4	4	3	5	5	3	5	5	5	5	5	5	5	5	5	4	5	5	5	1	3	2	3	3	3	5	2	3	2	3	1	4	4	4	5	5	5	5	5	5	5	1
5	4	4	1	2	3	5	5	4	5	1	5	5	5	5	5	5	5	4	4	3	3	5	5	1	3	2	3	3	3	3	3	3	3	3	1	4	5	5	5	4	5	5	5	5	5	4
4	4	2	3	4	1	3	3	3	5	1	5	4	4	5	5	5	5	5	4	5	5	5	5	1	5	4	5	5	4	4	4	4	4	4	1	2	2	1	1	4	4	5	4	1	1	3
4	1	3	3	2	1	2	5	3	5	5	5	3	3	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5	5	5	5	5	1	4	4	4	4	4	5	5	5	5	5	1
2	1	1	1	3	3	3	3	2	5	1	5	4	4	5	5	5	5	4	2	5	4	5	5	1	5	5	5	5	2	2	5	2	5	4	1	5	5	5	5	3	4	5	3	5	1	1
4	2	3	2	1	1	3	5	4	5	1	5	5	5	5	5	5	5	4	4	5	5	5	5	1	4	4	4	5	5	5	5	5	5	5	4	3	2	3	3	4	4	4	4	3	2	1
4	3	4	3	4	4	5	4	4	5	3	5	5	5	5	5	5	5	5	4	5	5	5	5	1	5	4	4	4	4	4	5	4	5	4	1	3	3	3	3	4	4	5	5	3	2	1
3	2	4	3	1	1	4	5	3	5	1	5	4	4	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	1	1	1	1	4	2	3	3	1	1	1
3	3	3	2	1	2	4	4	3	4	3	4	4	4	5	5	5	5	5	5	5	5	5	5	1	4	4	4	4	5	4	4	4	5	5	1	4	4	4	4	5	4	3	4	4	3	1
2	4	2	3	1	2	4	3	3	5	2	5	5	5	5	5	5	5	5	4	4	4	5	5	5	4	4	4	4	3	4	4	4	5	4	1	5	4	4	5	3	3	3	3	5	3	1
3	3	2	1	3	3	4	4	3	5	3	5	4	4	5	5	5	5	4	4	5	4	5	5	1	4	3	4	4	4	4	3	4	4	4	1	3	3	2	2	3	4	2	3	3	2	1
2	1	4	3	2	2	2	2	3	5	1	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	4	4	5	5	3	5	5	4	4	3	5	4	4	4	5	3	5	5	4	4	3
4	5	4	5	4	4	4	5	5	5	1	5	2	3	5	5	5	5	5	4	5	5	5	5	1	5	5	5	5	5	4	5	5	5	5	1	2	2	2	3	5	4	5	5	2	2	1
5	4	3	3	2	4	2	5	3	3	3	5	3	3	4	4	5	5	4	4	5	5	3	5	1	5	5	5	5	5	5	4	5	5	5	4	4	4	5	5	3	3	4	4	3	5	5
3	3	2	1	2	2	2	4	2	4	4	4	5	5	5	5	5	5	4	3	4	4	5	4	3	5	4	4	5	4	3	4	4	4	4	4	2	2	1	1	3	4	2	1	1	1	1
2	4	1	2	1	2	4	5	2	5	1	5	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5	4	5	5	5	1	2	2	3	3	4	3	4	4	2	2	1

Figure 12. Group C: Post-Experiment Survey Data (Part 3)

C. Analytics

Various analytics are applied to the survey data to determine their statistical properties and significance. The following lists the methodologies applied, and the next chapter showcases the key results and result interpretation.

1. Normality Tests

The data is first tested for normality. This is critical as the sample sizes are between 19 and 23 active-duty military (Tables 7–11 show the number of personnel participating in the experiment, noted as the unique number of data rows). In addition, the data is truncated between 1 and 5, inclusive, and are ordinal in nature. The survey responses are 1–5, for strongly disagree to strongly agree, hence there is an order to the data, making the data measurement ordinal. However, an argument can be made such that it is quasi-interval, whereby the “value differential” between 1 and 2 is the same as between 2 and 3, and so forth. Figure 13 shows a visualization of a sampling of the data, and visually, the probability distribution does not look normally distributed. Normality of the dataset is important to justify the use of parametric methods and hence the need to test the distribution.

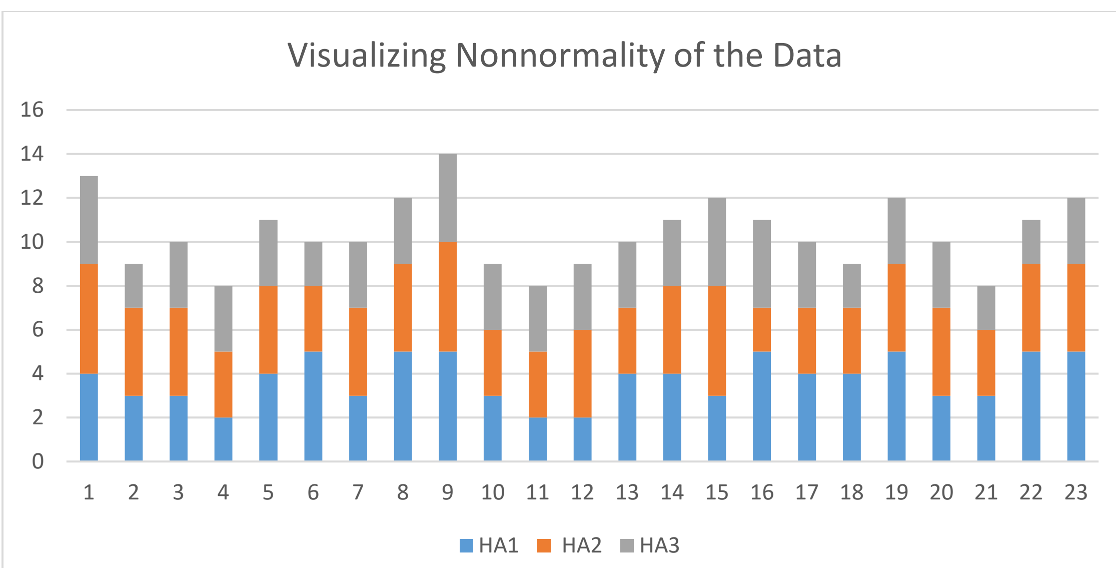

Figure 13. Visualizing Sample Survey Variables

To test for normality of the data, we applied multiple tests, such as the Akaike Information Criterion, Anderson–Darling, Kolmogorov–Smirnov, Kuiper's Statistic, Schwartz Criterion, and the Nonparametric Shapiro-Wilk Test for Normality. The first five tests require more data for a better fit, whereas the Shapiro–Wilk test is nonparametric and well suited for less data, as in our situation.

In all cases, the hypotheses tested are:

H_0: The sample is from a Normal Distribution

H_a: The sample is not from a Normal Distribution

The following are the various distributional fitting tests (Mun, 2018):

13.1 Akaike Information Criterion (AIC). Rewards goodness-of-fit but also includes a penalty that is an increasing function of the number of estimated parameters (although AIC penalizes the number of parameters less strongly than other methods).

13.2 Anderson–Darling (AD). When applied to testing if a normal distribution adequately describes a set of data, it is one of the most powerful statistical tools for detecting departures from normality and is powerful for testing normal tails. However, in non-normal distributions, this test lacks power compared to others.

13.3 Kolmogorov–Smirnov (KS). This is a nonparametric test based on the empirical distribution function of a sample dataset. This nonparametric characteristic is the key to understanding the KS test, which simply means that the distribution of the KS test statistic does not depend on the underlying cumulative distribution function being tested. Nonparametric simply means no predefined distributional parameters are required. In other words, the KS test is applicable across a multitude of underlying distributions.

13.4 Kuiper's Statistic (K). Related to the KS test, making it as sensitive in the tails as at the median and also making it invariant under cyclic transformations of the independent variable, rendering it invaluable when testing for cyclic variations over time. In comparison, the AD test provides equal sensitivity at the tails as the median, but it does not provide the cyclic invariance.

13.5 Schwarz/Bayes Information Criterion (SC/BIC). The SC/BIC test introduces a penalty term for the number of parameters in the model, with a larger penalty than AIC.

- Shapiro–Wilk–Royston (SWR). The SWR test for normality uses the Royston algorithm to test the null hypothesis if the data is normally distributed. It is nonparametric in nature and can handle situations when few data points are available.
- Chi-Square (CS) Normality Test. The CS test is usually used on categorical or ordinal data sets, where the actual data's frequency distribution is compared against the frequency distribution of a specified distribution, such as the normal distribution.

The usual null hypothesis for all of the previously mentioned tests is such that the dataset follows a specified distribution, while the alternate hypothesis is that the dataset does not follow the specified distribution, and in this case, the normal distribution. As an example, the hypothesis is tested using the Chi-Square statistic defined as $\chi^2 = \sum_{i=1}^{k}(O_i - E_i)^2/E_i$, where O_i is the observed frequency for bin i and E_i is the expected frequency for bin i. The expected frequency is calculated by $E_i = N(F(Y_U) - F(Y_L))$, where F is the cumulative distribution function for the distribution being tested, Y_U is the upper limit for class i, Y_L is the lower limit for class i, and N is the sample size.

2. Bar Charts and Histograms

Figures 14–16 show the average response for each of the three systems (A: Direct, B: Remote, and C: Autonomous) with respect to the 11 technology acceptance model questions, including perceived usefulness, perceived ease of use, and intent to use. In some situations, performing a simple visualization can yield valuable insights as to the behavior of the data. However, in the current situation, no distinguishing intelligence can be gleaned from the three charts, which indicates that additional, more advanced statistical methods and analytics will need to be applied to obtain any statistical significance and useful definitive conclusions.

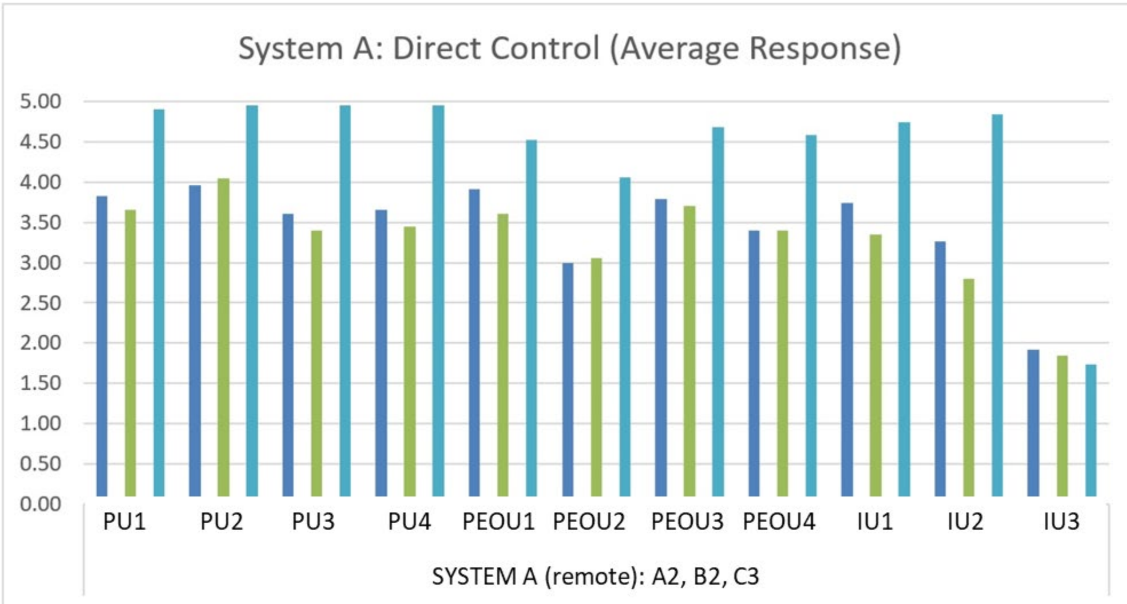

Figure 14. System A’s Average Responses in Three Situations

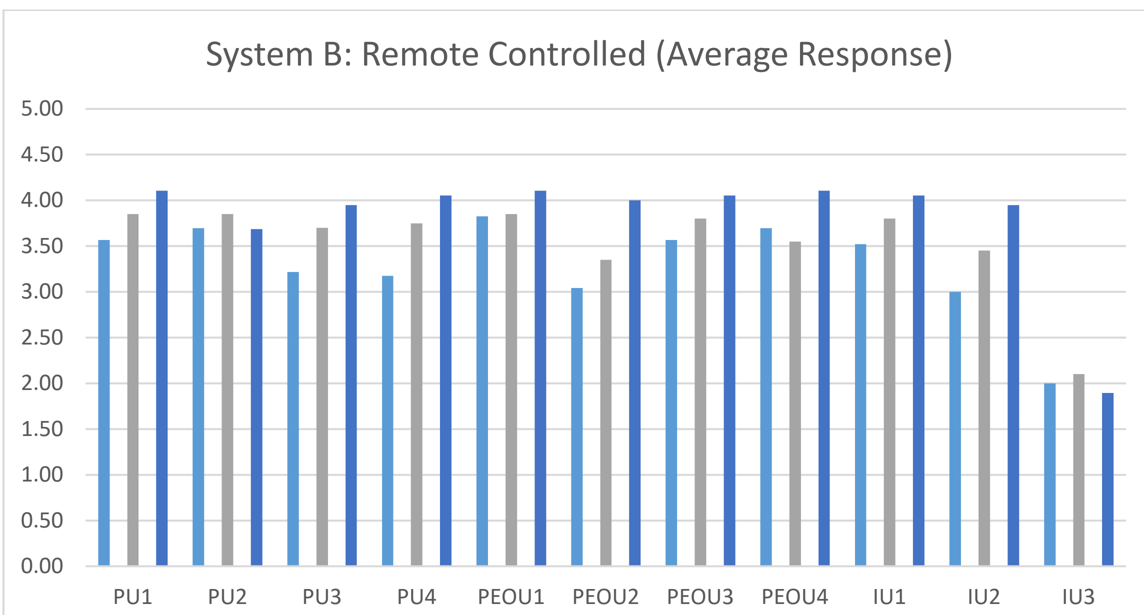

Figure 15. System B’s Average Responses in Three Situations

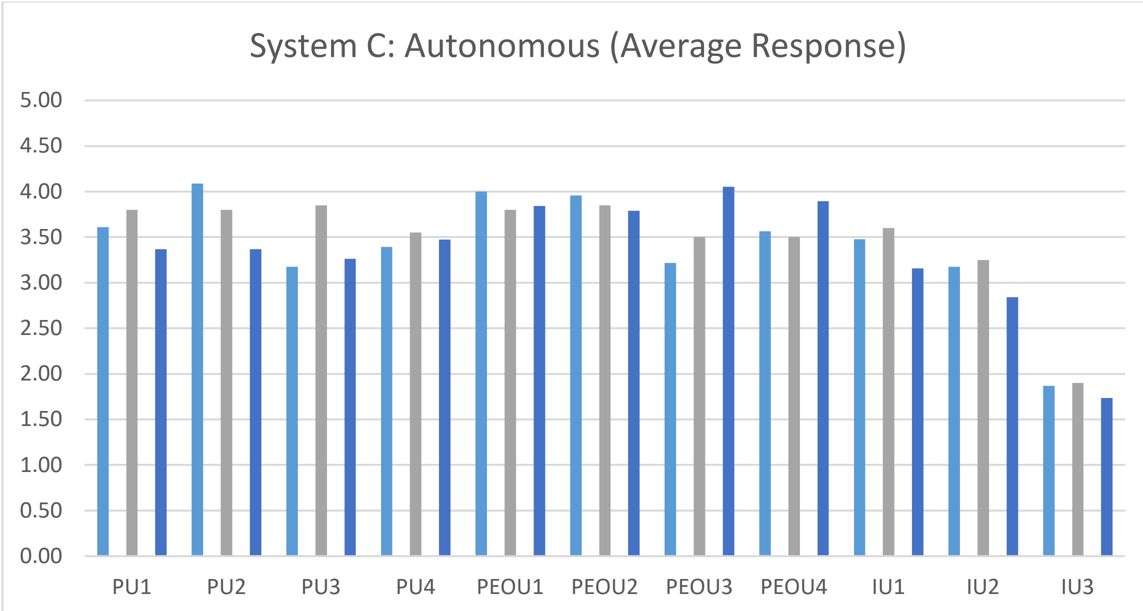

Figure 16. System C's Average Responses in Three Situations

3. Hotelling T-Squared with Equal Variances

The first test employed is to test the data in Group A (less information) with that of Group B (more information) and also Group C (experiment) as a whole. In other words, we look at the larger picture and employ a high-level analysis to see if the grouped data have any perceivable statistical significance. This method tests multiple features of two groups of variables at a time to see if they are statistically identical. All variables are tested at once in each group versus the second group. For example, features such as usefulness, attractiveness, durability, and interest level on two new products are collected and listed as column variables (Mun, 2018).

The null hypothesis tested is that there is zero difference between all the related features (variables) compared across the two groups against their respective goals.

The Hotelling T-Square for Two Dependent Variables with Related Measures is an extension of the T-Test for Dependent Variables and Bonferroni adjustments applied simultaneously to multiple paired variables. To run the test, exactly two groups are required. Two or more input variables are required in each group. Different variables are arranged in columns, and all variables (features) must have at least five data points each. All variables in both groups must have an equal number of data rows. The number of Group 2 Variables needs to be equal to the number of Group 1 Variables. The number of Goals must match the number of variables in Group 1 and are optional inputs (the default setting is that all goals are equal to 0).

- Group A1 vs. Group B1 VAR1:VAR14 against VAR101:VAR114
- Group A2 vs. Group B2 VAR15:VAR25 against VAR115:VAR125
- Group A3 vs. Group B3 VAR26:VAR36 against VAR126:VAR136
- Group A4 vs. Group B4 VAR37:VAR47 against VAR137:VAR147
- Group A5 vs. Group B5 VAR48:VAR51 against VAR148:VAR151
- Group A6 vs. Group B6 VAR52:VAR54 against VAR152:VAR154
- Group A2 vs. Group C3a VAR15:VAR25 against VAR415:VAR425
- Group A3 vs. Group C4a VAR26:VAR36 against VAR426:VAR436
- Group A4 vs. Group C5a VAR37:VAR47 against VAR437:VAR447
- Group B2 vs. Group C3a VAR115:VAR125 against VAR415:VAR425
- Group B3 vs. Group C4b VAR126:VAR136 against VAR426:VAR436
- Group B4 vs. Group C5c VAR137:VAR147 against VAR437:VAR447

The algorithm applied in ROV BizStats is as follows:

HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR1:VAR14 # VAR101:VAR114)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR15:VAR25 # VAR115:VAR125)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR26:VAR36 # VAR126:VAR136)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR37:VAR47 # VAR137:VAR147)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR48:VAR51 # VAR148:VAR151)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR52:VAR54 # VAR152:VAR154)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR15:VAR25 # VAR415:VAR425)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR26:VAR36 # VAR426:VAR436)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR37:VAR47 # VAR437:VAR447)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR115:VAR125 # VAR415:VAR425)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR126:VAR136 # VAR426:VAR436)
HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR137:VAR147 # VAR437:VAR447)

4. *Multivariate Bonferroni Test with Repetition*

Next, we run simultaneous tests of independent differences and correct for a grouped p-value and confidence interval with the Bonferroni test. The previous Hotelling test looks at the data as a group as a whole, whereas the current Bonferroni test looks at the grouped data as individual variables but tested simultaneously such that the p-value is appropriately adjusted.

The null hypothesis tested is that there is no difference collectively among all variables simultaneously between the two groups. The Bonferroni test makes an adjustment to the computed p-values when multiple dependent or independent statistical T-tests are being performed simultaneously on a single dataset. Simultaneous confidence intervals are computed and compared against multiple individual tests. This two-variable with repetition corrections test is applied on two groups of multiple variables each. The null hypothesis tested is that the individual expected differences are all equal to zero.

- Group A1 vs. Group B1 VAR1:VAR14 against VAR101:VAR114
- Group A2 vs. Group B2 VAR15:VAR25 against VAR115:VAR125
- Group A3 vs. Group B3 VAR26:VAR36 against VAR126:VAR136
- Group A4 vs. Group B4 VAR37:VAR47 against VAR137:VAR147
- Group A5 vs. Group B5 VAR48:VAR51 against VAR148:VAR151
- Group A6 vs. Group B6 VAR52:VAR54 against VAR152:VAR154
- Group A2 vs. Group C3a VAR15:VAR25 against VAR415:VAR425
- Group A3 vs. Group C4a VAR26:VAR36 against VAR426:VAR436
- Group A4 vs. Group C5a VAR37:VAR47 against VAR437:VAR447
- Group B2 vs. Group C3a VAR115:VAR125 against VAR415:VAR425
- Group B3 vs. Group C4a VAR126:VAR136 against VAR426:VAR436
- Group B4 vs. Group C5a VAR137:VAR147 against VAR437:VAR447

The algorithm applied in ROV BizStats is as follows:

BonferroniTestTwoVariableswithRepetition (VAR1:VAR14 # VAR101:VAR114)

BonferroniTestTwoVariableswithRepetition (VAR15:VAR25 # VAR115:VAR125)

BonferroniTestTwoVariableswithRepetition (VAR26:VAR36 # VAR126:VAR136)

BonferroniTestTwoVariableswithRepetition (VAR37:VAR47 # VAR137:VAR147)

BonferroniTestTwoVariableswithRepetition (VAR48:VAR51 # VAR148:VAR151)

BonferroniTestTwoVariableswithRepetition (VAR52:VAR54 # VAR52:VAR54)

BonferroniTestTwoVariableswithRepetition (VAR15:VAR25 # VAR415:VAR425)

BonferroniTestTwoVariableswithRepetition (VAR26:VAR36 # VAR426:VAR436)
BonferroniTestTwoVariableswithRepetition (VAR37:VAR47 # VAR437:VAR447)
BonferroniTestTwoVariableswithRepetition (VAR115:VAR125 # VAR415:VAR425)
BonferroniTestTwoVariableswithRepetition (VAR126:VAR136 # VAR426:VAR436)
BonferroniTestTwoVariableswithRepetition (VAR137:VAR147 # VAR437:VAR447)

5. ANOVA Single Factor Multiple Treatments

This method tests if there is a significant difference among the three systems when there is insufficient information versus when additional information is provided. It is an extension of the two-variable t-test, looking at multiple variables simultaneously and when the sampling distribution is assumed to be approximately normal. A two-tailed hypothesis tests the null hypothesis such that the population means of each treatment is statistically identical to the rest of the group, indicating that there is no effect among the different treatment groups. The randomized single ANOVA with multiple treatments tests the following hypotheses:

H_0: $\mu_1 = \mu_2 = \ldots = \mu_t$ for treatments *1* to *t* (there is no effect in the treatments)

H_a: Population means are not equal

(there is effect in at least one of the treatments)

The following tests the individual questions among the three systems within the same group (i.e., in the post-experiment group, if each of the three systems have similarities or differences, and the test is repeated for the pre-experiment less information group and again for the pre-experiment more information group).

- A2(i) vs. A3(i) vs. A4(i) for i =1 to 11 VAR15; VAR26; VAR37 ‡ 11
- B2(i) vs. B3(i) vs. B4(i) for i =1 to 11 VAR115; VAR126; VAR137 ‡ 11
- C3(i) vs. C4(i) vs. C5(i) for i =1 to 11 VAR229; VAR240; VAR251 ‡ 11
- C7(i) vs. C8(i) vs. C9(i) for i =1 to 10 VAR266; VAR276; VAR286 ‡ 10

The following tests the individual questions among the three systems among the three groups (i.e., for each of the survey questions, if each of the three systems have similarities or differences among the pre-experiment less information group, pre-experiment more information group, and the post-experiment group).

- A2(i) vs. B2(i) vs. A3a(i) for i =1 to 11 VAR15; VAR115; VAR415 ‡ 11
- A3(i) vs. B3(i) vs. A4a(i) for i =1 to 11 VAR26; VAR126; VAR426 ‡ 11
- A4(i) vs. B4(i) vs. A5a(i) for i =1 to 11 VAR37; VAR137; VAR437 ‡ 11

The algorithm applied in ROV BizStats is as follows:

ANOVASingleFactorMultipleTreatments (VAR15; VAR26; VAR37)
ANOVASingleFactorMultipleTreatments (VAR16; VAR27; VAR38)
ANOVASingleFactorMultipleTreatments (VAR17; VAR28; VAR39)
ANOVASingleFactorMultipleTreatments (VAR18; VAR29; VAR40)
ANOVASingleFactorMultipleTreatments (VAR19; VAR30; VAR41)
ANOVASingleFactorMultipleTreatments (VAR20; VAR31; VAR42)
ANOVASingleFactorMultipleTreatments (VAR21; VAR32; VAR43)
ANOVASingleFactorMultipleTreatments (VAR22; VAR33; VAR44)
ANOVASingleFactorMultipleTreatments (VAR23; VAR34; VAR45)
ANOVASingleFactorMultipleTreatments (VAR24; VAR35; VAR46)
ANOVASingleFactorMultipleTreatments (VAR25; VAR36; VAR47)

ANOVASingleFactorMultipleTreatments (VAR115; VAR126; VAR137)
ANOVASingleFactorMultipleTreatments (VAR116; VAR127; VAR138)
ANOVASingleFactorMultipleTreatments (VAR117; VAR128; VAR139)
ANOVASingleFactorMultipleTreatments (VAR118; VAR129; VAR140)
ANOVASingleFactorMultipleTreatments (VAR119; VAR130; VAR141)
ANOVASingleFactorMultipleTreatments (VAR120; VAR131; VAR142)
ANOVASingleFactorMultipleTreatments (VAR121; VAR132; VAR143)
ANOVASingleFactorMultipleTreatments (VAR122; VAR133; VAR144)
ANOVASingleFactorMultipleTreatments (VAR123; VAR134; VAR145)
ANOVASingleFactorMultipleTreatments (VAR124; VAR135; VAR146)
ANOVASingleFactorMultipleTreatments (VAR125; VAR136; VAR147)

ANOVASingleFactorMultipleTreatments (VAR229; VAR240; VAR251)
ANOVASingleFactorMultipleTreatments (VAR230; VAR241; VAR252)
ANOVASingleFactorMultipleTreatments (VAR231; VAR242; VAR253)
ANOVASingleFactorMultipleTreatments (VAR232; VAR243; VAR254)
ANOVASingleFactorMultipleTreatments (VAR233; VAR244; VAR255)
ANOVASingleFactorMultipleTreatments (VAR234; VAR245; VAR256)
ANOVASingleFactorMultipleTreatments (VAR235; VAR246; VAR257)
ANOVASingleFactorMultipleTreatments (VAR236; VAR247; VAR258)

ANOVASingleFactorMultipleTreatments (VAR237; VAR248; VAR259)
ANOVASingleFactorMultipleTreatments (VAR238; VAR249; VAR260)
ANOVASingleFactorMultipleTreatments (VAR239; VAR250; VAR261)

ANOVASingleFactorMultipleTreatments (VAR266; VAR276; VAR286)
ANOVASingleFactorMultipleTreatments (VAR267; VAR277; VAR287)
ANOVASingleFactorMultipleTreatments (VAR268; VAR278; VAR288)
ANOVASingleFactorMultipleTreatments (VAR269; VAR279; VAR289)
ANOVASingleFactorMultipleTreatments (VAR270; VAR280; VAR290)
ANOVASingleFactorMultipleTreatments (VAR271; VAR281; VAR291)
ANOVASingleFactorMultipleTreatments (VAR272; VAR282; VAR292)
ANOVASingleFactorMultipleTreatments (VAR273; VAR283; VAR293)
ANOVASingleFactorMultipleTreatments (VAR274; VAR284; VAR294)
ANOVASingleFactorMultipleTreatments (VAR275; VAR285; VAR295)

ANOVASingleFactorMultipleTreatments (VAR15; VAR115; VAR415)
ANOVASingleFactorMultipleTreatments (VAR16; VAR116; VAR416)
ANOVASingleFactorMultipleTreatments (VAR17; VAR117; VAR417)
ANOVASingleFactorMultipleTreatments (VAR18; VAR118; VAR418)
ANOVASingleFactorMultipleTreatments (VAR19; VAR119; VAR419)
ANOVASingleFactorMultipleTreatments (VAR20; VAR120; VAR420)
ANOVASingleFactorMultipleTreatments (VAR21; VAR121; VAR421)
ANOVASingleFactorMultipleTreatments (VAR22; VAR122; VAR422)
ANOVASingleFactorMultipleTreatments (VAR23; VAR123; VAR423)
ANOVASingleFactorMultipleTreatments (VAR24; VAR124; VAR424)
ANOVASingleFactorMultipleTreatments (VAR25; VAR125; VAR425)
ANOVASingleFactorMultipleTreatments (VAR26; VAR126; VAR426)
ANOVASingleFactorMultipleTreatments (VAR27; VAR127; VAR427)
ANOVASingleFactorMultipleTreatments (VAR28; VAR128; VAR428)
ANOVASingleFactorMultipleTreatments (VAR29; VAR129; VAR429)
ANOVASingleFactorMultipleTreatments (VAR30; VAR130; VAR430)
ANOVASingleFactorMultipleTreatments (VAR31; VAR131; VAR431)
ANOVASingleFactorMultipleTreatments (VAR32; VAR132; VAR432)
ANOVASingleFactorMultipleTreatments (VAR33; VAR133; VAR433)
ANOVASingleFactorMultipleTreatments (VAR34; VAR134; VAR434)
ANOVASingleFactorMultipleTreatments (VAR35; VAR135; VAR435)
ANOVASingleFactorMultipleTreatments (VAR36; VAR136; VAR436)
ANOVASingleFactorMultipleTreatments (VAR37; VAR137; VAR437)

ANOVASingleFactorMultipleTreatments (VAR38; VAR138; VAR438)

ANOVASingleFactorMultipleTreatments (VAR39; VAR139; VAR439)

ANOVASingleFactorMultipleTreatments (VAR40; VAR140; VAR440)

ANOVASingleFactorMultipleTreatments (VAR41; VAR141; VAR441)

ANOVASingleFactorMultipleTreatments (VAR42; VAR142; VAR442)

ANOVASingleFactorMultipleTreatments (VAR43; VAR143; VAR443)

ANOVASingleFactorMultipleTreatments (VAR44; VAR144; VAR444)

ANOVASingleFactorMultipleTreatments (VAR45; VAR145; VAR445)

ANOVASingleFactorMultipleTreatments (VAR46; VAR146; VAR446)

ANOVASingleFactorMultipleTreatments (VAR47; VAR147; VAR447)

6. ANOVA With Blocking Variables

Using post experiment survey results, users were blocked by groups to determine if there are differences among the responses as well as between blocking groups (A, B, C). We are controlling if the composite score of the three systems differ when we control for the three groups (e.g., different days, different diving conditions, and potentially slightly different system configurations). The sampling distribution is assumed to be approximately normal, and there exists a block variable for which ANOVA will control (i.e., block the effects of this variable by controlling it in the experiment). This analysis can test for the effects of both the treatments as well as the effectiveness of the control or block variable. If the calculated p-value for the treatment or block is less than or equal to the significance level used in the test, then reject the null hypothesis and conclude that there is a significant difference among the different treatments or blocks.

The specification tested in this ANOVA is $x_{i,j} = \mu + \tau_j + \beta_i + \varepsilon_{ij}$

H_0: $\tau_j = 0$ for treatments $j = 1$ to t (there is no effect in the treatments)

H_a: $\tau_j \neq 0$ for at least one treatment $j = 1$ to t

(one or more treatments has an effect)

We define τ as the treatments and β as the blocking variable.

The algorithm applied in ROV BizStats is as follows:

ANOVARandomizedBlocksMultipleTreatments (VAR296; VAR297; VAR298)

7. *Nonparametric Kruskal–Wallis Test*

Applies the Nonparametric equivalence of ANOVA Single Factor Multiple Treatments. This is a more appropriate test as the data are categorical in nature and limited in range from 1–5 or 1–100. The Kruskal–Wallis test is the extension of the Wilcoxon Signed Rank test by comparing more than two independent samples. The corresponding parametric test is the One-Way ANOVA, but unlike the ANOVA, the Kruskal–Wallis does not require that the dataset be randomly sampled from normally distributed populations with equal variances. The Kruskal–Wallis test is a two-tailed hypothesis test where the null hypothesis is such that the population medians of each treatment are statistically identical to the rest of the group; that is, there is no effect among the different treatment groups. Similar to the ANOVA method, the Kruskal–Wallis tests the following hypotheses:

H_0: $m_1 = m_2 = \ldots = m_K$ for $i = 1$ to k (population medians are identical).

H_a: At least one of the medians m differs from the others.

The method starts off with k variables to be tested. For each variable, the data is ranked from smallest to largest, with the smallest value receiving the rank of 1, and all tied ranks are assigned their average values. Then, sum all the ranks for each variable, yielding a list of summed ranks *Σ(R1), Σ(R2), …, Σ(RK)*. Then, the *H* statistic is computed using

$$H = \frac{12}{N(N+1)}\left[\frac{(\Sigma R_1)^2}{n_1} + \frac{(\Sigma R_2)^2}{n_2} + \ldots + \frac{(\Sigma R_K)^2}{n_K}\right] - 3(N+1)$$

The calculated *H* is compared to critical *H* values computed using a chi-square distribution with degrees of freedom $df = k - 1$. The algorithm applied in ROV BizStats is as follows:

NonparametricKruskalWallisTest (VAR15; VAR26; VAR37)
NonparametricKruskalWallisTest (VAR16; VAR27; VAR38)
NonparametricKruskalWallisTest (VAR17; VAR28; VAR39)
NonparametricKruskalWallisTest (VAR18; VAR29; VAR40)
NonparametricKruskalWallisTest (VAR19; VAR30; VAR41)
NonparametricKruskalWallisTest (VAR20; VAR31; VAR42)

NonparametricKruskalWallisTest (VAR21; VAR32; VAR43)
NonparametricKruskalWallisTest (VAR22; VAR33; VAR44)
NonparametricKruskalWallisTest (VAR23; VAR34; VAR45)
NonparametricKruskalWallisTest (VAR24; VAR35; VAR46)
NonparametricKruskalWallisTest (VAR25; VAR36; VAR47)
NonparametricKruskalWallisTest (VAR115; VAR126; VAR137)
NonparametricKruskalWallisTest (VAR116; VAR127; VAR138)
NonparametricKruskalWallisTest (VAR117; VAR128; VAR139)
NonparametricKruskalWallisTest (VAR118; VAR129; VAR140)
NonparametricKruskalWallisTest (VAR119; VAR130; VAR141)
NonparametricKruskalWallisTest (VAR120; VAR131; VAR142)
NonparametricKruskalWallisTest (VAR121; VAR132; VAR143)
NonparametricKruskalWallisTest (VAR122; VAR133; VAR144)
NonparametricKruskalWallisTest (VAR123; VAR134; VAR145)
NonparametricKruskalWallisTest (VAR124; VAR135; VAR146)
NonparametricKruskalWallisTest (VAR125; VAR136; VAR147)
NonparametricKruskalWallisTest (VAR229; VAR240; VAR251)
NonparametricKruskalWallisTest (VAR230; VAR241; VAR252)
NonparametricKruskalWallisTest (VAR231; VAR242; VAR253)
NonparametricKruskalWallisTest (VAR232; VAR243; VAR254)
NonparametricKruskalWallisTest (VAR233; VAR244; VAR255)
NonparametricKruskalWallisTest (VAR234; VAR245; VAR256)
NonparametricKruskalWallisTest (VAR235; VAR246; VAR257)
NonparametricKruskalWallisTest (VAR236; VAR247; VAR258)
NonparametricKruskalWallisTest (VAR237; VAR248; VAR259)
NonparametricKruskalWallisTest (VAR238; VAR249; VAR260)
NonparametricKruskalWallisTest (VAR239; VAR250; VAR261)
NonparametricKruskalWallisTest (VAR266; VAR276; VAR286)
NonparametricKruskalWallisTest (VAR267; VAR277; VAR287)
NonparametricKruskalWallisTest (VAR268; VAR278; VAR288)
NonparametricKruskalWallisTest (VAR269; VAR279; VAR289)
NonparametricKruskalWallisTest (VAR270; VAR280; VAR290)
NonparametricKruskalWallisTest (VAR271; VAR281; VAR291)
NonparametricKruskalWallisTest (VAR272; VAR282; VAR292)
NonparametricKruskalWallisTest (VAR273; VAR283; VAR293)
NonparametricKruskalWallisTest (VAR274; VAR284; VAR294)
NonparametricKruskalWallisTest (VAR275; VAR285; VAR295)

8. *Interrater Reliability Test with Interclass Correlation (ICC)*

We then test if the survey results are internally consistent and reliable. In addition, we can see if the level of reliability increases as more information is provided as hands-on experimentation is run. The ICC tests the reliability of ratings by comparing the variability of various ratings of the same subject to the total variation across all ratings and all subjects simultaneously. A high ICC indicates a high level of reliability, and the analysis can be applied to Likert scales and any other quantitative scales. The variable columns are each user's responses to different survey questions listed in rows. This means that the coded survey results will need to be transposed prior to the analysis (Mun, 2018).

Pre-Experiment with Less Info

- i. A1:: VAR1:VAR14
- ii. A2:: VAR15:VAR25
- iii. A3:: VAR26:VAR36
- iv. A4:: VAR37:VAR47
- v. A5:: VAR48:VAR51

Pre-Experiment with More Info

- i. B1:: VAR101:VAR114
- ii. B2:: VAR115:VAR125
- iii. B3:: VAR126:VAR136
- iv. B4:: VAR137:VAR147
- v. B5:: VAR148:VAR151

Post-Experiment

- i. VAR201:VAR214
- ii. VAR215:VAR228
- iii. VAR229:VAR239

iv. VAR240:VAR250

v. VAR251:VAR261

vi. VAR262:VAR265

vii. VAR266:VAR275

viii. VAR276:VAR285

ix. VAR286:VAR295

x. VAR296:VAR298

*The data needs to be first transposed to run ICC. Using transposed variables:

InterraterReliabilityInterClassCorrelationICC (VAR2:VAR24)
InterraterReliabilityInterClassCorrelationICC (VAR27:VAR49)
InterraterReliabilityInterClassCorrelationICC (VAR52:VAR74)
InterraterReliabilityInterClassCorrelationICC (VAR77:VAR99)
InterraterReliabilityInterClassCorrelationICC (VAR102:VAR124)
InterraterReliabilityInterClassCorrelationICC(VAR127:VAR146)
InterraterReliabilityInterClassCorrelationICC(VAR149:VAR168)
InterraterReliabilityInterClassCorrelationICC(VAR171:VAR190)
InterraterReliabilityInterClassCorrelationICC(VAR193:VAR212)
InterraterReliabilityInterClassCorrelationICC (VAR215:VAR234)

InterraterReliabilityInterClassCorrelationICC(VAR237:VAR255)
InterraterReliabilityInterClassCorrelationICC (VAR258:VAR276)
InterraterReliabilityInterClassCorrelationICC (VAR279:VAR297)
InterraterReliabilityInterClassCorrelationICC (VAR300:VAR318)
InterraterReliabilityInterClassCorrelationICC (VAR321:VAR339)
InterraterReliabilityInterClassCorrelationICC (VAR342:VAR360)
InterraterReliabilityInterClassCorrelationICC (VAR363:VAR381)
InterraterReliabilityInterClassCorrelationICC (VAR384:VAR402)
InterraterReliabilityInterClassCorrelationICC (VAR405:VAR423)
InterraterReliabilityInterClassCorrelationICC (VAR426:VAR444)

9. Correlation Matrix

We then computed the Pearson's linear product moment correlations (commonly referred to as the Pearson's R) as well as the nonlinear Spearman rank-based correlation between variable pairs and return them as a correlation matrix. The correlation coefficient must range between –1.0 and +1.0, inclusive. The sign indicates the direction of association between the variables, while the coefficient indicates the magnitude or strength of association. Linear and Nonlinear Correlation Matrix for the Risk Scores and Composite Scores are computed.

A standard Pearson's linear product moment correlation coefficient $r_{x,y} = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{n\sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2}\sqrt{n\sum_{i=1}^{n} y_i^2 - \left(\sum_{i=1}^{n} y_i\right)^2}}$ is computed, and its corresponding significance test using a partial t-test with $n-2$ degrees of freedom hypothesis test can be computed by taking $t = r\sqrt{\frac{n-2}{1-r^2}}$. The null hypothesis is such that the population correlation $\rho = 0$. For the nonlinear Spearman rank correlation, the data is first ranked, and then the Pearson's correlation is applied.

The algorithm applied in ROV BizStats is as follows:

CorrelationMatrixLinear,Nonlinear (VAR296; VAR297; VAR298)

CorrelationMatrixLinear,Nonlinear (VAR215:VAR228)

10. Multivariate Nonlinear Regression

This method answers the question of whether any pre-experiment data can be used to explain post-experiment results. If we assume that the post-experiment results are the actual results, the issue is whether using a quick pre-experiment survey sufficiently explains the final actual results without the need to run detailed experimentation. In other words, can trust be determined using perceived values and assumptions by the expert user.

As a side note, we use a 0–100 scale in the final experiment on some of the questions because we can easily revert back to a 1–5 scale; however, the opposite is not true. For instance, if we maintained a 1–5 scale, it would be impossible to granularize the data into a 1–100 scale. Also, this allows more granularity and hence we can run multivariate regressions and other econometric models to determine the predictability of some regressors such as those obtained in the low and high information environments. If we kept the variables as integers between 1–5, this will limit our ability to run some of these models, and we would be restricted to using Logistic regression methods and maximizing likelihood functions. By recoding the survey post-experiment to between 1–100, we now have the flexibility to maneuver between this more granular scale and quickly revert back to the 1–5 scale (e.g., 1–20 would be coded as 1, 21–40 will be coded as 2, and so forth).

Finally, the variable score (VAR296–VAR296) is used in the econometric models. This score is an accumulation of the individual questions of each system (VAR266–VAR275 for the direct control system, VAR276–VAR285 for the remote-controlled system, and VAR286–VAR295 for the autonomous system). The questions are also "inverted" to test the reliability of the user's inputs. In other words, 1 stands for strongly disagree, and 5 stands for strongly agree, but the questions alternate in terms of directionality. Question 1 asks if the system would be used frequently, where a score of 5 is considered optimal, whereas question 2 asks if the system is unnecessarily complex, where in this case, a score of 1 is optimal. For example, if a user responds: 5, 1, 5, 1, 5, 1, 5, 1, 5, 1, we obtain a score of 100. The inverse is true, where the following sequence: 1, 5, 1, 5, 1, 5, 1, 5, 1, 5 would yield a score of 0.

a. Direct Systems (Less Info). VAR296 vs. VAR15:VAR25

b. Direct Systems (More Info). VAR296 vs. VAR115:VAR125

c. Remote Systems (Less Info). VAR297 vs. VAR26:VAR36

d. Remote Systems (More Info). VAR297 vs. VAR126:VAR136

e. Autonomous Systems (Less Info). VAR298 vs. VAR37:VAR47

f. Autonomous Systems (More Info). VAR298 vs. VAR137:VAR147

g. Risk Scores (C2 from A1 and B1). VAR 215 vs. VAR1; VAR10 ‡ 14

h. Optional Analyses:

i. Individual Direct Issues (Less Info). VAR229 vs. VAR15; VAR115 ‡ for all 11 iterations

ii. Individual Remote Issues (Less Info). VAR240 vs. VAR26; VAR126 ‡ for all 11 iterations

iii. Individual Autonomous Issues (Less Info). VAR251 vs. VAR37; VAR137 ‡ for all 11 iterations

The algorithm applied in ROV BizStats is as follows:

CustomEconometricModel (VAR296 # VAR15:VAR25)

CustomEconometricModel (VAR296 # VAR115:VAR125)

CustomEconometricModel (VAR297 # VAR26:VAR36)

CustomEconometricModel (VAR297 # VAR126:VAR136)

CustomEconometricModel (VAR298 # VAR37:VAR47)

CustomEconometricModel (VAR298 # VAR137:VAR147)

CustomEconometricModel (VAR215 # VAR1;VAR101)

CustomEconometricModel (VAR216 # VAR2;VAR102)

CustomEconometricModel (VAR217 # VAR3;VAR103)

CustomEconometricModel (VAR218 # VAR4;VAR104)

CustomEconometricModel (VAR219 # VAR5;VAR105)

CustomEconometricModel (VAR220 # VAR6;VAR106)

CustomEconometricModel (VAR221 # VAR7;VAR107)

CustomEconometricModel (VAR222 # VAR8;VAR108)

CustomEconometricModel (VAR223 # VAR9;VAR109)

CustomEconometricModel (VAR224 # VAR10;VAR110)

CustomEconometricModel (VAR225 # VAR11;VAR111)

CustomEconometricModel (VAR226 # VAR12;VAR112)

CustomEconometricModel (VAR227 # VAR13;VAR113)

CustomEconometricModel (VAR228 # VAR14;VAR114)

CustomEconometricModel (VAR229 # VAR15;VAR115)

CustomEconometricModel (VAR230 # VAR16;VAR116)

CustomEconometricModel (VAR231 # VAR17;VAR117)

CustomEconometricModel (VAR232 # VAR18;VAR118)

CustomEconometricModel (VAR233 # VAR19;VAR119)

CustomEconometricModel (VAR234 # VAR20;VAR120)
CustomEconometricModel (VAR235 # VAR21;VAR121)
CustomEconometricModel (VAR236 # VAR22;VAR122)
CustomEconometricModel (VAR237 # VAR23;VAR123)
CustomEconometricModel (VAR238 # VAR24;VAR124)
CustomEconometricModel (VAR239 # VAR25;VAR125)

CustomEconometricModel (VAR240 # VAR26;VAR126)
CustomEconometricModel (VAR241 # VAR27;VAR127)
CustomEconometricModel (VAR242 # VAR28;VAR128)
CustomEconometricModel (VAR243 # VAR29;VAR129)
CustomEconometricModel (VAR244 # VAR30;VAR130)
CustomEconometricModel (VAR245 # VAR31;VAR131)
CustomEconometricModel (VAR246 # VAR32;VAR132)
CustomEconometricModel (VAR247 # VAR33;VAR133)
CustomEconometricModel (VAR248 # VAR34;VAR134)
CustomEconometricModel (VAR249 # VAR35;VAR135)
CustomEconometricModel (VAR250 # VAR36;VAR136)

CustomEconometricModel (VAR251 # VAR37;VAR137)
CustomEconometricModel (VAR252 # VAR38;VAR138)
CustomEconometricModel (VAR253 # VAR39;VAR139)
CustomEconometricModel (VAR254 # VAR40;VAR140)
CustomEconometricModel (VAR255 # VAR41;VAR141)
CustomEconometricModel (VAR256 # VAR42;VAR142)
CustomEconometricModel (VAR257 # VAR43;VAR143)
CustomEconometricModel (VAR258 # VAR44;VAR144)
CustomEconometricModel (VAR259 # VAR45;VAR145)
CustomEconometricModel (VAR260 # VAR46;VAR146)
CustomEconometricModel (VAR261 # VAR47;VAR147)

11. Complex Econometric Model

Complex econometric models are used to determine if some of the final results can be forecasted or predetermined by using less information or more information settings, without the need for a full-blown experimentation. This might yield valuable insights to identify the key determining factors where decision makers can collect information from a preliminary analysis and have a high confidence that the final result will be in the direction they anticipate.

The issue with using standard econometric methods such as linear and nonlinear multivariate regression (some sample models have been run and are reported in the Appendix) is that the data from the three segments (A, B, C) are based on different active-duty military from the same unit. This means that row 1 of the data in segment A is from a soldier who is not the same person as in the first row of segment B or segment C. Therefore, without this direct data correspondence, a standard regression will be insufficient and inaccurate at best.

The general linear multivariate regression equation used is the standard form where we have $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 ... + \beta_k X_k + \varepsilon$. In this case, the best-fitting line will be within a $k + 1$ dimensional plane. Regression analysis then finds the unique best-fitting line by requiring that the total errors be minimized (Mun, 2015) or by calculating

$$Min \sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2$$

where only one unique line minimizes this sum of squared errors. Solving this minimization problem with respect to the slope and intercept requires calculating first derivatives and setting them equal to zero (Mun, 2016):

$$\frac{d}{d\beta_0} \sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2 = 0 \quad \text{and} \quad \frac{d}{d\beta_1} \sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2 = 0$$

The general format is that the coefficients can be determined using the following matrix computation: $\mathrm{B} = (\mathrm{X}'\mathrm{X})^{-1}\mathrm{X}'\mathrm{Y}$. This of course makes multiple assumptions on the data such as normality and sphericity of the errors, homoskedastic time-series, and other technical requirements, such that the equation will be the best linear unbiased estimator (BLUE). The same method is used in this research, as are nonlinear models like polynomial and irrational functions, where we simplify the functional form by using natural logarithms where we have the estimated equation to be:

$$Y = \hat{\beta}_0 + \hat{\beta}_1 ln(X_1) + \hat{\beta}_2 ln(X_2) + \hat{\beta}_3 ln(X_3)\ldots + \hat{\beta}_k ln(X_k) + \varepsilon.$$

Finally, because of the non-correspondence of the data, we needed another methodology, a bootstrap multivariate regression, where given the original data $(X_1, Y_1), \ldots, (X_n, Y_n)$, we generate a new dataset that are independently and identically distributed (IID) observations where we now have $(X_1^*, Y_1^*), \ldots, (X_n^*, Y_n^*)$. This single (X_i^*, Y_i^*) is considered one iteration, and we replicate this iteration m times. In other words, we generate a new set of data with n data points and bootstrap this method for m times. The estimated coefficients $\hat{\beta}$ will be tabulated, as will their respective significance p-values. After running a bootstrap simulation thousands of times, the respective distributions of the p-values will be tabulated, and their confidence intervals determined. This method will allow the use of non-corresponding datasets yet assume a sufficiently large simulation IID sampling, that the BLUE condition still holds, and the results are valid.

12. Parametric 2 Variable T-Test with Equal Variance and Unequal Variance

The two-sample equal and unequal variance t-tests, as their names suggest, are used to compare two sample datasets against each other to determine if there is a statistically significant difference between their population means (μ). In other words, the test can identify if a certain event or experiment has an effect. This t-test assumes that the unknown population standard deviations (σ) of both samples are roughly equal and the populations are roughly normally distributed. The t-distribution is appropriate here as the true standard deviations of the populations are unknown, and when smaller sample sizes are available (typically < 30). This test is also known as the pooled-variances t-test because it takes the standard deviations of both samples and pools them into a single parameter in the model (Mun, 2018).

The hypotheses tested are as follows:

H_0: $\mu_1 = \mu_2$, the two samples' means are statistically similar

Ha: $\mu_1 \neq \mu_2$, the two samples' means are statistically significantly different

The algorithm applied in ROV BizStats is as follows:

ParametricTwoVariableTIndependentEqualVariance (VARx; VARy # 0.000000)

Pairwise tests were run on all possible pairwise combinations of those found statistically significant using the ANOVA models. The T-test results were then confirmed using the nonparametric Mann–Whitney Test as well as the nonparametric Wilcoxon Signed Rank test. This was done because the T-test is parametric and looks at the mean differences, whereas the latter two tests are nonparametric and test the medians, which accounts for the lack of data points and to handle situations where there are skewed distributions causing biases in the mean.

13. Nonparametric Mann–Whitney Test

The nonparametric Mann–Whitney Test for two independent samples is related to the Wilcoxon Signed Rank Test. It is the nonparametric equivalent of the Two Sample T-Test for Independent Variables. The null hypothesis tested is that there is zero difference between the two variables' medians. A nonparametric test is more appropriate in our current context as we have categorical data that are truncated to be between 1 and 5, are integers, and limited to between 19–23 data points for each variable.

The algorithm applied in ROV BizStats is as follows:

NonparametricMannWhitneyTestTwoVar (VARx # VARx)

14. Nonparametric Wilcoxon Signed Rank Test

This nonparametric Wilcoxon Signed Rank test is for paired variables and looks at whether the median of the differences between the two paired variables is equal. This test is specifically formulated for testing the same or similar samples before and after an event (e.g., measurements taken before a medical treatment are compared against those measurements taken after the treatment to see if there is a difference). The corresponding parametric test is the two-sample t-test with dependent means, which should be used if the underlying population is assumed to be normal, providing a higher power on the test.

The algorithm applied in ROV BizStats is as follows:

NonparametricWilcoxonSignedRankTestTwoVar (VARx; VARx # 0.000000)

15. Principal Component Analysis and Factor Analysis

Principal Component Analysis (PCA) or Factor Analysis is a way of identifying patterns and updating the data to highlight their similarities and differences. Patterns of data are very difficult to find in high dimensions when multiple variables exist. Once the patterns in the data are found, they can be compressed, and the number of dimensions will be reduced. This reduction of data dimensions does not mean much reduction in loss of information. Instead, similar levels of information can now be obtained by a potentially fewer number of variables. PCA is used to reduce data dimensionality using covariance analysis among independent variables by applying an orthogonal transformation to convert a set of correlated variables data into a new set of values of linearly uncorrelated variables named principal components (Mun, 2018).

According to Mun (2018), the number of computed principal components will be less than or equal to the number of original variables. This statistical transformation is set up such that the first principal component has the largest possible variance accounting for as much of the variability in the data as possible, and each subsequent component has the highest variance possible under the constraint that it is orthogonal to or uncorrelated with the preceding components. Thus, PCA reveals the internal structure of the data in a way that best explains the variance in the data. Such dimensionality reduction is useful to process high-dimensional datasets while still retaining as much of the variance in the dataset as possible. PCA essentially rotates the set of points around their mean in order to align with the principal components. Therefore, PCA creates variables that are linear combinations of the original variables. The new variables have the property that the variables are all orthogonal. Factor analysis is similar to PCA in that factor analysis also involves linear combinations of variables using correlations, whereas PCA uses covariance to determine eigenvectors and eigenvalues relevant to the data using a covariance matrix. Eigenvectors can be thought of as preferential directions of a dataset or main patterns in the data. Eigenvalues can be thought of as quantitative assessments of how much a component represents the data. The higher the eigenvalues of a component, the more representative it is of the data. As an example, PCA is useful when running multiple regression or basic econometrics when the number of independent variables is large or when there is significant multicollinearity in the independent variables. PCA can be run on the independent variables to reduce the number of variables and to eliminate any linear correlations among the independent variables. The extracted revised data obtained after running PCA can be used to rerun the linear multiple regression or linear basic econometric analysis. The resulting model will usually have slightly lower R-squared values but potentially higher statistical significance (lower p-value).

The algorithm applied in ROV BizStats is as follows:

PrincipalComponentAnalysis(VAR1:VAR11)

PrincipalComponentAnalysis(VAR12:VAR22)

PrincipalComponentAnalysis(VAR23:VAR33)

16. Other Methods Not Employed

The collected data is ordinal, quasi-interval, and cross-sectional in nature. This means that there are multiple data diagnostic methods that are irrelevant as they pertain to continuous data as well as time-series, such as heteroskedasticity (Lagrange Multiplier, Breusch–Pagan–Godfrey, and Wald tests), autocorrelation (ACF test and Correlograms), partial autocorrelation (PACF test), serial correlation and distributive lags, as well as regular leads and lags. Other issues such as testing for outliers (Grubb’s test) or excess kurtosis (Shapiro–Wilk test) are also irrelevant as the survey responses are truncated to be between 1 and 5; therefore, outliers will never be present, and excess kurtosis is always negative due to the data truncation. All other methods considered relevant have been considered in the previous sections.

17. Threats to Internal and External Validity

Causal relationships are validated scientifically by considering relationships in terms of statistical probability. There are threats to the validity of the inferences made from measurements when a researcher is not measuring what he intends to measure due to illusory correlations (Campbell & Stanley, 1963; Creswell, 2014; Graziano & Raulin, 1993). These threats must be examined.

The participant selection may interact with research bias to threaten the external validity of the results. How the setting of an experiment interacts with the results may also threaten external validity. Laboratory tests in the social sciences have a novelty effect, and the online apparatus may not properly capture how insider threat analysts perform their duties (Mayo, 1933). The experiment controls for the interaction of setting by using training scenarios written specifically for use in a similar setting. The scenarios were presented in an online format that is the same across all groups.

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V. RESULTS

Chapter IV discusses the analytical framework of the research design and data-coding schema that support each of the primary research questions.

A. Data Is Only Somewhat Normal

The following are the research questions we are attempting to answer in this section:

- **Is the data considered sufficiently normal?**
- **Can we apply conventional parametric methods, or do we need more advanced nonparametric methods to analyze the data?**

Table 3 shows the results from a randomly selected variable (VAR1), and Table 4 shows the sample results from another randomly selected variable (VAR105). The results are mixed, in that certain variables can be deemed normal under some conditions, whereas under different test conditions, the data is not normally distributed. For VAR1 (Table 3), the normal distribution is typically ranked as the top five distribution tested, but the mean absolute percentage error (MAPE) is approximately 20%, and the p-value is 0.6147 in the KS test. This means that although these are statistically significant, they may not be practically significant enough to justify normality. In addition, the SWR test returns a p-value of 0.0053, indicating nonnormality.

The main conclusions from the analysis are as follows:

- **The survey data are only somewhat normally distributed under certain circumstances, and we cannot state complete normality to fully justify standard modeling approaches.**
- **The data are ordinal and quasi-interval, with limited truncation between 1 and 5, and are limited to between 19 and 23 observations.**
- **Both parametric and nonparametric methods are used, and this mixed approach is therefore justified.**

There are some methods and tests that are considered nonparametric in nature. Compared to parametric tests (e.g., t-test, z-test, F-test, ANOVA), nonparametric tests have the following advantages and a single disadvantage (Mun, 2018):

- Fewer assumptions are required for the underlying data's population. Specifically, a nonparametric test does not require that the population be normally distributed. In fact, it does not require any specific distribution and, hence, is sometimes called distribution-free, or tests without specific population parameters (i.e., non-parametric).
- Smaller sample sizes can be used.
- Data with nominal and ordinal scales can be tested.
- Nonparametric methods have lower power and use the data less efficiently. Therefore, if assumptions have been met, it is better to use parametric tests whenever possible.

Therefore, going forward, both parametric and nonparametric tests are conducted whenever appropriate, and their results are compared for corroboration.

Table 3. VAR1 Normality Tests

Best-Fitting Distributions: VAR1

Rank	Akaike	Anderson	Kolmogorov	Kuiper's	Schwartz
1	Cosine	**Normal**	GenPareto	**Normal**	Cosine
2	Lognml3Arith	Logistic	Weibull	Logistic	Lognml3Arith
3	Weibull	TDist	GumbelMin	TDist	Weibull
4	**Normal**	Weibull	Triangular	Cosine	**Normal**
5	Gamma	GumbelMax	**Normal**	Weibull	Gamma

MAPE %:

Rank	Akaike	Anderson	Kolmogorov	Kuiper's	Schwartz
1	19.0136%	19.0915%	N/A	19.4214%	19.0136%
2	19.3421%	19.2969%	19.5824%	19.4370%	19.3421%
3	19.3665%	19.4732%	24.8250%	19.4732%	19.3665%
4	19.4297%	20.0214%	21.2316%	19.6235%	19.4297%
5	19.4575%	21.8529%	19.6539%	19.6312%	19.4575%

Best Fit Rank : **5**
Fit Name : Normal
Kolmogorov-Smirnov Statistic : 0.153350
Mean : 3.721371
Sigma : 1.250896
p value : **0.614791**
Actual to Theoretical Four Moments :
3.739130 1.053884 -0.190064 -1.168769;
3.721371 1.250896 0.000000 0.000000;

Nonparametric Shapiro-Wilk Test for Normality
(Royston Algorithm)
Shapiro-Wilks : 0.865946
SW P-value : **0.005368**
Null hypothesis: The data is normally distributed

Table 4. VAR105 Normality Tests

Best-Fitting Distributions: VAR105

Rank	Akaike	Anderson	Kolmogorov	Kuiper's	Schwartz
1	Cosine	TDist	Weibull	TDist	Cosine
2	Uniform	Gamma	Uniform	GumbelMax	Uniform
3	Triangular	Normal	GumbelMax	Weibull	Triangular
4	Weibull	GumbelMin	LognmlArith	Laplace	Weibull
5	TDist	Logistic	**Normal**	GumbelMin	TDist

MAPE %:

Rank	Akaike	Anderson	Kolmogorov	Kuiper's	Schwartz
1	20.2105%	20.4966%	25.4875%	20.4966%	20.2105%
2	20.3731%	21.5868%	19.8248%	21.8717%	20.3731%
3	20.4260%	22.5328%	25.6700%	22.2282%	20.4260%
4	20.4405%	22.6221%	23.5800%	23.3391%	20.4405%
5	20.4966%	22.9440%	20.7503%	24.0731%	20.4966%

```
Best Fit Rank : 5
   Fit Name : Normal
   Kolmogorov-Smirnov Statistic : 0.175000
   Mean : 3.647780
   Sigma : 1.105387
   p value : 0.531299
   Actual to Theoretical Four Moments :
     3.550000   1.050063  -0.146220  -1.072526;
     3.647780   1.105387   0.000000   0.000000;


   Nonparametric Shapiro-Wilk Test for Normality
   (Royston Algorithm)
   Shapiro-Wilks : 0.880332
   SW P-value : 0.017937
   Null hypothesis: The data is normally distributed
```

B. Hotelling

The research questions we are attempting to answer in this section are as follows:

- **When all the survey responses for each subgroup are taken together as a whole, are there statistical differences in the responses?**
  - **In other words, are the perceptions of the Direct-Controlled system different when Less Information is provided, More Information is available, or a hands-on Experiment is conducted?**
  - **In other words, are the perceptions of the Remote-Controlled system different when Less Information is provided, More Information is available, or a hands-on Experiment is conducted?**

- **In other words, are the perceptions of the Autonomous system different when Less Information is provided, More Information is available, or a hands-on Experiment is conducted?**

Tables 5 and 6 show a sampling of the results from the Hotelling T2 test. The null hypothesis is that there are no statistical differences using a parametric Hotelling T2 test where all of the survey responses in each of the subcategories, when taken together, simultaneously do not indicate that there are any differences between the two groups tested.

The following are the main conclusions from the analysis:

- **The results indicate that there are no perceivable differences between the Less Information and More Information groups in the Pre-experiment stage (comparing all sub-elements of Group A to all sub-elements of Group B).**
- **When comparing the Less Information Pre-experiment group against the Post-experiment group, we see a statistically significant difference among the responses. The trend seems to be that there is more difference between group A (less information) and group C (post-experiment) than between group B (more information) and group C.**
- **In addition, the significance is highest for Direct-Controlled systems than remote controlled systems, which, in turn, is more significant than autonomous systems.**

Table 5. Hotelling Test Results Summary

Hotelling Test Groups	**P-value**	**Variables Tested**
Group A1 vs. Group B1	0.5863	VAR1:VAR14 vs. VAR101:VAR114
Group A2 vs. Group B2	0.7998	VAR15:VAR25 vs. VAR115:VAR125
Group A3 vs. Group B3	0.3515	VAR26:VAR36 vs. VAR126:VAR136
Group A4 vs. Group B4	0.2084	VAR37:VAR47 vs. VAR137:VAR147
Group A5 vs. Group B5	0.7095	VAR48:VAR51 vs. VAR148:VAR151
Group A6 vs. Group B6	0.4475	VAR52:VAR54 vs. VAR152:VAR154
Group A2 vs. Group C3A	**0.0000**	VAR15:VAR25 vs. VAR415:VAR425
Group A3 vs. Group C4A	**0.0144**	VAR26:VAR36 vs. VAR426:VAR436
Group A4 vs. Group C5A	**0.0793**	VAR37:VAR47 vs. VAR437:VAR447
Group B2 vs. Group C3A	**0.0000**	VAR115:VAR125 vs. VAR415:VAR425
Group B3 vs. Group C4A	0.1215	VAR126:VAR136 vs. VAR426:VAR436
Group B4 vs. Group C5A	0.3232	VAR137:VAR147 vs. VAR437:VAR447

Table 6. Hotelling Test Results for Group A6 vs. Group B6

```
VAR52; VAR53; VAR54 vs. VAR152; VAR153; VAR154
D1, D2, D3 vs. D1, D2, D3
Hotelling T-Square: Two Independent Variable
Equal Variance with Multiple Related Measures

Hotelling T2  2.85372
F Statistic   0.90484
P-value       0.44753
Null hypothesis tested is that there is zero difference between
all the related variables compared across the two groups.

Covariance GROUP 1
   0.00000       0.00000       0.00000
   0.00000       15.56621      13.61660
   0.00000       13.61660      17.73419

Covariance GROUP 2
   0.23947       -0.26711      -1.00395
   -0.26711      9.35461       10.39408
   -1.00395      10.39408      15.11776

Covariance POOLED
   0.11098       -0.12378      -0.46524
   -0.12378      12.68766      12.12324
   -0.46524      12.12324      16.52170
```

C. Bonferroni

The research question we are attempting to answer in this section is:

- **When all the survey responses for each subgroup are taken individually, are there statistical differences in the responses?**

Table 7 shows a sampling of the results from the Bonferroni test. While the previous parametric Hotelling test looks at all subcategories in each group compared to all the subcategories in the second group, the parametric Bonferroni test looks at comparing one pair of the subgroups at a time, like the t-test. The difference is the Bonferroni test accounts for the added degrees of freedom with multiple simultaneous pairwise tests.

The main conclusion from the analysis is:

- **In all the tests, we did not detect any statistical significance and found that all subgroups are statistically identical. This implies that additional testing is required.**

Table 7. Bonferroni Test (Sample Results)

```
Model Inputs:
VAR48; VAR49; VAR50; VAR51
VAR148; VAR149; VAR150; VAR151
C1, C2, C3, C4
C1, C2, C3, C4
```

Simultaneous Confidence Intervals				
Mean Difference of Null	0	0	0	0
Mean Difference	0.0522	-0.3283	-0.0152	-0.0457
Variance Group 1	1.6917	1.5336	0.8024	0.5850
Variance Group 2	1.4105	0.5553	0.3658	0.5553
Pooled Variance	1.2496	1.0393	0.7746	0.7558
F-Critical	2.6190	2.6190	2.6190	2.6190
T-Critical	3.3620	3.3620	3.3620	3.3620
Standard Error	0.3820	0.3178	0.2368	0.2311
Lower Confidence	-1.2323	-1.3966	-0.8115	-0.8225
Upper Confidence	1.3366	0.7401	0.7810	0.7312
Within Confidence?	Yes	Yes	Yes	Yes
Bonferroni Critical	2.6127	2.6127	2.6127	2.6127
Lower Confidence	-1.4760	-1.5993	-0.9626	-0.9700
Upper Confidence	1.5803	0.9428	0.9321	0.8786
Within Confidence?	Yes	Yes	Yes	Yes

```
Null hypothesis: the individual expected differences are equal to zero
```

D. The Three Systems Are Perceived Differently

The research question we are attempting to answer in this section is:

- **Are the three systems statistically different in their main characteristics?**

As discussed in the previous chapter, 43 separate Single Variable Multiple Treatment ANOVA models were run. Table 8 shows the statistically significant results from the ANOVA models. Out of the 43 models, 21 show statistical significance. ANOVA tests each of the survey questions in each of the three systems independently. For example, when testing VAR20, VAR31, and VAR42, we see that at least one or more of these three variables are statistically different from one another.

The main conclusion from the analysis is:

- **The ANOVA results support the results from the Hotelling T2 tests, where we see that group A is statistically significantly different than group B and group C, and group B is statistically significantly different than group C.**

The ANOVA test looks at the individual questions within each of these groups to identify which questions returned different responses for each of the systems in the three different testing environments (pre-experiment less data, pre-experiment more data, and post-experiment).

Table 8. ANOVA Results I

ANOVA	P-value
VAR20; VAR31; VAR42	**0.0008**
VAR21; VAR32; VAR43	**0.0903**
VAR120; VAR131; VAR142	**0.0264**
VAR124; VAR135; VAR146	**0.0362**
VAR229; VAR240; VAR251	**0.0000**
VAR230; VAR241; VAR252	**0.0000**
VAR231; VAR242; VAR253	**0.0000**
VAR232; VAR243; VAR254	**0.0002**
VAR233; VAR244; VAR255	**0.0601**
VAR237; VAR248; VAR259	**0.0004**
VAR238; VAR249; VAR260	**0.0000**
VAR239; VAR250; VAR261	**0.0000**
VAR266; VAR276; VAR286	**0.0000**
VAR267; VAR277; VAR287	**0.0285**
VAR268; VAR278; VAR288	**0.0003**
VAR269; VAR279; VAR289	**0.0020**
VAR270; VAR280; VAR290	**0.0000**
VAR271; VAR281; VAR291	**0.0000**
VAR272; VAR282; VAR292	**0.0351**
VAR273; VAR283; VAR293	**0.0002**
VAR274; VAR284; VAR294	**0.0000**

E. The Three Surveys Provide Significantly New Valuable Information

The research question we are attempting to answer in this section is:

- **Do the added information and hands-on experimentation provide additional value-added insights?**

As discussed in the previous chapter, 33 separate Single Variable Multiple Treatment ANOVA models were also run to test the individual questions among the three systems among the three groups (i.e., for each of the survey questions, if each of the three systems have similarities or differences among the pre-experiment less information, pre-experiment more information, and the post-experiment groups). Table 9 shows the statistically significant results from the

ANOVA models. Out of the 33 models, 16 show statistical significance at the $\alpha = 0.05$ level.

The main conclusions from the analysis are:

- **Direct-Controlled systems tend to benefit the most from the knowledge gained from additional information and hands-on experimentation.**
- **Remote Controlled systems tend to somewhat benefit from the knowledge gained from additional information and hands-on experimentation.**
- **Autonomous systems tend to benefit the least from the knowledge gained from additional information and hands-on experimentation, and in fact, the additional work performed contributes only added insights to 18% of the cases.**

Table 9. ANOVA Results II

Model	**P-Value**
ANOVA on VAR15; VAR115; VAR415	**0.0000**
ANOVA on VAR16; VAR116; VAR416	**0.0000**
ANOVA on VAR17; VAR117; VAR417	**0.0000**
ANOVA on VAR18; VAR118; VAR418	**0.0000**
ANOVA on VAR19; VAR119; VAR419	**0.0008**
ANOVA on VAR20; VAR120; VAR420	**0.0003**
ANOVA on VAR21; VAR121; VAR421	**0.0001**
ANOVA on VAR22; VAR122; VAR422	**0.0000**
ANOVA on VAR23; VAR123; VAR423	**0.0001**
ANOVA on VAR24; VAR124; VAR424	**0.0000**
ANOVA on VAR25; VAR125; VAR425	0.9065
ANOVA on VAR26; VAR126; VAR426	0.1378
ANOVA on VAR27; VAR127; VAR427	0.8325
ANOVA on VAR28; VAR128; VAR428	**0.0232**
ANOVA on VAR29; VAR129; VAR429	**0.0157**
ANOVA on VAR30; VAR130; VAR430	0.4783
ANOVA on VAR31; VAR131; VAR431	**0.0114**
ANOVA on VAR32; VAR132; VAR432	0.2256
ANOVA on VAR33; VAR133; VAR433	0.1102
ANOVA on VAR34; VAR134; VAR434	0.3337
ANOVA on VAR35; VAR135; VAR435	**0.0089**
ANOVA on VAR36; VAR136; VAR436	0.8973
ANOVA on VAR37; VAR137; VAR437	0.3700
ANOVA on VAR38; VAR138; VAR438	**0.0472**
ANOVA on VAR39; VAR139; VAR439	0.0843
ANOVA on VAR40; VAR140; VAR440	0.8850
ANOVA on VAR41; VAR141; VAR441	0.6999
ANOVA on VAR42; VAR142; VAR442	0.8385
ANOVA on VAR43; VAR143; VAR443	**0.0324**
ANOVA on VAR44; VAR144; VAR444	0.4305
ANOVA on VAR45; VAR145; VAR445	0.4985
ANOVA on VAR46; VAR146; VAR446	0.4633
ANOVA on VAR47; VAR147; VAR447	0.9063

F. The Three Systems Are Statistically Different with No Intervening Variables

The research question we are attempting to answer in this section is:

- **Will different users of the technology with different backgrounds affect the results? That is, are there any controllable or blocking variables that need additional attention?**

Using the ANOVA with Blocking Variables model, we see the results in Table 10. In the experiment, the active-duty military either had experience with similar technology or they did not. The ANOVA test is run with blocking or controlling the user background.

The main conclusion from the analysis is:

- **The treatment factor indicates that there are statistically significantly different results among the three systems, but whether a soldier has a technical background or not does not affect the results.**

Table 10. ANOVA With Randomized Blocks

Model Inputs:
VAR296; VAR297; VAR298
SUSA, SUSB, SUSC

ANOVA Randomized Blocks Multiple Treatments

	DF	SS	MS	F Stat	p-Value
Block Factor (Row)	18	4384.65	243.59	1.5282	0.1367
Treatment Factor (Column)	2	11369.96	5684.98	5.6650	**0.0000**
Error	36	5738.38	159.40		
Total	56	21492.98			

F Critical (Treatment) @ 0.10	2.456346
F Critical (Treatment) @ 0.05	3.259446
F Critical (Treatment) @ 0.01	5.247893
F Critical (Blocking) @ 0.10	1.645252
F Critical (Blocking) @ 0.05	1.898622
F Critical (Blocking) @ 0.01	2.479730

G. Nonparametric Kruskal–Wallis

The research question we are attempting to answer in this section is:

- **Does a nonparametric approach yield different results than a parametric model?**

Table 11 shows the results from the nonparametric Kruskal–Wallis test. As discussed, this test is the nonparametric equivalence of the ANOVA. It is used to confirm the results of the ANOVA.

The main conclusion from the analysis is:

- **Comparable to the ANOVA, the Kruskal–Wallis results show that out of the 43 models, the same 21 combinations have statistical significance.**

Table 11. ANOVA and Kruskal–Wallis Comparative Results I

VARIABLES TESTED	ANOVA:	K-W:
VAR20; VAR31; VAR42	0.0008	0.0008
VAR21; VAR32; VAR43	0.0903	0.0116
VAR120; VAR131; VAR142	0.0264	0.0057
VAR124; VAR135; VAR146	0.0362	0.0317
VAR229; VAR240; VAR251	0.0000	0.0000
VAR230; VAR241; VAR252	0.0000	0.0000
VAR231; VAR242; VAR253	0.0000	0.0000
VAR232; VAR243; VAR254	0.0002	0.0000
VAR233; VAR244; VAR255	0.0601	0.0851
VAR237; VAR248; VAR259	0.0004	0.0000
VAR238; VAR249; VAR260	0.0000	0.0000
VAR239; VAR250; VAR261	0.0000	0.0248
VAR266; VAR276; VAR286	0.0000	0.0000
VAR267; VAR277; VAR287	0.0285	0.0239
VAR268; VAR278; VAR288	0.0003	0.0022
VAR269; VAR279; VAR289	0.0020	0.0162
VAR270; VAR280; VAR290	0.0000	0.0000
VAR271; VAR281; VAR291	0.0000	0.0000
VAR272; VAR282; VAR292	0.0351	0.0208
VAR273; VAR283; VAR293	0.0002	0.0007
VAR274; VAR284; VAR294	0.0000	0.0000

Table 12 shows the additional results from the nonparametric Kruskal–Wallis test. Similar to the ANOVA, the Kruskal–Wallis shows that out of the 33 models, the same 16 combinations show statistical significance.

Table 12. ANOVA and Kruskal–Wallis Comparative Results II

	ANOVA	KW
ANOVA & KW on VAR15; VAR115; VAR415	0.0000	0.0000
ANOVA & KW on VAR16; VAR116; VAR416	0.0000	0.0000
ANOVA & KW on VAR17; VAR117; VAR417	0.0000	0.0000
ANOVA & KW on VAR18; VAR118; VAR418	0.0000	0.0000
ANOVA & KW on VAR19; VAR119; VAR419	0.0008	0.0015
ANOVA & KW on VAR20; VAR120; VAR420	0.0003	0.0000
ANOVA & KW on VAR21; VAR121; VAR421	0.0001	0.0003
ANOVA & KW on VAR22; VAR122; VAR422	0.0000	0.0000
ANOVA & KW on VAR23; VAR123; VAR423	0.0001	0.0000
ANOVA & KW on VAR24; VAR124; VAR424	0.0000	0.0000
ANOVA & KW on VAR28; VAR128; VAR428	0.0232	0.0128
ANOVA & KW on VAR29; VAR129; VAR429	0.0157	0.0127
ANOVA & KW on VAR31; VAR131; VAR431	0.0114	0.0085
ANOVA & KW on VAR35; VAR135; VAR435	0.0089	0.0008
ANOVA & KW on VAR38; VAR138; VAR438	0.0472	0.0631
ANOVA & KW on VAR43; VAR143; VAR443	0.0324	0.0614

H. The Data Is Reliable and Valid

The research question we are attempting to answer in this section is:

- **Are the collected data reliable and valid for the research?**

The Interrater Reliability Test with Interclass Correlation (ICC) tests were run to determine if the data received were statistically reliable (Table 13). As mentioned, the ICC tests the reliability of the users' ratings by comparing the variability of all the ratings of the same subject to the total variation across all ratings and all users simultaneously. A high ICC indicates a high level of reliability (Mun, 2018).

The main conclusions from the analysis are:

- **The data shows statistical significance, and we conclude that the collected data is reliable and valid for the research.**
- **The ICC ranges from 0.1581 to 0.3544 for the pre-experiment stage for both less and more information, compared to a range from 0.2200 to 0.6925 for the post experiment results. In other words, the more hands-on experimentation, the higher the validity of the collected data.**

Table 13. ICC and Reliability Analysis

Intercorrelation ICC Reliability Measures (ICC)

Pre-Experiment Less Info	ICC	P-value
A1:: VAR1:VAR14	0.3544	0.0000
A2:: VAR15:VAR25	0.2886	0.0000
A3:: VAR26:VAR36	0.2302	0.0000
A4:: VAR37:VAR47	0.2692	0.0000
A5:: VAR48:VAR51		

Pre-Experiment More Info	ICC	P-value
B1:: VAR101:VAR114	0.3207	0.0000
B2:: VAR115:VAR125	0.2568	0.0000
B3:: VAR126:VAR136	0.2528	0.0000
B4:: VAR137:VAR147	0.2975	0.0000
B5:: VAR148:VAR151	0.1581	0.0016

Post Experiment	ICC	P-value
VAR201:VAR214	0.5067	0.0000
VAR215:VAR228	0.4584	0.0000
VAR229:VAR239	0.6709	0.0000
VAR240:VAR250	0.2593	0.0000
VAR251:VAR261	0.2200	0.0000
VAR262:VAR265	0.3146	0.0000
VAR266:VAR275	0.6925	0.0000
VAR276:VAR285	0.2264	0.0000
VAR286:VAR295	0.2328	0.0000
VAR296:VAR298	0.6081	0.0000

I. The Systems Are Independent and Uncorrelated

The research question we are attempting to answer in this section is:

- **Are the three systems somehow correlated in terms of their value to the warfighter?**

Table 14 shows a sampling of the results from the linear and nonlinear correlation matrices. The main conclusion from the analysis is:

- **It seems that there is very little correlation among the three final scores of the systems.**

The results and conclusion make sense as there should be very little relationship among the Direct, Remote Controlled, and Autonomous systems, especially when they are tested independently and at different times.

Table 14. Linear and Nonlinear Correlation Matrix

```
Model Inputs:
VAR296; VAR297; VAR298
SUSA, SUSB, SUSC

Linear Correlation :

  1.000000   0.234553   0.279342;
  0.234553   1.000000   0.065035;
  0.279342   0.065035   1.000000;

Linear Correlation p-Value :

  0.000000   0.333765   0.246782;
  0.333765   0.000000   0.791381;
  0.246782   0.791381   0.000000;

Nonlinear Correlation :

  1.000000   0.206909   0.265491;
  0.206909   1.000000   0.090518;
  0.265491   0.090518   1.000000;
```

J. Each Level of Experimentation Yields Valuable Actionable Intelligence

The research questions we are attempting to answer in this section are:

- **Within each experimentation stage, are the three systems perceived to be different (Direct vs. Remote Controlled, Direct vs. Autonomous, and Remote Controlled vs. Autonomous systems)?**
- **Between the three levels of experimentation (Less Information, More Information, Live Experiments), are each of the subsections of the technology considered similar or different?**

Tables 15 and 16 show summaries of the results from the relevant T-tests and Mann–Whitney tests (MW). Table 15 shows the results that answer the first question, whereas Table 16 answers the second research question.

The main conclusions from the analysis are:

- **Within each experimentation stage, the three systems are indeed perceived to be different.**
    - **Direct vs. Autonomous shows the most amount of difference, regardless of the experimental stage.**

- A majority of the Direct vs. Remote Controlled and Remote Controlled vs. Autonomous systems also showed differences, although less than the Direct vs. Autonomous systems.

- **Between the three levels of experimentation (Less Information, More Information, Live Experiments), are each subsections of the technology were considered statistically different.**
    - **Live experimentation shows a significant difference in the information and knowledge gathered.**
    - **Live experimentation can be concluded to have significant value and insight.**
    - **The difference between Less Information and More Information without any hands-on experimentation is only limited. In other words, having additional information on paper without the ability to perform hands-on experimentation yields little difference and only minor benefits.**

Table 15. Parametric T-Test and Nonparametric Mann–Whitney Test I

Direct vs. Remote	T-Test p-value	MW p-value	Direct vs. Autonomous	T-Test p-value	MW p-value	Remote vs. Autonomous	T-Test p-value	MW p-value
VAR20; VAR31	0.4306	0.4388	VAR20; VAR42	**0.0008**	**0.0013**	VAR31; VAR42	**0.0011**	**0.0016**
VAR21; VAR32	0.1783	0.2914	VAR21; VAR43	**0.0146**	**0.0199**	VAR32; VAR43	0.1100	0.0782
VAR120; VAR131	0.1728	0.1584	VAR120; VAR142	**0.0025**	**0.0043**	VAR131; VAR142	**0.0442**	0.0684
VAR124; VAR135	**0.0069**	**0.0180**	VAR124; VAR146	**0.0496**	0.0902	VAR135; VAR146	0.1984	0.2030
VAR229; VAR240	**0.0008**	**0.0011**	VAR229; VAR251	**0.0000**	**0.0000**	VAR240; VAR251	**0.0469**	**0.0362**
VAR230; VAR241	**0.0000**	**0.0000**	VAR230; VAR252	**0.0000**	**0.0000**	VAR241; VAR252	0.3202	0.3413
VAR231; VAR242	**0.0000**	**0.0000**	VAR231; VAR253	**0.0000**	**0.0000**	VAR242; VAR253	0.0577	0.0626
VAR232; VAR243	**0.0000**	**0.0002**	VAR232; VAR254	**0.0000**	**0.0001**	VAR243; VAR254	0.1160	0.1336
VAR233; VAR244	0.1970	0.3795	VAR233; VAR255	**0.0064**	**0.0148**	VAR244; VAR255	0.0847	0.0722
VAR237; VAR248	**0.0211**	**0.0068**	VAR237; VAR259	**0.0000**	**0.0001**	VAR248; VAR259	**0.0207**	**0.0178**
VAR238; VAR249	**0.0010**	**0.0006**	VAR238; VAR260	**0.0000**	**0.0000**	VAR249; VAR260	**0.0126**	**0.0212**
VAR239; VAR250	0.3377	0.2651	VAR239; VAR261	0.4549	0.3521	VAR250; VAR261	0.3706	0.3851
VAR266; VAR276	**0.0012**	**0.0027**	VAR266; VAR286	**0.0000**	**0.0000**	VAR276; VAR286	**0.0007**	**0.0016**
VAR267; VAR277	**0.0461**	0.0994	VAR267; VAR287	**0.0015**	**0.0044**	VAR277; VAR287	0.1865	0.2195
VAR268; VAR278	0.1402	0.2110	VAR268; VAR288	**0.0001**	**0.0010**	VAR278; VAR288	**0.0037**	**0.0090**
VAR269; VAR279	0.3237	0.2919	VAR269; VAR289	**0.0006**	**0.0015**	VAR279; VAR289	**0.0036**	**0.0043**
VAR270; VAR280	**0.0007**	**0.0026**	VAR270; VAR290	**0.0000**	**0.0000**	VAR280; VAR290	0.1646	0.2060
VAR271; VAR281	**0.0000**	**0.0002**	VAR271; VAR291	**0.0000**	**0.0000**	VAR281; VAR291	**0.0008**	**0.0019**
VAR272; VAR282	0.3549	0.4883	VAR272; VAR292	**0.0070**	**0.0128**	VAR282; VAR292	**0.0305**	**0.0191**
VAR273; VAR283	0.4451	0.4362	VAR273; VAR293	**0.0001**	**0.0004**	VAR283; VAR293	**0.0001**	**0.0005**
VAR274; VAR284	**0.0048**	**0.0080**	VAR274; VAR294	**0.0000**	**0.0000**	VAR284; VAR294	**0.0034**	**0.0040**

Table 16. Parametric T-Test and Nonparametric Mann–Whitney Test II

Less Info vs. More Info	T-Test p-value	MW p-value	Less Info vs. Live Experiment	T-Test p-value	MW p-value	More Info vs. Live Experiment	T-Test p-value	MW p-value
VAR15; VAR115	0.2858	0.2593	VAR15; VAR415	**0.0000**	**0.0000**	VAR115; VAR415	**0.0000**	**0.0001**
VAR16; VAR116	0.3564	0.4038	VAR16; VAR416	**0.0000**	**0.0000**	VAR116; VAR416	**0.0000**	**0.0000**
VAR17; VAR117	0.2419	0.2438	VAR17; VAR417	**0.0000**	**0.0000**	VAR117; VAR417	**0.0000**	**0.0000**
VAR18; VAR118	0.2298	0.4038	VAR18; VAR418	**0.0000**	**0.0000**	VAR118; VAR418	**0.0000**	**0.0000**
VAR19; VAR119	0.0968	0.1094	VAR19; VAR419	**0.0037**	**0.0043**	VAR119; VAR419	**0.0005**	**0.0010**
VAR20; VAR120	0.4280	0.1704	VAR20; VAR420	**0.0000**	**0.0004**	VAR120; VAR420	**0.0000**	**0.0010**
VAR21; VAR121	0.3632	0.3711	VAR21; VAR421	**0.0000**	**0.0002**	VAR121; VAR421	**0.0000**	**0.0005**
VAR22; VAR122	0.4853	0.4227	VAR22; VAR422	**0.0000**	**0.0000**	VAR122; VAR422	**0.0000**	**0.0000**
VAR23; VAR123	0.1156	**0.0489**	VAR23; VAR423	**0.0012**	**0.0003**	VAR123; VAR423	**0.0000**	**0.0000**
VAR24; VAR124	0.0518	0.0610	VAR24; VAR424	**0.0000**	**0.0000**	VAR124; VAR424	**0.0000**	**0.0000**
VAR28; VAR128	**0.0148**	**0.0388**	VAR28; VAR428	**0.0078**	**0.0055**	VAR128; VAR428	**0.0271**	0.1005
VAR29; VAR129	**0.0102**	**0.0192**	VAR29; VAR429	**0.0059**	**0.0022**	VAR129; VAR429	0.1867	0.0515
VAR31; VAR131	0.1438	0.1420	VAR31; VAR431	**0.0016**	**0.0017**	VAR131; VAR431	**0.0362**	**0.0254**
VAR35; VAR135	**0.0383**	0.0771	VAR35; VAR435	**0.0032**	**0.0016**	VAR135; VAR435	0.0617	**0.0142**
VAR38; VAR138	0.0986	0.0883	VAR38; VAR438	**0.0130**	**0.0395**	VAR138; VAR438	0.0948	0.1769
VAR43; VAR143	0.1612	0.1650	VAR43; VAR443	**0.0085**	**0.0123**	VAR143; VAR443	**0.0484**	**0.0486**

K. Predictability Without Experimentation Is Very Limited

The research question we are attempting to answer in this section is:

- **Can the final outcome of a detailed experiment be predicted by performing some basic pre-experimental survey?**

If this research question is found to be predictable, this would save the DoD considerable amounts of time and expense. Results from detailed experimentation can be predicted from a basic preliminary review of the technology.

Table 17 shows a sampling of the results from a multivariate regression model. There is little to no statistical significance when using pre-experimental data to predict the outcomes of the post-experiment scores. Multiple linear and nonlinear interacting multivariate regressions were also run, and none seem to exhibit coefficients of determination greater than 50% and adjusted coefficients of determination greater than 25%.

Table 18 shows a principal component analysis and factor analysis result where the multiple variables were reduced further to see if there would be any improvements in the multivariate regression, but the results similarly indicate that there is very low predictive power in the pre-experimental results.

A traditional ordinary least squares multivariate regression also does not make too much sense in that there is no one-to-one correspondence among the data rows. That is, different active-duty military from the same unit were on the three experimental stages. This means that the responses of one soldier will not correspond to the same perception of another soldier testing another system during a different stage. This explains partly the low predictability of post-experimental results using pre-experiment data. Additional sophisticated methods such as bootstrapping the regression were performed where an empirical bootstrap of the data was nonparametrically simulated and bootstrapped, and then regression models were run. The process was repeated thousands of times. Tables 17 to 19 and Figures 17 and 18 illustrate the results. Only 9% to 12% of the time is a single variable considered statistically significant, and the goodness-of-fit predictability levels vary widely, from 18% to 95% depending on the specific issue under study. There seems to be no consistent and valid predictive power in the pre-experimental data. This was of course confirmed by the two-variable T-tests and Mann–Whitney tests shown previously where we do see that significant and valuable insights exist when hands-on experimentation is performed, which means without these experiments, paper-based cursory system knowledge is insufficient to identify the true value and risks of a system. The main conclusion is:

- **The final detailed experimental results cannot be sufficiently predicted using the pre-experimental survey, regardless of how much non-experimental paper-based information is provided to the user.**

Table 17. Limited Predictability with Linear and Nonlinear Multivariate Regression

```
Model Inputs:
VAR296 vs. VAR15; VAR16; VAR17; VAR18; VAR19; VAR20; VAR21; VAR22; VAR23; VAR24;
VAR25
SUSA vs. PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results
OVERALL FIT
Multiple R            0.85341      Maximum Log Likelihood           -52.79311
R-Square              0.72830      Akaike Info Criterion (AIC)        6.82033
Adjusted R-Square     0.30135      Bayes Schwarz Criterion (BSC)      7.41682
Standard Error        7.28268      Hannan-Quinn Criterion (HQC)       6.92128
Observations            19

                 Coeff      Std. Error     T-stat      P-value    Lower 5%    Upper 95%
Intercept      135.82272    26.21155      5.18179     0.00128    73.84226   197.80319
VAR X1          -1.78874     5.52795     -0.32358     0.75571   -14.86027    11.28279
VAR X2           0.02206     4.87473      0.00452     0.99652   -11.50484    11.54895
VAR X3         -13.67128     6.12796     -2.23097     0.06088   -28.16161     0.81904
VAR X4          -9.34621     6.28587     -1.48686     0.18065   -24.20993     5.51752
VAR X5          -1.40361     5.80732     -0.24170     0.81594   -15.13574    12.32853
VAR X6          -5.81092     3.63238     -1.59976     0.15369   -14.40012     2.77829
VAR X7          -2.34249     4.29174     -0.54581     0.60215   -12.49084     7.80587
VAR X8           1.71980     3.64092      0.47235     0.65105    -6.88960    10.32921
VAR X9          17.00398     5.38884      3.15541     0.01603     4.26140    29.74656
VAR X10          2.09003     3.88437      0.53806     0.60721    -7.09505    11.27512
VAR X11         -5.90165     2.22358     -2.65412     0.03275   -11.15957    -0.64372

ANOVA                    DF           SS            MS           F        p-Value
Regression               11         995.19         90.47      1.70580     0.24525
Residual                  7         371.26         53.04
Total                    18        1366.45


Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924
```

Table 18. Limited Use for Principal Component Analysis

```
Model Inputs:
VAR23:VAR33
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

* indicates negative values

Cum Proportions:

55.05%  75.51%  85.26%  90.59%  94.76%  96.74%  97.92%  98.97%  99.57%  99.87%  100.00%

Eigenvectors:

0.3537 *0.2475 *0.1379 *0.0953  0.1383 *0.3637 *0.0508 *0.4055  0.5314 *0.0935 *0.4195
0.3592 *0.2186  0.0260  0.1763  0.1098 *0.1431 *0.7667  0.1402 *0.1323  0.2344  0.2811

Eigenvalues (Arranged and Ranked):

6.0552  2.2509  1.0725  0.5861  0.4586  0.2184  0.1292  0.1157  0.0666  0.0320  0.0148
```

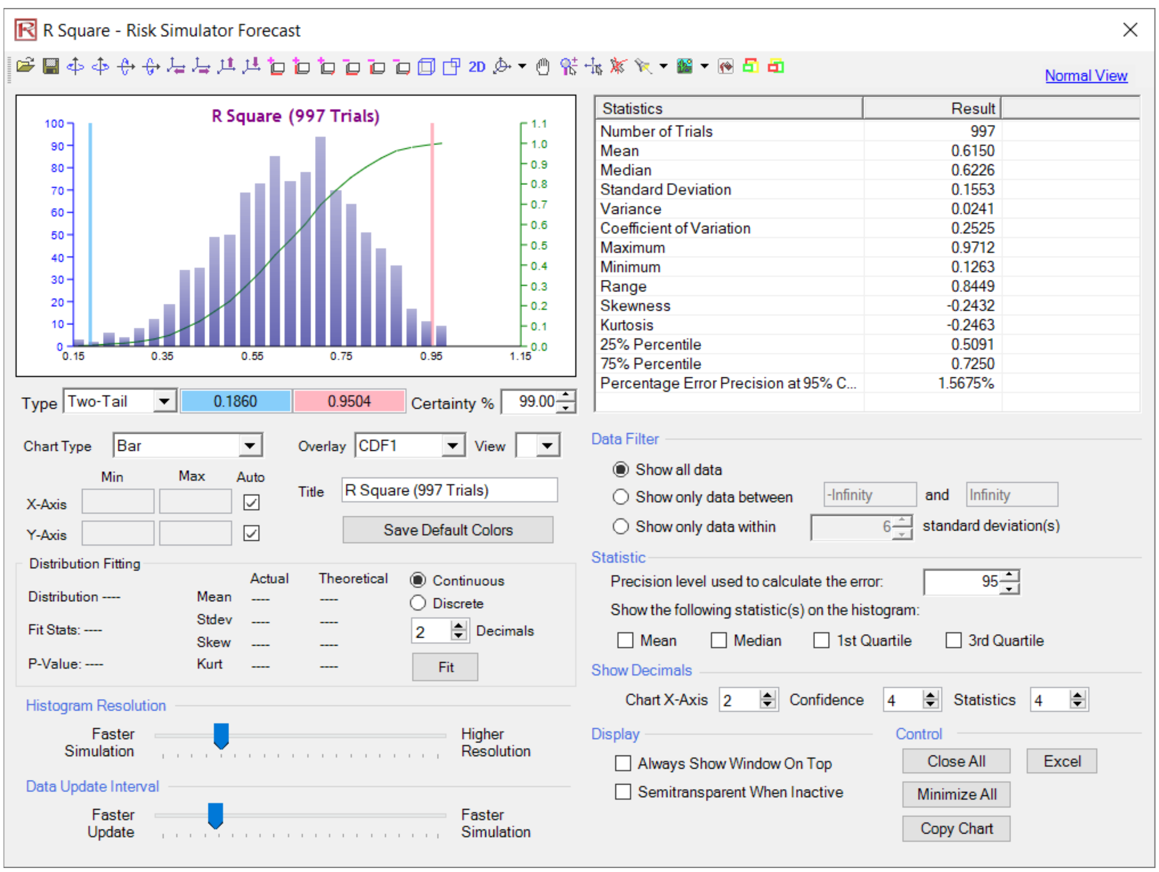

Figure 17. Bootstrap Regression I

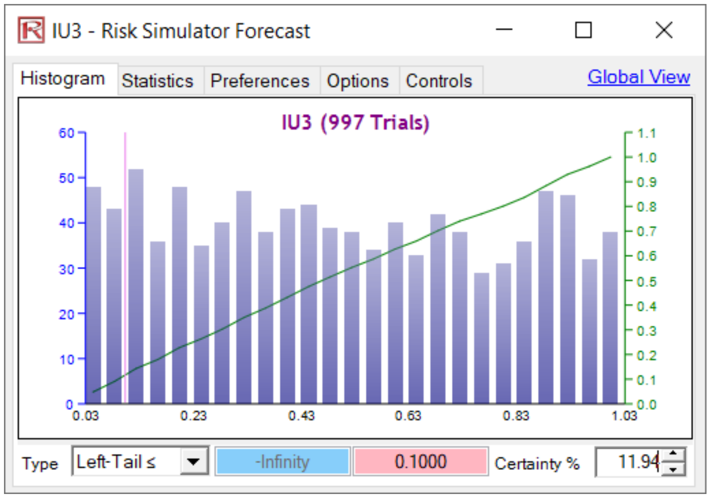

Figure 18. Bootstrap Regression II

Forecast Statistics Table (Bootstrap Regression)

Variable	IU1	IU2	IU3	PEOU1	PEOU2	PEOU3	PEOU4	PU1	PU2	PU3	PU4	R Square
Number of Datapoints	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Mean	0.5035	0.4958	0.4816	0.5066	0.4952	0.5217	0.5016	0.5064	0.5018	0.4944	0.5035	**0.6150**
Median	0.5132	0.4926	0.4652	0.5103	0.5026	0.5277	0.4935	0.5071	0.4971	0.4974	0.5057	**0.6226**
Standard Deviation	0.2886	0.2922	0.2931	0.2853	0.2899	0.2893	0.2867	0.2801	0.2862	0.2846	0.2917	0.1553
Variance	0.0833	0.0854	0.0859	0.0814	0.0840	0.0837	0.0822	0.0785	0.0819	0.0810	0.0851	2.41%
Coefficient of Variation	57.32%	58.94%	60.86%	56.32%	58.54%	55.46%	57.17%	55.32%	57.04%	57.57%	57.93%	0.2525
Maximum	1.0000	0.9974	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9712
Minimum	0.0021	0.0004	0.0004	0.0009	0.0005	0.0051	0.0003	0.0020	0.0009	0.0009	0.0005	0.1263
Range	0.9979	0.9970	0.9996	0.9991	0.9995	0.9949	0.9997	0.9980	0.9991	0.9991	0.9995	0.8449
Skewness	-0.0422	0.0362	0.0921	-0.0761	-0.0067	-0.0855	0.0071	0.0015	0.0005	0.0199	-0.0284	-0.2432
Kurtosis	-1.2087	-1.2455	-1.2177	-1.1780	-1.2168	-1.2010	-1.1436	-1.1199	-1.1846	-1.1535	-1.2117	-0.2463
25% Percentile	0.2408	0.2426	0.2211	0.2619	0.2352	0.2718	0.2533	0.2696	0.2630	0.2519	0.2550	0.5091
75% Percentile	0.7496	0.7566	0.7372	0.7596	0.7483	0.7652	0.7395	0.7330	0.7448	0.7325	0.7575	72.50%
Error Precision at 95%	3.56%	3.66%	3.78%	3.50%	3.63%	3.44%	3.55%	3.43%	3.54%	3.57%	3.60%	0.0157
5% Percentile	0.0463	0.0547	0.0409	0.0463	0.0443	0.0653	0.0459	0.0568	0.0501	0.0465	0.0430	0.3515
10% Percentile	0.1017	0.0985	0.0854	0.0986	0.0931	0.1071	0.1045	0.1205	0.1030	0.0985	0.0906	0.4041
20% Percentile	0.1984	0.1979	0.1840	0.2091	0.1917	0.2191	0.2021	0.2212	0.2137	0.2060	0.1933	0.4786
30% Percentile	0.3000	0.2837	0.2786	0.3223	0.2888	0.3305	0.3096	0.3198	0.3107	0.2929	0.2997	0.5361
40% Percentile	0.4165	0.3776	0.3701	0.4166	0.3913	0.4321	0.4187	0.4094	0.3993	0.3930	0.4010	0.5781
50% Percentile	0.5129	0.4914	0.4645	0.5098	0.5024	0.5260	0.4929	0.5062	0.4969	0.4962	0.5043	0.6224
60% Percentile	0.6109	0.5961	0.5733	0.6227	0.5969	0.6353	0.5875	0.6018	0.6012	0.5886	0.6142	0.6661
70% Percentile	0.7032	0.6981	0.6784	0.7089	0.6980	0.7279	0.6947	0.6931	0.7002	0.6800	0.7015	0.7013
80% Percentile	0.7940	0.8051	0.7959	0.7999	0.7913	0.8209	0.7956	0.7899	0.7930	0.7898	0.8053	0.7545
90% Percentile	0.8957	0.9014	0.8895	0.8876	0.8964	0.9119	0.9032	0.8988	0.9020	0.8868	0.9035	0.8156
95% Percentile	0.9418	0.9455	0.9498	0.9368	0.9448	0.9543	0.9536	0.9498	0.9419	0.9447	0.9570	0.8594
99% Percentile	0.9915	0.9894	0.9920	0.9912	0.9875	0.9914	0.9905	0.9923	0.9955	0.9914	0.9904	0.9344
Certainty Value 0.01	0.80%	1.40%	0.80%	1.10%	1.10%	0.40%	1.40%	1.20%	0.80%	1.30%	1.00%	
Certainty Value 0.05	5.52%	4.71%	6.32%	5.02%	5.52%	3.81%	5.22%	4.21%	4.81%	5.02%	5.52%	
Certainty Value 0.1	**9.83%**	**10.13%**	**11.94%**	**10.03%**	**10.73%**	**9.33%**	**9.53%**	**7.92%**	**9.83%**	**10.23%**	**10.93%**	

Figure 19. Bootstrap Regression III

VI. CONCLUSION

The topic of trust in technology is increasingly important to the DoD as outlined in the Defense Science Board Study on Autonomy (David & Nielsen, 2016) which states, “There is a need to build trust in autonomous systems while also improving the trustworthiness of autonomous capabilities. These are enablers that align RDT&E processes to more rapidly deliver autonomous capabilities to DoD missions”

This research tests theories of anthropomorphism and system hierarchy by manipulating system information to observe the impact on the formation of initial, reason-based technology trust. The dissertation answers the question of whether it is possible to predict and potentially capture trust in technology used for high-risk military applications. If a causal relationship exists between technology features and acceptance, it could greatly reduce the time and expense of adopting new technologies.

This work involves the introduction of novel ideas to existing theories that relate to the formation of trust. This research focuses on the impact of trust on the adoption of autonomous systems. We have established that trust involves a user assuming some level of risk. The only literature available on technology trust involves situations that expose users to insignificant levels of risk. We posit that our research conducted on technology used in high-risk military application will reveal causality not identified in previous trust research.

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VIII. Biography

Johnathan Mun, PhD, MBA, MS, BS, CQRM, CFC, FRM, MIFC

EDUCATION

Lehigh University, Doctor of Philosophy

Finance and Economics, 1998

Nova Southeastern University, Master of Business Administration

Business Management, 1995 (Summa Cum Laude)

University of Miami, Bachelor of Science

Biology and Physics, 1994 (Magna Cum Laude)

EXPERIENCE

2005–Present: Research Professor, Naval Postgraduate School,

Monterey, California

2005–Present: Chairman and CEO, Real Options Valuation, Inc., Dublin, California

2001–2010: Visiting Professor, University of Applied Sciences and

Swiss School of Management, Switzerland

2001–2004: Vice President of Analytics, Decisioneering-Oracle, Denver, Colorado

1999–2001: Senior Manager and Economist, KPMG Consulting, California

1998–2001: Adjunct Professor, Golden Gate University and

St. Mary's College, California

1998–1999: Manager, Viking, Inc. (FDX Corporation), California

PUBLISHED BOOKS

1. *Applied Analytical Project Management,* IIPER Press (2019).
2. *Applied Analytical Credit, Market, Operational, and Liquidity Risk,* IIPER Press (2019).
3. *Applied Analytical Quantitative Research Methods with ROV BizStats*, IIPER Press (2019).
4. *Applied Analytical Probability Distributions,* IIPER Press (2019).
5. *Applied Analytical Project Economic and Financial Evaluation*, IIPER Press (2019).
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2. "Deep Learning for Stock Market Trading: A Superior Trading Strategy?" Neural Network World (May 2019). [Coauthor: Timotej Jagric]
3. "Modeling and Analysis of Lifecycle and Total Ownership Cost," U.S. Naval Research Program and Acquisitions Research (Forthcoming in 2018).
4. "A Comparative Analysis of Advanced Methodologies to Improve the Acquisition of Information Technology in the Department of Defense for Optimal Risk Mitigation and Decision Support Systems to Avoid Cost and Schedule Overruns," U.S. Naval Research Program and Acquisitions Research (October 2019). [Coauthors: Thomas Housel, Ray Jones, and Ben Carlton]
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18. “Make or Buy: An Analysis of the Impacts of 3D Printing Operations, 3D Laser Scanning Technology, and Collaborative Product Lifecycle Management on Ship Maintenance and Modernization Cost Savings,” *Acquisitions Research*

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APPENDIX A. IRB AUTHORIZATION

As explained previously, pursuant to SECNAVINST 3900.39, NPS requires Institutional Review Board (IRB) approval for human-subjects research, as employed in this research. DoDI 3216.02 prohibits monetary compensation to federal employees as a method of participant coercion. This research did not provide monetary compensation in the research design or as a recruitment contrivance. Approval was obtained for this research and can be seen in Figure 20.

NPS IRB
HSR Determination Checklist
last updated: 1-22-19

Instructions: This form is to be completed by the IRB Chair or Vice-Chair when providing an official IRB determination on whether a proposed activity meets the federal definition of research with human subjects according to 32 CFR 219. After completing the form provide it to the IRB Administrator. The IRB Administrator will notify the investigators and file electronically.

Title of the Activity: **Technology Trust: The Impact of metrics on the adoption of autonomous systems used in high risk applications**

Department: **Information Science**

Principal Investigator: **Johnathan Mun**

Co-Investigators:

Student Researchers: **Michael Anderson**

Determination Criteria

		Yes	No
1.	**Is the activity research?** *For the activity to be research both (a) and (b) must be answered in the affirmative.*		
(a)	Is the activity a systematic investigation?	☒	☐
(b)	Is the activity designed to develop or contribute to generalizable knowledge?	☒	☐

If you have checked "no" to 1(a) or 1(b) skip to "IRB Determination" the activity does not meet the definition of human subject research.

		Yes	No
2.	***Does the activity involve the use of human subjects?*** *For the activity to involve human subjects (a) and [(b) or (c)] must be answered in the affirmative.*		
(a)	Is the activity designed to collect information about a living individual or use secondary information or biospecimens data about a living individual?	☐	☒
(b)	Does the activity involve interaction with a person or persons?	☐	☒
(c)	Does the activity involve the use of secondary information or biospecimens that are both private and personally identifiable?	☐	☒

The investigators plan to use secondary data collected by USMC. That USMC data collection activity was ruled not human subject research by the USMC IRB. The data to which the NPS investigators will have access does not contain data that are personally identifiable. Therefore, this present NPS activity is deemed not human subjects research.

IRB Determination

	Yes	No
The attached activity involves human subject research and require IRB and NPS President approval.	☐	☒

IRB Chair/Vice Chair: SHATTUCK.LAWRENCE.GEORG.1015756825 Digitally signed by SHATTUCK.LAWRENCE.GEORG.1015756825 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=SHATTUCK.LAWRENCE.GEORG.1015756825 Date: 2019.02.27 15:29:15 -08'00'

Date: 27 Feb 2019

Figure 20. IRB Authorization

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APPENDIX B. DATA ANALYTICS DETAILED RESULTS

This appendix provides the detailed analytical results of the experimental design survey data. The information is provided for the sake of completeness as well as to provide future researchers the opportunities to continue the work while being able to examine the results in more detail.

1. Hotelling

```
Model Inputs: VAR1; VAR2; VAR3; VAR4; VAR5; VAR6; VAR7; VAR8; VAR9; VAR10; VAR11; VAR12; VAR13; VAR14
VAR101; VAR102; VAR103; VAR104; VAR105; VAR106; VAR107; VAR108; VAR109; VAR110; VAR111; VAR112; VAR113; VAR114
HA1, HA2, HA3, HA4, AL1, AL2, AL3, AL4, AL5, LN1, LN2, LN3, LN4, LN5
HA1, HA2, HA3, HA4, AL1, AL2, AL3, AL4, AL5, LN1, LN2, LN3, LN4, LN5

Hotelling T-Square: Two Independent Variable
Equal Variance with Multiple Related Measures

Hotelling T2  18.04674
F Statistic   0.88033
P-value       0.58634

Null hypothesis tested is that there is zero difference between
all the related variables compared across the two groups.
```

Covariance GROUP 1

1.11067	0.05336	0.03360	0.39130	0.32609	-0.05336	-0.20158	0.09289	0.23518	0.24308	-0.24111	-0.05731	0.12846	0.03953
0.05336	0.58498	0.16798	0.22925	0.08498	0.14229	-0.14427	-0.03557	0.13043	0.16996	-0.02372	-0.05929	0.27866	-0.07510
0.03360	0.16798	0.40711	0.06522	-0.05929	0.15020	0.05731	0.14427	0.34980	0.19960	0.03557	0.17984	0.01383	0.06719
0.39130	0.22925	0.06522	0.52964	0.09289	0.04348	0.01779	0.23913	0.18379	0.09486	-0.03755	0.15613	0.22530	0.05534
0.32609	0.08498	-0.05929	0.09289	0.85771	0.32411	-0.00791	-0.35375	-0.00593	-0.01186	-0.34190	-0.19565	-0.13043	-0.16601
-0.05336	0.14229	0.15020	0.04348	0.32411	0.58498	0.18972	0.03557	0.36957	0.19368	0.16008	0.15020	0.03953	0.02964
-0.20158	-0.14427	0.05731	0.01779	-0.00791	0.18972	0.92885	0.45257	0.17391	0.16601	0.10474	0.55731	-0.12846	0.14229
0.09289	-0.03557	0.14427	0.23913	-0.35375	0.03557	0.45257	1.60474	0.41897	0.15613	0.22134	0.82609	0.30830	0.18577
0.23518	0.13043	0.34980	0.18379	-0.00593	0.36957	0.17391	0.41897	0.94862	0.44269	0.06719	0.39526	0.09684	0.19763
0.24308	0.16996	0.19960	0.09486	-0.01186	0.19368	0.16601	0.15613	0.44269	0.61265	0.22530	0.33597	0.10277	0.03162
-0.24111	-0.02372	0.03557	-0.03755	-0.34190	0.16008	0.10474	0.22134	0.06719	0.22530	1.26877	0.30830	0.02372	-0.11858
-0.05731	-0.05929	0.17984	0.15613	-0.19565	0.15020	0.55731	0.82609	0.39526	0.33597	0.30830	1.04348	0.05929	0.20356
0.12846	0.27866	0.01383	0.22530	-0.13043	0.03953	-0.12846	0.30830	0.09684	0.10277	0.02372	0.05929	0.67589	0.25692
0.03953	-0.07510	0.06719	0.05534	-0.16601	0.02964	0.14229	0.18577	0.19763	0.03162	-0.11858	0.20356	0.25692	0.44269

Covariance GROUP 2

0.82895	0.21053	0.10526	0.03947	0.43421	-0.10526	-0.07895	0.34211	0.03947	0.14474	-0.27632	0.15789	0.18421	0.18421
0.21053	0.67368	0.18947	0.16842	0.17895	0.11579	-0.62105	0.14737	-0.06316	-0.20000	0.03158	0.10526	0.02105	0.00000
0.10526	0.18947	0.80000	-0.08421	-0.06316	0.17895	-0.40000	0.03158	0.24211	0.07368	-0.04211	0.00000	-0.16842	0.05263
0.03947	0.16842	-0.08421	0.55526	0.15000	0.04211	-0.08947	0.35263	-0.05526	0.02895	0.11316	0.10526	0.05789	-0.02632
0.43421	0.17895	-0.06316	0.15000	1.10263	-0.17895	-0.20526	0.78421	-0.01842	0.20263	0.37105	0.57895	-0.17368	-0.13158
-0.10526	0.11579	0.17895	0.04211	-0.17895	1.09474	0.14737	0.32632	0.16842	0.25263	0.33684	0.26316	-0.07368	-0.05263
-0.07895	-0.62105	-0.40000	-0.08947	-0.20526	0.14737	1.04211	0.01053	-0.01579	0.33158	-0.11053	0.10526	0.13684	0.10526
0.34211	0.14737	0.03158	0.35263	0.78421	0.32632	0.01053	1.67368	0.17368	0.24737	0.68947	0.94737	-0.40000	-0.26316
0.03947	-0.06316	0.24211	-0.05526	-0.01842	0.16842	-0.01579	0.17368	0.55526	-0.05526	0.07105	0.15789	-0.26842	0.07895
0.14474	-0.20000	0.07368	0.02895	0.20263	0.25263	0.33158	0.24737	-0.05526	0.55526	0.06053	0.21053	0.05789	0.07895
-0.27632	0.03158	-0.04211	0.11316	0.37105	0.33684	-0.11053	0.68947	0.07105	0.06053	1.20789	0.73684	-0.40526	-0.23684
0.15789	0.10526	0.00000	0.10526	0.57895	0.26316	0.10526	0.94737	0.15789	0.21053	0.73684	1.15789	-0.26316	0.00000
0.18421	0.02105	-0.16842	0.05789	-0.17368	-0.07368	0.13684	-0.40000	-0.26842	0.05789	-0.40526	-0.26316	0.64211	0.26316
0.18421	0.00000	0.05263	-0.02632	-0.13158	-0.05263	0.10526	-0.26316	0.07895	0.07895	-0.23684	0.00000	0.26316	0.47368

Covariance POOLED

0.98012	0.12619	0.06681	0.22826	0.37619	-0.07741	-0.14475	0.20838	0.14449	0.19751	-0.25742	0.04242	0.15429	0.10657
0.12619	0.62609	0.17794	0.20106	0.12853	0.13001	-0.36522	0.04920	0.04072	-0.00148	0.00191	0.01697	0.15928	-0.04030

0.06681	0.17794	0.58918	-0.00403	-0.06108	0.16352	-0.15461	0.09205	0.29989	0.14125	-0.00042	0.09650	-0.07063	0.06045
0.22826	0.20106	-0.00403	0.54152	0.11935	0.04284	-0.03192	0.29173	0.07301	0.06432	0.03229	0.13256	0.14772	0.01750
0.37619	0.12853	-0.06108	0.11935	0.97121	0.09099	-0.09936	0.17359	-0.01172	0.08754	-0.01151	0.16331	-0.15048	-0.15005
-0.07741	0.13001	0.16352	0.04284	0.09099	0.82121	0.17010	0.17031	0.27635	0.22100	0.24199	0.20255	-0.01294	-0.00848
-0.14475	-0.36522	-0.15461	-0.03192	-0.09936	0.17010	0.98134	0.24772	0.08600	0.24274	0.00498	0.34783	-0.00551	0.12513
0.20838	0.04920	0.09205	0.29173	0.17359	0.17031	0.24772	1.63669	0.30530	0.19841	0.43828	0.88229	-0.01994	-0.02227
0.14449	0.04072	0.29989	0.07301	-0.01172	0.27635	0.08600	0.30530	0.76633	0.21193	0.06898	0.28526	-0.07243	0.14263
0.19751	-0.00148	0.14125	0.06432	0.08754	0.22100	0.24274	0.19841	0.21193	0.58606	0.14894	0.27784	0.08197	0.05355
-0.25742	0.00191	-0.00042	0.03229	-0.01151	0.24199	0.00498	0.43828	0.06898	0.14894	1.24056	0.50689	-0.17508	-0.17338
0.04242	0.01697	0.09650	0.13256	0.16331	0.20255	0.34783	0.88229	0.28526	0.27784	0.50689	1.09650	-0.09014	0.10923
0.15429	0.15928	-0.07063	0.14772	-0.15048	-0.01294	-0.00551	-0.01994	-0.07243	0.08197	-0.17508	-0.09014	0.66023	0.25981
0.10657	-0.04030	0.06045	0.01750	-0.15005	-0.00848	0.12513	-0.02227	0.14263	0.05355	-0.17338	0.10923	0.25981	0.45705

Model Inputs:
VAR15; VAR16; VAR17; VAR18; VAR19; VAR20; VAR21; VAR22; VAR23; VAR24; VAR25
VAR115; VAR116; VAR117; VAR118; VAR119; VAR120; VAR121; VAR122; VAR123; VAR124; VAR125
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Hotelling T-Square: Two Independent Variable
Equal Variance with Multiple Related Measures

Hotelling T2 8.98333
F Statistic 0.61748
P-value 0.79980

Null hypothesis tested is that there is zero difference between
all the related variables compared across the two groups.

Covariance GROUP 1

0.96838	0.67391	0.70158	0.39130	0.43874	0.31818	0.32411	0.38933	0.95257	0.63834	0.12055
0.67391	0.77075	0.52767	0.30237	0.22332	0.13636	0.17194	0.33597	0.66996	0.46640	0.08696
0.70158	0.52767	0.88538	0.40316	0.46443	0.13636	0.13834	0.38735	0.80237	0.47036	0.19170
0.39130	0.30237	0.40316	0.60079	0.33202	0.00000	-0.03360	0.18775	0.54150	0.50395	0.01383
0.43874	0.22332	0.46443	0.33202	0.44664	0.13636	0.02569	0.21739	0.56719	0.34190	0.12846
0.31818	0.13636	0.13636	0.00000	0.13636	0.72727	0.18182	0.31818	0.45455	0.22727	0.13636
0.32411	0.17194	0.13834	-0.03360	0.02569	0.18182	0.45059	0.22530	0.25889	0.15020	-0.06522
0.38933	0.33597	0.38735	0.18775	0.21739	0.31818	0.22530	0.61265	0.47036	0.30237	0.12648
0.95257	0.66996	0.80237	0.54150	0.56719	0.45455	0.25889	0.47036	1.29249	0.75296	0.38538
0.63834	0.46640	0.47036	0.50395	0.34190	0.22727	0.15020	0.30237	0.75296	0.83794	0.16008
0.12055	0.08696	0.19170	0.01383	0.12846	0.13636	-0.06522	0.12648	0.38538	0.16008	1.26482

Covariance GROUP 2

1.08158	0.33421	0.30526	0.79737	0.58947	0.22895	0.31053	0.30526	0.55000	0.61053	-0.26579
0.33421	0.57632	0.13684	0.34474	0.02105	0.05000	0.33158	0.24211	0.29737	0.32632	0.21842
0.30526	0.13684	0.98947	0.38947	0.06316	-0.38947	0.38947	0.25263	0.48421	0.50526	0.01053
0.79737	0.34474	0.38947	0.99737	0.45263	0.18684	0.24737	0.23158	0.62368	0.67368	-0.08684
0.58947	0.02105	0.06316	0.45263	0.77895	0.49474	0.08421	0.22105	0.09474	0.28421	-0.27368

0.22895	0.05000	-0.38947	0.18684	0.49474	0.89211	-0.03684	0.24211	-0.12368	0.06316	0.00789
0.31053	0.33158	0.38947	0.24737	0.08421	-0.03684	0.74737	0.38947	0.47895	0.35789	0.37368
0.30526	0.24211	0.25263	0.23158	0.22105	0.24211	0.38947	0.56842	0.32632	0.34737	0.11579
0.55000	0.29737	0.48421	0.62368	0.09474	-0.12368	0.47895	0.32632	0.87105	0.65263	0.26579
0.61053	0.32632	0.50526	0.67368	0.28421	0.06316	0.35789	0.34737	0.65263	0.80000	0.17895
-0.26579	0.21842	0.01053	-0.08684	-0.27368	0.00789	0.37368	0.11579	0.26579	0.17895	1.50263

Covariance POOLED

1.02084	0.51649	0.51792	0.57948	0.50859	0.27683	0.31782	0.35037	0.76601	0.62545	-0.05848
0.51649	0.68065	0.34655	0.32200	0.12959	0.09634	0.24592	0.29247	0.49730	0.40148	0.14788
0.51792	0.34655	0.93362	0.39682	0.27847	-0.10732	0.25472	0.32492	0.65493	0.48653	0.10774
0.57948	0.32200	0.39682	0.78457	0.38791	0.08659	0.09661	0.20806	0.57959	0.58261	-0.03282
0.50859	0.12959	0.27847	0.38791	0.60064	0.30244	0.05281	0.21909	0.34825	0.31516	-0.05790
0.27683	0.09634	-0.10732	0.08659	0.30244	0.80366	0.08049	0.28293	0.18659	0.15122	0.07683
0.31782	0.24592	0.25472	0.09661	0.05281	0.08049	0.58812	0.30138	0.36087	0.24645	0.13818
0.35037	0.29247	0.32492	0.20806	0.21909	0.28293	0.30138	0.59215	0.40361	0.32322	0.12153
0.76601	0.49730	0.65493	0.57959	0.34825	0.18659	0.36087	0.40361	1.09719	0.70647	0.32996
0.62545	0.40148	0.48653	0.58261	0.31516	0.15122	0.24645	0.32322	0.70647	0.82036	0.16882
-0.05848	0.14788	0.10774	-0.03282	-0.05790	0.07683	0.13818	0.12153	0.32996	0.16882	1.37503

Model Inputs:
VAR26; VAR27; VAR28; VAR29; VAR30; VAR31; VAR32; VAR33; VAR34; VAR35; VAR36
VAR126; VAR127; VAR128; VAR129; VAR130; VAR131; VAR132; VAR133; VAR134; VAR135; VAR136
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Hotelling T-Square: Two Independent Variable
Equal Variance with Multiple Related Measures

Hotelling T2 16.90438
F Statistic 1.16194
P-value 0.35151

Null hypothesis tested is that there is zero difference between
all the related variables compared across the two groups.

Covariance GROUP 1

0.71146	0.54348	0.28063	0.21542	0.23913	0.06522	0.34783	0.17984	0.60079	0.22727	0.31818
0.54348	0.76680	0.06917	0.05534	0.26285	0.10474	0.45257	0.22134	0.30237	0.00000	0.22727
0.28063	0.06917	0.54150	0.50593	-0.00593	-0.10079	0.14427	0.06917	0.29051	0.50000	0.18182
0.21542	0.05534	0.50593	0.69565	0.07708	-0.00791	0.26087	0.19170	0.31423	0.59091	0.27273
0.23913	0.26285	-0.00593	0.07708	0.33202	0.09881	0.23913	0.17194	0.36759	0.09091	0.09091
0.06522	0.10474	-0.10079	-0.00791	0.09881	0.67984	0.01976	0.05929	-0.06917	-0.09091	0.18182
0.34783	0.45257	0.14427	0.26087	0.23913	0.01976	0.80237	0.49802	0.46443	0.09091	0.13636
0.17984	0.22134	0.06917	0.19170	0.17194	0.05929	0.49802	0.58498	0.43874	0.18182	0.22727
0.60079	0.30237	0.29051	0.31423	0.36759	-0.06917	0.46443	0.43874	1.44269	0.59091	0.63636
0.22727	0.00000	0.50000	0.59091	0.09091	-0.09091	0.09091	0.18182	0.59091	0.81818	0.40909
0.31818	0.22727	0.18182	0.27273	0.09091	0.18182	0.13636	0.22727	0.63636	0.40909	1.45455

Covariance GROUP 2

0.45000	0.23947	0.26842	0.38158	0.29211	0.00263	0.07368	0.08684	0.33684	0.12368	0.01579
0.23947	0.45000	0.32105	0.27632	0.18684	0.00263	0.12632	0.08684	0.33684	0.22895	-0.03684
0.26842	0.32105	0.43158	0.34211	0.21579	-0.04737	0.09474	0.06842	0.41053	0.30000	-0.23158
0.38158	0.27632	0.34211	0.51316	0.32895	0.09211	0.10526	0.09211	0.36842	0.17105	-0.23684
0.29211	0.18684	0.21579	0.32895	0.55526	0.37105	0.23158	0.19211	0.17895	0.17632	-0.08947
0.00263	0.00263	-0.04737	0.09211	0.37105	1.08158	0.02105	0.16579	0.02105	-0.06053	-0.35263
0.07368	0.12632	0.09474	0.10526	0.23158	0.02105	0.37895	0.16842	0.11579	0.25263	0.17895
0.08684	0.08684	0.06842	0.09211	0.19211	0.16579	0.16842	0.26053	0.16842	0.21316	-0.05789
0.33684	0.33684	0.41053	0.36842	0.17895	0.02105	0.11579	0.16842	0.69474	0.35789	0.07368
0.12368	0.22895	0.30000	0.17105	0.17632	-0.06053	0.25263	0.21316	0.35789	0.47105	0.00526
0.01579	-0.03684	-0.23158	-0.23684	-0.08947	-0.35263	0.17895	-0.05789	0.07368	0.00526	2.30526

Covariance POOLED

0.59030	0.40260	0.27497	0.29242	0.26368	0.03621	0.22078	0.13674	0.47847	0.17927	0.17805
0.40260	0.61999	0.18590	0.15774	0.22762	0.05742	0.30138	0.15901	0.31835	0.10610	0.10488
0.27497	0.18590	0.49056	0.43001	0.09682	-0.07603	0.12131	0.06882	0.34613	0.40732	-0.00976
0.29242	0.15774	0.43001	0.61108	0.19380	0.03844	0.18876	0.14555	0.33934	0.39634	0.03659
0.26368	0.22762	0.09682	0.19380	0.43547	0.22497	0.23563	0.18128	0.28017	0.13049	0.00732
0.03621	0.05742	-0.07603	0.03844	0.22497	0.86601	0.02036	0.10864	-0.02736	-0.07683	-0.06585
0.22078	0.30138	0.12131	0.18876	0.23563	0.02036	0.60615	0.34528	0.30286	0.16585	0.15610
0.13674	0.15901	0.06882	0.14555	0.18128	0.10864	0.34528	0.43462	0.31347	0.19634	0.09512
0.47847	0.31835	0.34613	0.33934	0.28017	-0.02736	0.30286	0.31347	1.09608	0.48293	0.37561
0.17927	0.10610	0.40732	0.39634	0.13049	-0.07683	0.16585	0.19634	0.48293	0.65732	0.22195
0.17805	0.10488	-0.00976	0.03659	0.00732	-0.06585	0.15610	0.09512	0.37561	0.22195	1.84878

Model Inputs:
VAR37; VAR38; VAR39; VAR40; VAR41; VAR42; VAR43; VAR44; VAR45; VAR46; VAR47
VAR137; VAR138; VAR139; VAR140; VAR141; VAR142; VAR143; VAR144; VAR145; VAR146; VAR147
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Hotelling T-Square: Two Independent Variable
Equal Variance with Multiple Related Measures

Hotelling T2 20.82888
F Statistic 1.43170
P-value 0.20840

Null hypothesis tested is that there is zero difference between
all the related variables compared across the two groups.

Covariance GROUP 1

0.70356	0.21739	0.52569	0.56917	-0.09091	-0.01779	0.27075	0.09486	0.37747	0.34387	0.03755
0.21739	0.53755	0.12055	0.23715	0.00000	0.00395	0.02569	0.22134	0.18379	0.21146	-0.07905
0.52569	0.12055	0.69565	0.56522	-0.18182	-0.26482	0.05138	0.16996	0.36759	0.37747	0.16008
0.56917	0.23715	0.56522	0.88538	0.00000	0.01779	0.32016	0.31423	0.66798	0.65613	0.00791
-0.09091	0.00000	-0.18182	0.00000	0.54545	0.22727	0.18182	0.22727	0.31818	0.22727	-0.13636
-0.01779	0.00395	-0.26482	0.01779	0.22727	1.13439	0.41897	0.52569	0.47628	0.09881	-0.50593
0.27075	0.02569	0.05138	0.32016	0.18182	0.41897	0.99605	0.18972	0.39130	0.27866	-0.15217
0.09486	0.22134	0.16996	0.31423	0.22727	0.52569	0.18972	1.07510	0.53557	0.39723	0.03162
0.37747	0.18379	0.36759	0.66798	0.31818	0.47628	0.39130	0.53557	1.35178	0.77668	0.01976
0.34387	0.21146	0.37747	0.65613	0.22727	0.09881	0.27866	0.39723	0.77668	0.78656	0.11462
0.03755	-0.07905	0.16008	0.00791	-0.13636	-0.50593	-0.15217	0.03162	0.01976	0.11462	1.39130

Covariance GROUP 2

0.48421	0.32632	0.33684	0.22105	0.01053	0.07368	-0.10526	-0.05263	0.23158	0.31579	0.24211

0.32632	0.48421	0.44211	0.27368	0.11579	0.07368	-0.15789	0.15789	0.17895	0.31579	0.24211
0.33684	0.44211	0.66053	0.29737	0.17895	0.13421	-0.18421	0.13158	0.25263	0.35526	0.35263
0.22105	0.27368	0.29737	0.47105	0.16842	0.13947	-0.02632	-0.02632	0.38947	0.38158	-0.15263
0.01053	0.11579	0.17895	0.16842	0.69474	0.28421	0.21053	0.26316	0.02105	0.15789	-0.07368
0.07368	0.07368	0.13421	0.13947	0.28421	0.55526	0.23684	0.13158	0.20000	0.30263	-0.06842
-0.10526	-0.15789	-0.18421	-0.02632	0.21053	0.23684	0.68421	0.15789	-0.10526	-0.13158	-0.26316
-0.05263	0.15789	0.13158	-0.02632	0.26316	0.13158	0.15789	0.68421	-0.10526	0.02632	0.21053
0.23158	0.17895	0.25263	0.38947	0.02105	0.20000	-0.10526	-0.10526	0.77895	0.42105	-0.20000
0.31579	0.31579	0.35526	0.38158	0.15789	0.30263	-0.13158	0.02632	0.42105	0.61842	0.07895
0.24211	0.24211	0.35263	-0.15263	-0.07368	-0.06842	-0.26316	0.21053	-0.20000	0.07895	1.35789

Covariance POOLED

0.60191	0.26787	0.43818	0.40785	-0.04390	0.02460	0.09650	0.02651	0.30986	0.33086	0.13234
0.26787	0.51283	0.26957	0.25408	0.05366	0.03627	-0.05938	0.19194	0.18155	0.25981	0.06978
0.43818	0.26957	0.67937	0.44109	-0.01463	-0.07990	-0.05779	0.15217	0.31432	0.36718	0.24931
0.40785	0.25408	0.44109	0.69337	0.07805	0.07418	0.15960	0.15642	0.53892	0.52890	-0.06649
-0.04390	0.05366	-0.01463	0.07805	0.61463	0.25366	0.19512	0.24390	0.18049	0.19512	-0.10732
0.02460	0.03627	-0.07990	0.07418	0.25366	0.86601	0.33457	0.34305	0.34825	0.19327	-0.30318
0.09650	-0.05938	-0.05779	0.15960	0.19512	0.33457	0.85154	0.17497	0.16119	0.08855	-0.20361
0.02651	0.19194	0.15217	0.15642	0.24390	0.34305	0.17497	0.89396	0.23860	0.22534	0.11453
0.30986	0.18155	0.31432	0.53892	0.18049	0.34825	0.16119	0.23860	1.08632	0.61188	-0.08208
0.33086	0.25981	0.36718	0.52890	0.19512	0.19327	0.08855	0.22534	0.61188	0.70864	0.09809
0.13234	0.06978	0.24931	-0.06649	-0.10732	-0.30318	-0.20361	0.11453	-0.08208	0.09809	1.37582

Model Inputs:
VAR48; VAR49; VAR50; VAR51
VAR148; VAR149; VAR150; VAR151
C1, C2, C3, C4
C1, C2, C3, C4

Hotelling T-Square: Two Independent Variable
Equal Variance with Multiple Related Measures

Hotelling T2 2.31670
F Statistic 0.53680
P-value 0.70953

Null hypothesis tested is that there is zero difference between
all the related variables compared across the two groups.

Covariance GROUP 1

1.69170	1.05336	0.65810	0.65613
1.05336	1.53360	0.76285	0.69763
0.65810	0.76285	0.80237	0.45257

```
   0.65613       0.69763       0.45257       0.58498

Covariance GROUP 2
   1.41053       0.25263       0.13684       0.09474
   0.25263       0.55526       0.22895       0.21316
   0.13684       0.22895       0.36579       -0.00789
   0.09474       0.21316       -0.00789      0.55526
Covariance POOLED
   1.56140       0.68229       0.41654       0.39597
   0.68229       1.08022       0.51543       0.47312
   0.41654       0.51543       0.60005       0.23918
   0.39597       0.47312       0.23918       0.57121
------------------------------------------------------------

Model Inputs:
VAR52; VAR53; VAR54
VAR152; VAR153; VAR154
D1, D2, D3
D1, D2, D3

Hotelling T-Square: Two Independent Variable
Equal Variance with Multiple Related Measures


Hotelling T2  2.85372
F Statistic   0.90484
P-value       0.44753

Null hypothesis tested is that there is zero difference between
all the related variables compared across the two groups.


Covariance GROUP 1
   0.00000       0.00000       0.00000
   0.00000       15.56621      13.61660
   0.00000       13.61660      17.73419


Covariance GROUP 2
   0.23947       -0.26711      -1.00395
   -0.26711      9.35461       10.39408
   -1.00395      10.39408      15.11776
```

Covariance POOLED

0.11098	-0.12378	-0.46524
-0.12378	12.68766	12.12324
-0.46524	12.12324	16.52170

Hotelling T-Square: Two Independent Variable Equal Variance with Multiple Related Measures
Hotelling T2 139.29684
F Statistic 9.49751
P-value 0.00000

HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR15:VAR25 # VAR415:VAR425)
Null hypothesis tested is that there is zero difference between all the related variables compared across the two groups.

Covariance GROUP 1

0.96838	0.67391	0.70158	0.39130	0.43874	0.31818	0.32411	0.38933	0.95257	0.63834	0.12055
0.67391	0.77075	0.52767	0.30237	0.22332	0.13636	0.17194	0.33597	0.66996	0.46640	0.08696
0.70158	0.52767	0.88538	0.40316	0.46443	0.13636	0.13834	0.38735	0.80237	0.47036	0.19170
0.39130	0.30237	0.40316	0.60079	0.33202	0.00000	-0.03360	0.18775	0.54150	0.50395	0.01383
0.43874	0.22332	0.46443	0.33202	0.44664	0.13636	0.02569	0.21739	0.56719	0.34190	0.12846
0.31818	0.13636	0.13636	0.00000	0.13636	0.72727	0.18182	0.31818	0.45455	0.22727	0.13636
0.32411	0.17194	0.13834	-0.03360	0.02569	0.18182	0.45059	0.22530	0.25889	0.15020	-0.06522
0.38933	0.33597	0.38735	0.18775	0.21739	0.31818	0.22530	0.61265	0.47036	0.30237	0.12648
0.95257	0.66996	0.80237	0.54150	0.56719	0.45455	0.25889	0.47036	1.29249	0.75296	0.38538
0.63834	0.46640	0.47036	0.50395	0.34190	0.22727	0.15020	0.30237	0.75296	0.83794	0.16008
0.12055	0.08696	0.19170	0.01383	0.12846	0.13636	-0.06522	0.12648	0.38538	0.16008	1.26482

Covariance GROUP 2

0.09942	0.04971	0.04971	0.04971	0.11404	0.00585	0.02047	0.00877	0.24854	0.09357	0.08187
0.04971	0.05263	-0.00292	-0.00292	0.02924	0.00292	-0.01754	-0.02339	0.09649	-0.00877	0.04094
0.04971	-0.00292	0.05263	0.05263	0.08480	0.00292	0.03801	0.03216	0.15205	0.10234	0.04094
0.04971	-0.00292	0.05263	0.05263	0.08480	0.00292	0.03801	0.03216	0.15205	0.10234	0.04094
0.11404	0.02924	0.08480	0.08480	0.37427	0.19298	0.11988	0.23392	0.31287	0.19883	0.25731
0.00585	0.00292	0.00292	0.00292	0.19298	0.60819	0.01754	0.19006	0.01462	0.06433	-0.15205
0.02047	-0.01754	0.03801	0.03801	0.11988	0.01754	0.33918	0.24854	0.07895	0.11404	-0.08772
0.00877	-0.02339	0.03216	0.03216	0.23392	0.19006	0.24854	0.36842	0.04971	0.09649	-0.00585
0.24854	0.09649	0.15205	0.15205	0.31287	0.01462	0.07895	0.04971	0.64912	0.28947	0.20468
0.09357	-0.00877	0.10234	0.10234	0.19883	0.06433	0.11404	0.09649	0.28947	0.25146	0.01170
0.08187	0.04094	0.04094	0.04094	0.25731	-0.15205	-0.08772	-0.00585	0.20468	0.01170	2.31579

Covariance POOLED

0.57735	0.39302	0.40824	0.23759	0.29262	0.17763	0.18747	0.21808	0.63576	0.39319	0.10315
0.39302	0.44760	0.28890	0.16499	0.13598	0.07632	0.08667	0.17426	0.41190	0.25257	0.06625
0.40824	0.28890	0.51064	0.24542	0.29359	0.07632	0.09319	0.22752	0.50973	0.30475	0.12386
0.23759	0.16499	0.24542	0.35412	0.22077	0.00132	-0.00137	0.11773	0.36625	0.32323	0.02603
0.29262	0.13598	0.29359	0.22077	0.41407	0.16184	0.06808	0.22483	0.45275	0.27752	0.18644
0.17763	0.07632	0.07632	0.00132	0.16184	0.67368	0.10789	0.26053	0.25658	0.15395	0.00658
0.18747	0.08667	0.09319	-0.00137	0.06808	0.10789	0.40046	0.23576	0.17792	0.13392	-0.07534
0.21808	0.17426	0.22752	0.11773	0.22483	0.26053	0.23576	0.50275	0.28106	0.20973	0.06693
0.63576	0.41190	0.50973	0.36625	0.45275	0.25658	0.17792	0.28106	1.00297	0.54439	0.30406

0.39319	0.25257	0.30475	0.32323	0.27752	0.15395	0.13392	0.20973	0.54439	0.57403	0.09331
0.10315	0.06625	0.12386	0.02603	0.18644	0.00658	-0.07534	0.06693	0.30406	0.09331	1.73776

Hotelling T-Square: Two Independent Variable Equal Variance with Multiple Related Measures
Hotelling T2 39.97638
F Statistic 2.72566
P-value 0.01441

HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR26:VAR36 # VAR426:VAR436)
Null hypothesis tested is that there is zero difference between all the related variables compared across the two groups.

Covariance GROUP 1

0.71146	0.54348	0.28063	0.21542	0.23913	0.06522	0.34783	0.17984	0.60079	0.22727	0.31818
0.54348	0.76680	0.06917	0.05534	0.26285	0.10474	0.45257	0.22134	0.30237	0.00000	0.22727
0.28063	0.06917	0.54150	0.50593	-0.00593	-0.10079	0.14427	0.06917	0.29051	0.50000	0.18182
0.21542	0.05534	0.50593	0.69565	0.07708	-0.00791	0.26087	0.19170	0.31423	0.59091	0.27273
0.23913	0.26285	-0.00593	0.07708	0.33202	0.09881	0.23913	0.17194	0.36759	0.09091	0.09091
0.06522	0.10474	-0.10079	-0.00791	0.09881	0.67984	0.01976	0.05929	-0.06917	-0.09091	0.18182
0.34783	0.45257	0.14427	0.26087	0.23913	0.01976	0.80237	0.49802	0.46443	0.09091	0.13636
0.17984	0.22134	0.06917	0.19170	0.17194	0.05929	0.49802	0.58498	0.43874	0.18182	0.22727
0.60079	0.30237	0.29051	0.31423	0.36759	-0.06917	0.46443	0.43874	1.44269	0.59091	0.63636
0.22727	0.00000	0.50000	0.59091	0.09091	-0.09091	0.09091	0.18182	0.59091	0.81818	0.40909
0.31818	0.22727	0.18182	0.27273	0.09091	0.18182	0.13636	0.22727	0.63636	0.40909	1.45455

Covariance GROUP 2

1.09942	1.20175	1.06140	1.27193	0.43275	0.11111	0.71637	0.43275	1.16082	1.00585	0.12281
1.20175	1.67251	1.31579	1.51754	0.64620	0.38889	1.01754	0.70175	1.51754	1.31579	0.46491
1.06140	1.31579	1.27485	1.39181	0.45029	0.22222	0.66959	0.39474	1.33626	1.21930	0.10526
1.27193	1.51754	1.39181	1.71930	0.66082	0.33333	0.94152	0.66082	1.55263	1.44737	0.45029
0.43275	0.64620	0.45029	0.66082	1.09942	0.83333	0.71637	1.09942	0.71637	0.83918	0.56725
0.11111	0.38889	0.22222	0.33333	0.83333	1.33333	0.50000	1.05556	0.44444	0.61111	0.38889
0.71637	1.01754	0.66959	0.94152	0.71637	0.50000	1.27485	0.88304	1.10819	0.89181	0.45029
0.43275	0.70175	0.39474	0.66082	1.09942	1.05556	0.88304	1.32164	0.71637	0.78363	0.67836
1.16082	1.51754	1.33626	1.55263	0.71637	0.44444	1.10819	0.71637	1.83041	1.55848	0.17251
1.00585	1.31579	1.21930	1.44737	0.83918	0.61111	0.89181	0.78363	1.55848	1.49708	0.27193
0.12281	0.46491	0.10526	0.45029	0.56725	0.38889	0.45029	0.67836	0.17251	0.27193	1.98830

Covariance POOLED

0.88604	0.83970	0.63198	0.69085	0.32626	0.08587	0.51367	0.29365	0.85280	0.57763	0.23026
0.83970	1.17437	0.63015	0.71333	0.43535	0.23261	0.70681	0.43753	0.84920	0.59211	0.33421
0.63198	0.63015	0.87151	0.90458	0.19937	0.04457	0.38066	0.21568	0.76110	0.82368	0.14737
0.69085	0.71333	0.90458	1.15629	0.33976	0.14565	0.56716	0.40280	0.87151	0.97632	0.35263
0.32626	0.43535	0.19937	0.33976	0.67735	0.42935	0.45389	0.58930	0.52454	0.42763	0.30526
0.08587	0.23261	0.04457	0.14565	0.42935	0.97391	0.23587	0.50761	0.16196	0.22500	0.27500
0.51367	0.70681	0.38066	0.56716	0.45389	0.23587	1.01499	0.67128	0.75412	0.45132	0.27763
0.29365	0.43753	0.21568	0.40280	0.58930	0.50761	0.67128	0.91648	0.56367	0.45263	0.43026
0.85280	0.84920	0.76110	0.87151	0.52454	0.16196	0.75412	0.56367	1.61716	1.02632	0.42763
0.57763	0.59211	0.82368	0.97632	0.42763	0.22500	0.45132	0.45263	1.02632	1.12368	0.34737
0.23026	0.33421	0.14737	0.35263	0.30526	0.27500	0.27763	0.43026	0.42763	0.34737	1.69474

Hotelling T-Square: Two Independent Variable Equal Variance with Multiple Related Measures
Hotelling T2 27.94832
F Statistic 1.90557
P-value 0.07928

HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR37:VAR47 # VAR437:VAR447)
Null hypothesis tested is that there is zero difference between all the related variables compared across the two groups.

Covariance GROUP 1

0.70356	0.21739	0.52569	0.56917	-0.09091	-0.01779	0.27075	0.09486	0.37747	0.34387	0.03755
0.21739	0.53755	0.12055	0.23715	0.00000	0.00395	0.02569	0.22134	0.18379	0.21146	-0.07905
0.52569	0.12055	0.69565	0.56522	-0.18182	-0.26482	0.05138	0.16996	0.36759	0.37747	0.16008
0.56917	0.23715	0.56522	0.88538	0.00000	0.01779	0.32016	0.31423	0.66798	0.65613	0.00791
-0.09091	0.00000	-0.18182	0.00000	0.54545	0.22727	0.18182	0.22727	0.31818	0.22727	-0.13636
-0.01779	0.00395	-0.26482	0.01779	0.22727	1.13439	0.41897	0.52569	0.47628	0.09881	-0.50593
0.27075	0.02569	0.05138	0.32016	0.18182	0.41897	0.99605	0.18972	0.39130	0.27866	-0.15217
0.09486	0.22134	0.16996	0.31423	0.22727	0.52569	0.18972	1.07510	0.53557	0.39723	0.03162
0.37747	0.18379	0.36759	0.66798	0.31818	0.47628	0.39130	0.53557	1.35178	0.77668	0.01976
0.34387	0.21146	0.37747	0.65613	0.22727	0.09881	0.27866	0.39723	0.77668	0.78656	0.11462
0.03755	-0.07905	0.16008	0.00791	-0.13636	-0.50593	-0.15217	0.03162	0.01976	0.11462	1.39130

Covariance GROUP 2

1.57895	1.41228	1.50877	1.48246	0.06140	0.41520	0.59064	0.48538	1.66082	1.17251	0.38012
1.41228	1.57895	1.56433	1.53801	0.00585	0.52632	0.59064	0.48538	1.49415	1.28363	0.60234
1.50877	1.56433	1.98246	1.92398	0.21053	0.50292	0.81871	0.80702	1.73392	1.54386	0.79532
1.48246	1.53801	1.92398	2.04094	0.19006	0.43860	0.75146	0.77485	1.75439	1.57895	0.63158
0.06140	0.00585	0.21053	0.19006	0.80702	0.35380	0.56433	0.76023	0.24854	0.36257	0.17836
0.41520	0.52632	0.50292	0.43860	0.35380	0.84211	0.56725	0.53216	0.70175	0.57602	0.16374
0.59064	0.59064	0.81871	0.75146	0.56433	0.56725	1.38596	1.11696	0.76901	0.73099	0.51462
0.48538	0.48538	0.80702	0.77485	0.76023	0.53216	1.11696	1.32164	0.79532	1.03801	0.52632
1.66082	1.49415	1.73392	1.75439	0.24854	0.70175	0.76901	0.79532	2.25146	1.47076	0.09942
1.17251	1.28363	1.54386	1.57895	0.36257	0.57602	0.73099	1.03801	1.47076	2.25146	0.95614
0.38012	0.60234	0.79532	0.63158	0.17836	0.16374	0.51462	0.52632	0.09942	0.95614	1.76023

Covariance POOLED

1.09748	0.75509	0.96808	0.98015	-0.02237	0.17706	0.41470	0.27059	0.95498	0.71676	0.19170
0.75509	1.00618	0.77025	0.82254	0.00263	0.23902	0.27992	0.34016	0.77346	0.69394	0.22757
0.96808	0.77025	1.27471	1.17666	-0.00526	0.08066	0.39668	0.45664	0.98244	0.90235	0.44594
0.98015	0.82254	1.17666	1.40538	0.08553	0.20715	0.51424	0.52151	1.15686	1.07140	0.28856
-0.02237	0.00263	-0.00526	0.08553	0.66316	0.28421	0.35395	0.46711	0.28684	0.28816	0.00526
0.17706	0.23902	0.08066	0.20715	0.28421	1.00286	0.48570	0.52860	0.57775	0.31356	-0.20458
0.41470	0.27992	0.39668	0.51424	0.35395	0.48570	1.17151	0.60698	0.56127	0.48221	0.14788
0.27059	0.34016	0.45664	0.52151	0.46711	0.52860	0.60698	1.18604	0.65246	0.68558	0.25423
0.95498	0.77346	0.98244	1.15686	0.28684	0.57775	0.56127	0.65246	1.75664	1.08902	0.05561
0.71676	0.69394	0.90235	1.07140	0.28816	0.31356	0.48221	0.68558	1.08902	1.44577	0.49331
0.19170	0.22757	0.44594	0.28856	0.00526	-0.20458	0.14788	0.25423	0.05561	0.49331	1.55732

Hotelling T-Square: Two Independent Variable Equal Variance with Multiple Related Measures
Hotelling T2 108.67832
F Statistic 7.20962
P-value 0.00001

HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR115:VAR125 # VAR415:VAR425)
Null hypothesis tested is that there is zero difference between all the related variables compared across the two groups.

Covariance GROUP 1

1.08158	0.33421	0.30526	0.79737	0.58947	0.22895	0.31053	0.30526	0.55000	0.61053	-0.26579
0.33421	0.57632	0.13684	0.34474	0.02105	0.05000	0.33158	0.24211	0.29737	0.32632	0.21842
0.30526	0.13684	0.98947	0.38947	0.06316	-0.38947	0.38947	0.25263	0.48421	0.50526	0.01053
0.79737	0.34474	0.38947	0.99737	0.45263	0.18684	0.24737	0.23158	0.62368	0.67368	-0.08684
0.58947	0.02105	0.06316	0.45263	0.77895	0.49474	0.08421	0.22105	0.09474	0.28421	-0.27368
0.22895	0.05000	-0.38947	0.18684	0.49474	0.89211	-0.03684	0.24211	-0.12368	0.06316	0.00789
0.31053	0.33158	0.38947	0.24737	0.08421	-0.03684	0.74737	0.38947	0.47895	0.35789	0.37368
0.30526	0.24211	0.25263	0.23158	0.22105	0.24211	0.38947	0.56842	0.32632	0.34737	0.11579
0.55000	0.29737	0.48421	0.62368	0.09474	-0.12368	0.47895	0.32632	0.87105	0.65263	0.26579
0.61053	0.32632	0.50526	0.67368	0.28421	0.06316	0.35789	0.34737	0.65263	0.80000	0.17895
-0.26579	0.21842	0.01053	-0.08684	-0.27368	0.00789	0.37368	0.11579	0.26579	0.17895	1.50263

Covariance GROUP 2

0.09942	0.04971	0.04971	0.04971	0.11404	0.00585	0.02047	0.00877	0.24854	0.09357	0.08187
0.04971	0.05263	-0.00292	-0.00292	0.02924	0.00292	-0.01754	-0.02339	0.09649	-0.00877	0.04094
0.04971	-0.00292	0.05263	0.05263	0.08480	0.00292	0.03801	0.03216	0.15205	0.10234	0.04094
0.04971	-0.00292	0.05263	0.05263	0.08480	0.00292	0.03801	0.03216	0.15205	0.10234	0.04094
0.11404	0.02924	0.08480	0.08480	0.37427	0.19298	0.11988	0.23392	0.31287	0.19883	0.25731
0.00585	0.00292	0.00292	0.00292	0.19298	0.60819	0.01754	0.19006	0.01462	0.06433	-0.15205
0.02047	-0.01754	0.03801	0.03801	0.11988	0.01754	0.33918	0.24854	0.07895	0.11404	-0.08772
0.00877	-0.02339	0.03216	0.03216	0.23392	0.19006	0.24854	0.36842	0.04971	0.09649	-0.00585
0.24854	0.09649	0.15205	0.15205	0.31287	0.01462	0.07895	0.04971	0.64912	0.28947	0.20468
0.09357	-0.00877	0.10234	0.10234	0.19883	0.06433	0.11404	0.09649	0.28947	0.25146	0.01170
0.08187	0.04094	0.04094	0.04094	0.25731	-0.15205	-0.08772	-0.00585	0.20468	0.01170	2.31579

Covariance POOLED

0.60377	0.19580	0.18094	0.43364	0.35818	0.12041	0.16942	0.16102	0.40334	0.35903	-0.09666

0.19580	0.32155	0.06885	0.17560	0.02504	0.02710	0.16174	0.11294	0.19964	0.16330	0.13208
0.18094	0.06885	0.53371	0.22560	0.07368	-0.19858	0.21849	0.14538	0.32262	0.30925	0.02532
0.43364	0.17560	0.22560	0.53777	0.27368	0.09737	0.14552	0.13457	0.39424	0.39573	-0.02468
0.35818	0.02504	0.07368	0.27368	0.58208	0.34794	0.10156	0.22731	0.20085	0.24267	-0.01536
0.12041	0.02710	-0.19858	0.09737	0.34794	0.75398	-0.01038	0.21679	-0.05640	0.06373	-0.06991
0.16942	0.16174	0.21849	0.14552	0.10156	-0.01038	0.54879	0.32091	0.28435	0.23926	0.14922
0.16102	0.11294	0.14538	0.13457	0.22731	0.21679	0.32091	0.47112	0.19175	0.22532	0.05661
0.40334	0.19964	0.32262	0.39424	0.20085	-0.05640	0.28435	0.19175	0.76309	0.47596	0.23606
0.35903	0.16330	0.30925	0.39573	0.24267	0.06373	0.23926	0.22532	0.47596	0.53314	0.09758
-0.09666	0.13208	0.02532	-0.02468	-0.01536	-0.06991	0.14922	0.05661	0.23606	0.09758	1.89822

Hotelling T-Square: Two Independent Variable Equal Variance with Multiple Related Measures
Hotelling T2 25.97472
F Statistic 1.72314
P-value 0.12146

HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR126:VAR136 # VAR426:VAR436)
Null hypothesis tested is that there is zero difference between all the related variables compared across the two groups.

Covariance GROUP 1

0.45000	0.23947	0.26842	0.38158	0.29211	0.00263	0.07368	0.08684	0.33684	0.12368	0.01579
0.23947	0.45000	0.32105	0.27632	0.18684	0.00263	0.12632	0.08684	0.33684	0.22895	-0.03684
0.26842	0.32105	0.43158	0.34211	0.21579	-0.04737	0.09474	0.06842	0.41053	0.30000	-0.23158
0.38158	0.27632	0.34211	0.51316	0.32895	0.09211	0.10526	0.09211	0.36842	0.17105	-0.23684
0.29211	0.18684	0.21579	0.32895	0.55526	0.37105	0.23158	0.19211	0.17895	0.17632	-0.08947
0.00263	0.00263	-0.04737	0.09211	0.37105	1.08158	0.02105	0.16579	0.02105	-0.06053	-0.35263
0.07368	0.12632	0.09474	0.10526	0.23158	0.02105	0.37895	0.16842	0.11579	0.25263	0.17895
0.08684	0.08684	0.06842	0.09211	0.19211	0.16579	0.16842	0.26053	0.16842	0.21316	-0.05789
0.33684	0.33684	0.41053	0.36842	0.17895	0.02105	0.11579	0.16842	0.69474	0.35789	0.07368
0.12368	0.22895	0.30000	0.17105	0.17632	-0.06053	0.25263	0.21316	0.35789	0.47105	0.00526
0.01579	-0.03684	-0.23158	-0.23684	-0.08947	-0.35263	0.17895	-0.05789	0.07368	0.00526	2.30526

Covariance GROUP 2

1.09942	1.20175	1.06140	1.27193	0.43275	0.11111	0.71637	0.43275	1.16082	1.00585	0.12281
1.20175	1.67251	1.31579	1.51754	0.64620	0.38889	1.01754	0.70175	1.51754	1.31579	0.46491
1.06140	1.31579	1.27485	1.39181	0.45029	0.22222	0.66959	0.39474	1.33626	1.21930	0.10526
1.27193	1.51754	1.39181	1.71930	0.66082	0.33333	0.94152	0.66082	1.55263	1.44737	0.45029
0.43275	0.64620	0.45029	0.66082	1.09942	0.83333	0.71637	1.09942	0.71637	0.83918	0.56725
0.11111	0.38889	0.22222	0.33333	0.83333	1.33333	0.50000	1.05556	0.44444	0.61111	0.38889
0.71637	1.01754	0.66959	0.94152	0.71637	0.50000	1.27485	0.88304	1.10819	0.89181	0.45029
0.43275	0.70175	0.39474	0.66082	1.09942	1.05556	0.88304	1.32164	0.71637	0.78363	0.67836
1.16082	1.51754	1.33626	1.55263	0.71637	0.44444	1.10819	0.71637	1.83041	1.55848	0.17251
1.00585	1.31579	1.21930	1.44737	0.83918	0.61111	0.89181	0.78363	1.55848	1.49708	0.27193
0.12281	0.46491	0.10526	0.45029	0.56725	0.38889	0.45029	0.67836	0.17251	0.27193	1.98830

Covariance POOLED

0.76593	0.70761	0.65420	0.81472	0.36053	0.05541	0.38634	0.25512	0.73770	0.55284	0.06785
0.70761	1.04474	0.80498	0.88016	0.41031	0.19054	0.55989	0.38599	0.91124	0.75768	0.20725
0.65420	0.80498	0.84182	0.85277	0.32987	0.08378	0.37440	0.22717	0.86088	0.74723	-0.06771

0.81472	0.88016	0.85277	1.09993	0.49040	0.20946	0.51209	0.36878	0.94452	0.79196	0.09744
0.36053	0.41031	0.32987	0.49040	0.81999	0.59595	0.46743	0.63350	0.44040	0.49879	0.23001
0.05541	0.19054	0.08378	0.20946	0.59595	1.20405	0.25405	0.59865	0.22703	0.26622	0.00811
0.38634	0.55989	0.37440	0.51209	0.46743	0.25405	0.81479	0.51607	0.59858	0.56358	0.31095
0.25512	0.38599	0.22717	0.36878	0.63350	0.59865	0.51607	0.77674	0.43499	0.49068	0.30028
0.73770	0.91124	0.86088	0.94452	0.44040	0.22703	0.59858	0.43499	1.24723	0.94196	0.12176
0.55284	0.75768	0.74723	0.79196	0.49879	0.26622	0.56358	0.49068	0.94196	0.97020	0.13499
0.06785	0.20725	-0.06771	0.09744	0.23001	0.00811	0.31095	0.30028	0.12176	0.13499	2.15107

Hotelling T-Square: Two Independent Variable Equal Variance with Multiple Related Measures
Hotelling T2 18.33992
F Statistic 1.21665
P-value 0.32320

HotellingTSquare2VARIndep.EqualVariancewithRelatedMeasures (VAR137:VAR147 # VAR437:VAR447)
Null hypothesis tested is that there is zero difference between all the related variables compared across the two groups.

Covariance GROUP 1

0.48421	0.32632	0.33684	0.22105	0.01053	0.07368	-0.10526	-0.05263	0.23158	0.31579	0.24211
0.32632	0.48421	0.44211	0.27368	0.11579	0.07368	-0.15789	0.15789	0.17895	0.31579	0.24211
0.33684	0.44211	0.66053	0.29737	0.17895	0.13421	-0.18421	0.13158	0.25263	0.35526	0.35263
0.22105	0.27368	0.29737	0.47105	0.16842	0.13947	-0.02632	-0.02632	0.38947	0.38158	-0.15263
0.01053	0.11579	0.17895	0.16842	0.69474	0.28421	0.21053	0.26316	0.02105	0.15789	-0.07368
0.07368	0.07368	0.13421	0.13947	0.28421	0.55526	0.23684	0.13158	0.20000	0.30263	-0.06842
-0.10526	-0.15789	-0.18421	-0.02632	0.21053	0.23684	0.68421	0.15789	-0.10526	-0.13158	-0.26316
-0.05263	0.15789	0.13158	-0.02632	0.26316	0.13158	0.15789	0.68421	-0.10526	0.02632	0.21053
0.23158	0.17895	0.25263	0.38947	0.02105	0.20000	-0.10526	-0.10526	0.77895	0.42105	-0.20000
0.31579	0.31579	0.35526	0.38158	0.15789	0.30263	-0.13158	0.02632	0.42105	0.61842	0.07895
0.24211	0.24211	0.35263	-0.15263	-0.07368	-0.06842	-0.26316	0.21053	-0.20000	0.07895	1.35789

Covariance GROUP 2

1.57895	1.41228	1.50877	1.48246	0.06140	0.41520	0.59064	0.48538	1.66082	1.17251	0.38012
1.41228	1.57895	1.56433	1.53801	0.00585	0.52632	0.59064	0.48538	1.49415	1.28363	0.60234
1.50877	1.56433	1.98246	1.92398	0.21053	0.50292	0.81871	0.80702	1.73392	1.54386	0.79532
1.48246	1.53801	1.92398	2.04094	0.19006	0.43860	0.75146	0.77485	1.75439	1.57895	0.63158
0.06140	0.00585	0.21053	0.19006	0.80702	0.35380	0.56433	0.76023	0.24854	0.36257	0.17836
0.41520	0.52632	0.50292	0.43860	0.35380	0.84211	0.56725	0.53216	0.70175	0.57602	0.16374
0.59064	0.59064	0.81871	0.75146	0.56433	0.56725	1.38596	1.11696	0.76901	0.73099	0.51462
0.48538	0.48538	0.80702	0.77485	0.76023	0.53216	1.11696	1.32164	0.79532	1.03801	0.52632
1.66082	1.49415	1.73392	1.75439	0.24854	0.70175	0.76901	0.79532	2.25146	1.47076	0.09942
1.17251	1.28363	1.54386	1.57895	0.36257	0.57602	0.73099	1.03801	1.47076	2.25146	0.95614
0.38012	0.60234	0.79532	0.63158	0.17836	0.16374	0.51462	0.52632	0.09942	0.95614	1.76023

Covariance POOLED

1.01679	0.85462	0.90697	0.83471	0.03528	0.23983	0.23329	0.20910	0.92688	0.73257	0.30925
0.85462	1.01679	0.98805	0.88876	0.06230	0.29388	0.20626	0.31721	0.81878	0.78663	0.41735
0.90697	0.98805	1.30363	1.08869	0.19431	0.31358	0.30370	0.46017	0.97326	0.93350	0.56799
0.83471	0.88876	1.08869	1.23478	0.17895	0.28499	0.35206	0.36344	1.05349	0.96408	0.22888

0.03528	0.06230	0.19431	0.17895	0.74936	0.31807	0.38265	0.50498	0.13172	0.25747	0.04893
0.23983	0.29388	0.31358	0.28499	0.31807	0.69481	0.39758	0.32646	0.44410	0.43563	0.04452
0.23329	0.20626	0.30370	0.35206	0.38265	0.39758	1.02560	0.62447	0.32006	0.28805	0.11522
0.20910	0.31721	0.46017	0.36344	0.50498	0.32646	0.62447	0.99431	0.33286	0.51849	0.36415
0.92688	0.81878	0.97326	1.05349	0.13172	0.44410	0.32006	0.33286	1.49531	0.93172	-0.05434
0.73257	0.78663	0.93350	0.96408	0.25747	0.43563	0.28805	0.51849	0.93172	1.41287	0.50569
0.30925	0.41735	0.56799	0.22888	0.04893	0.04452	0.11522	0.36415	-0.05434	0.50569	1.55363

2. Bonferroni Tests

Model Inputs:
VAR1; VAR2; VAR3; VAR4; VAR5; VAR6; VAR7; VAR8; VAR9; VAR10; VAR11; VAR12; VAR13; VAR14
VAR101; VAR102; VAR103; VAR104; VAR105; VAR106; VAR107; VAR108; VAR109; VAR110; VAR111; VAR112; VAR113; VAR114
HA1, HA2, HA3, HA4, AL1, AL2, AL3, AL4, AL5, LN1, LN2, LN3, LN4, LN5
HA1, HA2, HA3, HA4, AL1, AL2, AL3, AL4, AL5, LN1, LN2, LN3, LN4, LN5

Simultaneous Confidence Intervals

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	0.4891	0.0957	-0.2435	-0.2152	0.1457	-0.0957	0.3609	0.0739	-0.1543	-0.2587	-0.6674	-0.0435	0.0043	-0.0217
Variance Group 1	1.1107	0.5850	0.4071	0.5296	0.8577	0.5850	0.9289	1.6047	0.9486	0.6126	1.2688	1.0435	0.6759	0.4427
Variance Group 2	0.8289	0.6737	0.8000	0.5553	1.1026	1.0947	1.0421	1.6737	0.5553	0.5553	1.2079	1.1579	0.6421	0.4737
Pooled Variance	0.9900	0.7913	0.7676	0.7359	0.9855	0.9062	0.9906	1.2793	0.8754	0.7655	1.1138	1.0471	0.8125	0.6761
F-Critical	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635	2.0635
T-Critical	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040	6.5040
Standard Error	0.3027	0.2419	0.2347	0.2250	0.3013	0.2771	0.3029	0.3911	0.2676	0.2341	0.3405	0.3202	0.2484	0.2067
Lower Confidence	-1.4796	-1.4778	-1.7699	-1.6786	-1.8141	-1.8977	-1.6090	-2.4701	-1.8951	-1.7810	-2.8823	-2.1258	-1.6115	-1.3661
Upper Confidence	2.4578	1.6691	1.2829	1.2481	2.1054	1.7064	2.3308	2.6179	1.5864	1.2636	1.5475	2.0388	1.6201	1.3226
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11	VAR12	VAR13	VAR14
Bonferroni Critical	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917	3.0917
Lower Confidence	-3.7485	-3.2912	-3.5290	-3.3651	-4.0727	-3.9746	-3.8794	-5.4021	-3.9014	-3.5355	-5.4349	-4.5256	-3.4737	-2.9155
Upper Confidence	4.7268	3.4825	3.0421	2.9346	4.3640	3.7833	4.6011	5.5500	3.5927	3.0181	4.1001	4.4387	3.4824	2.8720
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

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Model Inputs:
VAR15; VAR16; VAR17; VAR18; VAR19; VAR20; VAR21; VAR22; VAR23; VAR24; VAR25
VAR115; VAR116; VAR117; VAR118; VAR119; VAR120; VAR121; VAR122; VAR123; VAR124; VAR125
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	0.1761	-0.0935	0.2087	0.2022	0.3130	-0.0500	0.0826	-0.0087	0.3891	0.4609	0.0630
Variance Group 1	0.9684	0.7708	0.8854	0.6008	0.4466	0.7273	0.4506	0.6126	1.2925	0.8379	1.2648
Variance Group 2	1.0816	0.5763	0.9895	0.9974	0.7789	0.8921	0.7474	0.5684	0.8711	0.8000	1.5026
Pooled Variance	1.0104	0.8250	0.9662	0.8858	0.7750	0.8965	0.7669	0.7695	1.0475	0.9057	1.1726
F-Critical	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141
T-Critical	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458
Standard Error	0.3089	0.2522	0.2954	0.2708	0.2370	0.2741	0.2345	0.2353	0.3203	0.2769	0.3585
Lower Confidence	-1.5371	-1.4924	-1.4296	-1.2997	-1.0011	-1.5700	-1.2177	-1.3135	-1.3869	-1.0749	-1.9252
Upper Confidence	1.8893	1.3054	1.8470	1.7041	1.6271	1.4700	1.3829	1.2961	2.1652	1.9966	2.0513
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11
Bonferroni Critical	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026
Lower Confidence	-3.2219	-2.8681	-3.0409	-2.7768	-2.2934	-3.0650	-2.4966	-2.5967	-3.1337	-2.5853	-3.8807
Upper Confidence	3.5741	2.6812	3.4583	3.1811	2.9195	2.9650	2.6618	2.5793	3.9119	3.5070	4.0067
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

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Model Inputs:
VAR26; VAR27; VAR28; VAR29; VAR30; VAR31; VAR32; VAR33; VAR34; VAR35; VAR36
VAR126; VAR127; VAR128; VAR129; VAR130; VAR131; VAR132; VAR133; VAR134; VAR135; VAR136
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	-0.2848	-0.1543	-0.4826	-0.5761	-0.0239	-0.3065	-0.2348	0.1457	-0.2783	-0.4500	-0.1000
Variance Group 1	0.7115	0.7668	0.5415	0.6957	0.3320	0.6798	0.8024	0.5850	1.4427	0.8182	1.4545
Variance Group 2	0.4500	0.4500	0.4316	0.5132	0.5553	1.0816	0.3789	0.2605	0.6947	0.4711	2.3053
Pooled Variance	0.7683	0.7874	0.7004	0.7817	0.6599	0.9306	0.7786	0.6593	1.0469	0.8108	1.3597
F-Critical	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141
T-Critical	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458
Standard Error	0.2349	0.2407	0.2141	0.2390	0.2018	0.2845	0.2380	0.2016	0.3201	0.2479	0.4157
Lower Confidence	-1.5875	-1.4894	-1.6702	-1.9016	-1.1428	-1.8844	-1.5549	-0.9722	-2.0534	-1.8247	-2.4055
Upper Confidence	1.0180	1.1807	0.7050	0.7494	1.0950	1.2714	1.0853	1.2635	1.4969	0.9247	2.2055
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11
Bonferroni Critical	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026
Lower Confidence	-2.8687	-2.8025	-2.8382	-3.2051	-2.2433	-3.4363	-2.8532	-2.0715	-3.7993	-3.1767	-4.6729
Upper Confidence	2.2992	2.4938	1.8730	2.0530	2.1954	2.8232	2.3836	2.3629	3.2428	2.2767	4.4729
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

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Model Inputs:
VAR37; VAR38; VAR39; VAR40; VAR41; VAR42; VAR43; VAR44; VAR45; VAR46; VAR47
VAR137; VAR138; VAR139; VAR140; VAR141; VAR142; VAR143; VAR144; VAR145; VAR146; VAR147
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	-0.1913	0.2870	-0.6761	-0.1587	0.2000	0.1065	-0.2826	0.0652	-0.1217	-0.0761	-0.0304
Variance Group 1	0.7036	0.5375	0.6957	0.8854	0.5455	1.1344	0.9960	1.0751	1.3518	0.7866	1.3913
Variance Group 2	0.4842	0.4842	0.6605	0.4711	0.6947	0.5553	0.6842	0.6842	0.7789	0.6184	1.3579
Pooled Variance	0.7758	0.7161	0.8242	0.8327	0.7840	0.9306	0.9228	0.9455	1.0423	0.8418	1.1730
F-Critical	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141	2.1141
T-Critical	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458	5.5458
Standard Error	0.2372	0.2189	0.2520	0.2546	0.2397	0.2845	0.2821	0.2891	0.3187	0.2574	0.3586
Lower Confidence	-1.5068	-0.9273	-2.0737	-1.5706	-1.1293	-1.4714	-1.8473	-1.5379	-1.8890	-1.5035	-2.0193
Upper Confidence	1.1242	1.5012	0.7215	1.2532	1.5293	1.6844	1.2821	1.6684	1.6455	1.3513	1.9584
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11
Bonferroni Critical	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026	3.0026
Lower Confidence	-2.8005	-2.1215	-3.4481	-2.9592	-2.4367	-3.0232	-3.3861	-3.1146	-3.6271	-2.9072	-3.9753
Upper Confidence	2.4179	2.6954	2.0960	2.6418	2.8367	3.2363	2.8209	3.2451	3.3836	2.7551	3.9144
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

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Model Inputs:
VAR48; VAR49; VAR50; VAR51
VAR148; VAR149; VAR150; VAR151
C1, C2, C3, C4
C1, C2, C3, C4

Simultaneous Confidence Intervals

Mean Difference of Null	0	0	0	0
Mean Difference	0.0522	-0.3283	-0.0152	-0.0457
Variance Group 1	1.6917	1.5336	0.8024	0.5850
Variance Group 2	1.4105	0.5553	0.3658	0.5553
Pooled Variance	1.2496	1.0393	0.7746	0.7558
F-Critical	2.6190	2.6190	2.6190	2.6190
T-Critical	3.3620	3.3620	3.3620	3.3620
Standard Error	0.3820	0.3178	0.2368	0.2311
Lower Confidence	-1.2323	-1.3966	-0.8115	-0.8225
Upper Confidence	1.3366	0.7401	0.7810	0.7312
Within Confidence?	Yes	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4
Bonferroni Critical	2.6127	2.6127	2.6127	2.6127
Lower Confidence	-1.4760	-1.5993	-0.9626	-0.9700
Upper Confidence	1.5803	0.9428	0.9321	0.8786
Within Confidence?	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

----

Model Inputs:
VAR52; VAR53; VAR54
VAR52; VAR53; VAR54
D1, D2, D3
D1, D2, D3

Simultaneous Confidence Intervals

Mean Difference of Null	0	0	0
Mean Difference	0.0000	0.0000	0.0000
Variance Group 1	0.0000	15.5662	17.7342
Variance Group 2	0.0000	15.5662	17.7342
Pooled Variance	0.0000	3.9454	4.2112
F-Critical	2.8270	2.8270	2.8270
T-Critical	2.9808	2.9808	2.9808
Standard Error	0.0000	1.1634	1.2418
Lower Confidence	0.0000	-3.4679	-3.7016
Upper Confidence	0.0000	3.4679	3.7016
Within Confidence?	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3
Bonferroni Critical	2.4890	2.4890	2.4890
Lower Confidence	0.0000	-3.4903	-3.7254
Upper Confidence	0.0000	3.4903	3.7254
Within Confidence?	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

Model Inputs:
VAR15; VAR16; VAR17; VAR18; VAR19; VAR20; VAR21; VAR22; VAR23; VAR24; VAR25
VAR415; VAR416; VAR417; VAR418; VAR419; VAR420; VAR421; VAR422; VAR423; VAR424; VAR425
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals: BonferroniTestTwoVariableswithRepetition (VAR15:VAR25 # VAR415:VAR425)

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	-1.0686	-0.9908	-1.3387	-1.2952	-0.6133	-1.0526	-0.9016	-1.1876	-0.9977	-1.5812	0.1762
Variance Group 1	0.9684	0.7708	0.8854	0.6008	0.4466	0.7273	0.4506	0.6126	1.2925	0.8379	1.2648
Variance Group 2	0.0994	0.0526	0.0526	0.0526	0.3743	0.6082	0.3392	0.3684	0.6491	0.2515	2.3158
Pooled Variance	0.7598	0.6690	0.7146	0.5951	0.6435	0.8208	0.6328	0.7090	1.0015	0.7576	1.3182
F-Critical	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256
T-Critical	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834
Standard Error	0.2356	0.2074	0.2215	0.1845	0.1995	0.2545	0.1962	0.2198	0.3105	0.2349	0.4087
Lower Confidence	-2.3839	-2.1489	-2.5756	-2.3253	-1.7271	-2.4734	-1.9970	-2.4150	-2.7312	-2.8927	-2.1056
Upper Confidence	0.2466	0.1672	-0.1017	-0.2651	0.5006	0.3681	0.1938	0.0397	0.7358	-0.2698	2.4580
Within Confidence?	Yes	Yes	Low	Low	Yes	Yes	Yes	Yes	Yes	Low	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11
Bonferroni Critical	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069
Lower Confidence	-3.6598	-3.2723	-3.7756	-3.3245	-2.8077	-3.8516	-3.0596	-3.6056	-4.4130	-4.1649	-4.3192
Upper Confidence	1.5225	1.2907	1.0982	0.7341	1.5811	1.7464	1.2564	1.2303	2.4175	1.0025	4.6716
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

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Model Inputs:
VAR26; VAR27; VAR28; VAR29; VAR30; VAR31; VAR32; VAR33; VAR34; VAR35; VAR36
VAR426; VAR427; VAR428; VAR429; VAR430; VAR431; VAR432; VAR433; VAR434; VAR435; VAR436
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals: BonferroniTestTwoVariableswithRepetition (VAR26:VAR36 # VAR426:VAR436)

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	-0.5400	0.0114	-0.7300	-0.8787	-0.2792	-0.9565	-0.4874	-0.4096	-0.5309	-0.9474	0.1053
Variance Group 1	0.7115	0.7668	0.5415	0.6957	0.3320	0.6798	0.8024	0.5850	1.4427	0.8182	1.4545
Variance Group 2	1.0994	1.6725	1.2749	1.7193	1.0994	1.3333	1.2749	1.3216	1.8304	1.4971	1.9883
Pooled Variance	0.9413	1.0837	0.9335	1.0753	0.8230	0.9869	1.0075	0.9573	1.2717	1.0600	1.3018
F-Critical	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256	2.1256
T-Critical	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834	5.5834
Standard Error	0.2918	0.3360	0.2894	0.3334	0.2551	0.3059	0.3123	0.2968	0.3942	0.3286	0.4036
Lower Confidence	-2.1694	-1.8644	-2.3459	-2.7400	-1.7038	-2.6648	-2.2313	-2.0667	-2.7321	-2.7823	-2.1481
Upper Confidence	1.0893	1.8873	0.8860	0.9826	1.1454	0.7517	1.2565	1.2475	1.6703	0.8875	2.3587
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11
Bonferroni Critical	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069	3.0069
Lower Confidence	-3.7500	-3.6841	-3.9135	-4.5457	-3.0858	-4.3219	-3.9231	-3.6743	-4.8675	-4.5623	-4.3342
Upper Confidence	2.6699	3.7070	2.4536	2.7883	2.5274	2.4089	2.9482	2.8550	3.8057	2.6676	4.5447
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

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Model Inputs:
VAR37; VAR38; VAR39; VAR40; VAR41; VAR42; VAR43; VAR44; VAR45; VAR46; VAR47
VAR437; VAR438; VAR439; VAR440; VAR441; VAR442; VAR443; VAR444; VAR445; VAR446; VAR447
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals: BonferroniTestTwoVariableswithRepetition (VAR37:VAR47 # VAR437:VAR447)
Mean Difference of Null           0       0       0       0       0         0         0       0       0       0       0
Mean Difference            0.2403  0.7185  -0.0892 -0.0824 0.1579  0.1670   -0.8352   -0.3295 0.3204  0.3318  0.1327
Variance Group 1           0.7036  0.5375  0.6957  0.8854  0.5455  1.1344   0.9960    1.0751  1.3518  0.7866  1.3913
Variance Group 2           1.5789  1.5789  1.9825  2.0409  0.8070  0.8421   1.3860    1.3216  2.2515  2.2515  1.7602
Pooled Variance            1.0476  1.0031  1.1290  1.1855  0.8143  1.0014   1.0824    1.0891  1.3254  1.2024  1.2479
F-Critical                 2.1256  2.1256  2.1256  2.1256  2.1256  2.1256   2.1256    2.1256  2.1256  2.1256  2.1256
T-Critical                 5.5834  5.5834  5.5834  5.5834  5.5834  5.5834   5.5834    5.5834  5.5834  5.5834  5.5834
Standard Error             0.3248  0.3110  0.3500  0.3675  0.2525  0.3105   0.3355    0.3376  0.4109  0.3728  0.3869
Lower Confidence           -1.5731 -1.0178 -2.0436 -2.1344 -1.2517 -1.5664  -2.7088   -2.2146 -1.9738 -1.7495 -2.0274
Upper Confidence           2.0536  2.4548  1.8651  1.9696  1.5675  1.9005   1.0383    1.5556  2.6145  2.4131  2.2928
Within Confidence?         Yes     Yes     Yes     Yes     Yes     Yes      Yes       Yes     Yes     Yes     Yes

Bonferroni Test
                           VAR1    VAR2    VAR3    VAR4    VAR5    VAR6     VAR7      VAR8    VAR9    VAR10   VAR11
Bonferroni Critical        3.0069  3.0069  3.0069  3.0069  3.0069  3.0069   3.0069    3.0069  3.0069  3.0069  3.0069
Lower Confidence           -3.3323 -2.7022 -3.9394 -4.1251 -2.6192 -3.2480  -4.5263   -4.0434 -4.1994 -3.7686 -4.1229
Upper Confidence           3.8128  4.1392  3.7610  3.9603  2.9350  3.5821   2.8558    3.3843  4.8401  4.4322  4.3884
Within Confidence?         Yes     Yes     Yes     Yes     Yes     Yes      Yes       Yes     Yes     Yes     Yes

Null hypothesis: the individual expected differences are equal to zero

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Model Inputs:
VAR115; VAR116; VAR117; VAR118; VAR119; VAR120; VAR121; VAR122; VAR123; VAR124; VAR125
VAR415; VAR416; VAR417; VAR418; VAR419; VAR420; VAR421; VAR422; VAR423; VAR424; VAR425
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals: BonferroniTestTwoVariableswithRepetition (VAR115:VAR125 # VAR415:VAR425)

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	-1.2447	-0.8974	-1.5474	-1.4974	-0.9263	-1.0026	-0.9842	-1.1789	-1.3868	-2.0421	0.1132
Variance Group 1	1.0816	0.5763	0.9895	0.9974	0.7789	0.8921	0.7474	0.5684	0.8711	0.8000	1.5026
Variance Group 2	0.0994	0.0526	0.0526	0.0526	0.3743	0.6082	0.3392	0.3684	0.6491	0.2515	2.3158
Pooled Variance	0.7770	0.5671	0.7306	0.7333	0.7629	0.8683	0.7408	0.6864	0.8735	0.7302	1.3778
F-Critical	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655
T-Critical	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135
Standard Error	0.2489	0.1817	0.2340	0.2349	0.2444	0.2782	0.2373	0.2199	0.2799	0.2339	0.4414
Lower Confidence	-2.6670	-1.9353	-2.8846	-2.8396	-2.3228	-2.5920	-2.3402	-2.4353	-2.9858	-3.3786	-2.4087
Upper Confidence	0.1775	0.1406	-0.2102	-0.1551	0.4701	0.5867	0.3717	0.0774	0.2121	-0.7056	2.6350
Within Confidence?	Yes	Yes	**Low**	**Low**	Yes	Yes	Yes	Yes	Yes	**Low**	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11
Bonferroni Critical	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214
Lower Confidence	-3.9830	-2.8957	-4.1218	-4.0816	-3.6149	-4.0626	-3.5948	-3.5978	-4.4652	-4.6152	-4.7420
Upper Confidence	1.4935	1.1009	1.0271	1.0869	1.7623	2.0573	1.6264	1.2399	1.6915	0.5310	4.9684
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero
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Model Inputs:
VAR126; VAR127; VAR128; VAR129; VAR130; VAR131; VAR132; VAR133; VAR134; VAR135; VAR136
VAR426; VAR427; VAR428; VAR429; VAR430; VAR431; VAR432; VAR433; VAR434; VAR435; VAR436
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals: BonferroniTestTwoVariableswithRepetition (VAR126:VAR136 # VAR426:VAR436)

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	-0.2553	0.1658	-0.2474	-0.3026	-0.2553	-0.6500	-0.2526	-0.5553	-0.2526	-0.4974	0.2053
Variance Group 1	0.4500	0.4500	0.4316	0.5132	0.5553	1.0816	0.3789	0.2605	0.6947	0.4711	2.3053
Variance Group 2	1.0994	1.6725	1.2749	1.7193	1.0994	1.3333	1.2749	1.3216	1.8304	1.4971	1.9883
Pooled Variance	0.8752	1.0221	0.9175	1.0488	0.9055	1.0973	0.9027	0.8813	1.1168	0.9850	1.4667
F-Critical	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655
T-Critical	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135
Standard Error	0.2804	0.3274	0.2939	0.3360	0.2901	0.3515	0.2892	0.2823	0.3578	0.3156	0.4699
Lower Confidence	-1.8572	-1.7051	-1.9267	-2.2223	-1.9127	-2.6585	-1.9048	-2.1684	-2.2968	-2.3003	-2.4793
Upper Confidence	1.3466	2.0367	1.4320	1.6170	1.4022	1.3585	1.3996	1.0579	1.7915	1.3055	2.8898
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11
Bonferroni Critical	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214
Lower Confidence	-3.3394	-3.4362	-3.4806	-3.9985	-3.4463	-4.5168	-3.4336	-3.6611	-4.1882	-3.9684	-4.9632
Upper Confidence	2.8288	3.7677	2.9859	3.3932	2.9358	3.2168	2.9283	2.5505	3.6829	2.9737	5.3737
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

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Model Inputs:
VAR137; VAR138; VAR139; VAR140; VAR141; VAR142; VAR143; VAR144; VAR145; VAR146; VAR147
VAR437; VAR438; VAR439; VAR440; VAR441; VAR442; VAR443; VAR444; VAR445; VAR446; VAR447
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Simultaneous Confidence Intervals: BonferroniTestTwoVariableswithRepetition (VAR137:VAR147 # VAR437:VAR447)

Mean Difference of Null	0	0	0	0	0	0	0	0	0	0	0
Mean Difference	0.4316	0.4316	0.5868	0.0763	-0.0421	0.0605	-0.5526	-0.3947	0.4421	0.4079	0.1632
Variance Group 1	0.4842	0.4842	0.6605	0.4711	0.6947	0.5553	0.6842	0.6842	0.7789	0.6184	1.3579
Variance Group 2	1.5789	1.5789	1.9825	2.0409	0.8070	0.8421	1.3860	1.3216	2.2515	2.2515	1.7602
Pooled Variance	1.0084	1.0084	1.1418	1.1112	0.8657	0.8336	1.0127	0.9972	1.2228	1.1886	1.2464
F-Critical	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655	2.1655
T-Critical	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135	5.7135
Standard Error	0.3230	0.3230	0.3658	0.3560	0.2773	0.2670	0.3244	0.3194	0.3917	0.3808	0.3993
Lower Confidence	-1.4141	-1.4141	-1.5030	-1.9576	-1.6266	-1.4652	-2.4063	-2.2199	-1.7961	-1.7678	-2.1183
Upper Confidence	2.2772	2.2772	2.6767	2.1102	1.5424	1.5862	1.3010	1.4304	2.6803	2.5836	2.4446
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Bonferroni Test

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10	VAR11
Bonferroni Critical	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214	3.0214
Lower Confidence	-3.1219	-3.1219	-3.4367	-3.8396	-3.0927	-2.8769	-4.1214	-3.9087	-3.8671	-3.7809	-4.2293
Upper Confidence	3.9850	3.9850	4.6104	3.9922	3.0084	2.9979	3.0162	3.1192	4.7513	4.5966	4.5556
Within Confidence?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Null hypothesis: the individual expected differences are equal to zero

3. *Anova Single Factor Multiple Treatments I: Comparing Three Systems Within the Same Experimental Design*

```
Model Inputs:
VAR15; VAR26; VAR37
PU1, PU1, PU1

One Way ANOVA with Randomized Multiple Treatments

                      DF    Sums of Squares    Mean Square      F Stat    p-Value
Between Groups         2               0.90           0.45      0.5655     0.5708
Within Groups         66              52.43           0.79
Total                 68              53.33           0.78

F Critical @ 0.10                  2.384818
F Critical @ 0.05                  3.135918
F Critical @ 0.01                  4.941981
The treatment has NO significant effects on at any of its levels

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Model Inputs:
VAR16; VAR27; VAR38
PU2, PU2, PU2

One Way ANOVA with Randomized Multiple Treatments

                      DF    Sums of Squares    Mean Square      F Stat    p-Value
Between Groups         2               1.83           0.91      1.3200     0.2741
Within Groups         66              45.65           0.69
Total                 68              47.48           0.70

F Critical @ 0.10                  2.384818
F Critical @ 0.05                  3.135918
F Critical @ 0.01                  4.941981
The treatment has NO significant effects on at any of its levels

------------------------------------------------------


Model Inputs:
VAR17; VAR28; VAR39
```

PU3, PU3, PU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	2.64	1.32	1.8641	0.1631
Within Groups	66	46.70	0.71		
Total	68	49.33	0.73		

F Critical @ 0.10 2.384818
F Critical @ 0.05 3.135918
F Critical @ 0.01 4.941981
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR18; VAR29; VAR40
PU4, PU4, PU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	2.64	1.32	1.8134	0.1711
Within Groups	66	48.00	0.73		
Total	68	50.64	0.74		

F Critical @ 0.10 2.384818
F Critical @ 0.05 3.135918
F Critical @ 0.01 4.941981
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR19; VAR30; VAR41
PEOU1, PEOU1, PEOU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.35	0.17	0.3940	0.6759
Within Groups	66	29.13	0.44		
Total	68	29.48	0.43		

F Critical @ 0.10 2.384818
F Critical @ 0.05 3.135918
F Critical @ 0.01 4.941981
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR20; VAR31; VAR42
PEOU2, PEOU2, PEOU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	13.42	6.71	7.9207	0.0008
Within Groups	66	55.91	0.85		
Total	68	69.33	1.02		

F Critical @ 0.10 2.384818
F Critical @ 0.05 3.135918
F Critical @ 0.01 4.941981

Model Inputs:
VAR21; VAR32; VAR43
PEOU3, PEOU3, PEOU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	3.74	1.87	2.4938	0.0903
Within Groups	66	49.48	0.75		
Total	68	53.22	0.78		

F Critical @ 0.10 2.384818
F Critical @ 0.05 3.135918
F Critical @ 0.01 4.941981

Model Inputs:
VAR22; VAR33; VAR44
PEOU4, PEOU4, PEOU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	1.07	0.54	0.7078	0.4964
Within Groups	66	50.00	0.76		
Total	68	51.07	0.75		

F Critical @ 0.10 2.384818
F Critical @ 0.05 3.135918
F Critical @ 0.01 4.941981
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR23; VAR34; VAR45
IU1, IU1, IU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.90	0.45	0.3298	0.7203
Within Groups	66	89.91	1.36		
Total	68	90.81	1.34		

F Critical @ 0.10 2.384818
F Critical @ 0.05 3.135918
F Critical @ 0.01 4.941981
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR24; VAR35; VAR46
IU2, IU2, IU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.81	0.41	0.4984	0.6098
Within Groups	66	53.74	0.81		
Total	68	54.55	0.80		

```
F Critical @ 0.10                  2.384818
F Critical @ 0.05                  3.135918
F Critical @ 0.01                  4.941981
The treatment has NO significant effects on at any of its levels

------------------------------------------------------
```

```
Model Inputs:
VAR25; VAR36; VAR47
IU3, IU3, IU3

One Way ANOVA with Randomized Multiple Treatments
```

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.20	0.10	0.0740	0.9287
Within Groups	66	90.43	1.37		
Total	68	90.64	1.33		

```
F Critical @ 0.10                  2.384818
F Critical @ 0.05                  3.135918
F Critical @ 0.01                  4.941981
The treatment has NO significant effects on at any of its levels

------------------------------------------------------
```

Model Inputs:
VAR115; VAR126; VAR137
PU1, PU1, PU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.43	0.22	0.3225	0.7257
Within Groups	57	38.30	0.67		
Total	59	38.73	0.66		

F Critical @ 0.10	2.398157
F Critical @ 0.05	3.158843
F Critical @ 0.01	4.998109

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR116; VAR127; VAR138
PU2, PU2, PU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.70	0.35	0.6951	0.5032
Within Groups	57	28.70	0.50		
Total	59	29.40	0.50		

F Critical @ 0.10	2.398157
F Critical @ 0.05	3.158843
F Critical @ 0.01	4.998109

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR117; VAR128; VAR139
PU3, PU3, PU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	2.10	1.05	1.5133	0.2289
Within Groups	57	39.55	0.69		
Total	59	41.65	0.71		

F Critical @ 0.10	2.398157
F Critical @ 0.05	3.158843
F Critical @ 0.01	4.998109

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR118; VAR129; VAR140
PU4, PU4, PU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.93	0.47	0.7065	0.4976
Within Groups	57	37.65	0.66		
Total	59	38.58	0.65		

F Critical @ 0.10	2.398157
F Critical @ 0.05	3.158843
F Critical @ 0.01	4.998109

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR119; VAR130; VAR141
PEOU1, PEOU1, PEOU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.70	0.35	0.5175	0.5988
Within Groups	57	38.55	0.68		
Total	59	39.25	0.67		

F Critical @ 0.10	2.398157
F Critical @ 0.05	3.158843
F Critical @ 0.01	4.998109

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR120; VAR131; VAR142
PEOU2, PEOU2, PEOU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	6.53	3.27	3.8751	**0.0264**
Within Groups	57	48.05	0.84		
Total	59	54.58	0.93		

F Critical @ 0.10	2.398157
F Critical @ 0.05	3.158843
F Critical @ 0.01	4.998109

Model Inputs:
VAR121; VAR132; VAR143
PEOU3, PEOU3, PEOU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.93	0.47	0.7733	0.4663
Within Groups	57	34.40	0.60		
Total	59	35.33	0.60		

F Critical @ 0.10	2.398157
F Critical @ 0.05	3.158843
F Critical @ 0.01	4.998109

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR122; VAR133; VAR144
PEOU4, PEOU4, PEOU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.23	0.12	0.2313	0.7942
Within Groups	57	28.75	0.50		
Total	59	28.98	0.49		

F Critical @ 0.10	2.398157
F Critical @ 0.05	3.158843
F Critical @ 0.01	4.998109

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR123; VAR134; VAR145
IU1, IU1, IU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	2.03	1.02	1.3008	0.2803
Within Groups	57	44.55	0.78		
Total	59	46.58	0.79		

F Critical @ 0.10 2.398157
F Critical @ 0.05 3.158843
F Critical @ 0.01 4.998109
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR124; VAR135; VAR146
IU2, IU2, IU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	4.43	2.22	3.5195	**0.0362**
Within Groups	57	35.90	0.63		
Total	59	40.33	0.68		

F Critical @ 0.10 2.398157
F Critical @ 0.05 3.158843
F Critical @ 0.01 4.998109

Model Inputs:
VAR125; VAR136; VAR147
IU3, IU3, IU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.70	0.35	0.2033	0.8167
Within Groups	57	98.15	1.72		
Total	59	98.85	1.68		

F Critical @ 0.10 2.398157
F Critical @ 0.05 3.158843
F Critical @ 0.01 4.998109
The treatment has NO significant effects on at any of its levels

----
Model Inputs:
VAR229; VAR240; VAR251
PU1, PU1, PU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	10050.00	5025.00	12.3120	**0.0000**
Within Groups	54	22039.47	408.14		
Total	56	32089.47	573.03		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217

Model Inputs:
VAR230; VAR241; VAR252
PU2, PU2, PU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	13097.37	6548.68	14.4431	0.0000
Within Groups	54	24484.21	453.41		
Total	56	37581.58	671.10		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

Model Inputs:
VAR231; VAR242; VAR253
PU3, PU3, PU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	14028.95	7014.47	15.6999	0.0000
Within Groups	54	24126.32	446.78		
Total	56	38155.26	681.34		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

Model Inputs:
VAR232; VAR243; VAR254
PU4, PU4, PU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	11129.82	5564.91	9.9116	**0.0002**
Within Groups	54	30318.42	561.45		
Total	56	41448.25	740.15		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217

Model Inputs:
VAR233; VAR244; VAR255
PEOU1, PEOU1, PEOU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	1911.40	955.70	2.9637	**0.0601**
Within Groups	54	17413.16	322.47		
Total	56	19324.56	345.08		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217

Model Inputs:
VAR234; VAR245; VAR256
PEOU2, PEOU2, PEOU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	532.46	266.23	0.6260	0.5386
Within Groups	54	22965.79	425.29		
Total	56	23498.25	419.61		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217
The treatment has NO significant effects on at any of its levels

----
Model Inputs:
VAR235; VAR246; VAR257
PEOU3, PEOU3, PEOU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	1485.09	742.54	1.8589	0.1657
Within Groups	54	21571.05	399.46		
Total	56	23056.14	411.72		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR236; VAR247; VAR258
PEOU4, PEOU4, PEOU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	1950.00	975.00	2.2784	0.1122
Within Groups	54	23107.89	427.92		
Total	56	25057.89	447.46		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR237; VAR248; VAR259
IU1, IU1, IU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	13911.40	6955.70	9.1653	**0.0004**
Within Groups	54	40981.58	758.92		
Total	56	54892.98	980.23		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217

Model Inputs:
VAR238; VAR249; VAR260
IU2, IU2, IU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	18351.19	9175.60	14.7972	**0.0000**
Within Groups	54	33484.95	620.09		
Total	56	51836.14	925.65		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

Model Inputs:
VAR239; VAR250; VAR261
IU3, IU3, IU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	255.26	127.63	0.1018	0.9034
Within Groups	54	67731.58	1254.29		
Total	56	67986.84	1214.05		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR266; VAR276; VAR286
Q1, Q1, Q1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	53.72	26.86	25.4695	**0.0000**
Within Groups	54	56.95	1.05		
Total	56	110.67	1.98		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

Model Inputs:
VAR267; VAR277; VAR287
Q2, Q2, Q2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	6.88	3.44	3.8017	**0.0285**
Within Groups	54	48.84	0.90		
Total	56	55.72	0.99		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

Model Inputs:
VAR268; VAR278; VAR288
Q3, Q3, Q3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	10.56	5.28	9.4063	**0.0003**
Within Groups	54	30.32	0.56		
Total	56	40.88	0.73		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

Model Inputs:
VAR269; VAR279; VAR289
Q4, Q4, Q4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	16.46	8.23	6.9653	**0.0020**
Within Groups	54	63.79	1.18		
Total	56	80.25	1.43		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

```
Model Inputs:
VAR270; VAR280; VAR290
Q5, Q5, Q5

One Way ANOVA with Randomized Multiple Treatments

                      DF    Sums of Squares    Mean Square      F Stat    p-Value
Between Groups         2              24.11          12.05     12.2436     0.0000
Within Groups         54              53.16           0.98
Total                 56              77.26           1.38

F Critical @ 0.10                  2.403620
F Critical @ 0.05                  3.168246
F Critical @ 0.01                  5.021217

------------------------------------------------------

Model Inputs:
VAR271; VAR281; VAR291
Q6, Q6, Q6

One Way ANOVA with Randomized Multiple Treatments

                      DF    Sums of Squares    Mean Square      F Stat    p-Value
Between Groups         2              55.82          27.91     36.7154     0.0000
Within Groups         54              41.05           0.76
Total                 56              96.88           1.73

F Critical @ 0.10                  2.403620
F Critical @ 0.05                  3.168246
F Critical @ 0.01                  5.021217
------------------------------------------------------
```

Model Inputs:
VAR272; VAR282; VAR292
Q7, Q7, Q7

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	6.04	3.02	3.5668	**0.0351**
Within Groups	54	45.68	0.85		
Total	56	51.72	0.92		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

Model Inputs:
VAR273; VAR283; VAR293
Q8, Q8, Q8

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	24.67	12.33	10.2379	**0.0002**
Within Groups	54	65.05	1.20		
Total	56	89.72	1.60		

F Critical @ 0.10	2.403620
F Critical @ 0.05	3.168246
F Critical @ 0.01	5.021217

Model Inputs:
VAR274; VAR284; VAR294
Q9, Q9, Q9

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	38.14	19.07	17.3457	0.0000
Within Groups	54	59.37	1.10		
Total	56	97.51	1.74		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217

Model Inputs:
VAR275; VAR285; VAR295
Q10, Q10, Q10

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.67	0.33	0.2464	0.7825
Within Groups	54	73.05	1.35		
Total	56	73.72	1.32		

F Critical @ 0.10 2.403620
F Critical @ 0.05 3.168246
F Critical @ 0.01 5.021217
The treatment has NO significant effects on at any of its levels

4. *Anova Single Factor Multiple Treatments II: Comparing Three Systems Among All Three Experimental Designs*

Model Inputs:
VAR15; VAR115; VAR415
PU1, PU1, PU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	17.78	8.89	12.0149	0.0000
Within Groups	59	43.64	0.74		
Total	61	61.42	1.01		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR16; VAR116; VAR416
PU2, PU2, PU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	11.92	5.96	12.1872	0.0000
Within Groups	59	28.85	0.49		
Total	61	40.77	0.67		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:

VAR17; VAR117; VAR417
PU3, PU3, PU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	27.63	13.81	20.7788	0.0000
Within Groups	59	39.23	0.66		
Total	61	66.85	1.10		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR18; VAR118; VAR418
PU4, PU4, PU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	25.87	12.93	23.0453	0.0000
Within Groups	59	33.11	0.56		
Total	61	58.98	0.97		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR19; VAR119; VAR419
PEOU1, PEOU1, PEOU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	8.64	4.32	8.1240	0.0008
Within Groups	59	31.36	0.53		
Total	61	40.00	0.66		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR20; VAR120; VAR420
PEOU2, PEOU2, PEOU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	13.99	6.99	9.4014	0.0003
Within Groups	59	43.90	0.74		
Total	61	57.89	0.95		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR21; VAR121; VAR421
PEOU3, PEOU3, PEOU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	11.72	5.86	11.4387	0.0001
Within Groups	59	30.22	0.51		
Total	61	41.94	0.69		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR22; VAR122; VAR422
PEOU4, PEOU4, PEOU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	18.46	9.23	17.6191	0.0000
Within Groups	59	30.91	0.52		
Total	61	49.37	0.81		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR23; VAR123; VAR423
IU1, IU1, IU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	19.93	9.96	10.3737	0.0001
Within Groups	59	56.67	0.96		
Total	61	76.60	1.26		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR24; VAR124; VAR424
IU2, IU2, IU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	44.76	22.38	34.5999	0.0000
Within Groups	59	38.16	0.65		
Total	61	82.92	1.36		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR25; VAR125; VAR425
IU3, IU3, IU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.33	0.16	0.0983	0.9065
Within Groups	59	98.06	1.66		
Total	61	98.39	1.61		

F Critical @ 0.10 2.394832
F Critical @ 0.05 3.153123
F Critical @ 0.01 4.984078
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR26; VAR126; VAR426
PU1, PU1, PU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	3.06	1.53	2.0498	0.1378
Within Groups	59	43.99	0.75		
Total	61	47.05	0.77		

F Critical @ 0.10 2.394832
F Critical @ 0.05 3.153123
F Critical @ 0.01 4.984078
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR27; VAR127; VAR427
PU2, PU2, PU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.35	0.17	0.1839	0.8325
Within Groups	59	55.52	0.94		
Total	61	55.87	0.92		

F Critical @ 0.10 2.394832
F Critical @ 0.05 3.153123
F Critical @ 0.01 4.984078
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR28; VAR128; VAR428
PU3, PU3, PU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	5.86	2.93	4.0139	0.0232
Within Groups	59	43.06	0.73		
Total	61	48.92	0.80		

F Critical @ 0.10 2.394832
F Critical @ 0.05 3.153123
F Critical @ 0.01 4.984078

Model Inputs:
VAR29; VAR129; VAR429
PU4, PU4, PU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	8.47	4.23	4.4596	0.0157
Within Groups	59	56.00	0.95		
Total	61	64.47	1.06		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR30; VAR130; VAR430
PEOU1, PEOU1, PEOU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.95	0.48	0.7468	0.4783
Within Groups	59	37.64	0.64		
Total	61	38.60	0.63		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR31; VAR131; VAR431
PEOU2, PEOU2, PEOU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	9.74	4.87	4.8263	0.0114
Within Groups	59	59.51	1.01		
Total	61	69.24	1.14		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR32; VAR132; VAR432
PEOU3, PEOU3, PEOU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	2.47	1.24	1.5273	0.2256
Within Groups	59	47.80	0.81		
Total	61	50.27	0.82		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR33; VAR133; VAR433
PEOU4, PEOU4, PEOU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	3.23	1.61	2.2898	0.1102
Within Groups	59	41.61	0.71		
Total	61	44.84	0.74		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR34; VAR134; VAR434
IU1, IU1, IU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	2.95	1.48	1.1182	0.3337
Within Groups	59	77.89	1.32		
Total	61	80.84	1.33		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR35; VAR135; VAR435
IU2, IU2, IU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	9.34	4.67	5.1146	0.0089
Within Groups	59	53.90	0.91		
Total	61	63.24	1.04		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR36; VAR136; VAR436
IU3, IU3, IU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.41	0.21	0.1085	0.8973
Within Groups	59	111.59	1.89		
Total	61	112.00	1.84		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR37; VAR137; VAR437
PU1, PU1, PU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	1.82	0.91	1.0111	0.3700
Within Groups	59	53.10	0.90		
Total	61	54.92	0.90		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR38; VAR138; VAR438
PU2, PU2, PU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	5.39	2.70	3.2166	0.0472
Within Groups	59	49.45	0.84		
Total	61	54.84	0.90		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR39; VAR139; VAR439
PU3, PU3, PU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	5.56	2.78	2.5806	0.0843
Within Groups	59	63.54	1.08		
Total	61	69.10	1.13		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR40; VAR140; VAR440
PU4, PU4, PU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.27	0.14	0.1224	0.8850
Within Groups	59	65.17	1.10		
Total	61	65.44	1.07		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR41; VAR141; VAR441
PEOU1, PEOU1, PEOU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.48	0.24	0.3589	0.6999
Within Groups	59	39.73	0.67		
Total	61	40.21	0.66		

F Critical @ 0.10 2.394832
F Critical @ 0.05 3.153123
F Critical @ 0.01 4.984078
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR42; VAR142; VAR442
PEOU2, PEOU2, PEOU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.30	0.15	0.1766	0.8385
Within Groups	59	50.66	0.86		
Total	61	50.97	0.84		

F Critical @ 0.10 2.394832
F Critical @ 0.05 3.153123
F Critical @ 0.01 4.984078
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR43; VAR143; VAR443
PEOU3, PEOU3, PEOU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	7.38	3.69	3.6377	0.0324
Within Groups	59	59.86	1.01		
Total	61	67.24	1.10		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

Model Inputs:
VAR44; VAR144; VAR444
PEOU4, PEOU4, PEOU4

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	1.75	0.88	0.8551	0.4305
Within Groups	59	60.44	1.02		
Total	61	62.19	1.02		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR45; VAR145; VAR445
IU1, IU1, IU1

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	2.03	1.02	0.7044	0.4985
Within Groups	59	85.07	1.44		
Total	61	87.10	1.43		

F Critical @ 0.10 2.394832
F Critical @ 0.05 3.153123
F Critical @ 0.01 4.984078
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR46; VAR146; VAR446
IU2, IU2, IU2

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	1.84	0.92	0.7795	0.4633
Within Groups	59	69.58	1.18		
Total	61	71.42	1.17		

F Critical @ 0.10 2.394832
F Critical @ 0.05 3.153123
F Critical @ 0.01 4.984078
The treatment has NO significant effects on at any of its levels

----

Model Inputs:
VAR47; VAR147; VAR447
IU3, IU3, IU3

One Way ANOVA with Randomized Multiple Treatments

	DF	Sums of Squares	Mean Square	F Stat	p-Value
Between Groups	2	0.29	0.15	0.0985	0.9063
Within Groups	59	88.09	1.49		
Total	61	88.39	1.45		

F Critical @ 0.10	2.394832
F Critical @ 0.05	3.153123
F Critical @ 0.01	4.984078

The treatment has NO significant effects on at any of its levels

5. *Anova Randomized Block Multiple Treatments*

```
Model Inputs:
   VAR296; VAR297; VAR298
   SUSA, SUSB, SUSC

   ANOVA Randomized Blocks Multiple Treatments

                               DF    Sums of Squares    Mean Square      F Stat    p-Value
   Block Factor (Row)          18            4384.65         243.59      1.5282     0.1367
   Treatment Factor (Column)    2           11369.96        5684.98     35.6650     0.0000
   Error                       36            5738.38         159.40
   Total                       56           21492.98

   F Critical (Treatment) @ 0.10             2.456346
   F Critical (Treatment) @ 0.05             3.259446
   F Critical (Treatment) @ 0.01             5.247893
   F Critical (Blocking) @ 0.10              1.645252
   F Critical (Blocking) @ 0.05              1.898622
   F Critical (Blocking) @ 0.01              2.479730

   The treatment variable has NO significant effects on at any of its levels
```

6. Nonparametric Kruskal-Wallis I: Comparing Three Systems Within the Same Experimental Design

```
Model Inputs:
VAR15; VAR26; VAR37
PU1, PU1, PU1


         Kruskal-Wallis Test
H Statistic : 4.966568
p-Value : 0.083469
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% and 5% significance,
 but are not statistically equal at 10% significance.

-------------------------------------------------------

Model Inputs:
VAR16; VAR27; VAR38
PU2, PU2, PU2


         Kruskal-Wallis Test
H Statistic : 5.523521
p-Value : 0.063180
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% and 5% significance,
 but are not statistically equal at 10% significance.

-------------------------------------------------------
Model Inputs:
```

```
VAR17; VAR28; VAR39
PU3, PU3, PU3


         Kruskal-Wallis Test
H Statistic : 3.631002
p-Value : 0.162756
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------

Model Inputs:
VAR18; VAR29; VAR40
PU4, PU4, PU4


         Kruskal-Wallis Test
H Statistic : 3.953767
p-Value : 0.138500
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR19; VAR30; VAR41
PEOU1, PEOU1, PEOU1


         Kruskal-Wallis Test
H Statistic : 4.748366
p-Value : 0.093091
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% and 5% significance,
 but are not statistically equal at 10% significance.

-------------------------------------------------------

Model Inputs:
VAR20; VAR31; VAR42
PEOU2, PEOU2, PEOU2


         Kruskal-Wallis Test
H Statistic : 14.251796
p-Value : 0.000804
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR21; VAR32; VAR43
PEOU3, PEOU3, PEOU3


         Kruskal-Wallis Test
H Statistic : 8.919039
p-Value : 0.011568
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% significance,
 but are not statistically equal at 5% and 10% significance.

-------------------------------------------------------

Model Inputs:
VAR22; VAR33; VAR44
PEOU4, PEOU4, PEOU4


         Kruskal-Wallis Test
H Statistic : 0.514826
p-Value : 0.773049
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR23; VAR34; VAR45
IU1, IU1, IU1


         Kruskal-Wallis Test
H Statistic : 1.246989
p-Value : 0.536068
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

------------------------------------------------------

Model Inputs:
VAR24; VAR35; VAR46
IU2, IU2, IU2


         Kruskal-Wallis Test
H Statistic : 2.475182
p-Value : 0.290082
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR25; VAR36; VAR47
IU3, IU3, IU3


         Kruskal-Wallis Test
H Statistic : 3.651094
p-Value : 0.161130
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------

Model Inputs:
VAR115; VAR126; VAR137
PU1, PU1, PU1


         Kruskal-Wallis Test
H Statistic : 0.464590
p-Value : 0.792712
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR116; VAR127; VAR138
PU2, PU2, PU2


         Kruskal-Wallis Test
H Statistic : 4.369508
p-Value : 0.112505
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

------------------------------------------------------

Model Inputs:
VAR117; VAR128; VAR139
PU3, PU3, PU3


         Kruskal-Wallis Test
H Statistic : 1.713770
p-Value : 0.424482
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR118; VAR129; VAR140
PU4, PU4, PU4


         Kruskal-Wallis Test
H Statistic : 0.578361
p-Value : 0.748877
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR119; VAR130; VAR141
PEOU1, PEOU1, PEOU1


         Kruskal-Wallis Test
H Statistic : 0.251803
p-Value : 0.881702
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR120; VAR131; VAR142
PEOU2, PEOU2, PEOU2


         Kruskal-Wallis Test
H Statistic : 10.334754
p-Value : 0.005699
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

-------------------------------------------------------

Model Inputs:
VAR121; VAR132; VAR143
PEOU3, PEOU3, PEOU3


         Kruskal-Wallis Test
H Statistic : 2.031475
p-Value : 0.362135
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR122; VAR133; VAR144
PEOU4, PEOU4, PEOU4


         Kruskal-Wallis Test
H Statistic : 2.382623
p-Value : 0.303823
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------

Model Inputs:
VAR123; VAR134; VAR145
IU1, IU1, IU1


         Kruskal-Wallis Test
H Statistic : 2.522295
p-Value : 0.283329
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR124; VAR135; VAR146
IU2, IU2, IU2


         Kruskal-Wallis Test
H Statistic : 6.905246
p-Value : 0.031662
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% significance,
 but are not statistically equal at 5% and 10% significance.

------------------------------------------------------


Model Inputs:
VAR125; VAR136; VAR147
IU3, IU3, IU3


         Kruskal-Wallis Test
H Statistic : 3.323607
p-Value : 0.189796
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR229; VAR240; VAR251
PU1, PU1, PU1


         Kruskal-Wallis Test
H Statistic : 20.303372
p-Value : 0.000039
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

-------------------------------------------------------

Model Inputs:
VAR230; VAR241; VAR252
PU2, PU2, PU2


         Kruskal-Wallis Test
H Statistic : 28.644952
p-Value : 0.000001
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR231; VAR242; VAR253
PU3, PU3, PU3


         Kruskal-Wallis Test
H Statistic : 25.724329
p-Value : 0.000003
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

------------------------------------------------------

Model Inputs:
VAR232; VAR243; VAR254
PU4, PU4, PU4


         Kruskal-Wallis Test
H Statistic : 22.564142
p-Value : 0.000013
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR233; VAR244; VAR255
PEOU1, PEOU1, PEOU1


         Kruskal-Wallis Test
H Statistic : 4.928838
p-Value : 0.085058
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% and 5% significance,
 but are not statistically equal at 10% significance.

------------------------------------------------------


Model Inputs:
VAR234; VAR245; VAR256
PEOU2, PEOU2, PEOU2


         Kruskal-Wallis Test
H Statistic : 2.219505
p-Value : 0.329641
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR235; VAR246; VAR257
PEOU3, PEOU3, PEOU3


         Kruskal-Wallis Test
H Statistic : 2.989779
p-Value : 0.224273
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------

Model Inputs:
VAR236; VAR247; VAR258
PEOU4, PEOU4, PEOU4


         Kruskal-Wallis Test
H Statistic : 4.048906
p-Value : 0.132066
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR237; VAR248; VAR259
IU1, IU1, IU1


         Kruskal-Wallis Test
H Statistic : 20.463081
p-Value : 0.000036
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

-------------------------------------------------------

Model Inputs:
VAR238; VAR249; VAR260
IU2, IU2, IU2


         Kruskal-Wallis Test
H Statistic : 22.724233
p-Value : 0.000012
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR239; VAR250; VAR261
IU3, IU3, IU3


         Kruskal-Wallis Test
H Statistic : 7.390964
p-Value : 0.024835
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% significance,
 but are not statistically equal at 5% and 10% significance.

------------------------------------------------------


Model Inputs:
VAR266; VAR276; VAR286
Q1, Q1, Q1


         Kruskal-Wallis Test
H Statistic : 30.812112
p-Value : 0.000000
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR267; VAR277; VAR287
Q2, Q2, Q2


         Kruskal-Wallis Test
H Statistic : 7.470054
p-Value : 0.023873
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% significance,
 but are not statistically equal at 5% and 10% significance.

------------------------------------------------------

Model Inputs:
VAR268; VAR278; VAR288
Q3, Q3, Q3


         Kruskal-Wallis Test
H Statistic : 12.270895
p-Value : 0.002165
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR269; VAR279; VAR289
Q4, Q4, Q4


         Kruskal-Wallis Test
H Statistic : 8.240329
p-Value : 0.016242
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% significance,
 but are not statistically equal at 5% and 10% significance.

-------------------------------------------------------

Model Inputs:
VAR270; VAR280; VAR290
Q5, Q5, Q5


         Kruskal-Wallis Test
H Statistic : 21.706753
p-Value : 0.000019
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

-------------------------------------------------------
```

```
Model Inputs:
VAR271; VAR281; VAR291
Q6, Q6, Q6


         Kruskal-Wallis Test
H Statistic : 33.910784
p-Value : 0.000000
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

------------------------------------------------------


Model Inputs:
VAR272; VAR282; VAR292
Q7, Q7, Q7


         Kruskal-Wallis Test
H Statistic : 7.744388
p-Value : 0.020813
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% significance,
 but are not statistically equal at 5% and 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR273; VAR283; VAR293
Q8, Q8, Q8


         Kruskal-Wallis Test
H Statistic : 14.636737
p-Value : 0.000663
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

------------------------------------------------------

Model Inputs:
VAR274; VAR284; VAR294
Q9, Q9, Q9


         Kruskal-Wallis Test
H Statistic : 22.744102
p-Value : 0.000012
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

------------------------------------------------------
```

```
Model Inputs:
VAR275; VAR285; VAR295
Q10, Q10, Q10


         Kruskal-Wallis Test
H Statistic : 0.196007
p-Value : 0.906646
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 10% significance.
```

7. *Nonparametric Kruskal-Wallis II: Comparing Three Systems Among All Three Experimental Designs*

```
Model Inputs:
VAR15; VAR115; VAR415
PU1, PU1, PU1

          Kruskal-Wallis Test
H Statistic : 26.604924
p-Value : 0.000002
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
------------------------------------------------------

Model Inputs:
VAR16; VAR116; VAR416
PU2, PU2, PU2
          Kruskal-Wallis Test
H Statistic : 30.483336
p-Value : 0.000000
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
------------------------------------------------------

Model Inputs:
VAR17; VAR117; VAR417
PU3, PU3, PU3
          Kruskal-Wallis Test
H Statistic : 31.533757
p-Value : 0.000000
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

------------------------------------------------------

Model Inputs:
VAR18; VAR118; VAR418
```

```
PU4, PU4, PU4

          Kruskal-Wallis Test
H Statistic : 34.777462
p-Value : 0.000000
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
------------------------------------------------------

Model Inputs:
VAR19; VAR119; VAR419
PEOU1, PEOU1, PEOU1

          Kruskal-Wallis Test
H Statistic : 12.975671
p-Value : 0.001522
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
------------------------------------------------------

Model Inputs:
VAR20; VAR120; VAR420
PEOU2, PEOU2, PEOU2

          Kruskal-Wallis Test
H Statistic : 19.074989
p-Value : 0.000072
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
------------------------------------------------------
```

```
Model Inputs:
VAR21; VAR121; VAR421
PEOU3, PEOU3, PEOU3

          Kruskal-Wallis Test
H Statistic : 15.704835
p-Value : 0.000389
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
-------------------------------------------------------

Model Inputs:
VAR22; VAR122; VAR422
PEOU4, PEOU4, PEOU4

          Kruskal-Wallis Test
H Statistic : 22.806660
p-Value : 0.000011
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
-------------------------------------------------------

Model Inputs:
VAR23; VAR123; VAR423
IU1, IU1, IU1

          Kruskal-Wallis Test
H Statistic : 21.936274
p-Value : 0.000017
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
-------------------------------------------------------
```

```
Model Inputs:
VAR24; VAR124; VAR424
IU2, IU2, IU2
          Kruskal-Wallis Test
H Statistic : 33.478648
p-Value : 0.000000
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.
------------------------------------------------------

Model Inputs:
VAR28; VAR128; VAR428
PU3, PU3, PU3
          Kruskal-Wallis Test
H Statistic : 8.709532
p-Value : 0.012845
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% significance,
 but are not statistically equal at 5% and 10% significance.
------------------------------------------------------

Model Inputs:
VAR29; VAR129; VAR429
PU4, PU4, PU4
          Kruskal-Wallis Test
H Statistic : 8.730167
p-Value : 0.012714
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% significance,
 but are not statistically equal at 5% and 10% significance.
------------------------------------------------------
```

Model Inputs:
VAR31; VAR131; VAR431
PEOU2, PEOU2, PEOU2
Kruskal-Wallis Test
H Statistic : 9.517117
p-Value : **0.008578**
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

Model Inputs:
VAR35; VAR135; VAR435
IU2, IU2, IU2
Kruskal-Wallis Test
H Statistic : 14.278968
p-Value : **0.000793**
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically not equal at 1%, 5%, or 10% significance.

Model Inputs:
VAR38; VAR138; VAR438
PU2, PU2, PU2
Kruskal-Wallis Test
H Statistic : 5.525735
p-Value : **0.063111**
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% and 5% significance,
but are not statistically equal at 10% significance.

```
Model Inputs:
VAR43; VAR143; VAR443
PEOU3, PEOU3, PEOU3
          Kruskal-Wallis Test
H Statistic : 5.580003
p-Value : 0.061421
H Critical at 1% : 9.210340
H Critical at 5% : 5.991465
H Critical at 10% : 4.605170
The population medians are statistically equal at 1% and 5% significance,
 but are not statistically equal at 10% significance.
```

8. Inter Rater Reliability (ICC): Less Info Group Pre-Experiment

```
   Model Inputs:
   VAR2; VAR3; VAR4; VAR5; VAR6; VAR7; VAR8; VAR9; VAR10; VAR11; VAR12; VAR13; VAR14; VAR15; VAR16; VAR17; VAR18; VAR19; VAR20; VAR21; VAR22; VAR23; VAR24
   User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20, User 21, User 22, User 23

   ANOVA Randomized Blocks Multiple Treatments
```

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	13	145.25	11.17	15.69530	**0.00000**
Columns	22	51.61	2.35	3.29561	0.00000
Error	286	203.60	0.71		
Total	321	400.47			

Interclass Correlation 0.35439

```
   A high ICC indicates a high level of reliability vs. low correlations
   mean low reliability and low consistency

   -------------------------------------------------------

   Model Inputs:
   VAR27; VAR28; VAR29; VAR30; VAR31; VAR32; VAR33; VAR34; VAR35; VAR36; VAR37; VAR38; VAR39; VAR40; VAR41; VAR42; VAR43; VAR44; VAR45; VAR46; VAR47; VAR48; VAR49
   User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20, User 21, User 22, User 23

   ANOVA Randomized Blocks Multiple Treatments
```

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	79.94	7.99	16.66936	**0.00000**
Columns	22	89.36	4.06	8.46932	0.00000
Error	220	105.51	0.48		
Total	252	274.81			

Interclass Correlation 0.28864

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR52; VAR53; VAR54; VAR55; VAR56; VAR57; VAR58; VAR59; VAR60; VAR61; VAR62; VAR63; VAR64; VAR65; VAR66; VAR67; VAR68; VAR69; VAR70; VAR71; VAR72; VAR73; VAR74
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20, User 21, User 22, User 23

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	60.91	6.09	10.69666	**0.00000**
Columns	22	68.99	3.14	5.50704	0.00000
Error	220	125.27	0.57		
Total	252	255.17			

Interclass Correlation 0.23021

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR77; VAR78; VAR79; VAR80; VAR81; VAR82; VAR83; VAR84; VAR85; VAR86; VAR87; VAR88; VAR89; VAR90; VAR91; VAR92; VAR93; VAR94; VAR95; VAR96; VAR97; VAR98; VAR99
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20, User 21, User 22, User 23

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	84.99	8.50	11.86704	**0.00000**
Columns	22	64.70	2.94	4.10667	0.00000
Error	220	157.56	0.72		

Total	252	307.25

Interclass Correlation **0.26923**

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR102; VAR103; VAR104; VAR105; VAR106; VAR107; VAR108; VAR109; VAR110; VAR111; VAR112; VAR113; VAR114; VAR115; VAR116; VAR117; VAR118; VAR119; VAR120; VAR121; VAR122; VAR123; VAR124
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20, User 21, User 22, User 23

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	3	14.48	4.83	10.97528	**0.00001**
Columns	22	72.46	3.29	7.48989	0.00000
Error	66	29.02	0.44		
Total	91	115.96			

Interclass Correlation 0.14191

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

9. *Inter Rater Reliability (ICC): More Info Group Pre-Experiment*

Model Inputs:
VAR127; VAR128; VAR129; VAR130; VAR131; VAR132; VAR133; VAR134; VAR135; VAR136; VAR137; VAR138; VAR139; VAR140; VAR141; VAR142; VAR143; VAR144; VAR145; VAR146
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	13	118.87	9.14	11.34221	**0.00000**
Columns	19	35.77	1.88	2.33532	0.00167
Error	247	199.13	0.81		
Total	279	353.77			

Interclass Correlation 0.32069

A high ICC indicates a high level of reliability vs. low correlations
mean low reliability and low consistency

Model Inputs:
VAR149; VAR150; VAR151; VAR152; VAR153; VAR154; VAR155; VAR156; VAR157; VAR158; VAR159; VAR160; VAR161; VAR162; VAR163; VAR164; VAR165; VAR166; VAR167; VAR168
User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20, User 21

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	67.90	6.79	10.75817	**0.00000**
Columns	19	66.38	3.49	5.53559	0.00000
Error	190	119.92	0.63		
Total	219	254.20			

Interclass Correlation 0.25676

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR171; VAR172; VAR173; VAR174; VAR175; VAR176; VAR177; VAR178; VAR179; VAR180; VAR181; VAR182; VAR183; VAR184; VAR185; VAR186; VAR187; VAR188; VAR189; VAR190
User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20, User 21

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	52.20	5.22	9.50497	**0.00000**
Columns	19	39.90	2.10	3.82427	0.00000
Error	190	104.35	0.55		
Total	219	196.45			

Interclass Correlation 0.25282

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR193; VAR194; VAR195; VAR196; VAR197; VAR198; VAR199; VAR200; VAR201; VAR202; VAR203; VAR204; VAR205; VAR206; VAR207; VAR208; VAR209; VAR210; VAR211; VAR212
User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20, User 21

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	62.98	6.30	11.55478	**0.00000**
Columns	19	38.44	2.02	3.71138	0.00000

Error	190	103.56	0.55		
Total	219	204.98			

Interclass Correlation 0.29745

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR215; VAR216; VAR217; VAR218; VAR219; VAR220; VAR221; VAR222; VAR223; VAR224; VAR225; VAR226; VAR227; VAR228; VAR229; VAR230; VAR231; VAR232; VAR233; VAR234
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19, User 20

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	3	9.84	3.28	5.76668	**0.00162**
Columns	19	22.44	1.18	2.07675	0.01768
Error	57	32.41	0.57		
Total	79	64.69			

Interclass Correlation 0.15810

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

10. Inter Rater Reliability (ICC): Post-Experiment

Model Inputs:
VAR237; VAR238; VAR239; VAR240; VAR241; VAR242; VAR243; VAR244; VAR245; VAR246; VAR247; VAR248; VAR249; VAR250; VAR251; VAR252; VAR253; VAR254; VAR255
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	13	2506.29	192.79	19.83188	**0.00000**
Columns	18	88.69	4.93	0.50686	0.95359
Error	234	2274.78	9.72		
Total	265	4869.76			

Interclass Correlation 0.50674

A high ICC indicates a high level of reliability vs. low correlations
mean low reliability and low consistency

Model Inputs:
VAR258; VAR259; VAR260; VAR261; VAR262; VAR263; VAR264; VAR265; VAR266; VAR267; VAR268; VAR269; VAR270; VAR271; VAR272; VAR273; VAR274; VAR275; VAR276
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	13	89070.80	6851.60	19.18701	**0.00000**
Columns	18	18202.74	1011.26	2.83191	0.00017
Error	234	83560.41	357.10		
Total	265	190833.96			

Interclass Correlation 0.45842

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR279; VAR280; VAR281; VAR282; VAR283; VAR284; VAR285; VAR286; VAR287; VAR288; VAR289; VAR290; VAR291; VAR292; VAR293; VAR294; VAR295; VAR296; VAR297
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	100378.13	10037.81	46.37263	**0.00000**
Columns	18	11234.70	624.15	2.88344	0.00017
Error	180	38962.78	216.46		
Total	208	150575.61			

Interclass Correlation 0.67094

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR300; VAR301; VAR302; VAR303; VAR304; VAR305; VAR306; VAR307; VAR308; VAR309; VAR310; VAR311; VAR312; VAR313; VAR314; VAR315; VAR316; VAR317; VAR318
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	47465.79	4746.58	15.04857	**0.00000**
Columns	18	75153.83	4175.21	13.23711	0.00000
Error	180	56775.12	315.42		
Total	208	179394.74			

Interclass Correlation 0.25927

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR321; VAR322; VAR323; VAR324; VAR325; VAR326; VAR327; VAR328; VAR329; VAR330; VAR331; VAR332; VAR333; VAR334; VAR335; VAR336; VAR337; VAR338; VAR339
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	10	43467.61	4346.76	11.08887	**0.00000**
Columns	18	75539.24	4196.62	10.70586	0.00000
Error	180	70558.76	391.99		
Total	208	189565.61			

Interclass Correlation 0.22002

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR342; VAR343; VAR344; VAR345; VAR346; VAR347; VAR348; VAR349; VAR350; VAR351; VAR352; VAR353; VAR354; VAR355; VAR356; VAR357; VAR358; VAR359; VAR360
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	3	13969.41	4656.47	11.86818	**0.00000**
Columns	18	14010.53	778.36	1.98385	0.02737
Error	54	21186.84	392.35		
Total	75	49166.78			

Interclass Correlation 0.31464

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR363; VAR364; VAR365; VAR366; VAR367; VAR368; VAR369; VAR370; VAR371; VAR372; VAR373; VAR374; VAR375; VAR376; VAR377; VAR378; VAR379; VAR380; VAR381
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	9	233.42	25.94	42.40317	**0.00000**
Columns	18	7.44	0.41	0.67598	0.83123
Error	162	99.08	0.61		
Total	189	339.94			

Interclass Correlation 0.69251

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR384; VAR385; VAR386; VAR387; VAR388; VAR389; VAR390; VAR391; VAR392; VAR393; VAR394; VAR395; VAR396; VAR397; VAR398; VAR399; VAR400; VAR401; VAR402
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	9	76.86	8.54	6.66005	**0.00000**
Columns	18	27.21	1.51	1.17887	0.28421
Error	162	207.74	1.28		
Total	189	311.81			

Interclass Correlation 0.22640

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR405; VAR406; VAR407; VAR408; VAR409; VAR410; VAR411; VAR412; VAR413; VAR414; VAR415; VAR416; VAR417; VAR418; VAR419; VAR420; VAR421; VAR422; VAR423
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	9	65.79	7.31	7.03169	**0.00000**
Columns	18	27.38	1.52	1.46315	0.10973
Error	162	168.41	1.04		
Total	189	261.58			

Interclass Correlation 0.23278

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

----

Model Inputs:
VAR426; VAR427; VAR428; VAR429; VAR430; VAR431; VAR432; VAR433; VAR434; VAR435; VAR436; VAR437; VAR438; VAR439; VAR440; VAR441; VAR442; VAR443; VAR444
User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10, User 11, User 12, User 13, User 14, User 15, User 16, User 17, User 18, User 19

ANOVA Randomized Blocks Multiple Treatments

	DF	Sums of Squares	Mean Square	F-Stat	p-Value
Rows	2	11369.96	5684.98	35.66500	**0.00000**
Columns	18	4384.65	243.59	1.52818	0.13668
Error	36	5738.38	159.40		
Total	56	21492.98			

Interclass Correlation 0.60805

A high ICC indicates a high level of reliability vs. low correlations mean low reliability and low consistency

11. Correlation Matrix

```
Model Inputs:
VAR296; VAR297; VAR298
SUSA, SUSB, SUSC

Linear Correlation :
  1.000000   0.234553   0.279342;
  0.234553   1.000000   0.065035;
  0.279342   0.065035   1.000000;

Linear Correlation p-Value :
  0.000000   0.333765   0.246782;
  0.333765   0.000000   0.791381;
  0.246782   0.791381   0.000000;

Nonlinear Correlation :
  1.000000   0.206909   0.265491;
  0.206909   1.000000   0.090518;
  0.265491   0.090518   1.000000;

------------------------------------------------------------------
```

Model Inputs:
VAR215; VAR216; VAR217; VAR218; VAR219; VAR220; VAR221; VAR222; VAR223; VAR224; VAR225; VAR226; VAR227; VAR228
HA1, HA2, HA3, HA4, AL1, AL2, AL3, AL4, AL5, LN1, LN2, LN3, LN4, LN5

Linear Correlation :

1.000000	0.302439	0.433615	0.323061	0.246998	0.143282	0.018226	0.574552	0.590125	-0.151786	0.228863	0.286293	-0.207610	-0.191811;
0.302439	1.000000	0.145767	0.410559	0.063872	0.257369	0.511551	0.141373	0.398597	-0.036700	-0.132535	0.349965	0.040174	0.093397;
0.433615	0.145767	1.000000	0.470199	-0.054406	0.131414	0.209818	0.116800	0.651888	0.147265	-0.025895	0.215888	0.008148	0.058278;
0.323061	0.410559	0.470199	1.000000	0.118132	0.077450	0.179908	0.043081	0.473468	0.243491	-0.227003	0.494956	-0.088567	-0.022586;
0.246998	0.063872	-0.054406	0.118132	1.000000	0.352851	0.058246	-0.004389	0.207629	0.092798	-0.072486	0.089521	-0.386142	-0.391916;
0.143282	0.257369	0.131414	0.077450	0.352851	1.000000	0.178457	0.029441	0.341347	-0.217688	0.059654	0.037978	-0.119068	-0.101725;
0.018226	0.511551	0.209818	0.179908	0.058246	0.178457	1.000000	0.052659	0.453360	0.366895	-0.312956	0.170969	0.221303	0.246350;
0.574552	0.141373	0.116800	0.043081	-0.004389	0.029441	0.052659	1.000000	0.283673	-0.233702	0.031627	-0.007138	-0.209110	-0.217603;
0.590125	0.398597	0.651888	0.473468	0.207629	0.341347	0.453360	0.283673	1.000000	0.332093	-0.076381	0.433831	0.093749	0.148829;
-0.151786	-0.036700	0.147265	0.243491	0.092798	-0.217688	0.366895	-0.233702	0.332093	1.000000	-0.194294	0.641340	0.372126	0.423994;
0.228863	-0.132535	-0.025895	-0.227003	-0.072486	0.059654	-0.312956	0.031627	-0.076381	-0.194294	1.000000	-0.169756	-0.144685	-0.129287;
0.286293	0.349965	0.215888	0.494956	0.089521	0.037978	0.170969	-0.007138	0.433831	0.641340	-0.169756	1.000000	0.373088	0.423476;
-0.207610	0.040174	0.008148	-0.088567	-0.386142	-0.119068	0.221303	-0.209110	0.093749	0.372126	-0.144685	0.373088	1.000000	0.991140;
-0.191811	0.093397	0.058278	-0.022586	-0.391916	-0.101725	0.246350	-0.217603	0.148829	0.423994	-0.129287	0.423476	0.991140	1.000000;

Linear Correlation p-Value :

0.000000	0.208200	0.063635	0.177305	0.307987	0.558425	0.940964	0.010082	0.007820	0.535050	0.345959	0.234725	0.393735	0.431476;
0.208200	0.000000	0.551548	0.080806	0.795038	0.287449	0.025173	0.563732	0.090955	0.881426	0.588589	0.141882	0.870290	0.703719;
0.063635	0.551548	0.000000	0.042201	0.824926	0.591774	0.388609	0.633939	0.002492	0.547420	0.916196	0.374713	0.973590	0.812671;
0.177305	0.080806	0.042201	0.000000	0.630047	0.752647	0.461117	0.860987	0.040598	0.315127	0.350001	0.031196	0.718432	0.926876;
0.307987	0.795038	0.824926	0.630047	0.000000	0.138400	0.812771	0.985773	0.393691	0.705540	0.768074	0.715518	0.102480	0.097013;
0.558425	0.287449	0.591774	0.752647	0.138400	0.000000	0.464801	0.904767	0.152641	0.370645	0.808325	0.877326	0.627320	0.678594;
0.940964	0.025173	0.388609	0.461117	0.812771	0.464801	0.000000	0.830468	0.051242	0.122310	0.192030	0.484038	0.362554	0.309300;
0.010082	0.563732	0.633939	0.860987	0.985773	0.904767	0.830468	0.000000	0.239224	0.335572	0.897728	0.976862	0.390249	0.370837;
0.007820	0.090955	0.002492	0.040598	0.393691	0.152641	0.051242	0.239224	0.000000	0.164807	0.755960	0.063488	0.702652	0.543127;
0.535050	0.881426	0.547420	0.315127	0.705540	0.370645	0.122310	0.335572	0.164807	0.000000	0.425421	0.003082	0.116672	0.070431;
0.345959	0.588589	0.916196	0.350001	0.768074	0.808325	0.192030	0.897728	0.755960	0.425421	0.000000	0.487191	0.554536	0.597838;
0.234725	0.141882	0.374713	0.031196	0.715518	0.877326	0.484038	0.976862	0.063488	0.003082	0.487191	0.000000	0.115655	0.070811;
0.393735	0.870290	0.973590	0.718432	0.102480	0.627320	0.362554	0.390249	0.702652	0.116672	0.554536	0.115655	0.000000	0.000000;
0.431476	0.703719	0.812671	0.926876	0.097013	0.678594	0.309300	0.370837	0.543127	0.070431	0.597838	0.070811	0.000000	0.000000;

Nonlinear Correlation :

1.000000	0.273389	0.444381	0.335121	0.224079	0.120449	-0.026805	0.572302	0.599840	-0.150767	0.295861	0.304184	-0.248069	-0.233338;
0.273389	1.000000	0.114085	0.235893	-0.028018	0.125652	0.577767	0.106713	0.336473	-0.095668	0.103934	0.464037	0.186658	0.209117;
0.444381	0.114085	1.000000	0.432658	-0.057911	0.123957	0.185692	0.225539	0.689111	0.180949	-0.021519	0.167758	-0.031817	-0.004051;
0.335121	0.235893	0.432658	1.000000	-0.029619	-0.070717	0.163587	-0.038109	0.463268	0.308616	-0.106121	0.599783	-0.049487	-0.041185;
0.224079	-0.028018	-0.057911	-0.029619	1.000000	0.467968	-0.132663	-0.055394	0.128073	0.088034	-0.001596	0.149080	-0.369957	-0.369317;
0.120449	0.125652	0.123957	-0.070717	0.467968	1.000000	0.082575	0.045017	0.227459	-0.181998	0.184581	0.024677	-0.183708	-0.177740;
-0.026805	0.577767	0.185692	0.163587	-0.132663	0.082575	1.000000	0.065243	0.389486	0.147735	-0.138183	0.374744	0.225919	0.236853;
0.572302	0.106713	0.225539	-0.038109	-0.055394	0.045017	0.065243	1.000000	0.307528	-0.362481	-0.016834	-0.047402	-0.204140	-0.196814;
0.599840	0.336473	0.689111	0.463268	0.128073	0.227459	0.389486	0.307528	1.000000	0.370754	0.023048	0.503836	0.071890	0.097207;
-0.150767	-0.095668	0.180949	0.308616	0.088034	-0.181998	0.147735	-0.362481	0.370754	1.000000	-0.223043	0.466106	0.077039	0.092699;
0.295861	0.103934	-0.021519	-0.106121	-0.001596	0.184581	-0.138183	-0.016834	0.023048	-0.223043	1.000000	-0.208826	-0.230505	-0.212087;
0.304184	0.464037	0.167758	0.599783	0.149080	0.024677	0.374744	-0.047402	0.503836	0.466106	-0.208826	1.000000	0.300366	0.309440;
-0.248069	0.186658	-0.031817	-0.049487	-0.369957	-0.183708	0.225919	-0.204140	0.071890	0.077039	-0.230505	0.300366	1.000000	0.997200;
-0.233338	0.209117	-0.004051	-0.041185	-0.369317	-0.177740	0.236853	-0.196814	0.097207	0.092699	-0.212087	0.309440	0.997200	1.000000;

12. T-Tests, Mann–Whitney Tests, and Wilcoxon Signed Rank Tests I: Comparing Three Systems Within the Same Experimental Design

TWO VARIABLE T-TEST WITH SIMILAR VARIANCE

```
Model Inputs:
VAR20; VAR31
PEOU2, PEOU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.000000
Column 1 Sample Standard Deviation : 0.852803
Column 2 Observations : 23
Column 2 Sample Mean : 3.043478
Column 2 Sample Standard Deviation : 0.824525
Sample Mean Difference : -0.043478
t-Statistic : -0.175781
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.430636
p-Value Right Tailed : 0.569364
p-Value Two Tailed : 0.861273
-----------------------------------------------------

Model Inputs:
VAR20; VAR42
PEOU2, PU4
Column 1 Observations : 23
Column 1 Sample Mean : 3.000000
Column 1 Sample Standard Deviation : 0.852803
Column 2 Observations : 23
Column 2 Sample Mean : 3.956522
Column 2 Sample Standard Deviation : 1.065076
Sample Mean Difference : -0.956522
t-Statistic : -3.362084
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000805
p-Value Right Tailed : 0.999195
p-Value Two Tailed : 0.001609
-----------------------------------------------------

Model Inputs:
VAR31; VAR42
PEOU2, PEOU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.043478
Column 1 Sample Standard Deviation : 0.824525
Column 2 Observations : 23
Column 2 Sample Mean : 3.956522
Column 2 Sample Standard Deviation : 1.065076
Sample Mean Difference : -0.913043
t-Statistic : -3.250943
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.001105
p-Value Right Tailed : 0.998895
p-Value Two Tailed : 0.002210
-----------------------------------------------------

Model Inputs:
VAR21; VAR32
PEOU3, PEOU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.782609
Column 1 Sample Standard Deviation : 0.671262
Column 2 Observations : 23
Column 2 Sample Mean : 3.565217
Column 2 Sample Standard Deviation : 0.895752
Sample Mean Difference : 0.217391
t-Statistic : 0.931401
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.821636
p-Value Right Tailed : 0.178364
p-Value Two Tailed : 0.356729
-----------------------------------------------------
```

Model Inputs:
VAR21; VAR43
PEOU3, PEOU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.782609
Column 1 Sample Standard Deviation : 0.671262
Column 2 Observations : 23
Column 2 Sample Mean : 3.217391
Column 2 Sample Standard Deviation : 0.998022
Sample Mean Difference : 0.565217
t-Statistic : 2.253716
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.985377
p-Value Right Tailed : 0.014623
p-Value Two Tailed : 0.029247

Model Inputs:
VAR32; VAR43
PEOU3, PEOU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.565217
Column 1 Sample Standard Deviation : 0.895752
Column 2 Observations : 23
Column 2 Sample Mean : 3.217391
Column 2 Sample Standard Deviation : 0.998022
Sample Mean Difference : 0.347826
t-Statistic : 1.243886
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.889936
p-Value Right Tailed : 0.110064
p-Value Two Tailed : 0.220128

Model Inputs:
VAR120; VAR131
PEOU2, PEOU2
Column 1 Observations : 20
Column 1 Sample Mean : 3.050000
Column 1 Sample Standard Deviation : 0.944513
Column 2 Observations : 20
Column 2 Sample Mean : 3.350000
Column 2 Sample Standard Deviation : 1.039990
Sample Mean Difference : -0.300000
t-Statistic : -0.954987
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.172810
p-Value Right Tailed : 0.827190
p-Value Two Tailed : 0.345620

Model Inputs:
VAR120; VAR142
PEOU2, PEOU2
Column 1 Observations : 20
Column 1 Sample Mean : 3.050000
Column 1 Sample Standard Deviation : 0.944513
Column 2 Observations : 20
Column 2 Sample Mean : 3.850000
Column 2 Sample Standard Deviation : 0.745160
Sample Mean Difference : -0.800000
t-Statistic : -2.973825
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.002543
p-Value Right Tailed : 0.997457
p-Value Two Tailed : 0.005086

Model Inputs:
VAR131; VAR142
PEOU2, PEOU2
Column 1 Observations : 20
Column 1 Sample Mean : 3.350000
Column 1 Sample Standard Deviation : 1.039990
Column 2 Observations : 20
Column 2 Sample Mean : 3.850000
Column 2 Sample Standard Deviation : 0.745160
Sample Mean Difference : -0.500000
t-Statistic : -1.747759
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.044291
p-Value Right Tailed : 0.955709
p-Value Two Tailed : 0.088583

Model Inputs:

```
VAR124; VAR135
IU2, IU2
Column 1 Observations : 20
Column 1 Sample Mean : 2.800000
Column 1 Sample Standard Deviation : 0.894427
Column 2 Observations : 20
Column 2 Sample Mean : 3.450000
Column 2 Sample Standard Deviation : 0.686333
Sample Mean Difference : -0.650000
t-Statistic : -2.578378
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.006963
p-Value Right Tailed : 0.993037
p-Value Two Tailed : 0.013926
-----------------------------------------------------

Model Inputs:
VAR124; VAR146
IU2, IU2
Column 1 Observations : 20
Column 1 Sample Mean : 2.800000
Column 1 Sample Standard Deviation : 0.894427
Column 2 Observations : 20
Column 2 Sample Mean : 3.250000
Column 2 Sample Standard Deviation : 0.786398
Sample Mean Difference : -0.450000
t-Statistic : -1.689760
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.049632
p-Value Right Tailed : 0.950368
p-Value Two Tailed : 0.099263
-----------------------------------------------------


Model Inputs:
VAR135; VAR146
IU2, IU2
Column 1 Observations : 20
Column 1 Sample Mean : 3.450000
Column 1 Sample Standard Deviation : 0.686333
Column 2 Observations : 20
Column 2 Sample Mean : 3.250000
Column 2 Sample Standard Deviation : 0.786398
Sample Mean Difference : 0.200000
t-Statistic : 0.856913
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.801567
p-Value Right Tailed : 0.198433
p-Value Two Tailed : 0.396865
-----------------------------------------------------

Model Inputs:
VAR229; VAR240
PU1, PU1
Column 1 Observations : 19
Column 1 Sample Mean : 96.315789
Column 1 Sample Standard Deviation : 8.306976
Column 2 Observations : 19
Column 2 Sample Mean : 77.368421
Column 2 Sample Standard Deviation : 22.874563
Sample Mean Difference : 18.947368
t-Statistic : 3.393694
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999155
p-Value Right Tailed : 0.000845
p-Value Two Tailed : 0.001691
-----------------------------------------------------

Model Inputs:
VAR229; VAR251
PU1, PU1
Column 1 Observations : 19
Column 1 Sample Mean : 96.315789
Column 1 Sample Standard Deviation : 8.306976
Column 2 Observations : 19
Column 2 Sample Mean : 63.947368
Column 2 Sample Standard Deviation : 25.142867
Sample Mean Difference : 32.368421
t-Statistic : 5.328277
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999997
p-Value Right Tailed : 0.000003
p-Value Two Tailed : 0.000005
```

```
Model Inputs:
VAR240; VAR251   PU1, PU1
Column 1 Observations : 19
Column 1 Sample Mean : 77.368421
Column 1 Sample Standard Deviation : 22.874563
Column 2 Observations : 19
Column 2 Sample Mean : 63.947368
Column 2 Sample Standard Deviation : 25.142867
Sample Mean Difference : 13.421053
t-Statistic : 1.721058
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.953087
p-Value Right Tailed : 0.046913
p-Value Two Tailed : 0.093825
-----------------------------------------------------
Model Inputs:
VAR230; VAR241
PU2, PU2
Column 1 Observations : 19
Column 1 Sample Mean : 98.157895
Column 1 Sample Standard Deviation : 5.058141
Column 2 Observations : 19
Column 2 Sample Mean : 68.157895
Column 2 Sample Standard Deviation : 26.468562
Sample Mean Difference : 30.000000
t-Statistic : 4.852651
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999988
p-Value Right Tailed : 0.000012
p-Value Two Tailed : 0.000024
Model Inputs:
VAR230; VAR252
PU2, PU2
Column 1 Observations : 19
Column 1 Sample Mean : 98.157895
Column 1 Sample Standard Deviation : 5.058141
Column 2 Observations : 19
Column 2 Sample Mean : 64.210526
Column 2 Sample Standard Deviation : 25.180634
Sample Mean Difference : 33.947368
t-Statistic : 5.761379
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999999
p-Value Right Tailed : 0.000001
p-Value Two Tailed : 0.000001
-----------------------------------------------------
Model Inputs:
VAR241; VAR252
PU2, PU2
Column 1 Observations : 19
Column 1 Sample Mean : 68.157895
Column 1 Sample Standard Deviation : 26.468562
Column 2 Observations : 19
Column 2 Sample Mean : 64.210526
Column 2 Sample Standard Deviation : 25.180634
Sample Mean Difference : 3.947368
t-Statistic : 0.470978
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.679751
p-Value Right Tailed : 0.320249
p-Value Two Tailed : 0.640498
-----------------------------------------------------
```

```
Model Inputs:
VAR231; VAR242
PU3, PU3
Column 1 Observations : 19
Column 1 Sample Mean : 98.421053
Column 1 Sample Standard Deviation : 5.014599
Column 2 Observations : 19
Column 2 Sample Mean : 73.947368
Column 2 Sample Standard Deviation : 23.188775
Sample Mean Difference : 24.473684
t-Statistic : 4.496492
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999965
p-Value Right Tailed : 0.000035
p-Value Two Tailed : 0.000069
-----------------------------------------------------

Model Inputs:
VAR231; VAR253
PU3, PU3
Column 1 Observations : 19
Column 1 Sample Mean : 98.421053
Column 1 Sample Standard Deviation : 5.014599
Column 2 Observations : 19
Column 2 Sample Mean : 60.526316
Column 2 Sample Standard Deviation : 27.883425
Sample Mean Difference : 37.894737
t-Statistic : 5.830390
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999999
p-Value Right Tailed : 0.000001
p-Value Two Tailed : 0.000001
-----------------------------------------------------
Model Inputs:
VAR242; VAR253
PU3, PU3
Column 1 Observations : 19
Column 1 Sample Mean : 73.947368
Column 1 Sample Standard Deviation : 23.188775
Column 2 Observations : 19
Column 2 Sample Mean : 60.526316
Column 2 Sample Standard Deviation : 27.883425
Sample Mean Difference : 13.421053
t-Statistic : 1.613120
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.942274
p-Value Right Tailed : 0.057726
p-Value Two Tailed : 0.115452
-----------------------------------------------------

Model Inputs:
VAR232; VAR243
PU4, PU4
Column 1 Observations : 19
Column 1 Sample Mean : 98.421053
Column 1 Sample Standard Deviation : 5.014599
Column 2 Observations : 19
Column 2 Sample Mean : 76.315789
Column 2 Sample Standard Deviation : 26.501683
Sample Mean Difference : 22.105263
t-Statistic : 3.572402
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999486
p-Value Right Tailed : 0.000514
p-Value Two Tailed : 0.001028
-----------------------------------------------------

Model Inputs:
VAR232; VAR254
PU4, PU4
Column 1 Observations : 19
Column 1 Sample Mean : 98.421053
Column 1 Sample Standard Deviation : 5.014599
Column 2 Observations : 19
Column 2 Sample Mean : 64.736842
Column 2 Sample Standard Deviation : 30.933337
Sample Mean Difference : 33.684211
t-Statistic : 4.685366
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999980
p-Value Right Tailed : 0.000020
p-Value Two Tailed : 0.000039
-----------------------------------------------------
```

```
Model Inputs:
VAR243; VAR254
PU4, PU4
Column 1 Observations : 19
Column 1 Sample Mean : 76.315789
Column 1 Sample Standard Deviation : 26.501683
Column 2 Observations : 19
Column 2 Sample Mean : 64.736842
Column 2 Sample Standard Deviation : 30.933337
Sample Mean Difference : 11.578947
t-Statistic : 1.239068
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.888331
p-Value Right Tailed : 0.111669
p-Value Two Tailed : 0.223338
Model Inputs:
VAR233; VAR244
PEOU1, PEOU1
Column 1 Observations : 19
Column 1 Sample Mean : 84.473684
Column 1 Sample Standard Deviation : 12.121461
Column 2 Observations : 19
Column 2 Sample Mean : 79.736842
Column 2 Sample Standard Deviation : 20.647416
Sample Mean Difference : 4.736842
t-Statistic : 0.862373
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.802905
p-Value Right Tailed : 0.197095
p-Value Two Tailed : 0.394191
------------------------------------------------------
Model Inputs:
VAR233; VAR255
PEOU1, PEOU1
Column 1 Observations : 19
Column 1 Sample Mean : 84.473684
Column 1 Sample Standard Deviation : 12.121461
Column 2 Observations : 19
Column 2 Sample Mean : 70.526316
Column 2 Sample Standard Deviation : 19.853263
Sample Mean Difference : 13.947368
t-Statistic : 2.613591
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.993502
p-Value Right Tailed : 0.006498
p-Value Two Tailed : 0.012996
------------------------------------------------------

Model Inputs:
VAR244; VAR255
PEOU1, PEOU1
Column 1 Observations : 19
Column 1 Sample Mean : 79.736842
Column 1 Sample Standard Deviation : 20.647416
Column 2 Observations : 19
Column 2 Sample Mean : 70.526316
Column 2 Sample Standard Deviation : 19.853263
Sample Mean Difference : 9.210526
t-Statistic : 1.401621
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.915204
p-Value Right Tailed : 0.084796
p-Value Two Tailed : 0.169592
------------------------------------------------------

Model Inputs:
VAR237; VAR248
IU1, IU1
Column 1 Observations : 19
Column 1 Sample Mean : 92.894737
Column 1 Sample Standard Deviation : 17.265556
Column 2 Observations : 19
Column 2 Sample Mean : 76.315789
Column 2 Sample Standard Deviation : 29.666765
Sample Mean Difference : 16.578947
t-Statistic : 2.105335
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.978848
p-Value Right Tailed : 0.021152
p-Value Two Tailed : 0.042304
------------------------------------------------------

Model Inputs:
VAR237; VAR259
```

```
IU1, IU1
Column 1 Observations : 19
Column 1 Sample Mean : 92.894737
Column 1 Sample Standard Deviation : 17.265556
Column 2 Observations : 19
Column 2 Sample Mean : 54.736842
Column 2 Sample Standard Deviation : 33.144200
Sample Mean Difference : 38.157895
t-Statistic : 4.450608
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999960
p-Value Right Tailed : 0.000040
p-Value Two Tailed : 0.000079
-----------------------------------------------------

Model Inputs:
VAR248; VAR259
IU1, IU1
Column 1 Observations : 19
Column 1 Sample Mean : 76.315789
Column 1 Sample Standard Deviation : 29.666765
Column 2 Observations : 19
Column 2 Sample Mean : 54.736842
Column 2 Sample Standard Deviation : 33.144200
Sample Mean Difference : 21.578947
t-Statistic : 2.114570
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.979271
p-Value Right Tailed : 0.020729
p-Value Two Tailed : 0.041458
-----------------------------------------------------
Model Inputs:
VAR238; VAR249
IU2, IU2
Column 1 Observations : 19
Column 1 Sample Mean : 95.684211
Column 1 Sample Standard Deviation : 10.000292
Column 2 Observations : 19
Column 2 Sample Mean : 74.210526
Column 2 Sample Standard Deviation : 26.523740
Sample Mean Difference : 21.473684
t-Statistic : 3.302071
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.998913
p-Value Right Tailed : 0.001087
p-Value Two Tailed : 0.002174
-----------------------------------------------------

Model Inputs:
VAR238; VAR260
IU2, IU2
Column 1 Observations : 19
Column 1 Sample Mean : 95.684211
Column 1 Sample Standard Deviation : 10.000292
Column 2 Observations : 19
Column 2 Sample Mean : 51.736842
Column 2 Sample Standard Deviation : 32.507849
Sample Mean Difference : 43.947368
t-Statistic : 5.632315
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999999
p-Value Right Tailed : 0.000001
p-Value Two Tailed : 0.000002
-----------------------------------------------------

Model Inputs:
VAR249; VAR260
IU2, IU2
Column 1 Observations : 19
Column 1 Sample Mean : 74.210526
Column 1 Sample Standard Deviation : 26.523740
Column 2 Observations : 19
Column 2 Sample Mean : 51.736842
Column 2 Sample Standard Deviation : 32.507849
Sample Mean Difference : 22.473684
t-Statistic : 2.334864
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.987378
p-Value Right Tailed : 0.012622
p-Value Two Tailed : 0.025244
-----------------------------------------------------

Model Inputs:
VAR239; VAR250
```

```
IU3, IU3
Column 1 Observations : 19
Column 1 Sample Mean : 18.947368
Column 1 Sample Standard Deviation : 37.843939
Column 2 Observations : 19
Column 2 Sample Mean : 23.947368
Column 2 Sample Standard Deviation : 35.141735
Sample Mean Difference : -5.000000
t-Statistic : -0.422014
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.337762
p-Value Right Tailed : 0.662238
p-Value Two Tailed : 0.675525
-----------------------------------------------------

Model Inputs:
VAR239; VAR261
IU3, IU3
Column 1 Observations : 19
Column 1 Sample Mean : 18.947368
Column 1 Sample Standard Deviation : 37.843939
Column 2 Observations : 19
Column 2 Sample Mean : 20.263158
Column 2 Sample Standard Deviation : 33.102269
Sample Mean Difference : -1.315789
t-Statistic : -0.114073
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.454907
p-Value Right Tailed : 0.545093
p-Value Two Tailed : 0.909814
-----------------------------------------------------
Model Inputs:
VAR250; VAR261
IU3, IU3
Column 1 Observations : 19
Column 1 Sample Mean : 23.947368
Column 1 Sample Standard Deviation : 35.141735
Column 2 Observations : 19
Column 2 Sample Mean : 20.263158
Column 2 Sample Standard Deviation : 33.102269
Sample Mean Difference : 3.684211
t-Statistic : 0.332643
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.629333
p-Value Right Tailed : 0.370667
p-Value Two Tailed : 0.741333
-----------------------------------------------------

Model Inputs:
VAR266; VAR276
Q1, Q1
Column 1 Observations : 19
Column 1 Sample Mean : 4.789474
Column 1 Sample Standard Deviation : 0.418854
Column 2 Observations : 19
Column 2 Sample Mean : 3.789474
Column 2 Sample Standard Deviation : 1.272746
Sample Mean Difference : 1.000000
t-Statistic : 3.253162
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.998758
p-Value Right Tailed : 0.001242
p-Value Two Tailed : 0.002484
-----------------------------------------------------
```

```
Model Inputs:
VAR266; VAR286
Q1, Q1
Column 1 Observations : 19
Column 1 Sample Mean : 4.789474
Column 1 Sample Standard Deviation : 0.418854
Column 2 Observations : 19
Column 2 Sample Mean : 2.421053
Column 2 Sample Standard Deviation : 1.169795
Sample Mean Difference : 2.368421
t-Statistic : 8.308676
Hypothesized Mean : 0.000000
p-Value Left Tailed : 1.000000
p-Value Right Tailed : 0.000000
p-Value Two Tailed : 0.000000
-----------------------------------------------------

Model Inputs:
VAR276; VAR286
Q1, Q1
Column 1 Observations : 19
Column 1 Sample Mean : 3.789474
Column 1 Sample Standard Deviation : 1.272746
Column 2 Observations : 19
Column 2 Sample Mean : 2.421053
Column 2 Sample Standard Deviation : 1.169795
Sample Mean Difference : 1.368421
t-Statistic : 3.450517
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999278
p-Value Right Tailed : 0.000722
p-Value Two Tailed : 0.001445
-----------------------------------------------------

Model Inputs:
VAR267; VAR277
Q2, Q2
Column 1 Observations : 19
Column 1 Sample Mean : 1.947368
Column 1 Sample Standard Deviation : 0.621261
Column 2 Observations : 19
Column 2 Sample Mean : 2.473684
Column 2 Sample Standard Deviation : 1.172292
Sample Mean Difference : -0.526316
t-Statistic : -1.729171
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.046173
p-Value Right Tailed : 0.953827
p-Value Two Tailed : 0.092346
-----------------------------------------------------
Model Inputs:
VAR267; VAR287
Q2, Q2
Column 1 Observations : 19
Column 1 Sample Mean : 1.947368
Column 1 Sample Standard Deviation : 0.621261
Column 2 Observations : 19
Column 2 Sample Mean : 2.789474
Column 2 Sample Standard Deviation : 0.976328
Sample Mean Difference : -0.842105
t-Statistic : -3.171929
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.001546
p-Value Right Tailed : 0.998454
p-Value Two Tailed : 0.003092
-----------------------------------------------------

Model Inputs:
VAR277; VAR287
Q2, Q2
Column 1 Observations : 19
Column 1 Sample Mean : 2.473684
Column 1 Sample Standard Deviation : 1.172292
Column 2 Observations : 19
Column 2 Sample Mean : 2.789474
Column 2 Sample Standard Deviation : 0.976328
Sample Mean Difference : -0.315789
t-Statistic : -0.902258
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.186459
p-Value Right Tailed : 0.813541
p-Value Two Tailed : 0.372917
-----------------------------------------------------
```

Model Inputs:
VAR268; VAR278
Q3, Q3
Column 1 Observations : 19
Column 1 Sample Mean : 4.263158
Column 1 Sample Standard Deviation : 0.452414
Column 2 Observations : 19
Column 2 Sample Mean : 4.052632
Column 2 Sample Standard Deviation : 0.705036
Sample Mean Difference : 0.210526
t-Statistic : 1.095445
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.859702
p-Value Right Tailed : 0.140298
p-Value Two Tailed : 0.280596

Model Inputs:
VAR268; VAR288
Q3, Q3
Column 1 Observations : 19
Column 1 Sample Mean : 4.263158
Column 1 Sample Standard Deviation : 0.452414
Column 2 Observations : 19
Column 2 Sample Mean : 3.263158
Column 2 Sample Standard Deviation : 0.991189
Sample Mean Difference : 1.000000
t-Statistic : 4.000616
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999850
p-Value Right Tailed : 0.000150
p-Value Two Tailed : 0.000301
Model Inputs:
VAR278; VAR288
Q3, Q3
Column 1 Observations : 19
Column 1 Sample Mean : 4.052632
Column 1 Sample Standard Deviation : 0.705036
Column 2 Observations : 19
Column 2 Sample Mean : 3.263158
Column 2 Sample Standard Deviation : 0.991189
Sample Mean Difference : 0.789474
t-Statistic : 2.829126
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.996208
p-Value Right Tailed : 0.003792
p-Value Two Tailed : 0.007583

Model Inputs:
VAR269; VAR279
Q4, Q4
Column 1 Observations : 19
Column 1 Sample Mean : 2.052632
Column 1 Sample Standard Deviation : 0.970320
Column 2 Observations : 19
Column 2 Sample Mean : 2.210526
Column 2 Sample Standard Deviation : 1.134262
Sample Mean Difference : -0.157895
t-Statistic : -0.461084
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.323756
p-Value Right Tailed : 0.676244
p-Value Two Tailed : 0.647512

Model Inputs:
VAR269; VAR289
Q4, Q4
Column 1 Observations : 19
Column 1 Sample Mean : 2.052632
Column 1 Sample Standard Deviation : 0.970320
Column 2 Observations : 19
Column 2 Sample Mean : 3.263158
Column 2 Sample Standard Deviation : 1.147079
Sample Mean Difference : -1.210526
t-Statistic : -3.512008
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000609
p-Value Right Tailed : 0.999391
p-Value Two Tailed : 0.001217

Model Inputs:
VAR279; VAR289

```
Q4, Q4
Column 1 Observations : 19
Column 1 Sample Mean : 2.210526
Column 1 Sample Standard Deviation : 1.134262
Column 2 Observations : 19
Column 2 Sample Mean : 3.263158
Column 2 Sample Standard Deviation : 1.147079
Sample Mean Difference : -1.052632
t-Statistic : -2.844273
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.003648
p-Value Right Tailed : 0.996352
p-Value Two Tailed : 0.007296
-----------------------------------------------------

Model Inputs:
VAR270; VAR280
Q5, Q5
Column 1 Observations : 19
Column 1 Sample Mean : 4.263158
Column 1 Sample Standard Deviation : 0.561951
Column 2 Observations : 19
Column 2 Sample Mean : 3.105263
Column 2 Sample Standard Deviation : 1.242521
Sample Mean Difference : 1.157895
t-Statistic : 3.701096
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999643
p-Value Right Tailed : 0.000357
p-Value Two Tailed : 0.000714
Model Inputs:
VAR270; VAR290
Q5, Q5
Column 1 Observations : 19
Column 1 Sample Mean : 4.263158
Column 1 Sample Standard Deviation : 0.561951
Column 2 Observations : 19
Column 2 Sample Mean : 2.736842
Column 2 Sample Standard Deviation : 1.045738
Sample Mean Difference : 1.526316
t-Statistic : 5.604163
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.999999
p-Value Right Tailed : 0.000001
p-Value Two Tailed : 0.000002
-----------------------------------------------------
Model Inputs:
VAR280; VAR290
Q5, Q5
Column 1 Observations : 19
Column 1 Sample Mean : 3.105263
Column 1 Sample Standard Deviation : 1.242521
Column 2 Observations : 19
Column 2 Sample Mean : 2.736842
Column 2 Sample Standard Deviation : 1.045738
Sample Mean Difference : 0.368421
t-Statistic : 0.988851
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.835332
p-Value Right Tailed : 0.164668
p-Value Two Tailed : 0.329336
-----------------------------------------------------

Model Inputs:
VAR271; VAR281
Q6, Q6
Column 1 Observations : 19
Column 1 Sample Mean : 1.947368
Column 1 Sample Standard Deviation : 0.524265
Column 2 Observations : 19
Column 2 Sample Mean : 3.263158
Column 2 Sample Standard Deviation : 1.097578
Sample Mean Difference : -1.315789
t-Statistic : -4.715210
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000018
p-Value Right Tailed : 0.999982
p-Value Two Tailed : 0.000036
-----------------------------------------------------

Model Inputs:
VAR271; VAR291
Q6, Q6
Column 1 Observations : 19
```

```
Column 1 Sample Mean : 1.947368
Column 1 Sample Standard Deviation : 0.524265
Column 2 Observations : 19
Column 2 Sample Mean : 4.368421
Column 2 Sample Standard Deviation : 0.895081
Sample Mean Difference : -2.421053
t-Statistic : -10.173495
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000000
p-Value Right Tailed : 1.000000
p-Value Two Tailed : 0.000000
------------------------------------------------------

Model Inputs:
VAR281; VAR291
Q6, Q6
Column 1 Observations : 19
Column 1 Sample Mean : 3.263158
Column 1 Sample Standard Deviation : 1.097578
Column 2 Observations : 19
Column 2 Sample Mean : 4.368421
Column 2 Sample Standard Deviation : 0.895081
Sample Mean Difference : -1.105263
t-Statistic : -3.401680
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000827
p-Value Right Tailed : 0.999173
p-Value Two Tailed : 0.001654
Model Inputs:
VAR272; VAR282
Q7, Q7
Column 1 Observations : 19
Column 1 Sample Mean : 4.210526
Column 1 Sample Standard Deviation : 0.713283
Column 2 Observations : 19
Column 2 Sample Mean : 4.105263
Column 2 Sample Standard Deviation : 0.994135
Sample Mean Difference : 0.105263
t-Statistic : 0.375000
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.645070
p-Value Right Tailed : 0.354930
p-Value Two Tailed : 0.709861
------------------------------------------------------
Model Inputs:
VAR272; VAR292
Q7, Q7
Column 1 Observations : 19
Column 1 Sample Mean : 4.210526
Column 1 Sample Standard Deviation : 0.713283
Column 2 Observations : 19
Column 2 Sample Mean : 3.473684
Column 2 Sample Standard Deviation : 1.020263
Sample Mean Difference : 0.736842
t-Statistic : 2.580039
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.992947
p-Value Right Tailed : 0.007053
p-Value Two Tailed : 0.014106-------------------------
------------------------------

Model Inputs:
VAR282; VAR292
Q7, Q7
Column 1 Observations : 19
Column 1 Sample Mean : 4.105263
Column 1 Sample Standard Deviation : 0.994135
Column 2 Observations : 19
Column 2 Sample Mean : 3.473684
Column 2 Sample Standard Deviation : 1.020263
Sample Mean Difference : 0.631579
t-Statistic : 1.932581
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.969407
p-Value Right Tailed : 0.030593
p-Value Two Tailed : 0.061185
------------------------------------------------------

Model Inputs:
VAR273; VAR283
Q8, Q8
Column 1 Observations : 19
Column 1 Sample Mean : 2.631579
Column 1 Sample Standard Deviation : 1.116071
```

```
Column 2 Observations : 19
Column 2 Sample Mean : 2.578947
Column 2 Sample Standard Deviation : 1.216360
Sample Mean Difference : 0.052632
t-Statistic : 0.138972
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.554877
p-Value Right Tailed : 0.445123
p-Value Two Tailed : 0.890247
------------------------------------------------------

Model Inputs:
VAR273; VAR293
Q8, Q8
Column 1 Observations : 19
Column 1 Sample Mean : 2.631579
Column 1 Sample Standard Deviation : 1.116071
Column 2 Observations : 19
Column 2 Sample Mean : 4.000000
Column 2 Sample Standard Deviation : 0.942809
Sample Mean Difference : -1.368421
t-Statistic : -4.082707
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000118
p-Value Right Tailed : 0.999882
p-Value Two Tailed : 0.000237
Model Inputs:
VAR283; VAR293
Q8, Q8
Column 1 Observations : 19
Column 1 Sample Mean : 2.578947
Column 1 Sample Standard Deviation : 1.216360
Column 2 Observations : 19
Column 2 Sample Mean : 4.000000
Column 2 Sample Standard Deviation : 0.942809
Sample Mean Difference : -1.421053
t-Statistic : -4.024922
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000140
p-Value Right Tailed : 0.999860
p-Value Two Tailed : 0.000280
------------------------------------------------------

Model Inputs:
VAR274; VAR284
Q9, Q9
Column 1 Observations : 19
Column 1 Sample Mean : 4.578947
Column 1 Sample Standard Deviation : 0.692483
Column 2 Observations : 19
Column 2 Sample Mean : 3.684211
Column 2 Sample Standard Deviation : 1.249561
Sample Mean Difference : 0.894737
t-Statistic : 2.729967
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.995129
p-Value Right Tailed : 0.004871
p-Value Two Tailed : 0.009741
------------------------------------------------------

Model Inputs:
VAR274; VAR294
Q9, Q9
Column 1 Observations : 19
Column 1 Sample Mean : 4.578947
Column 1 Sample Standard Deviation : 0.692483
Column 2 Observations : 19
Column 2 Sample Mean : 2.578947
Column 2 Sample Standard Deviation : 1.121298
Sample Mean Difference : 2.000000
t-Statistic : 6.614951
Hypothesized Mean : 0.000000
p-Value Left Tailed : 1.000000
p-Value Right Tailed : 0.000000
p-Value Two Tailed : 0.000000
------------------------------------------------------

Model Inputs:
VAR284; VAR294
Q9, Q9
Column 1 Observations : 19
```

```
Column 1 Sample Mean : 3.684211
Column 1 Sample Standard Deviation : 1.249561
Column 2 Observations : 19
Column 2 Sample Mean : 2.578947
Column 2 Sample Standard Deviation : 1.121298
Sample Mean Difference : 1.105263
```

```
t-Statistic : 2.869571
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.996581
p-Value Right Tailed : 0.003419
p-Value Two Tailed : 0.006838
```

MANN-WHITNEY TEST

Model Inputs:
VAR20
VAR31
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	23
Median	3.00	3.00
Rank Sum	533.00	548.00
U Values	272.00	257.00
Wilcoxon W	533.00	
U-Stat	257.00	
Mean	264.50	
Std Dev	45.51831	
Z-Score	0.15378	
P-value (One Tail)	0.43889	
P-value (Two Tail)	0.87778	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR20
VAR42
PEOU2
PEOU2

Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	23
Median	3.00	4.00
Rank Sum	403.50	677.50
U Values	401.50	127.50
Wilcoxon W	403.50	
U-Stat	127.50	
Mean	264.50	
Std Dev	45.51831	
Z-Score	2.99879	
P-value (One Tail)	0.00136	
P-value (Two Tail)	0.00271	

* Adjusted for Ties

Null hypothesis: There is zero difference between the two variables

----

Model Inputs:
VAR31
VAR42
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	23
Median	3.00	4.00
Rank Sum	406.00	675.00
U Values	399.00	130.00
Wilcoxon W	406.00	
U-Stat	130.00	
Mean	264.50	
Std Dev	45.51831	
Z-Score	2.94387	
P-value (One Tail)	0.00162	
P-value (Two Tail)	0.00324	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR21
VAR32
PEOU3

PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	23
Median	4.00	4.00
Rank Sum	566.00	515.00
U Values	239.00	290.00
Wilcoxon W	566.00	
U-Stat	239.00	
Mean	264.50	
Std Dev	45.51831	
Z-Score	0.54923	
P-value (One Tail)	0.29142	
P-value (Two Tail)	0.58285	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR21
VAR43
PEOU3
PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	23
Median	4.00	3.00
Rank Sum	634.50	446.50
U Values	170.50	358.50
Wilcoxon W	634.50	
U-Stat	170.50	
Mean	264.50	
Std Dev	45.51831	
Z-Score	2.05412	
P-value (One Tail)	0.01998	
P-value (Two Tail)	0.03996	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR32
VAR43
PEOU3
PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	23
Median	4.00	3.00
Rank Sum	605.50	475.50
U Values	199.50	329.50
Wilcoxon W	605.50	
U-Stat	199.50	
Mean	264.50	
Std Dev	45.51831	
Z-Score	1.41701	
P-value (One Tail)	0.07824	
P-value (Two Tail)	0.15648	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR120
VAR131
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	20
Median	3.00	3.50
Rank Sum	372.50	447.50
U Values	237.50	162.50
Wilcoxon W	372.50	
U-Stat	162.50	
Mean	200.00	
Std Dev	36.96846	
Z-Score	1.00085	
P-value (One Tail)	0.15845	
P-value (Two Tail)	0.31690	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR120
VAR142
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	20
Median	3.00	4.00
Rank Sum	312.50	507.50
U Values	297.50	102.50
Wilcoxon W	312.50	
U-Stat	102.50	
Mean	200.00	
Std Dev	36.96846	
Z-Score	2.62386	
P-value (One Tail)	0.00435	
P-value (Two Tail)	0.00869	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR131
VAR142
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	20
Median	3.50	4.00
Rank Sum	354.50	465.50
U Values	255.50	144.50
Wilcoxon W	354.50	
U-Stat	144.50	
Mean	200.00	
Std Dev	36.96846	
Z-Score	1.48775	
P-value (One Tail)	0.06841	
P-value (Two Tail)	0.13682	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR124
VAR135
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	20
Median	3.00	3.00
Rank Sum	332.00	488.00
U Values	278.00	122.00
Wilcoxon W	332.00	
U-Stat	122.00	
Mean	200.00	
Std Dev	36.96846	
Z-Score	2.09638	
P-value (One Tail)	0.01802	
P-value (Two Tail)	0.03605	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR124
VAR146
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	20
Median	3.00	3.00
Rank Sum	360.00	460.00

U Values	250.00	150.00
Wilcoxon W	360.00	
U-Stat	150.00	
Mean	200.00	
Std Dev	36.96846	
Z-Score	1.33898	
P-value (One Tail)	0.09029	
P-value (Two Tail)	0.18058	

* Adjusted for Ties

Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR135
VAR146
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	20
Median	3.00	3.00
Rank Sum	439.00	381.00
U Values	171.00	229.00
Wilcoxon W	439.00	
U-Stat	171.00	
Mean	200.00	
Std Dev	36.96846	
Z-Score	0.77093	
P-value (One Tail)	0.22037	
P-value (Two Tail)	0.44075	

* Adjusted for Ties

Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR229
VAR240
PU1
PU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	100.00	80.00
Rank Sum	475.50	265.50
U Values	75.50	285.50
Wilcoxon W	475.50	
U-Stat	75.50	
Mean	180.50	
Std Dev	34.25274	
Z-Score	3.05085	
P-value (One Tail)	0.00114	
P-value (Two Tail)	0.00228	

* Adjusted for Ties

Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR229
VAR251
PU1
PU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	100.00	70.00
Rank Sum	515.00	226.00
U Values	36.00	325.00
Wilcoxon W	515.00	
U-Stat	36.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	4.20404	
P-value (One Tail)	0.00001	
P-value (Two Tail)	0.00003	

* Adjusted for Ties

Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR240

VAR251
PU1
PU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	80.00	70.00
Rank Sum	432.50	308.50
U Values	118.50	242.50
Wilcoxon W	432.50	
U-Stat	118.50	
Mean	180.50	
Std Dev	34.25274	
Z-Score	1.79548	
P-value (One Tail)	0.03629	
P-value (Two Tail)	0.07258	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR230
VAR241
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	100.00	75.00
Rank Sum	513.00	228.00
U Values	38.00	323.00
Wilcoxon W	513.00	
U-Stat	38.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	4.14565	
P-value (One Tail)	0.00002	
P-value (Two Tail)	0.00003	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR230
VAR252
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	100.00	75.00
Rank Sum	524.00	217.00
U Values	27.00	334.00
Wilcoxon W	524.00	
U-Stat	27.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	4.46680	
P-value (One Tail)	0.00000	
P-value (Two Tail)	0.00001	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR241
VAR252
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	75.00	75.00
Rank Sum	385.00	356.00
U Values	166.00	195.00
Wilcoxon W	385.00	
U-Stat	166.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	0.40873	

```
P-value (One Tail)  0.34137
P-value (Two Tail)  0.68274
* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR231
VAR242
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              100.00              80.00
Rank Sum            503.50              237.50
U Values            47.50               313.50
Wilcoxon W          503.50
U-Stat              47.50
Mean                180.50
Std Dev             34.25274
Z-Score             3.86830
P-value (One Tail)  0.00005
P-value (Two Tail)  0.00011
* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR231
VAR253
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              100.00              70.00
Rank Sum            526.50              214.50
U Values            24.50               336.50
Wilcoxon W          526.50
U-Stat              24.50
Mean                180.50
Std Dev             34.25274
Z-Score             4.53978
P-value (One Tail)  0.00000
P-value (Two Tail)  0.00001
* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR242
VAR253
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              80.00               70.00
Rank Sum            423.50              317.50
U Values            127.50              233.50
Wilcoxon W          423.50
U-Stat              127.50
Mean                180.50
Std Dev             34.25274
Z-Score             1.53272
P-value (One Tail)  0.06267
P-value (Two Tail)  0.12534
* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR232
VAR243
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
```

Median	100.00	85.00
Rank Sum	490.50	250.50
U Values	60.50	300.50
Wilcoxon W	490.50	
U-Stat	60.50	
Mean	180.50	
Std Dev	34.25274	
Z-Score	3.48877	
P-value (One Tail)	0.00024	
P-value (Two Tail)	0.00049	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR232
VAR254
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	100.00	70.00
Rank Sum	496.50	244.50
U Values	54.50	306.50
Wilcoxon W	496.50	
U-Stat	54.50	
Mean	180.50	
Std Dev	34.25274	
Z-Score	3.66394	
P-value (One Tail)	0.00012	
P-value (Two Tail)	0.00025	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR243
VAR254
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	85.00	70.00
Rank Sum	409.00	332.00
U Values	142.00	219.00
Wilcoxon W	409.00	
U-Stat	142.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	1.10940	
P-value (One Tail)	0.13363	
P-value (Two Tail)	0.26726	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

```
Model Inputs:
VAR233
VAR244
PEOU1
PEOU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              90.00               80.00
Rank Sum            381.50              359.50
U Values            169.50              191.50
Wilcoxon W          381.50
U-Stat              169.50
Mean                180.50
Std Dev             34.25274
Z-Score             0.30654
P-value (One Tail)  0.37959
P-value (Two Tail)  0.75919
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR233
VAR255
PEOU1
PEOU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              90.00               70.00
Rank Sum            445.50              295.50
U Values            105.50              255.50
Wilcoxon W          445.50
U-Stat              105.50
Mean                180.50
Std Dev             34.25274
Z-Score             2.17501
P-value (One Tail)  0.01481
P-value (Two Tail)  0.02963
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR244
VAR255
PEOU1
PEOU1
Nonparametric Mann-Whitney Test


(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              80.00               70.00
Rank Sum            421.00              320.00
U Values            130.00              231.00
Wilcoxon W          421.00
U-Stat              130.00
Mean                180.50
Std Dev             34.25274
Z-Score             1.45974
P-value (One Tail)  0.07218
P-value (Two Tail)  0.14436
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR237
VAR248
IU1
IU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              100.00              90.00
Rank Sum            455.50              285.50
U Values            95.50               265.50
```

```
Wilcoxon W          455.50
U-Stat              95.50
Mean                180.50
Std Dev             34.25274
Z-Score             2.46696
P-value (One Tail)  0.00681
P-value (Two Tail)  0.01363
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR237
VAR259
IU1
IU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              100.00              50.00
Rank Sum            496.00              245.00
U Values            55.00               306.00
Wilcoxon W          496.00
U-Stat              55.00
Mean                180.50
Std Dev             34.25274
Z-Score             3.64934
P-value (One Tail)  0.00013
P-value (Two Tail)  0.00026
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR248
VAR259
IU1
IU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              90.00               50.00
Rank Sum            443.00              298.00
U Values            108.00              253.00
Wilcoxon W          443.00
U-Stat              108.00
Mean                180.50
Std Dev             34.25274
Z-Score             2.10202
P-value (One Tail)  0.01778
P-value (Two Tail)  0.03555
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR238
VAR249
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              100.00              80.00
Rank Sum            482.00              259.00
U Values            69.00               292.00
Wilcoxon W          482.00
U-Stat              69.00
Mean                180.50
Std Dev             34.25274
Z-Score             3.24062
P-value (One Tail)  0.00060
P-value (Two Tail)  0.00119
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR238
VAR260
IU2
```

IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	100.00	40.00
Rank Sum	514.00	227.00
U Values	37.00	324.00
Wilcoxon W	514.00	
U-Stat	37.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	4.17485	
P-value (One Tail)	0.00001	
P-value (Two Tail)	0.00003	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR249
VAR260
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	80.00	40.00
Rank Sum	440.50	300.50
U Values	110.50	250.50
Wilcoxon W	440.50	
U-Stat	110.50	
Mean	180.50	
Std Dev	34.25274	
Z-Score	2.02903	
P-value (One Tail)	0.02123	
P-value (Two Tail)	0.04245	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR239
VAR250
IU3
IU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	0.00	0.00
Rank Sum	348.50	392.50
U Values	202.50	158.50
Wilcoxon W	348.50	
U-Stat	158.50	
Mean	180.50	
Std Dev	34.25274	
Z-Score	0.62769	
P-value (One Tail)	0.26510	
P-value (Two Tail)	0.53021	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR239
VAR261
IU3
IU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	0.00	0.00
Rank Sum	357.00	384.00
U Values	194.00	167.00
Wilcoxon W	357.00	
U-Stat	167.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	0.37953	
P-value (One Tail)	0.35215	
P-value (Two Tail)	0.70429	

```
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR250
VAR261
IU3
IU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              0.00                0.00
Rank Sum            381.00              360.00
U Values            170.00              191.00
Wilcoxon W          381.00
U-Stat              170.00
Mean                180.50
Std Dev             34.25274
Z-Score             0.29195
P-value (One Tail)  0.38516
P-value (Two Tail)  0.77033
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR266
VAR276
Q1
Q1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              5.00                4.00
Rank Sum            466.00              275.00
U Values            85.00               276.00
Wilcoxon W          466.00
U-Stat              85.00
Mean                180.50
Std Dev             34.25274
Z-Score             2.77350
P-value (One Tail)  0.00277
P-value (Two Tail)  0.00555
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR266
VAR286
Q1
Q1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              5.00                2.00
Rank Sum            533.50              207.50
U Values            17.50               343.50
Wilcoxon W          533.50
U-Stat              17.50
Mean                180.50
Std Dev             34.25274
Z-Score             4.74415
P-value (One Tail)  0.00000
P-value (Two Tail)  0.00000
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------
```

```
Model Inputs:
VAR276
VAR286
Q1
Q1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              4.00                2.00
Rank Sum            472.00              269.00
U Values            79.00               282.00
Wilcoxon W          472.00
U-Stat              79.00
Mean                180.50
Std Dev             34.25274
Z-Score             2.94867
P-value (One Tail)  0.00160
P-value (Two Tail)  0.00319
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR267
VAR277
Q2
Q2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              2.00                2.00
Rank Sum            326.00              415.00
U Values            225.00              136.00
Wilcoxon W          326.00
U-Stat              136.00
Mean                180.50
Std Dev             34.25274
Z-Score             1.28457
P-value (One Tail)  0.09947
P-value (Two Tail)  0.19894
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR267
VAR287
Q2
Q2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              2.00                3.00
Rank Sum            280.50              460.50
U Values            270.50              90.50
Wilcoxon W          280.50
U-Stat              90.50
Mean                180.50
Std Dev             34.25274
Z-Score             2.61293
P-value (One Tail)  0.00449
P-value (Two Tail)  0.00898
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR277
VAR287
Q2
Q2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              2.00                3.00
Rank Sum            343.50              397.50
U Values            207.50              153.50
Wilcoxon W          343.50
U-Stat              153.50
Mean                180.50
```

```
Std Dev             34.25274
Z-Score             0.77366
P-value (One Tail)  0.21957
P-value (Two Tail)  0.43913
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR268
VAR278
Q3
Q3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              4.00                4.00
Rank Sum            398.50              342.50
U Values            152.50              208.50
Wilcoxon W          398.50
U-Stat              152.50
Mean                180.50
Std Dev             34.25274
Z-Score             0.80286
P-value (One Tail)  0.21103
P-value (Two Tail)  0.42206
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR268
VAR288
Q3
Q3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              4.00                3.00
Rank Sum            476.00              265.00
U Values            75.00               286.00
Wilcoxon W          476.00
U-Stat              75.00
Mean                180.50
Std Dev             34.25274
Z-Score             3.06545
P-value (One Tail)  0.00109
P-value (Two Tail)  0.00217
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR278
VAR288
Q3
Q3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              4.00                3.00
Rank Sum            452.00              289.00
U Values            99.00               262.00
Wilcoxon W          452.00
U-Stat              99.00
Mean                180.50
Std Dev             34.25274
Z-Score             2.36477
P-value (One Tail)  0.00902
P-value (Two Tail)  0.01804
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------
```

Model Inputs:
VAR269
VAR279
Q4
Q4
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	2.00	2.00
Rank Sum	360.00	381.00
U Values	191.00	170.00
Wilcoxon W	360.00	
U-Stat	170.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	0.29195	
P-value (One Tail)	0.38516	
P-value (Two Tail)	0.77033	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR269
VAR289
Q4
Q4
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	2.00	3.00
Rank Sum	268.00	473.00
U Values	283.00	78.00
Wilcoxon W	268.00	
U-Stat	78.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	2.97786	
P-value (One Tail)	0.00145	
P-value (Two Tail)	0.00290	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR279
VAR289
Q4
Q4
Nonparametric Mann-Whitney Test

(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	2.00	3.00
Rank Sum	280.00	461.00
U Values	271.00	90.00
Wilcoxon W	280.00	
U-Stat	90.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	2.62753	
P-value (One Tail)	0.00430	
P-value (Two Tail)	0.00860	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR270
VAR280
Q5
Q5
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	4.00	3.00
Rank Sum	466.50	274.50
U Values	84.50	276.50
Wilcoxon W	466.50	

```
U-Stat              84.50
Mean                180.50
Std Dev             34.25274
Z-Score             2.78810
P-value (One Tail)  0.00265
P-value (Two Tail)  0.00530
* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables
-------------------------------------------------------
```

```
Model Inputs:
VAR270
VAR290
Q5
Q5
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              4.00                3.00
Rank Sum            507.00              234.00
U Values            44.00               317.00
Wilcoxon W          507.00
U-Stat              44.00
Mean                180.50
Std Dev             34.25274
Z-Score             3.97049
P-value (One Tail)  0.00004
P-value (Two Tail)  0.00007
* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables
-------------------------------------------------------
```

```
Model Inputs:
VAR280
VAR290
Q5
Q5
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              3.00                3.00
Rank Sum            399.50              341.50
U Values            151.50              209.50
Wilcoxon W          399.50
U-Stat              151.50
Mean                180.50
Std Dev             34.25274
Z-Score             0.83205
P-value (One Tail)  0.20269
P-value (Two Tail)  0.40538
* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables
-------------------------------------------------------
```

```
Model Inputs:
VAR271
VAR281
Q6
Q6
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               19                  19
Median              2.00                3.00
Rank Sum            249.00              492.00
U Values            302.00              59.00
Wilcoxon W          249.00
U-Stat              59.00
Mean                180.50
Std Dev             34.25274
Z-Score             3.53256
P-value (One Tail)  0.00021
P-value (Two Tail)  0.00041
* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables
-------------------------------------------------------
```

Model Inputs:
VAR271
VAR291
Q6
Q6
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	2.00	5.00
Rank Sum	201.00	540.00
U Values	350.00	11.00
Wilcoxon W	201.00	
U-Stat	11.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	4.93391	
P-value (One Tail)	0.00000	
P-value (Two Tail)	0.00000	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR281
VAR291
Q6
Q6
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	3.00	5.00
Rank Sum	271.00	470.00
U Values	280.00	81.00
Wilcoxon W	271.00	
U-Stat	81.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	2.89028	
P-value (One Tail)	0.00192	
P-value (Two Tail)	0.00385	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR272
VAR282
Q7
Q7
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	4.00	4.00
Rank Sum	372.00	369.00
U Values	179.00	182.00
Wilcoxon W	372.00	
U-Stat	179.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	0.02919	
P-value (One Tail)	0.48835	
P-value (Two Tail)	0.97671	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR272
VAR292
Q7
Q7
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	4.00	3.00
Rank Sum	447.50	293.50
U Values	103.50	257.50
Wilcoxon W	447.50	
U-Stat	103.50	
Mean	180.50	

```
Std Dev              34.25274
Z-Score              2.23340
P-value (One Tail)   0.01276
P-value (Two Tail)   0.02552
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR282
VAR292
Q7
Q7
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1             Sample 2
Count                19                   19
Median               4.00                 3.00
Rank Sum             442.00               299.00
U Values             109.00               252.00
Wilcoxon W           442.00
U-Stat               109.00
Mean                 180.50
Std Dev              34.25274
Z-Score              2.07283
P-value (One Tail)   0.01909
P-value (Two Tail)   0.03819
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR273
VAR283
Q8
Q8
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1             Sample 2
Count                19                   19
Median               3.00                 2.00
Rank Sum             376.50               364.50
U Values             174.50               186.50
Wilcoxon W           376.50
U-Stat               174.50
Mean                 180.50
Std Dev              34.25274
Z-Score              0.16057
P-value (One Tail)   0.43622
P-value (Two Tail)   0.87243
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR273
VAR293
Q8
Q8
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1             Sample 2
Count                19                   19
Median               3.00                 4.00
Rank Sum             256.50               484.50
U Values             294.50               66.50
Wilcoxon W           256.50
U-Stat               66.50
Mean                 180.50
Std Dev              34.25274
Z-Score              3.31360
P-value (One Tail)   0.00046
P-value (Two Tail)   0.00092
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------
```

Model Inputs:
VAR283
VAR293
Q8
Q8
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	2.00	4.00
Rank Sum	258.50	482.50
U Values	292.50	68.50
Wilcoxon W	258.50	
U-Stat	68.50	
Mean	180.50	
Std Dev	34.25274	
Z-Score	3.25521	
P-value (One Tail)	0.00057	
P-value (Two Tail)	0.00113	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR274
VAR284
Q9
Q9
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	5.00	4.00
Rank Sum	453.50	287.50
U Values	97.50	263.50
Wilcoxon W	453.50	
U-Stat	97.50	
Mean	180.50	
Std Dev	34.25274	
Z-Score	2.40857	
P-value (One Tail)	0.00801	
P-value (Two Tail)	0.01602	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR274
VAR294
Q9
Q9

Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	5.00	3.00
Rank Sum	526.00	215.00
U Values	25.00	336.00
Wilcoxon W	526.00	
U-Stat	25.00	
Mean	180.50	
Std Dev	34.25274	
Z-Score	4.52519	
P-value (One Tail)	0.00000	
P-value (Two Tail)	0.00001	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR284
VAR294
Q9
Q9
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	19	19
Median	4.00	3.00
Rank Sum	462.00	279.00
U Values	89.00	272.00
Wilcoxon W	462.00	
U-Stat	89.00	

Mean	180.50
Std Dev	34.25274
Z-Score	2.65672
P-value (One Tail)	0.00395
P-value (Two Tail)	0.00789

* Adjusted for Ties

Null hypothesis: There's 0 difference between the variables

13. T-Tests, Mann–Whitney Tests, and Wilcoxon Signed Rank Tests II: Comparing Three Systems Among All Three Experimental Designs

```
Two Variable (T) Independent Equal Variance

Model Inputs:
VAR15; VAR115
PU1, PU1
Column 1 Observations : 23
Column 1 Sample Mean : 3.826087
Column 1 Sample Standard Deviation : 0.984063
Column 2 Observations : 20
Column 2 Sample Mean : 3.650000
Column 2 Sample Standard Deviation : 1.039990
Sample Mean Difference : 0.176087
t-Statistic : 0.570024
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.714114
p-Value Right Tailed : 0.285886
p-Value Two Tailed : 0.571772
------------------------------------------------------

Model Inputs:
VAR15; VAR415
PU1, PU1
Column 1 Observations : 23
Column 1 Sample Mean : 3.826087
Column 1 Sample Standard Deviation : 0.984063
Column 2 Observations : 19
Column 2 Sample Mean : 4.894737
Column 2 Sample Standard Deviation : 0.315302
Sample Mean Difference : -1.068650
t-Statistic : -4.536633
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000026
p-Value Right Tailed : 0.999974
p-Value Two Tailed : 0.000051
------------------------------------------------------

Model Inputs:
VAR115; VAR415
PU1, PU1
Column 1 Observations : 20
Column 1 Sample Mean : 3.650000
Column 1 Sample Standard Deviation : 1.039990
Column 2 Observations : 19
Column 2 Sample Mean : 4.894737
Column 2 Sample Standard Deviation : 0.315302
Sample Mean Difference : -1.244737
t-Statistic : -5.000362
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000007
p-Value Right Tailed : 0.999993
p-Value Two Tailed : 0.000014
------------------------------------------------------

Model Inputs:
VAR16; VAR116
PU2, PU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.956522
Column 1 Sample Standard Deviation : 0.877924
Column 2 Observations : 20
Column 2 Sample Mean : 4.050000
Column 2 Sample Standard Deviation : 0.759155
Sample Mean Difference : -0.093478
t-Statistic : -0.370591
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.356425
p-Value Right Tailed : 0.643575
p-Value Two Tailed : 0.712850
------------------------------------------------------
```

```
Model Inputs:
VAR16; VAR416
PU2, PU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.956522
Column 1 Sample Standard Deviation : 0.877924
Column 2 Observations : 19
Column 2 Sample Mean : 4.947368
Column 2 Sample Standard Deviation : 0.229416
Sample Mean Difference : -0.990847
t-Statistic : -4.777259
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000012
p-Value Right Tailed : 0.999988
p-Value Two Tailed : 0.000024
------------------------------------------------------
Model Inputs:
VAR116; VAR416
PU2, PU2
Column 1 Observations : 20
Column 1 Sample Mean : 4.050000
Column 1 Sample Standard Deviation : 0.759155
Column 2 Observations : 19
Column 2 Sample Mean : 4.947368
Column 2 Sample Standard Deviation : 0.229416
Sample Mean Difference : -0.897368
t-Statistic : -4.939758
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000008
p-Value Right Tailed : 0.999992
p-Value Two Tailed : 0.000017
------------------------------------------------------

Model Inputs:
VAR17; VAR117
PU3, PU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.608696
Column 1 Sample Standard Deviation : 0.940944
Column 2 Observations : 20
Column 2 Sample Mean : 3.400000
Column 2 Sample Standard Deviation : 0.994723
Sample Mean Difference : 0.208696
t-Statistic : 0.706438
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.758044
p-Value Right Tailed : 0.241956
p-Value Two Tailed : 0.483911
------------------------------------------------------

Model Inputs:
VAR17; VAR417
PU3, PU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.608696
Column 1 Sample Standard Deviation : 0.940944
Column 2 Observations : 19
Column 2 Sample Mean : 4.947368
Column 2 Sample Standard Deviation : 0.229416
Sample Mean Difference : -1.338673
t-Statistic : -6.042724
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000000
p-Value Right Tailed : 1.000000
p-Value Two Tailed : 0.000000
------------------------------------------------------

Model Inputs:
VAR117; VAR417
PU3, PU3
Column 1 Observations : 20
Column 1 Sample Mean : 3.400000
Column 1 Sample Standard Deviation : 0.994723
Column 2 Observations : 19
Column 2 Sample Mean : 4.947368
Column 2 Sample Standard Deviation : 0.229416
Sample Mean Difference : -1.547368
t-Statistic : -6.611492
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000000
p-Value Right Tailed : 1.000000
p-Value Two Tailed : 0.000000
Model Inputs:
VAR18; VAR118
```

PU4, PU4
Column 1 Observations : 23
Column 1 Sample Mean : 3.652174
Column 1 Sample Standard Deviation : 0.775107
Column 2 Observations : 20
Column 2 Sample Mean : 3.450000
Column 2 Sample Standard Deviation : 0.998683
Sample Mean Difference : 0.202174
t-Statistic : 0.746541
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.770200
p-Value Right Tailed : 0.229800
p-Value Two Tailed : 0.459600

Model Inputs:
VAR18; VAR418
PU4, PU4
Column 1 Observations : 23
Column 1 Sample Mean : 3.652174
Column 1 Sample Standard Deviation : 0.775107
Column 2 Observations : 19
Column 2 Sample Mean : 4.947368
Column 2 Sample Standard Deviation : 0.229416
Sample Mean Difference : -1.295195
t-Statistic : -7.020636
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000000
p-Value Right Tailed : 1.000000
p-Value Two Tailed : 0.000000

Model Inputs:
VAR118; VAR418
PU4, PU4
Column 1 Observations : 20
Column 1 Sample Mean : 3.450000
Column 1 Sample Standard Deviation : 0.998683
Column 2 Observations : 19
Column 2 Sample Mean : 4.947368
Column 2 Sample Standard Deviation : 0.229416
Sample Mean Difference : -1.497368
t-Statistic : -6.373694
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000000
p-Value Right Tailed : 1.000000
p-Value Two Tailed : 0.000000

Model Inputs:
VAR19; VAR119
PEOU1, PEOU1
Column 1 Observations : 23
Column 1 Sample Mean : 3.913043
Column 1 Sample Standard Deviation : 0.668312
Column 2 Observations : 20
Column 2 Sample Mean : 3.600000
Column 2 Sample Standard Deviation : 0.882580
Sample Mean Difference : 0.313043
t-Statistic : 1.321124
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.903107
p-Value Right Tailed : 0.096893
significant at 10%
significantly greater than the hypothesized mean difference.
p-Value Two Tailed : 0.193786

Model Inputs:
VAR19; VAR419
PEOU1, PEOU1
Column 1 Observations : 23
Column 1 Sample Mean : 3.913043
Column 1 Sample Standard Deviation : 0.668312
Column 2 Observations : 19
Column 2 Sample Mean : 4.526316
Column 2 Sample Standard Deviation : 0.611775
Sample Mean Difference : -0.613272
t-Statistic : -3.074191
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.001897
p-Value Right Tailed : 0.998103
p-Value Two Tailed : 0.003793
Model Inputs:
VAR119; VAR419
PEOU1, PEOU1

```
Column 1 Observations : 20
Column 1 Sample Mean : 3.600000
Column 1 Sample Standard Deviation : 0.882580
Column 2 Observations : 19
Column 2 Sample Mean : 4.526316
Column 2 Sample Standard Deviation : 0.611775
Sample Mean Difference : -0.926316
t-Statistic : -3.789906
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000269
p-Value Right Tailed : 0.999731
p-Value Two Tailed : 0.000538
------------------------------------------------------
Model Inputs:
VAR20; VAR120
PEOU2, PEOU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.000000
Column 1 Sample Standard Deviation : 0.852803
Column 2 Observations : 20
Column 2 Sample Mean : 3.050000
Column 2 Sample Standard Deviation : 0.944513
Sample Mean Difference : -0.050000
t-Statistic : -0.182423
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.428075
p-Value Right Tailed : 0.571925
p-Value Two Tailed : 0.856150
------------------------------------------------------


Model Inputs:
VAR20; VAR420
PEOU2, PEOU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.000000
Column 1 Sample Standard Deviation : 0.852803
Column 2 Observations : 19
Column 2 Sample Mean : 4.052632
Column 2 Sample Standard Deviation : 0.779864
Sample Mean Difference : -1.052632
t-Statistic : -4.136798
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000088
p-Value Right Tailed : 0.999912
p-Value Two Tailed : 0.000176
------------------------------------------------------

Model Inputs:
VAR120; VAR420
PEOU2, PEOU2
Column 1 Observations : 20
Column 1 Sample Mean : 3.050000
Column 1 Sample Standard Deviation : 0.944513
Column 2 Observations : 19
Column 2 Sample Mean : 4.052632
Column 2 Sample Standard Deviation : 0.779864
Sample Mean Difference : -1.002632
t-Statistic : -3.604293
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000458
p-Value Right Tailed : 0.999542
p-Value Two Tailed : 0.000917
------------------------------------------------------

Model Inputs:
VAR21; VAR121
PEOU3, PEOU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.782609
Column 1 Sample Standard Deviation : 0.671262
Column 2 Observations : 20
Column 2 Sample Mean : 3.700000
Column 2 Sample Standard Deviation : 0.864505
Sample Mean Difference : 0.082609
t-Statistic : 0.352319
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.636798
p-Value Right Tailed : 0.363202
p-Value Two Tailed : 0.726404
Model Inputs:
VAR21; VAR421
PEOU3, PEOU3
Column 1 Observations : 23
```

```
Column 1 Sample Mean : 3.782609
Column 1 Sample Standard Deviation : 0.671262
Column 2 Observations : 19
Column 2 Sample Mean : 4.684211
Column 2 Sample Standard Deviation : 0.582393
Sample Mean Difference : -0.901602
t-Statistic : -4.595709
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000021
p-Value Right Tailed : 0.999979
p-Value Two Tailed : 0.000043
-----------------------------------------------------
Model Inputs:
VAR121; VAR421
PEOU3, PEOU3
Column 1 Observations : 20
Column 1 Sample Mean : 3.700000
Column 1 Sample Standard Deviation : 0.864505
Column 2 Observations : 19
Column 2 Sample Mean : 4.684211
Column 2 Sample Standard Deviation : 0.582393
Sample Mean Difference : -0.984211
t-Statistic : -4.147096
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000094
p-Value Right Tailed : 0.999906
p-Value Two Tailed : 0.000189
-----------------------------------------------------

Model Inputs:
VAR22; VAR122
PEOU4, PEOU4
Column 1 Observations : 23
Column 1 Sample Mean : 3.391304
Column 1 Sample Standard Deviation : 0.782718
Column 2 Observations : 20
Column 2 Sample Mean : 3.400000
Column 2 Sample Standard Deviation : 0.753937
Sample Mean Difference : -0.008696
t-Statistic : -0.036960
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.485348
p-Value Right Tailed : 0.514652
p-Value Two Tailed : 0.970696
-----------------------------------------------------

Model Inputs:
VAR22; VAR422
PEOU4, PEOU4
Column 1 Observations : 23
Column 1 Sample Mean : 3.391304
Column 1 Sample Standard Deviation : 0.782718
Column 2 Observations : 19
Column 2 Sample Mean : 4.578947
Column 2 Sample Standard Deviation : 0.606977
Sample Mean Difference : -1.187643
t-Statistic : -5.402909
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000002
p-Value Right Tailed : 0.999998
p-Value Two Tailed : 0.000003
-----------------------------------------------------

Model Inputs:
VAR122; VAR422
PEOU4, PEOU4
Column 1 Observations : 20
Column 1 Sample Mean : 3.400000
Column 1 Sample Standard Deviation : 0.753937
Column 2 Observations : 19
Column 2 Sample Mean : 4.578947
Column 2 Sample Standard Deviation : 0.606977
Sample Mean Difference : -1.178947
t-Statistic : -5.361501
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000002
p-Value Right Tailed : 0.999998
p-Value Two Tailed : 0.000005
Model Inputs:
VAR23; VAR123
IU1, IU1
Column 1 Observations : 23
Column 1 Sample Mean : 3.739130
Column 1 Sample Standard Deviation : 1.136877
```

```
Column 2 Observations : 20
Column 2 Sample Mean : 3.350000
Column 2 Sample Standard Deviation : 0.933302
Sample Mean Difference : 0.389130
t-Statistic : 1.215064
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.884354
p-Value Right Tailed : 0.115646
p-Value Two Tailed : 0.231293
-----------------------------------------------------
Model Inputs:
VAR23; VAR423
IU1, IU1
Column 1 Observations : 23
Column 1 Sample Mean : 3.739130
Column 1 Sample Standard Deviation : 1.136877
Column 2 Observations : 19
Column 2 Sample Mean : 4.736842
Column 2 Sample Standard Deviation : 0.805682
Sample Mean Difference : -0.997712
t-Statistic : -3.213484
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.001296
p-Value Right Tailed : 0.998704
p-Value Two Tailed : 0.002592
-----------------------------------------------------
Model Inputs:
VAR123; VAR423
IU1, IU1
Column 1 Observations : 20
Column 1 Sample Mean : 3.350000
Column 1 Sample Standard Deviation : 0.933302
Column 2 Observations : 19
Column 2 Sample Mean : 4.736842
Column 2 Sample Standard Deviation : 0.805682
Sample Mean Difference : -1.386842
t-Statistic : -4.955638
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000008
p-Value Right Tailed : 0.999992
p-Value Two Tailed : 0.000016
-----------------------------------------------------
Model Inputs:
VAR24; VAR124
IU2, IU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.260870
Column 1 Sample Standard Deviation : 0.915393
Column 2 Observations : 20
Column 2 Sample Mean : 2.800000
Column 2 Sample Standard Deviation : 0.894427
Sample Mean Difference : 0.460870
t-Statistic : 1.664257
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.948157
p-Value Right Tailed : 0.051843
significant at 10%
significantly greater than the hypothesized mean
difference.
p-Value Two Tailed : 0.103687
-----------------------------------------------------
Model Inputs:
VAR24; VAR424
IU2, IU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.260870
Column 1 Sample Standard Deviation : 0.915393
Column 2 Observations : 19
Column 2 Sample Mean : 4.842105
Column 2 Sample Standard Deviation : 0.501460
Sample Mean Difference : -1.581236
t-Statistic : -6.732035
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000000
p-Value Right Tailed : 1.000000
p-Value Two Tailed : 0.000000
Model Inputs:
VAR124; VAR424
IU2, IU2
Column 1 Observations : 20
Column 1 Sample Mean : 2.800000
Column 1 Sample Standard Deviation : 0.894427
Column 2 Observations : 19
```

```
Column 2 Sample Mean : 4.842105
Column 2 Sample Standard Deviation : 0.501460
Sample Mean Difference : -2.042105
t-Statistic : -8.730025
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.000000
p-Value Right Tailed : 1.000000
p-Value Two Tailed : 0.000000
-----------------------------------------------------

Model Inputs:
VAR28; VAR128
PU3, PU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.217391
Column 1 Sample Standard Deviation : 0.735868
Column 2 Observations : 20
Column 2 Sample Mean : 3.700000
Column 2 Sample Standard Deviation : 0.656947
Sample Mean Difference : -0.482609
t-Statistic : -2.253683
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.014813
significant at 10% and 5%
p-Value Right Tailed : 0.985187
p-Value Two Tailed : 0.029627
significant at 10% and 5%
-----------------------------------------------------

Model Inputs:
VAR28; VAR428
PU3, PU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.217391
Column 1 Sample Standard Deviation : 0.735868
Column 2 Observations : 19
Column 2 Sample Mean : 3.947368
Column 2 Sample Standard Deviation : 1.129094
Sample Mean Difference : -0.729977
t-Statistic : -2.522255
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.007871
p-Value Right Tailed : 0.992129
p-Value Two Tailed : 0.015743
significant at 10% and 5%
-----------------------------------------------------

Model Inputs:
VAR128; VAR428
PU3, PU3
Column 1 Observations : 20
Column 1 Sample Mean : 3.700000
Column 1 Sample Standard Deviation : 0.656947
Column 2 Observations : 19
Column 2 Sample Mean : 3.947368
Column 2 Sample Standard Deviation : 1.129094
Sample Mean Difference : -0.247368
t-Statistic : -0.841577
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.202716
p-Value Right Tailed : 0.797284
p-Value Two Tailed : 0.405431
-----------------------------------------------------

Model Inputs:
VAR29; VAR129
PU4, PU4
Column 1 Observations : 23
Column 1 Sample Mean : 3.173913
Column 1 Sample Standard Deviation : 0.834058
Column 2 Observations : 20
Column 2 Sample Mean : 3.750000
Column 2 Sample Standard Deviation : 0.716350
Sample Mean Difference : -0.576087
t-Statistic : -2.410367
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.010253
significant at 10% and 5%
p-Value Right Tailed : 0.989747
p-Value Two Tailed : 0.020506
significant at 10% and 5%
-----------------------------------------------------

Model Inputs:
```

```
VAR29; VAR429
PU4, PU4
Column 1 Observations : 23
Column 1 Sample Mean : 3.173913
Column 1 Sample Standard Deviation : 0.834058
Column 2 Observations : 19
Column 2 Sample Mean : 4.052632
Column 2 Sample Standard Deviation : 1.311220
Sample Mean Difference : -0.878719
t-Statistic : -2.635918
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.005942
p-Value Right Tailed : 0.994058
p-Value Two Tailed : 0.011885
significant at 10% and 5%
------------------------------------------------------

Model Inputs:
VAR129; VAR429
PU4, PU4
Column 1 Observations : 20
Column 1 Sample Mean : 3.750000
Column 1 Sample Standard Deviation : 0.716350
Column 2 Observations : 19
Column 2 Sample Mean : 4.052632
Column 2 Sample Standard Deviation : 1.311220
Sample Mean Difference : -0.302632
t-Statistic : -0.900723
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.186781
p-Value Right Tailed : 0.813219
p-Value Two Tailed : 0.373561
------------------------------------------------------

Model Inputs:
VAR31; VAR131
PEOU2, PEOU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.043478
Column 1 Sample Standard Deviation : 0.824525
Column 2 Observations : 20
Column 2 Sample Mean : 3.350000
Column 2 Sample Standard Deviation : 1.039990
Sample Mean Difference : -0.306522
t-Statistic : -1.077318
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.143818
p-Value Right Tailed : 0.856182
p-Value Two Tailed : 0.287636
------------------------------------------------------
```

Model Inputs:
VAR31; VAR431
PEOU2, PEOU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.043478
Column 1 Sample Standard Deviation : 0.824525
Column 2 Observations : 19
Column 2 Sample Mean : 4.000000
Column 2 Sample Standard Deviation : 1.154701
Sample Mean Difference : -0.956522
t-Statistic : -3.126445
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.001646
p-Value Right Tailed : 0.998354
p-Value Two Tailed : 0.003291

Model Inputs:
VAR131; VAR431
PEOU2, PEOU2
Column 1 Observations : 20
Column 1 Sample Mean : 3.350000
Column 1 Sample Standard Deviation : 1.039990
Column 2 Observations : 19
Column 2 Sample Mean : 4.000000
Column 2 Sample Standard Deviation : 1.154701
Sample Mean Difference : -0.650000
t-Statistic : -1.849055
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.036226
significant at 10% and 5%
p-Value Right Tailed : 0.963774
p-Value Two Tailed : 0.072452
significant at 10%

Model Inputs:
VAR35; VAR135
IU2, IU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.000000
Column 1 Sample Standard Deviation : 0.904534
Column 2 Observations : 20
Column 2 Sample Mean : 3.450000
Column 2 Sample Standard Deviation : 0.686333
Sample Mean Difference : -0.450000
t-Statistic : -1.815389
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.038392
significant at 10% and 5%
p-Value Right Tailed : 0.961608
p-Value Two Tailed : 0.076783
significant at 10%

Model Inputs:
VAR35; VAR435
IU2, IU2
Column 1 Observations : 23
Column 1 Sample Mean : 3.000000
Column 1 Sample Standard Deviation : 0.904534
Column 2 Observations : 19
Column 2 Sample Mean : 3.947368
Column 2 Sample Standard Deviation : 1.223551
Sample Mean Difference : -0.947368
t-Statistic : -2.882789
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.003157
p-Value Right Tailed : 0.996843
p-Value Two Tailed : 0.006314

Model Inputs:
VAR135; VAR435
IU2, IU2
Column 1 Observations : 20

```
Column 1 Sample Mean : 3.450000
Column 1 Sample Standard Deviation : 0.686333
Column 2 Observations : 19
Column 2 Sample Mean : 3.947368
Column 2 Sample Standard Deviation : 1.223551
Sample Mean Difference : -0.497368
t-Statistic : -1.576185
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.061748
significant at 10%
p-Value Right Tailed : 0.938252
p-Value Two Tailed : 0.123496
------------------------------------------------------

Model Inputs:
VAR38; VAR138
PU2, PU2
Column 1 Observations : 23
Column 1 Sample Mean : 4.086957
Column 1 Sample Standard Deviation : 0.733178
Column 2 Observations : 20
Column 2 Sample Mean : 3.800000
Column 2 Sample Standard Deviation : 0.695852
Sample Mean Difference : 0.286957
t-Statistic : 1.310610
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.901358
p-Value Right Tailed : 0.098642
significant at 10%
significantly greater than the hypothesized mean
difference.
p-Value Two Tailed : 0.197284
------------------------------------------------------

Model Inputs:
VAR38; VAR438
PU2, PU2
Column 1 Observations : 23
Column 1 Sample Mean : 4.086957
Column 1 Sample Standard Deviation : 0.733178
Column 2 Observations : 19
Column 2 Sample Mean : 3.368421
Column 2 Sample Standard Deviation : 1.256562
Sample Mean Difference : 0.718535
t-Statistic : 2.310611
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.986954
p-Value Right Tailed : 0.013046
significant at 10% and 5%
significantly greater than the hypothesized mean
difference.
p-Value Two Tailed : 0.026093
significant at 10% and 5%
------------------------------------------------------

Model Inputs:
VAR138; VAR438
PU2, PU2
Column 1 Observations : 20
Column 1 Sample Mean : 3.800000
Column 1 Sample Standard Deviation : 0.695852
Column 2 Observations : 19
Column 2 Sample Mean : 3.368421
Column 2 Sample Standard Deviation : 1.256562
Sample Mean Difference : 0.431579
t-Statistic : 1.335996
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.905145
p-Value Right Tailed : 0.094855
significant at 10%
significantly greater than the hypothesized mean
difference.
p-Value Two Tailed : 0.189710
------------------------------------------------------
Model Inputs:
VAR43; VAR143
PEOU3, PEOU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.217391
Column 1 Sample Standard Deviation : 0.998022
Column 2 Observations : 20
Column 2 Sample Mean : 3.500000
```

```
Column 2 Sample Standard Deviation : 0.827170
Sample Mean Difference : -0.282609
t-Statistic : -1.001678
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.161187
p-Value Right Tailed : 0.838813
p-Value Two Tailed : 0.322374
------------------------------------------------------

Model Inputs:
VAR43; VAR443
PEOU3, PEOU3
Column 1 Observations : 23
Column 1 Sample Mean : 3.217391
Column 1 Sample Standard Deviation : 0.998022
Column 2 Observations : 19
Column 2 Sample Mean : 4.052632
Column 2 Sample Standard Deviation : 1.177270
Sample Mean Difference : -0.835240
t-Statistic : -2.489169
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.008532
p-Value Right Tailed : 0.991468
p-Value Two Tailed : 0.017063
significant at 10% and 5%
------------------------------------------------------

Model Inputs:
VAR143; VAR443
PEOU3, PEOU3
Column 1 Observations : 20
Column 1 Sample Mean : 3.500000
Column 1 Sample Standard Deviation : 0.827170
Column 2 Observations : 19
Column 2 Sample Mean : 4.052632
Column 2 Sample Standard Deviation : 1.177270
Sample Mean Difference : -0.552632
t-Statistic : -1.703355
Hypothesized Mean : 0.000000
p-Value Left Tailed : 0.048444
significant at 10% and 5%
p-Value Right Tailed : 0.951556
p-Value Two Tailed : 0.096889
significant at 10%
```

MANN-WHITNEY TEST

```
Model Inputs:
VAR15
VAR115
PU1
PU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  20
Median              4.00                4.00
Rank Sum            533.00              413.00
U Values            203.00              257.00
Wilcoxon W          413.00
U-Stat              203.00
Mean                230.00
Std Dev             41.06905
Z-Score             0.64525
P-value (One Tail)  0.25938
P-value (Two Tail)  0.51876
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR15
VAR415
PU1
PU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  19
Median              4.00                5.00
Rank Sum            340.50              562.50
U Values            372.50              64.50
Wilcoxon W          562.50
U-Stat              64.50
Mean                218.50
Std Dev             39.57166
Z-Score             3.87904
P-value (One Tail)  0.00005
P-value (Two Tail)  0.00010
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR115
VAR415
PU1
PU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               20                  19
Median              4.00                5.00
Rank Sum            268.50              511.50
U Values            321.50              58.50
Wilcoxon W          511.50
U-Stat              58.50
Mean                190.00
Std Dev             35.59026
Z-Score             3.68078
P-value (One Tail)  0.00012
P-value (Two Tail)  0.00023
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------
```

Model Inputs:
VAR16
VAR116
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	20
Median	4.00	4.00
Rank Sum	495.50	450.50
U Values	240.50	219.50
Wilcoxon W	450.50	
U-Stat	219.50	
Mean	230.00	
Std Dev	41.06905	
Z-Score	0.24349	
P-value (One Tail)	0.40381	
P-value (Two Tail)	0.80762	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR16
VAR416
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	19
Median	4.00	5.00
Rank Sum	333.00	570.00
U Values	380.00	57.00
Wilcoxon W	570.00	
U-Stat	57.00	
Mean	218.50	
Std Dev	39.57166	
Z-Score	4.06857	
P-value (One Tail)	0.00002	
P-value (Two Tail)	0.00005	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR116
VAR416
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	19
Median	4.00	5.00
Rank Sum	266.00	514.00
U Values	324.00	56.00
Wilcoxon W	514.00	
U-Stat	56.00	
Mean	190.00	
Std Dev	35.59026	
Z-Score	3.75103	
P-value (One Tail)	0.00009	
P-value (Two Tail)	0.00018	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

Model Inputs:
VAR17
VAR117
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	20
Median	4.00	3.50
Rank Sum	535.00	411.00
U Values	201.00	259.00
Wilcoxon W	411.00	
U-Stat	201.00	
Mean	230.00	

```
Std Dev              41.06905
Z-Score              0.69395
P-value (One Tail)   0.24386
P-value (Two Tail)   0.48771
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR17
VAR417
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1            Sample 2
Count                23                  19
Median               4.00                5.00
Rank Sum             311.50              591.50
U Values             401.50              35.50
Wilcoxon W           591.50
U-Stat               35.50
Mean                 218.50
Std Dev              39.57166
Z-Score              4.61189
P-value (One Tail)   0.00000
P-value (Two Tail)   0.00000
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR117
VAR417
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1            Sample 2
Count                20                  19
Median               3.50                5.00
Rank Sum             234.00              546.00
U Values             356.00              24.00
Wilcoxon W           546.00
U-Stat               24.00
Mean                 190.00
Std Dev              35.59026
Z-Score              4.65015
P-value (One Tail)   0.00000
P-value (Two Tail)   0.00000
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------

Model Inputs:
VAR18
VAR118
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1            Sample 2
Count                23                  20
Median               4.00                4.00
Rank Sum             516.50              429.50
U Values             219.50              240.50
Wilcoxon W           429.50
U-Stat               219.50
Mean                 230.00
Std Dev              41.06905
Z-Score              0.24349
P-value (One Tail)   0.40381
P-value (Two Tail)   0.80762
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-------------------------------------------------------
Model Inputs:
VAR18
VAR418
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1            Sample 2
```

Count	23	19
Median	4.00	5.00
Rank Sum	311.00	592.00
U Values	402.00	35.00
Wilcoxon W	592.00	
U-Stat	35.00	
Mean	218.50	
Std Dev	39.57166	
Z-Score	4.62452	
P-value (One Tail)	0.00000	
P-value (Two Tail)	0.00000	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR118
VAR418
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	19
Median	4.00	5.00
Rank Sum	226.00	554.00
U Values	364.00	16.00
Wilcoxon W	554.00	
U-Stat	16.00	
Mean	190.00	
Std Dev	35.59026	
Z-Score	4.87493	
P-value (One Tail)	0.00000	
P-value (Two Tail)	0.00000	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR19
VAR119
PEOU1
PEOU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	20
Median	4.00	4.00
Rank Sum	557.00	389.00
U Values	179.00	281.00
Wilcoxon W	389.00	
U-Stat	179.00	
Mean	230.00	
Std Dev	41.06905	
Z-Score	1.22964	
P-value (One Tail)	0.10942	
P-value (Two Tail)	0.21883	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR19
VAR419
PEOU1
PEOU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	19
Median	4.00	5.00
Rank Sum	390.00	513.00
U Values	323.00	114.00
Wilcoxon W	513.00	
U-Stat	114.00	
Mean	218.50	
Std Dev	39.57166	
Z-Score	2.62814	
P-value (One Tail)	0.00429	
P-value (Two Tail)	0.00859	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

```
Model Inputs:
VAR119
VAR419
PEOU1
PEOU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                      Sample 1             Sample 2
Count                 20                   19
Median                4.00                 5.00
Rank Sum              290.00               490.00
U Values              300.00               80.00
Wilcoxon W            490.00
U-Stat                80.00
Mean                  190.00
Std Dev               35.59026
Z-Score               3.07668
P-value (One Tail)    0.00105
P-value (Two Tail)    0.00209
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR20
VAR120
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                      Sample 1             Sample 2
Count                 23                   20
Median                3.00                 3.00
Rank Sum              498.50               447.50
U Values              237.50               222.50
Wilcoxon W            447.50
U-Stat                222.50
Mean                  230.00
Std Dev               41.06905
Z-Score               0.17044
P-value (One Tail)    0.43233
P-value (Two Tail)    0.86466
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR20
VAR420
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                      Sample 1             Sample 2
Count                 23                   19
Median                3.00                 4.00
Rank Sum              362.00               541.00
U Values              351.00               86.00
Wilcoxon W            541.00
U-Stat                86.00
Mean                  218.50
Std Dev               39.57166
Z-Score               3.33572
P-value (One Tail)    0.00043
P-value (Two Tail)    0.00085
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------
Model Inputs:
VAR120
VAR420
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                      Sample 1             Sample 2
Count                 20                   19
Median                3.00                 4.00
Rank Sum              289.00               491.00
U Values              301.00               79.00
Wilcoxon W            491.00
U-Stat                79.00
Mean                  190.00
Std Dev               35.59026
```

```
Z-Score             3.10478
P-value (One Tail)  0.00095
P-value (Two Tail)  0.00190
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR21
VAR121
PEOU3
PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  20
Median              4.00                4.00
Rank Sum            520.00              426.00
U Values            216.00              244.00
Wilcoxon W          426.00
U-Stat              216.00
Mean                230.00
Std Dev             41.06905
Z-Score             0.32871
P-value (One Tail)  0.37119
P-value (Two Tail)  0.74237
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR21
VAR421
PEOU3
PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  19
Median              4.00                5.00
Rank Sum            352.00              551.00
U Values            361.00              76.00
Wilcoxon W          551.00
U-Stat              76.00
Mean                218.50
Std Dev             39.57166
Z-Score             3.58843
P-value (One Tail)  0.00017
P-value (Two Tail)  0.00033
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR121
VAR421
PEOU3
PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               20                  19
Median              4.00                5.00
Rank Sum            283.00              497.00
U Values            307.00              73.00
Wilcoxon W          497.00
U-Stat              73.00
Mean                190.00
Std Dev             35.59026
Z-Score             3.27337
P-value (One Tail)  0.00053
P-value (Two Tail)  0.00106
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR22
VAR122
PEOU4
PEOU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
```

Count	23	20
Median	3.00	3.00
Rank Sum	514.50	431.50
U Values	221.50	238.50
Wilcoxon W	431.50	
U-Stat	221.50	
Mean	230.00	
Std Dev	41.06905	
Z-Score	0.19479	
P-value (One Tail)	0.42278	
P-value (Two Tail)	0.84555	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR22
VAR422
PEOU4
PEOU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	19
Median	3.00	5.00
Rank Sum	333.50	569.50
U Values	379.50	57.50
Wilcoxon W	569.50	
U-Stat	57.50	
Mean	218.50	
Std Dev	39.57166	
Z-Score	4.05593	
P-value (One Tail)	0.00002	
P-value (Two Tail)	0.00005	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR122
VAR422
PEOU4
PEOU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	19
Median	3.00	5.00
Rank Sum	262.00	518.00
U Values	328.00	52.00
Wilcoxon W	518.00	
U-Stat	52.00	
Mean	190.00	
Std Dev	35.59026	
Z-Score	3.86342	
P-value (One Tail)	0.00006	
P-value (Two Tail)	0.00011	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR23
VAR123
IU1
IU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	20
Median	4.00	3.00
Rank Sum	574.50	371.50
U Values	161.50	298.50
Wilcoxon W	371.50	
U-Stat	161.50	
Mean	230.00	
Std Dev	41.06905	
Z-Score	1.65575	
P-value (One Tail)	0.04889	
P-value (Two Tail)	0.09777	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:

```
VAR23
VAR423
IU1
IU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  19
Median              4.00                5.00
Rank Sum            357.50              545.50
U Values            355.50              81.50
Wilcoxon W          545.50
U-Stat              81.50
Mean                218.50
Std Dev             39.57166
Z-Score             3.44944
P-value (One Tail)  0.00028
P-value (Two Tail)  0.00056
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR123
VAR423
IU1
IU1
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               20                  19
Median              3.00                5.00
Rank Sum            258.50              521.50
U Values            331.50              48.50
Wilcoxon W          521.50
U-Stat              48.50
Mean                190.00
Std Dev             35.59026
Z-Score             3.96176
P-value (One Tail)  0.00004
P-value (Two Tail)  0.00007
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR24
VAR124
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  20
Median              3.00                3.00
Rank Sum            570.00              376.00
U Values            166.00              294.00
Wilcoxon W          376.00
U-Stat              166.00
Mean                230.00
Std Dev             41.06905
Z-Score             1.54618
P-value (One Tail)  0.06103
P-value (Two Tail)  0.12206
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR24
VAR424
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  19
Median              3.00                5.00
Rank Sum            304.50              598.50
U Values            408.50              28.50
Wilcoxon W          598.50
U-Stat              28.50
Mean                218.50
Std Dev             39.57166
```

```
Z-Score              4.78878
P-value (One Tail)   0.00000
P-value (Two Tail)   0.00000
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR124
VAR424
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1            Sample 2
Count                20                  19
Median               3.00                5.00
Rank Sum             221.00              559.00
U Values             369.00              11.00
Wilcoxon W           559.00
U-Stat               11.00
Mean                 190.00
Std Dev              35.59026
Z-Score              5.01542
P-value (One Tail)   0.00000
P-value (Two Tail)   0.00000
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR28
VAR128
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1            Sample 2
Count                23                  20
Median               3.00                4.00
Rank Sum             433.00              513.00
U Values             303.00              157.00
Wilcoxon W           513.00
U-Stat               157.00
Mean                 230.00
Std Dev              41.06905
Z-Score              1.76532
P-value (One Tail)   0.03876
P-value (Two Tail)   0.07751
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------
Model Inputs:
VAR28
VAR428
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1            Sample 2
Count                23                  19
Median               3.00                4.00
Rank Sum             393.50              509.50
U Values             319.50              117.50
Wilcoxon W           509.50
U-Stat               117.50
Mean                 218.50
Std Dev              39.57166
Z-Score              2.53970
P-value (One Tail)   0.00555
P-value (Two Tail)   0.01109
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR128
VAR428
PU3
PU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                     Sample 1            Sample 2
Count                20                  19
```

```
Median              4.00                4.00
Rank Sum            354.00              426.00
U Values            236.00              144.00
Wilcoxon W          426.00
U-Stat              144.00
Mean                190.00
Std Dev             35.59026
Z-Score             1.27844
P-value (One Tail)  0.10055
P-value (Two Tail)  0.20109
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR29
VAR129
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  20
Median              3.00                4.00
Rank Sum            420.50              525.50
U Values            315.50              144.50
Wilcoxon W          525.50
U-Stat              144.50
Mean                230.00
Std Dev             41.06905
Z-Score             2.06969
P-value (One Tail)  0.01924
P-value (Two Tail)  0.03848
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR29
VAR429
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  19
Median              3.00                5.00
Rank Sum            381.00              522.00
U Values            332.00              105.00
Wilcoxon W          522.00
U-Stat              105.00
Mean                218.50
Std Dev             39.57166
Z-Score             2.85558
P-value (One Tail)  0.00215
P-value (Two Tail)  0.00430
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR129
VAR429
PU4
PU4
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               20                  19
Median              4.00                5.00
Rank Sum            341.50              438.50
U Values            248.50              131.50
Wilcoxon W          438.50
U-Stat              131.50
Mean                190.00
Std Dev             35.59026
Z-Score             1.62966
P-value (One Tail)  0.05159
P-value (Two Tail)  0.10317
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
```

```
VAR31
VAR131
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  20
Median              3.00                3.50
Rank Sum            461.50              484.50
U Values            274.50              185.50
Wilcoxon W          484.50
U-Stat              185.50
Mean                230.00
Std Dev             41.06905
Z-Score             1.07137
P-value (One Tail)  0.14200
P-value (Two Tail)  0.28400
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR31
VAR431
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  19
Median              3.00                4.00
Rank Sum            378.50              524.50
U Values            334.50              102.50
Wilcoxon W          524.50
U-Stat              102.50
Mean                218.50
Std Dev             39.57166
Z-Score             2.91876
P-value (One Tail)  0.00176
P-value (Two Tail)  0.00351
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------
Model Inputs:
VAR131
VAR431
PEOU2
PEOU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               20                  19
Median              3.50                4.00
Rank Sum            330.00              450.00
U Values            260.00              120.00
Wilcoxon W          450.00
U-Stat              120.00
Mean                190.00
Std Dev             35.59026
Z-Score             1.95278
P-value (One Tail)  0.02542
P-value (Two Tail)  0.05085
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
-----------------------------------------------------

Model Inputs:
VAR35
VAR135
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  20
Median              3.00                3.00
Rank Sum            447.00              499.00
U Values            289.00              171.00
Wilcoxon W          499.00
U-Stat              171.00
Mean                230.00
Std Dev             41.06905
Z-Score             1.42443
```

```
P-value (One Tail)  0.07716
P-value (Two Tail)  0.15432
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR35
VAR435
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  19
Median              3.00                4.00
Rank Sum            377.00              526.00
U Values            336.00              101.00
Wilcoxon W          526.00
U-Stat              101.00
Mean                218.50
Std Dev             39.57166
Z-Score             2.95666
P-value (One Tail)  0.00155
P-value (Two Tail)  0.00311
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR135
VAR435
IU2
IU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               20                  19
Median              3.00                4.00
Rank Sum            321.50              458.50
U Values            268.50              111.50
Wilcoxon W          458.50
U-Stat              111.50
Mean                190.00
Std Dev             35.59026
Z-Score             2.19161
P-value (One Tail)  0.01420
P-value (Two Tail)  0.02841
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR38
VAR138
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  20
Median              4.00                4.00
Rank Sum            562.00              384.00
U Values            174.00              286.00
Wilcoxon W          384.00
U-Stat              174.00
Mean                230.00
Std Dev             41.06905
Z-Score             1.35138
P-value (One Tail)  0.08829
P-value (Two Tail)  0.17657
* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables
------------------------------------------------------

Model Inputs:
VAR38
VAR438
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)
                    Sample 1            Sample 2
Count               23                  19
```

Median	4.00	4.00
Rank Sum	564.50	338.50
U Values	148.50	288.50
Wilcoxon W	338.50	
U-Stat	148.50	
Mean	218.50	
Std Dev	39.57166	
Z-Score	1.75631	
P-value (One Tail)	0.03952	
P-value (Two Tail)	0.07904	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR138
VAR438
PU2
PU2
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	19
Median	4.00	4.00
Rank Sum	433.50	346.50
U Values	156.50	223.50
Wilcoxon W	346.50	
U-Stat	156.50	
Mean	190.00	
Std Dev	35.59026	
Z-Score	0.92722	
P-value (One Tail)	0.17691	
P-value (Two Tail)	0.35381	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR43
VAR143
PEOU3
PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	20
Median	3.00	3.00
Rank Sum	465.50	480.50
U Values	270.50	189.50
Wilcoxon W	480.50	
U-Stat	189.50	
Mean	230.00	
Std Dev	41.06905	
Z-Score	0.97397	
P-value (One Tail)	0.16504	
P-value (Two Tail)	0.33007	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR43
VAR443
PEOU3
PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	23	19
Median	3.00	5.00
Rank Sum	405.00	498.00
U Values	308.00	129.00
Wilcoxon W	498.00	
U-Stat	129.00	
Mean	218.50	
Std Dev	39.57166	
Z-Score	2.24908	
P-value (One Tail)	0.01225	
P-value (Two Tail)	0.02451	

* Adjusted for Ties
Null hypothesis: There's 0 difference between the variables

Model Inputs:
VAR143

VAR443
PEOU3
PEOU3
Nonparametric Mann-Whitney Test
(Two Independent Samples)

	Sample 1	Sample 2
Count	20	19
Median	3.00	5.00
Rank Sum	340.50	439.50
U Values	249.50	130.50
Wilcoxon W	439.50	
U-Stat	130.50	
Mean	190.00	
Std Dev	35.59026	
Z-Score	1.65776	
P-value (One Tail)	0.04868	
P-value (Two Tail)	0.09737	

* Adjusted for Ties
Null hypothesis: There’s 0 difference between the variables

14. *Custom Econometric Model*

```
Model Inputs:
VAR296
VAR15; VAR16; VAR17; VAR18; VAR19; VAR20; VAR21; VAR22; VAR23; VAR24; VAR25
SUSA
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT
Multiple R              0.85341     Maximum Log Likelihood            -52.79311
R-Square                0.72830     Akaike Info Criterion (AIC)         6.82033
Adjusted R-Square       0.30135     Bayes Schwarz Criterion (BSC)       7.41682
Standard Error          7.28268     Hannan-Quinn Criterion (HQC)        6.92128
Observations                 19


                   Coeff  Std. Error       T-stat      P-value    Lower 5%    Upper 95%
Intercept      135.82272    26.21155      5.18179      0.00128    73.84226    197.80319
VAR X1          -1.78874     5.52795     -0.32358      0.75571   -14.86027     11.28279
VAR X2           0.02206     4.87473      0.00452      0.99652   -11.50484     11.54895
VAR X3         -13.67128     6.12796     -2.23097      0.06088   -28.16161      0.81904
VAR X4          -9.34621     6.28587     -1.48686      0.18065   -24.20993      5.51752
VAR X5          -1.40361     5.80732     -0.24170      0.81594   -15.13574     12.32853
VAR X6          -5.81092     3.63238     -1.59976      0.15369   -14.40012      2.77829
VAR X7          -2.34249     4.29174     -0.54581      0.60215   -12.49084      7.80587
VAR X8           1.71980     3.64092      0.47235      0.65105    -6.88960     10.32921
VAR X9          17.00398     5.38884      3.15541      0.01603     4.26140     29.74656
VAR X10          2.09003     3.88437      0.53806      0.60721    -7.09505     11.27512
VAR X11         -5.90165     2.22358     -2.65412      0.03275   -11.15957     -0.64372


ANOVA
                      DF              SS             MS            F        p-Value
Regression            11          995.19          90.47      1.70580        0.24525
Residual               7          371.26          53.04
Total                 18         1366.45


Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting
        Period       Actual (Y)       Forecast (F)         Error (E)
            1          95.0000            88.3590            6.6410
            2          72.5000            74.1628           -1.6628
            3          70.0000            75.6522           -5.6522
            4          75.0000            75.8116           -0.8116
            5          75.0000            80.3578           -5.3578
            6          82.5000            80.8513            1.6487
            7          67.5000            69.9100           -2.4100
            8          80.0000            79.2775            0.7225
            9          75.0000            72.0685            2.9315
           10          72.5000            69.3965            3.1035
           11          80.0000            74.7454            5.2546
           12          85.0000            94.8167           -9.8167
           13          72.5000            70.6797            1.8203
           14          85.0000            82.1545            2.8455
           15          87.5000            82.2271            5.2729
           16          57.5000            62.7255           -5.2255
           17          67.5000            71.9936           -4.4936
           18          70.0000            69.8192            0.1808
           19          82.5000            77.4913            5.0087

------------------------------------------------------
```

Model Inputs:
VAR296
VAR115; VAR116; VAR117; VAR118; VAR119; VAR120; VAR121; VAR122; VAR123; VAR124; VAR125
SUSA
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.88343	Maximum Log Likelihood	-50.87483
R-Square	0.78046	Akaike Info Criterion (AIC)	6.61840
Adjusted R-Square	0.43546	Bayes Schwarz Criterion (BSC)	7.21489
Standard Error	6.54648	Hannan-Quinn Criterion (HQC)	6.71935
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	84.41065	14.02099	6.02031	0.00053	51.25627	117.56502
VAR X1	4.29701	3.22930	1.33063	0.22502	-3.33909	11.93310
VAR X2	-4.74808	3.47455	-1.36653	0.21404	-12.96409	3.46793
VAR X3	-1.55878	2.71996	-0.57309	0.58452	-7.99047	4.87292
VAR X4	0.19499	3.52861	0.05526	0.95748	-8.14886	8.53883
VAR X5	2.34834	3.46511	0.67771	0.51972	-5.84534	10.54203
VAR X6	0.12822	3.12654	0.04101	0.96843	-7.26488	7.52133
VAR X7	-9.63957	3.51108	-2.74547	0.02869	-17.94195	-1.33719
VAR X8	1.30092	3.68058	0.35346	0.73415	-7.40226	10.00410
VAR X9	7.71859	3.86191	1.99864	0.08579	-1.41339	16.85056
VAR X10	-4.08750	3.76275	-1.08631	0.31333	-12.98498	4.80998
VAR X11	3.88113	1.65218	2.34910	0.05116	-0.02565	7.78791

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	1066.45	96.95	2.26221	0.14394
Residual	7	299.99	42.86		
Total	18	1366.45			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	95.0000	88.9821	6.0179
2	72.5000	78.9031	-6.4031
3	70.0000	68.8483	1.1517
4	75.0000	75.4205	-0.4205
5	75.0000	75.8613	-0.8613
6	82.5000	80.4929	2.0071
7	67.5000	72.1619	-4.6619
8	80.0000	76.8574	3.1426
9	75.0000	69.6283	5.3717
10	72.5000	63.1904	9.3096
11	80.0000	83.7127	-3.7127
12	85.0000	84.9268	0.0732
13	72.5000	74.1235	-1.6235
14	85.0000	83.3330	1.6670
15	87.5000	87.1051	0.3949
16	57.5000	63.6923	-6.1923
17	67.5000	68.3553	-0.8553
18	70.0000	72.9885	-2.9885
19	82.5000	83.9165	-1.4165

Model Inputs:
VAR297
VAR26; VAR27; VAR28; VAR29; VAR30; VAR31; VAR32; VAR33; VAR34; VAR35; VAR36
SUSB
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.41400	Maximum Log Likelihood	-75.07586
R-Square	0.17140	Akaike Info Criterion (AIC)	9.16588
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.76237
Standard Error	25.11410	Hannan-Quinn Criterion (HQC)	9.26683
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	73.60663	59.01666	1.24722	0.25243	-65.94561	213.15886
VAR X1	-9.85115	29.10503	-0.33847	0.74494	-78.67361	58.97131
VAR X2	2.22424	17.00323	0.13081	0.89960	-37.98202	42.43049
VAR X3	17.32394	42.26699	0.40987	0.69415	-82.62161	117.26949
VAR X4	9.05908	46.05609	0.19670	0.84965	-99.84626	117.96442
VAR X5	5.83809	32.83013	0.17783	0.86390	-71.79284	83.46902
VAR X6	-4.67918	12.56492	-0.37240	0.72061	-34.39050	25.03215
VAR X7	-5.22580	37.30754	-0.14007	0.89255	-93.44412	82.99252
VAR X8	-2.55167	19.13462	-0.13335	0.89767	-47.79785	42.69452
VAR X9	6.08891	17.19362	0.35414	0.73366	-34.56755	46.74536
VAR X10	-23.39301	55.19399	-0.42383	0.68441	-153.90607	107.12005
VAR X11	1.13779	10.08145	0.11286	0.91331	-22.70105	24.97663

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	913.26	83.02	0.13163	0.99825
Residual	7	4415.03	630.72		
Total	18	5328.29			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	70.0000	69.3266	0.6734
2	17.5000	61.0329	-43.5329
3	62.5000	61.8052	0.6948
4	52.5000	61.6853	-9.1853
5	40.0000	52.7767	-12.7767
6	77.5000	71.7678	5.7322
7	65.0000	55.8199	9.1801
8	47.5000	64.5702	-17.0702
9	82.5000	79.0521	3.4479
10	50.0000	59.1853	-9.1853
11	80.0000	61.7282	18.2718
12	72.5000	74.1624	-1.6624
13	50.0000	57.4916	-7.4916
14	65.0000	66.5137	-1.5137
15	80.0000	59.3342	20.6658
16	57.5000	64.0322	-6.5322
17	87.5000	64.5955	22.9045
18	72.5000	59.8952	12.6048
19	65.0000	50.2251	14.7749

Model Inputs:
VAR297
VAR126; VAR127; VAR128; VAR129; VAR130; VAR131; VAR132; VAR133; VAR134; VAR135; VAR136
SUSB
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.71362	Maximum Log Likelihood	-70.36150
R-Square	0.50926	Akaike Info Criterion (AIC)	8.66963
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.26612
Standard Error	19.32733	Hannan-Quinn Criterion (HQC)	8.77058
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	144.15681	68.43138	2.10659	0.07316	-17.65769	305.97131
VAR X1	-19.85530	14.77429	-1.34391	0.22090	-54.79094	15.08034
VAR X2	9.77247	13.47704	0.72512	0.49190	-22.09566	41.64059
VAR X3	-18.03786	27.35753	-0.65934	0.53076	-82.72814	46.65241
VAR X4	4.35736	19.03998	0.22885	0.82553	-40.66504	49.37976
VAR X5	23.41367	15.12588	1.54792	0.16557	-12.35336	59.18070
VAR X6	-6.98935	6.99968	-0.99852	0.35128	-23.54096	9.56227
VAR X7	-23.35786	12.56216	-1.85938	0.10531	-53.06264	6.34692
VAR X8	-1.18514	20.97284	-0.05651	0.95652	-50.77802	48.40774
VAR X9	9.73763	13.78441	0.70642	0.50275	-22.85733	42.33259
VAR X10	1.09762	18.07236	0.06073	0.95327	-41.63673	43.83197
VAR X11	-3.22113	4.87714	-0.66046	0.53009	-14.75373	8.31146

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	2713.47	246.68	0.66037	0.74162
Residual	7	2614.82	373.55		
Total	18	5328.29			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	70.0000	60.8043	9.1957
2	17.5000	28.6807	-11.1807
3	62.5000	62.8903	-0.3903
4	52.5000	67.5379	-15.0379
5	40.0000	67.5062	-27.5062
6	77.5000	67.8865	9.6135
7	65.0000	54.3905	10.6095
8	47.5000	66.6995	-19.1995
9	82.5000	77.8860	4.6140
10	50.0000	43.8826	6.1174
11	80.0000	82.5926	-2.5926
12	72.5000	61.7825	10.7175
13	50.0000	56.7486	-6.7486
14	65.0000	70.3898	-5.3898
15	80.0000	66.4862	13.5138
16	57.5000	50.3621	7.1379
17	87.5000	70.6651	16.8349
18	72.5000	66.4555	6.0445
19	65.0000	71.3531	-6.3531

Model Inputs:
VAR298
VAR37; VAR38; VAR39; VAR40; VAR41; VAR42; VAR43; VAR44; VAR45; VAR46; VAR47
SUSC
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.89265	Maximum Log Likelihood	-58.45594
R-Square	0.79683	Akaike Info Criterion (AIC)	7.41641
Adjusted R-Square	0.47756	Bayes Schwarz Criterion (BSC)	8.01290
Standard Error	9.97518	Hannan-Quinn Criterion (HQC)	7.51736
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	124.03364	47.11869	2.63237	0.03380	12.61564	235.45164
VAR X1	0.68233	6.42648	0.10617	0.91842	-14.51389	15.87854
VAR X2	-5.33325	6.05009	-0.88151	0.40729	-19.63944	8.97295
VAR X3	-14.79477	12.09981	-1.22273	0.26100	-43.40627	13.81673
VAR X4	-3.88013	8.19348	-0.47356	0.65023	-23.25463	15.49437
VAR X5	-5.32504	5.18321	-1.02736	0.33844	-17.58139	6.93131
VAR X6	-18.70452	5.38859	-3.47113	0.01039	-31.44652	-5.96252
VAR X7	5.37888	4.56624	1.17797	0.27730	-5.41856	16.17632
VAR X8	11.61093	6.83245	1.69938	0.13305	-4.54524	27.76711
VAR X9	5.63244	4.01871	1.40155	0.20380	-3.87030	15.13517
VAR X10	7.98640	6.32898	1.26188	0.24741	-6.97925	22.95205
VAR X11	-6.74464	2.74341	-2.45849	0.04356	-13.23178	-0.25751

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	2731.76	248.34	2.49579	0.11717
Residual	7	696.53	99.50		
Total	18	3428.29			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	72.5000	62.4626	10.0374
2	42.5000	34.8846	7.6154
3	47.5000	53.0272	-5.5272
4	55.0000	59.0813	-4.0813
5	42.5000	38.3684	4.1316
6	45.0000	40.0761	4.9239
7	60.0000	61.3668	-1.3668
8	20.0000	21.1984	-1.1984
9	50.0000	43.1607	6.8393
10	37.5000	35.4381	2.0619
11	30.0000	33.4265	-3.4265
12	47.5000	47.9480	-0.4480
13	40.0000	32.9212	7.0788
14	52.5000	55.3537	-2.8537
15	47.5000	50.9017	-3.4017
16	35.0000	31.9282	3.0718
17	32.5000	32.1283	0.3717
18	27.5000	42.5523	-15.0523
19	15.0000	23.7761	-8.7761

Model Inputs:
VAR298
VAR137; VAR138; VAR139; VAR140; VAR141; VAR142; VAR143; VAR144; VAR145; VAR146; VAR147
SUSC
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.48672	Maximum Log Likelihood	-70.36610
R-Square	0.23689	Akaike Info Criterion (AIC)	8.67012
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.26660
Standard Error	19.33227	Hannan-Quinn Criterion (HQC)	8.77106
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	37.14345	45.07098	0.82411	0.43705	-69.43248	143.71939
VAR X1	3.50715	11.52996	0.30418	0.76984	-23.75687	30.77117
VAR X2	-2.85355	14.32993	-0.19913	0.84782	-36.73845	31.03134
VAR X3	-1.51031	10.12789	-0.14912	0.88566	-25.45898	22.43835
VAR X4	12.65144	13.58893	0.93101	0.38283	-19.48128	44.78416
VAR X5	-3.15128	7.07835	-0.44520	0.66962	-19.88892	13.58635
VAR X6	8.10490	9.89760	0.81888	0.43984	-15.29920	31.50900
VAR X7	-2.58199	8.16909	-0.31607	0.76117	-21.89881	16.73483
VAR X8	-0.22895	7.62375	-0.03003	0.97688	-18.25626	17.79835
VAR X9	-0.37588	7.80832	-0.04814	0.96295	-18.83963	18.08787
VAR X10	-15.40196	12.23706	-1.25863	0.24851	-44.33800	13.53409
VAR X11	2.75434	5.73420	0.48034	0.64564	-10.80488	16.31356

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	812.13	73.83	0.19755	0.99123
Residual	7	2616.16	373.74		
Total	18	3428.29			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	72.5000	44.4629	28.0371
2	42.5000	47.0747	-4.5747
3	47.5000	35.4939	12.0061
4	55.0000	56.6545	-1.6545
5	42.5000	43.8346	-1.3346
6	45.0000	40.6760	4.3240
7	60.0000	53.0923	6.9077
8	20.0000	34.6542	-14.6542
9	50.0000	47.6549	2.3451
10	37.5000	41.2946	-3.7946
11	30.0000	36.5464	-6.5464
12	47.5000	44.3071	3.1929
13	40.0000	32.5360	7.4640
14	52.5000	46.7927	5.7073
15	47.5000	32.1601	15.3399
16	35.0000	35.9813	-0.9813
17	32.5000	46.5735	-14.0735
18	27.5000	40.3251	-12.8251
19	15.0000	39.8851	-24.8851

Model Inputs:
VAR215
VAR1; VAR101
HA1
HA1, HA1

Regression Results

OVERALL FIT

Multiple R	0.26892	Maximum Log Likelihood	-78.29596
R-Square	0.07232	Akaike Info Criterion (AIC)	8.55747
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.70659
Standard Error	19.86549	Hannan-Quinn Criterion (HQC)	8.58271
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	27.82386	30.63905	0.90812	0.37729	-37.12802	92.77574
VAR X1	3.30455	4.87668	0.67762	0.50769	-7.03355	13.64265
VAR X2	6.01658	5.52138	1.08969	0.29199	-5.68823	17.72139

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	492.22	246.11	0.62363	0.54853
Residual	16	6314.21	394.64		
Total	18	6806.42			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	75.0000	65.1084	9.8916
2	40.0000	55.7873	-15.7873
3	60.0000	61.8038	-1.8038
4	63.0000	58.4993	4.5007
5	90.0000	71.1250	18.8750
6	80.0000	62.3964	17.6036
7	80.0000	55.7873	24.2127
8	30.0000	62.3964	-32.3964
9	70.0000	56.3798	13.6202
10	65.0000	55.7873	9.2127
11	50.0000	58.4993	-8.4993
12	60.0000	58.4993	1.5007
13	25.0000	53.0752	-28.0752
14	50.0000	53.0752	-3.0752
15	40.0000	55.7873	-15.7873
16	75.0000	56.3798	18.6202
17	90.0000	59.0918	30.9082
18	50.0000	71.1250	-21.1250
19	40.0000	62.3964	-22.3964

Model Inputs:
VAR216
VAR2; VAR102
HA2
HA2, HA2

Regression Results

OVERALL FIT

Multiple R	0.64923	Maximum Log Likelihood	-77.74652
R-Square	0.42150	Akaike Info Criterion (AIC)	8.49963
Adjusted R-Square	0.34919	Bayes Schwarz Criterion (BSC)	8.64876
Standard Error	19.26827	Hannan-Quinn Criterion (HQC)	8.52487
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	134.92912	29.22769	4.61648	0.00029	72.96918	196.88906
VAR X1	-18.46902	5.53856	-3.33462	0.00420	-30.21025	-6.72778
VAR X2	-4.04212	5.88093	-0.68733	0.50172	-16.50914	8.42489

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	4328.16	2164.08	5.82892	0.01254
Residual	16	5940.26	371.27		
Total	18	10268.42			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	35.0000	30.4577	4.5423
2	30.0000	44.8846	-14.8846
3	40.0000	44.8846	-4.8846
4	70.0000	59.3115	10.6885
5	80.0000	48.9267	31.0733
6	80.0000	63.3536	16.6464
7	15.0000	48.9267	-33.9267
8	20.0000	44.8846	-24.8846
9	40.0000	30.4577	9.5423
10	50.0000	63.3536	-13.3536
11	40.0000	67.3957	-27.3957
12	60.0000	40.8424	19.1576
13	75.0000	67.3957	7.6043
14	50.0000	48.9267	1.0733
15	20.0000	26.4156	-6.4156
16	100.0000	85.8647	14.1353
17	70.0000	71.4378	-1.4378
18	50.0000	63.3536	-13.3536
19	75.0000	48.9267	26.0733

Model Inputs:
VAR217
VAR3; VAR103
HA3
HA3, HA3

Regression Results

OVERALL FIT

Multiple R	0.62212	Maximum Log Likelihood	-74.32877
R-Square	0.38703	Akaike Info Criterion (AIC)	8.13987
Adjusted R-Square	0.31041	Bayes Schwarz Criterion (BSC)	8.28899
Standard Error	15.93607	Hannan-Quinn Criterion (HQC)	8.16511
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	-52.66667	32.20044	-1.63559	0.12144	-120.92855	15.59521
VAR X1	20.66667	7.01801	2.94480	0.00951	5.78914	35.54419
VAR X2	12.00000	4.75122	2.52567	0.02248	1.92787	22.07213

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	2565.61	1282.81	5.05125	0.01993
Residual	16	4063.33	253.96		
Total	18	6628.95			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	40.0000	42.0000	-2.0000
2	30.0000	36.6667	-6.6667
3	50.0000	45.3333	4.6667
4	65.0000	57.3333	7.6667
5	70.0000	45.3333	24.6667
6	40.0000	36.6667	3.3333
7	45.0000	45.3333	-0.3333
8	20.0000	33.3333	-13.3333
9	50.0000	66.0000	-16.0000
10	65.0000	45.3333	19.6667
11	80.0000	57.3333	22.6667
12	60.0000	57.3333	2.6667
13	25.0000	57.3333	-32.3333
14	30.0000	45.3333	-15.3333
15	75.0000	78.0000	-3.0000
16	75.0000	54.0000	21.0000
17	50.0000	57.3333	-7.3333
18	40.0000	36.6667	3.3333
19	20.0000	33.3333	-13.3333

Model Inputs:
VAR218
VAR4; VAR104
HA4
HA4, HA4

Regression Results

OVERALL FIT

Multiple R	0.44274	Maximum Log Likelihood	-79.41627
R-Square	0.19602	Akaike Info Criterion (AIC)	8.67540
Adjusted R-Square	0.09552	Bayes Schwarz Criterion (BSC)	8.82452
Standard Error	21.14121	Hannan-Quinn Criterion (HQC)	8.70063
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	77.96049	26.42207	2.95058	0.00940	21.94821	133.97278
VAR X1	-13.05185	6.61074	-1.97434	0.06586	-27.06599	0.96228
VAR X2	-2.21728	6.67718	-0.33207	0.74415	-16.37227	11.93770

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	1743.53	871.76	1.95047	0.17457
Residual	16	7151.21	446.95		
Total	18	8894.74			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	50.0000	29.9358	20.0642
2	10.0000	45.2049	-35.2049
3	10.0000	32.1531	-22.1531
4	60.0000	60.4741	-0.4741
5	20.0000	34.3704	-14.3704
6	60.0000	45.2049	14.7951
7	50.0000	34.3704	15.6296
8	20.0000	32.1531	-12.1531
9	40.0000	34.3704	5.6296
10	60.0000	47.4222	12.5778
11	50.0000	47.4222	2.5778
12	40.0000	56.0395	-16.0395
13	50.0000	42.9877	7.0123
14	0.0000	34.3704	-34.3704
15	50.0000	47.4222	2.5778
16	90.0000	45.2049	44.7951
17	50.0000	47.4222	2.5778
18	20.0000	32.1531	-12.1531
19	40.0000	21.3185	18.6815

Model Inputs:
VAR219
VAR5; VAR105
AL1
AL1, AL1

Regression Results

OVERALL FIT

Multiple R	0.32140	Maximum Log Likelihood	-79.59255
R-Square	0.10330	Akaike Info Criterion (AIC)	8.69395
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.84307
Standard Error	21.34926	Hannan-Quinn Criterion (HQC)	8.71919
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	-1.28749	29.42632	-0.04375	0.96564	-63.66850	61.09352
VAR X1	7.22092	6.06208	1.19116	0.25096	-5.63013	20.07196
VAR X2	3.46694	4.97787	0.69647	0.49613	-7.08568	14.01957

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	840.08	420.04	0.92157	0.41801
Residual	16	7292.65	455.79		
Total	18	8132.74			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	65.0000	34.2430	30.7570
2	50.0000	30.7761	19.2239
3	50.0000	41.4639	8.5361
4	20.0000	41.4639	-21.4639
5	30.0000	52.1518	-22.1518
6	70.0000	45.2179	24.7821
7	25.0000	34.2430	-9.2430
8	50.0000	44.9309	5.0691
9	20.0000	27.3091	-7.3091
10	65.0000	44.9309	20.0691
11	10.0000	30.7761	-20.7761
12	10.0000	34.2430	-24.2430
13	10.0000	27.0221	-17.0221
14	50.0000	41.4639	8.5361
15	33.0000	37.9970	-4.9970
16	75.0000	30.7761	44.2239
17	30.0000	41.7510	-11.7510
18	30.0000	37.7100	-7.7100
19	20.0000	34.5301	-14.5301

Model Inputs:
VAR220
VAR6; VAR106
AL2
AL2, AL2

Regression Results

OVERALL FIT

Multiple R	0.21153	Maximum Log Likelihood	-81.51096
R-Square	0.04475	Akaike Info Criterion (AIC)	8.89589
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.04501
Standard Error	23.75030	Hannan-Quinn Criterion (HQC)	8.92113
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	71.79930	38.05167	1.88689	0.07746	-8.86665	152.46524
VAR X1	-6.63850	10.85574	-0.61152	0.54945	-29.65164	16.37464
VAR X2	-5.97300	6.95202	-0.85918	0.40293	-20.71062	8.76461

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	422.77	211.38	0.37474	0.69334
Residual	16	9025.23	564.08		
Total	18	9448.00			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	60.0000	52.5493	7.4507
2	50.0000	47.2418	2.7582
3	50.0000	39.9378	10.0622
4	80.0000	40.6033	39.3967
5	50.0000	45.9108	4.0892
6	0.0000	34.6303	-34.6303
7	10.0000	39.9378	-29.9378
8	50.0000	46.5763	3.4237
9	20.0000	46.5763	-26.5763
10	65.0000	40.6033	24.3967
11	10.0000	46.5763	-36.5763
12	30.0000	33.9648	-3.9648
13	25.0000	40.6033	-15.6033
14	50.0000	45.9108	4.0892
15	33.0000	39.9378	-6.9378
16	75.0000	40.6033	34.3967
17	70.0000	39.9378	30.0622
18	30.0000	40.6033	-10.6033
19	40.0000	35.2958	4.7042

Model Inputs:
VAR221
VAR7; VAR107
AL3
AL3, AL3

Regression Results

OVERALL FIT

Multiple R	0.03526	Maximum Log Likelihood	-77.81701
R-Square	0.00124	Akaike Info Criterion (AIC)	8.50705
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.65618
Standard Error	19.34388	Hannan-Quinn Criterion (HQC)	8.53229
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	59.43057	24.00835	2.47541	0.02487	8.53514	110.32600
VAR X1	-0.43368	5.42859	-0.07989	0.93732	-11.94177	11.07441
VAR X2	0.50829	4.88335	0.10409	0.91839	-9.84394	10.86052

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	7.45	3.73	0.00996	0.99010
Residual	16	5986.97	374.19		
Total	18	5994.42			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	55.0000	61.1047	-6.1047
2	60.0000	60.0881	-0.0881
3	50.0000	59.1461	-9.1461
4	68.0000	59.1461	8.8539
5	90.0000	59.2207	30.7793
6	60.0000	60.0135	-0.0135
7	35.0000	59.6544	-24.6544
8	50.0000	58.7124	-8.7124
9	60.0000	60.5964	-0.5964
10	90.0000	59.6544	30.3456
11	70.0000	59.2207	10.7793
12	70.0000	59.1461	10.8539
13	75.0000	59.6544	15.3456
14	62.0000	59.6544	2.3456
15	33.0000	58.7124	-25.7124
16	75.0000	59.2207	15.7793
17	30.0000	59.7290	-29.7290
18	30.0000	59.6544	-29.6544
19	70.0000	60.6710	9.3290

Model Inputs:
VAR222
VAR8; VAR108
AL4
AL4, AL4

Regression Results

OVERALL FIT

Multiple R	0.40601	Maximum Log Likelihood	-75.66603
R-Square	0.16484	Akaike Info Criterion (AIC)	8.28063
Adjusted R-Square	0.06045	Bayes Schwarz Criterion (BSC)	8.42976
Standard Error	17.16508	Hannan-Quinn Criterion (HQC)	8.30587
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	54.50550	16.06234	3.39337	0.00371	20.45485	88.55615
VAR X1	5.65578	3.18312	1.77681	0.09461	-1.09213	12.40369
VAR X2	0.93469	3.34553	0.27938	0.78353	-6.15752	8.02690

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	930.50	465.25	1.57904	0.23667
Residual	16	4714.24	294.64		
Total	18	5644.74			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	69.5558	30.4442
2	70.0000	75.2116	-5.2116
3	70.0000	79.9327	-9.9327
4	55.0000	63.9000	-8.9000
5	90.0000	76.1463	13.8537
6	60.0000	64.8347	-4.8347
7	85.0000	74.2769	10.7231
8	50.0000	67.6864	-17.6864
9	100.0000	78.9980	21.0020
10	65.0000	69.5558	-4.5558
11	90.0000	84.6538	5.3462
12	70.0000	80.8674	-10.8674
13	50.0000	80.8674	-30.8674
14	75.0000	74.2769	0.7231
15	40.0000	66.7517	-26.7517
16	90.0000	86.5232	3.4768
17	90.0000	66.7517	23.2483
18	80.0000	69.5558	10.4442
19	85.0000	84.6538	0.3462

Model Inputs:
VAR223
VAR9; VAR109
AL5
AL5, AL5

Regression Results

OVERALL FIT

Multiple R	0.03359	Maximum Log Likelihood	-77.61473
R-Square	0.00113	Akaike Info Criterion (AIC)	8.48576
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.63488
Standard Error	19.12772	Hannan-Quinn Criterion (HQC)	8.51100
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	55.64730	30.62745	1.81691	0.08801	-9.28000	120.57459
VAR X1	0.61565	4.58816	0.13418	0.89493	-9.11081	10.34211
VAR X2	0.05466	5.94693	0.00919	0.99278	-12.55227	12.66159

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	6.61	3.31	0.00904	0.99101
Residual	16	5853.91	365.87		
Total	18	5860.53			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	70.0000	58.2739	11.7261
2	40.0000	57.0426	-17.0426
3	60.0000	58.8895	1.1105
4	90.0000	57.0972	32.9028
5	80.0000	57.7129	22.2871
6	60.0000	57.1519	2.8481
7	50.0000	58.2739	-8.2739
8	30.0000	58.2739	-28.2739
9	80.0000	58.8895	21.1105
10	70.0000	57.7129	12.2871
11	60.0000	58.3285	1.6715
12	50.0000	58.3285	-8.3285
13	50.0000	58.3285	-8.3285
14	55.0000	58.3832	-3.3832
15	50.0000	58.2739	-8.2739
16	90.0000	58.9442	31.0558
17	50.0000	58.9988	-8.9988
18	40.0000	58.3832	-18.3832
19	30.0000	57.7129	-27.7129

Model Inputs:
VAR224
VAR10; VAR110
LN1
LN1, LN1

Regression Results

OVERALL FIT

Multiple R	0.33961	Maximum Log Likelihood	-73.50668
R-Square	0.11533	Akaike Info Criterion (AIC)	8.05333
Adjusted R-Square	0.00475	Bayes Schwarz Criterion (BSC)	8.20246
Standard Error	15.22461	Hannan-Quinn Criterion (HQC)	8.07857
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	132.65517	44.61151	2.97356	0.00896	38.08300	227.22734
VAR X1	2.89655	4.37979	0.66135	0.51780	-6.38818	12.18128
VAR X2	-11.24138	8.57514	-1.31093	0.20839	-29.41986	6.93710

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	483.48	241.74	1.04294	0.37518
Residual	16	3708.62	231.79		
Total	18	4192.11			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	90.0000	90.9310	-0.9310
2	60.0000	85.1379	-25.1379
3	100.0000	90.9310	9.0690
4	100.0000	99.2759	0.7241
5	90.0000	88.0345	1.9655
6	100.0000	85.1379	14.8621
7	100.0000	96.3793	3.6207
8	100.0000	90.9310	9.0690
9	100.0000	90.9310	9.0690
10	100.0000	88.0345	11.9655
11	100.0000	85.1379	14.8621
12	80.0000	90.9310	-10.9310
13	100.0000	90.9310	9.0690
14	100.0000	102.1724	-2.1724
15	100.0000	90.9310	9.0690
16	100.0000	102.1724	-2.1724
17	50.0000	88.0345	-38.0345
18	70.0000	90.9310	-20.9310
19	95.0000	88.0345	6.9655

Model Inputs:
VAR225
VAR11; VAR111
LN2
LN2, LN2

Regression Results

OVERALL FIT

Multiple R	0.25282	Maximum Log Likelihood	-84.03348
R-Square	0.06392	Akaike Info Criterion (AIC)	9.16142
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.31054
Standard Error	27.32318	Hannan-Quinn Criterion (HQC)	9.18666
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	27.52014	24.72949	1.11285	0.28221	-24.90404	79.94432
VAR X1	5.62369	5.40918	1.03966	0.31396	-5.84326	17.09065
VAR X2	-1.88899	6.11785	-0.30877	0.76148	-14.85825	11.08027

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	815.63	407.81	0.54626	0.58954
Residual	16	11944.90	746.56		
Total	18	12760.53			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	20.0000	38.7243	-18.7243
2	30.0000	36.8353	-6.8353
3	90.0000	44.3480	45.6520
4	50.0000	31.2116	18.7884
5	20.0000	48.0827	-28.0827
6	20.0000	23.6989	-3.6989
7	90.0000	36.8353	53.1647
8	5.0000	36.8353	-31.8353
9	10.0000	34.9896	-24.9896
10	50.0000	44.3480	5.6520
11	10.0000	36.8785	-26.8785
12	60.0000	44.3480	15.6520
13	25.0000	46.1937	-21.1937
14	50.0000	34.9463	15.0537
15	10.0000	31.2116	-21.2116
16	20.0000	36.8353	-16.8353
17	50.0000	29.3659	20.6341
18	70.0000	38.7243	31.2757
19	20.0000	25.5879	-5.5879

```
Model Inputs:
VAR226
VAR12; VAR112
LN3
LN3, LN3

Regression Results

OVERALL FIT
Multiple R              0.17537      Maximum Log Likelihood           -70.38605
R-Square                0.03075      Akaike Info Criterion (AIC)        7.72485
Adjusted R-Square       0.00000      Bayes Schwarz Criterion (BSC)      7.87397
Standard Error         12.80127      Hannan-Quinn Criterion (HQC)       7.75008
Observations                 19


                   Coeff  Std. Error      T-stat     P-value    Lower 5%   Upper 95%
Intercept       87.01027    18.79359     4.62978     0.00028    47.16963   126.85091
VAR X1           1.76444     2.98125     0.59185     0.56222    -4.55552     8.08440
VAR X2          -0.84917     3.09379    -0.27447     0.78723    -7.40770     5.70937


ANOVA
                      DF             SS            MS             F       p-Value
Regression             2          83.20         41.60       0.25384       0.77888
Residual              16        2621.96        163.87
Total                 18        2705.16


Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171


Forecasting
        Period         Actual (Y)       Forecast (F)          Error (E)
             1            95.0000            89.8222             5.1778
             2            50.0000            86.2933           -36.2933
             3            90.0000            92.3697            -2.3697
             4            99.0000            88.0578            10.9422
             5           100.0000            89.8222            10.1778
             6           100.0000            84.5289            15.4711
             7            95.0000            90.6714             4.3286
             8            90.0000            88.9069             1.0931
             9            90.0000            92.3697            -2.3697
            10            95.0000            91.5866             3.4134
            11            90.0000            91.5205            -1.5205
            12            70.0000            91.5866           -21.5866
            13           100.0000            90.6714             9.3286
            14            90.0000            89.8222             0.1778
            15            95.0000            88.9069             6.0931
            16           100.0000            92.4358             7.5642
            17            90.0000            91.5205            -1.5205
            18            80.0000            90.6714           -10.6714
            19            95.0000            92.4358             2.5642

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Model Inputs:
VAR227
VAR13; VAR113
LN4
LN4, LN4

Regression Results

OVERALL FIT

Multiple R	0.44336	Maximum Log Likelihood	-78.01303
R-Square	0.19656	Akaike Info Criterion (AIC)	8.52769
Adjusted R-Square	0.09613	Bayes Schwarz Criterion (BSC)	8.67681
Standard Error	19.55569	Hannan-Quinn Criterion (HQC)	8.55293
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	17.31903	31.52366	0.54940	0.59032	-49.50814	84.14621
VAR X1	8.04960	5.33397	1.50912	0.15076	-3.25790	19.35710
VAR X2	6.15952	5.77245	1.06705	0.30178	-6.07754	18.39657

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	1496.99	748.49	1.95723	0.17362
Residual	16	6118.80	382.43		
Total	18	7615.79			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	85.0000	88.3646	-3.3646
2	40.0000	74.1555	-34.1555
3	80.0000	74.1555	5.8445
4	95.0000	58.0563	36.9437
5	100.0000	80.3150	19.6850
6	70.0000	76.0456	-6.0456
7	55.0000	74.1555	-19.1555
8	70.0000	80.3150	-10.3150
9	100.0000	88.3646	11.6354
10	90.0000	74.1555	15.8445
11	65.0000	82.2051	-17.2051
12	80.0000	88.3646	-8.3646
13	100.0000	82.2051	17.7949
14	70.0000	61.8365	8.1635
15	100.0000	88.3646	11.6354
16	40.0000	66.1059	-26.1059
17	50.0000	72.2654	-22.2654
18	90.0000	82.2051	7.7949
19	100.0000	88.3646	11.6354

Model Inputs:
VAR228
VAR14; VAR114
LN5
LN5, LN5

Regression Results

OVERALL FIT

Multiple R	0.29292	Maximum Log Likelihood	-78.16975
R-Square	0.08580	Akaike Info Criterion (AIC)	8.54418
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.69331
Standard Error	19.72670	Hannan-Quinn Criterion (HQC)	8.56942
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	52.22936	37.12229	1.40695	0.17857	-26.46639	130.92510
VAR X1	-2.72171	7.02756	-0.38729	0.70364	-17.61947	12.17605
VAR X2	8.61162	7.02756	1.22541	0.23816	-6.28614	23.50938

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	584.35	292.18	0.75082	0.48790
Residual	16	6226.28	389.14		
Total	18	6810.63			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	80.0000	81.6789	-1.6789
2	40.0000	78.5107	-38.5107
3	80.0000	67.1774	12.8226
4	98.0000	78.5107	19.4893
5	100.0000	84.4006	15.5994
6	70.0000	81.6789	-11.6789
7	60.0000	73.0673	-13.0673
8	70.0000	84.4006	-14.4006
9	100.0000	84.4006	15.5994
10	90.0000	75.7890	14.2110
11	65.0000	81.6789	-16.6789
12	80.0000	81.6789	-1.6789
13	100.0000	73.0673	26.9327
14	70.0000	75.7890	-5.7890
15	100.0000	81.6789	18.3211
16	50.0000	64.4557	-14.4557
17	50.0000	81.6789	-31.6789
18	90.0000	81.6789	8.3211
19	100.0000	81.6789	18.3211

Model Inputs:
VAR229
VAR15; VAR115
PU1
PU1, PU1

Regression Results

OVERALL FIT

Multiple R	0.10538	Maximum Log Likelihood	-63.56150
R-Square	0.01111	Akaike Info Criterion (AIC)	7.00647
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	7.15560
Standard Error	8.76182	Hannan-Quinn Criterion (HQC)	7.03171
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	91.66835	13.01140	7.04523	0.00000	64.08542	119.25128
VAR X1	1.07685	2.55350	0.42171	0.67885	-4.33633	6.49002
VAR X2	0.12133	2.08492	0.05820	0.95431	-4.29851	4.54118

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	13.79	6.90	0.08984	0.91454
Residual	16	1228.31	76.77		
Total	18	1242.11			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	95.2629	4.7371
2	70.0000	96.5824	-26.5824
3	100.0000	96.2184	3.7816
4	100.0000	96.3397	3.6603
5	100.0000	96.4611	3.5389
6	100.0000	94.4287	5.5713
7	100.0000	96.4611	3.5389
8	100.0000	95.2629	4.7371
9	100.0000	97.5379	2.4621
10	100.0000	96.5824	3.4176
11	100.0000	96.5824	3.4176
12	90.0000	96.3397	-6.3397
13	100.0000	95.3842	4.6158
14	100.0000	96.5824	3.4176
15	100.0000	97.5379	2.4621
16	100.0000	97.5379	2.4621
17	80.0000	95.2629	-15.2629
18	90.0000	96.2184	-6.2184
19	100.0000	97.4166	2.5834

Model Inputs:
VAR230
VAR16; VAR116
PU2
PU2, PU2

Regression Results

OVERALL FIT

Multiple R	0.48177	Maximum Log Likelihood	-52.35537
R-Square	0.23210	Akaike Info Criterion (AIC)	5.82688
Adjusted R-Square	0.13612	Bayes Schwarz Criterion (BSC)	5.97600
Standard Error	4.70131	Hannan-Quinn Criterion (HQC)	5.85212
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	85.36364	10.04324	8.49961	0.00000	64.07291	106.65436
VAR X1	4.09091	1.95388	2.09373	0.05257	-0.05114	8.23296
VAR X2	-1.00000	1.48668	-0.67264	0.51078	-4.15163	2.15163

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	106.89	53.44	2.41808	0.12090
Residual	16	353.64	22.10		
Total	18	460.53			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	97.7273	2.2727
2	90.0000	96.7273	-6.7273
3	100.0000	101.8182	-1.8182
4	100.0000	97.7273	2.2727
5	100.0000	97.7273	2.2727
6	100.0000	97.7273	2.2727
7	100.0000	97.7273	2.2727
8	100.0000	97.7273	2.2727
9	100.0000	101.8182	-1.8182
10	100.0000	96.7273	3.2727
11	100.0000	96.7273	3.2727
12	95.0000	97.7273	-2.7273
13	100.0000	93.6364	6.3636
14	100.0000	97.7273	2.2727
15	100.0000	102.8182	-2.8182
16	100.0000	100.8182	-0.8182
17	80.0000	93.6364	-13.6364
18	100.0000	99.7273	0.2727
19	100.0000	98.7273	1.2727

Model Inputs:
VAR231
VAR17; VAR117
PU3
PU3, PU3

Regression Results

OVERALL FIT

Multiple R	0.10118	Maximum Log Likelihood	-54.48404
R-Square	0.01024	Akaike Info Criterion (AIC)	6.05095
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	6.20007
Standard Error	5.29149	Hannan-Quinn Criterion (HQC)	6.07619
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	101.23918	7.34948	13.77501	0.00000	85.65897	116.81938
VAR X1	-0.40584	1.63762	-0.24783	0.80742	-3.87745	3.06576
VAR X2	-0.36797	1.23091	-0.29894	0.76884	-2.97738	2.24145

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	4.63	2.32	0.08275	0.92098
Residual	16	448.00	28.00		
Total	18	452.63			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	98.9177	1.0823
2	80.0000	98.1439	-18.1439
3	100.0000	98.5119	1.4881
4	100.0000	98.5119	1.4881
5	100.0000	98.5498	1.4502
6	100.0000	98.9556	1.0444
7	100.0000	98.1439	1.8561
8	100.0000	99.2857	0.7143
9	100.0000	97.7381	2.2619
10	100.0000	97.7381	2.2619
11	100.0000	99.2478	0.7522
12	90.0000	98.5119	-8.5119
13	100.0000	98.5119	1.4881
14	100.0000	98.1439	1.8561
15	100.0000	98.1439	1.8561
16	100.0000	97.3701	2.6299
17	100.0000	98.1818	1.8182
18	100.0000	98.8799	1.1201
19	100.0000	98.5119	1.4881

Model Inputs:
VAR232
VAR18; VAR118
PU4
PU4, PU4

Regression Results

OVERALL FIT

Multiple R	0.12369	Maximum Log Likelihood	-54.43789
R-Square	0.01530	Akaike Info Criterion (AIC)	6.04609
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	6.19522
Standard Error	5.27794	Hannan-Quinn Criterion (HQC)	6.07133
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	102.17391	7.82071	13.06453	0.00000	85.59475	118.75308
VAR X1	-0.71196	1.55151	-0.45888	0.65249	-4.00101	2.57709
VAR X2	-0.30978	1.29633	-0.23897	0.81416	-3.05789	2.43832

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	6.93	3.46	0.12430	0.88396
Residual	16	445.71	27.86		
Total	18	452.63			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	97.3750	2.6250
2	80.0000	98.0870	-18.0870
3	100.0000	98.3967	1.6033
4	100.0000	98.7065	1.2935
5	100.0000	98.7989	1.2011
6	100.0000	99.5109	0.4891
7	100.0000	98.0870	1.9130
8	100.0000	99.4185	0.5815
9	100.0000	97.3750	2.6250
10	100.0000	98.7989	1.2011
11	100.0000	98.4891	1.5109
12	90.0000	98.3967	-8.3967
13	100.0000	98.7989	1.2011
14	100.0000	98.0870	1.9130
15	100.0000	98.0870	1.9130
16	100.0000	97.3750	2.6250
17	100.0000	98.7989	1.2011
18	100.0000	99.0163	0.9837
19	100.0000	98.3967	1.6033

Model Inputs:
VAR233
VAR19; VAR119
PEOU1
PEOU1, PEOU1

Regression Results

OVERALL FIT

Multiple R	0.26323	Maximum Log Likelihood	-69.81760
R-Square	0.06929	Akaike Info Criterion (AIC)	7.66501
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	7.81413
Standard Error	12.40332	Hannan-Quinn Criterion (HQC)	7.69025
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	68.68558	19.00266	3.61452	0.00233	28.40174	108.96943
VAR X1	0.48933	4.29179	0.11402	0.91064	-8.60886	9.58751
VAR X2	3.76106	3.68977	1.01932	0.32322	-4.06089	11.58302

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	183.26	91.63	0.59560	0.56300
Residual	16	2461.48	153.84		
Total	18	2644.74			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	85.0000	85.6871	-0.6871
2	60.0000	81.9261	-21.9261
3	70.0000	78.1650	-8.1650
4	90.0000	81.9261	8.0739
5	70.0000	85.6871	-15.6871
6	90.0000	84.7085	5.2915
7	90.0000	81.9261	8.0739
8	80.0000	81.4368	-1.4368
9	70.0000	86.1765	-16.1765
10	90.0000	85.6871	4.3129
11	90.0000	89.4482	0.5518
12	100.0000	81.9261	18.0739
13	100.0000	86.1765	13.8235
14	80.0000	89.4482	-9.4482
15	100.0000	85.6871	14.3129
16	100.0000	89.9375	10.0625
17	80.0000	81.4368	-1.4368
18	70.0000	85.6871	-15.6871
19	90.0000	81.9261	8.0739

Model Inputs:
VAR234
VAR20; VAR120
PEOU2
PEOU2, PEOU2

Regression Results

OVERALL FIT

Multiple R	0.39948	Maximum Log Likelihood	-75.61699
R-Square	0.15959	Akaike Info Criterion (AIC)	8.27547
Adjusted R-Square	0.05453	Bayes Schwarz Criterion (BSC)	8.42459
Standard Error	17.11838	Hannan-Quinn Criterion (HQC)	8.30071
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	48.94184	20.64902	2.37018	0.03068	5.16787	92.71582
VAR X1	8.70213	4.99395	1.74254	0.10060	-1.88456	19.28882
VAR X2	0.61844	4.31526	0.14331	0.88783	-8.52951	9.76639

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	890.32	445.16	1.51912	0.24885
Residual	16	4688.62	293.04		
Total	18	5578.95			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	80.0000	77.5220	2.4780
2	70.0000	68.2014	1.7986
3	80.0000	68.2014	11.7986
4	90.0000	84.9872	5.0128
5	80.0000	85.6057	-5.6057
6	80.0000	68.8199	11.1801
7	100.0000	84.3688	15.6312
8	30.0000	76.9035	-46.9035
9	70.0000	76.9035	-6.9035
10	80.0000	85.6057	-5.6057
11	100.0000	86.8426	13.1574
12	90.0000	76.9035	13.0965
13	75.0000	68.8199	6.1801
14	75.0000	68.2014	6.7986
15	50.0000	67.5830	-17.5830
16	80.0000	77.5220	2.4780
17	70.0000	67.5830	2.4170
18	50.0000	77.5220	-27.5220
19	95.0000	76.9035	18.0965

Model Inputs:
VAR235
VAR21; VAR121
PEOU3
PEOU3, PEOU3

Regression Results

OVERALL FIT

Multiple R	0.36988	Maximum Log Likelihood	-70.09875
R-Square	0.13681	Akaike Info Criterion (AIC)	7.69460
Adjusted R-Square	0.02892	Bayes Schwarz Criterion (BSC)	7.84373
Standard Error	12.59857	Hannan-Quinn Criterion (HQC)	7.71984
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	62.12216	26.70351	2.32637	0.03346	5.51325	118.73107
VAR X1	7.76429	5.41604	1.43357	0.17095	-3.71720	19.24579
VAR X2	-1.32733	3.66385	-0.36228	0.72189	-9.09435	6.43969

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	402.52	201.26	1.26799	0.30820
Residual	16	2539.58	158.72		
Total	18	2942.11			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	90.0000	80.1057	9.8943
2	70.0000	78.7784	-8.7784
3	90.0000	89.1973	0.8027
4	80.0000	89.1973	-9.1973
5	50.0000	80.1057	-30.1057
6	90.0000	87.8700	2.1300
7	95.0000	87.8700	7.1300
8	100.0000	81.4330	18.5670
9	90.0000	87.8700	2.1300
10	85.0000	86.5427	-1.5427
11	100.0000	89.1973	10.8027
12	85.0000	90.5247	-5.5247
13	75.0000	80.1057	-5.1057
14	90.0000	81.4330	8.5670
15	90.0000	87.8700	2.1300
16	100.0000	86.5427	13.4573
17	100.0000	89.1973	10.8027
18	70.0000	89.1973	-19.1973
19	90.0000	96.9616	-6.9616

Model Inputs:
VAR236
VAR22; VAR122
PEOU4
PEOU4, PEOU4

Regression Results

OVERALL FIT

Multiple R	0.15351	Maximum Log Likelihood	-72.71669
R-Square	0.02356	Akaike Info Criterion (AIC)	7.97018
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.11930
Standard Error	14.57088	Hannan-Quinn Criterion (HQC)	7.99542
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	92.27273	23.40224	3.94290	0.00116	42.66219	141.88326
VAR X1	0.75758	4.50624	0.16812	0.86860	-8.79523	10.31038
VAR X2	-2.57576	4.50624	-0.57160	0.57554	-12.12857	6.97705

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	81.98	40.99	0.19306	0.82632
Residual	16	3396.97	212.31		
Total	18	3478.95			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	84.2424	15.7576
2	70.0000	84.2424	-14.2424
3	80.0000	87.5758	-7.5758
4	90.0000	87.5758	2.4242
5	50.0000	84.2424	-34.2424
6	85.0000	84.2424	0.7576
7	95.0000	87.5758	7.4242
8	80.0000	87.5758	-7.5758
9	100.0000	90.9091	9.0909
10	90.0000	82.4242	7.5758
11	100.0000	86.8182	13.1818
12	85.0000	86.8182	-1.8182
13	75.0000	84.2424	-9.2424
14	80.0000	86.8182	-6.8182
15	95.0000	86.0606	8.9394
16	100.0000	82.4242	17.5758
17	100.0000	86.0606	13.9394
18	65.0000	87.5758	-22.5758
19	95.0000	87.5758	7.4242

Model Inputs:
VAR237
VAR23; VAR123
IU1
IU1, IU1

Regression Results

OVERALL FIT

Multiple R	0.26026	Maximum Log Likelihood	-76.19988
R-Square	0.06774	Akaike Info Criterion (AIC)	8.33683
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.48595
Standard Error	17.68180	Hannan-Quinn Criterion (HQC)	8.36207
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	87.64453	22.56551	3.88400	0.00132	39.80778	135.48128
VAR X1	3.54290	4.05477	0.87376	0.39517	-5.05284	12.13863
VAR X2	-2.42710	4.37965	-0.55418	0.58712	-11.71156	6.85735

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	363.46	181.73	0.58126	0.57057
Residual	16	5002.33	312.65		
Total	18	5365.79			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	92.1077	7.8923
2	40.0000	89.6806	-49.6806
3	100.0000	94.5348	5.4652
4	90.0000	96.9619	-6.9619
5	100.0000	88.5648	11.4352
6	100.0000	81.4790	18.5210
7	95.0000	92.1077	2.8923
8	100.0000	90.9919	9.0081
9	100.0000	98.0777	1.9223
10	100.0000	92.1077	7.8923
11	100.0000	98.0777	1.9223
12	100.0000	98.0777	1.9223
13	100.0000	90.9919	9.0081
14	100.0000	94.5348	5.4652
15	100.0000	89.6806	10.3194
16	100.0000	95.6506	4.3494
17	50.0000	87.4490	-37.4490
18	90.0000	99.3890	-9.3890
19	100.0000	94.5348	5.4652

Model Inputs:
VAR238
VAR24; VAR124
IU2
IU2, IU2

Regression Results

OVERALL FIT

Multiple R	0.00889	Maximum Log Likelihood	-67.00063
R-Square	0.00008	Akaike Info Criterion (AIC)	7.36849
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	7.51761
Standard Error	10.60649	Hannan-Quinn Criterion (HQC)	7.39373
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	95.70434	12.47090	7.67421	0.00000	69.26720	122.14148
VAR X1	-0.06420	2.64922	-0.02423	0.98097	-5.68030	5.55191
VAR X2	0.06781	2.78949	0.02431	0.98091	-5.84564	5.98127

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	0.14	0.07	0.00063	0.99937
Residual	16	1799.96	112.50		
Total	18	1800.11			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	95.6510	4.3490
2	60.0000	95.7830	-35.7830
3	100.0000	95.5832	4.4168
4	98.0000	95.5154	2.4846
5	100.0000	95.7830	4.2170
6	100.0000	95.8436	4.1564
7	95.0000	95.6510	-0.6510
8	90.0000	95.6474	-5.6474
9	100.0000	95.7152	4.2848
10	100.0000	95.7830	4.2170
11	100.0000	95.7152	4.2848
12	95.0000	95.7152	-0.7152
13	100.0000	95.7116	4.2884
14	100.0000	95.6510	4.3490
15	100.0000	95.6510	4.3490
16	100.0000	95.6546	4.3454
17	100.0000	95.7794	4.2206
18	80.0000	95.5154	-15.5154
19	100.0000	95.6510	4.3490

```
Model Inputs:
VAR239
VAR25; VAR125
IU3
IU3, IU3

Regression Results

OVERALL FIT
Multiple R               0.44599      Maximum Log Likelihood           -88.96074
R-Square                 0.19891      Akaike Info Criterion (AIC)        9.68008
Adjusted R-Square        0.09877      Bayes Schwarz Criterion (BSC)      9.82920
Standard Error          35.92640      Hannan-Quinn Criterion (HQC)       9.70532
Observations                  19
```

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	11.63242	22.61588	0.51435	0.61404	-36.31111	59.57594
VAR X1	11.03335	7.50351	1.47043	0.16084	-4.87338	26.94007
VAR X2	-7.82474	7.52016	-1.04050	0.31358	-23.76677	8.11729

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	5127.65	2563.82	1.98637	0.16961
Residual	16	20651.30	1290.71		
Total	18	25778.95			

```
Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171
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Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	0.0000	-16.4579	16.4579
2	10.0000	13.4335	-3.4335
3	0.0000	36.9077	-36.9077
4	0.0000	7.0163	-7.0163
5	0.0000	7.0163	-7.0163
6	0.0000	14.8410	-14.8410
7	0.0000	25.8744	-25.8744
8	0.0000	36.9077	-36.9077
9	0.0000	7.0163	-7.0163
10	0.0000	14.8410	-14.8410
11	100.0000	58.9744	41.0256
12	0.0000	7.0163	-7.0163
13	100.0000	25.8744	74.1256
14	0.0000	25.8744	-25.8744
15	100.0000	14.8410	85.1590
16	0.0000	29.0830	-29.0830
17	0.0000	14.8410	-14.8410
18	50.0000	36.9077	13.0923
19	0.0000	-0.8085	0.8085

Model Inputs:
VAR240
VAR26; VAR126
PU1
PU1, PU1

Regression Results

OVERALL FIT

Multiple R	0.37867	Maximum Log Likelihood	-80.50178
R-Square	0.14339	Akaike Info Criterion (AIC)	8.78966
Adjusted R-Square	0.03632	Bayes Schwarz Criterion (BSC)	8.93878
Standard Error	22.45537	Hannan-Quinn Criterion (HQC)	8.81490
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	13.64198	39.99856	0.34106	0.73749	-71.15118	98.43513
VAR X1	5.33333	6.35134	0.83972	0.41344	-8.13090	18.79757
VAR X2	11.69136	7.76275	1.50609	0.15153	-4.76493	28.14765

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	1350.52	675.26	1.33915	0.28991
Residual	16	8067.90	504.24		
Total	18	9418.42			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	50.0000	71.0741	-21.0741
2	30.0000	81.7407	-51.7407
3	30.0000	53.0247	-23.0247
4	50.0000	76.4074	-26.4074
5	60.0000	81.7407	-21.7407
6	100.0000	71.0741	28.9259
7	85.0000	76.4074	8.5926
8	100.0000	81.7407	18.2593
9	80.0000	70.0494	9.9506
10	100.0000	82.7654	17.2346
11	80.0000	93.4321	-13.4321
12	80.0000	76.4074	3.5926
13	75.0000	81.7407	-6.7407
14	80.0000	81.7407	-1.7407
15	90.0000	81.7407	8.2593
16	100.0000	87.0741	12.9259
17	100.0000	81.7407	18.2593
18	90.0000	70.0494	19.9506
19	90.0000	70.0494	19.9506

Model Inputs:
VAR241
VAR27; VAR127
PU2
PU2, PU2

Regression Results

OVERALL FIT

Multiple R	0.40166	Maximum Log Likelihood	-82.93810
R-Square	0.16133	Akaike Info Criterion (AIC)	9.04612
Adjusted R-Square	0.05649	Bayes Schwarz Criterion (BSC)	9.19524
Standard Error	25.71002	Hannan-Quinn Criterion (HQC)	9.07135
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	-4.45835	45.31303	-0.09839	0.92284	-100.51770	91.60099
VAR X1	10.16352	6.77761	1.49957	0.15320	-4.20437	24.53141
VAR X2	9.42259	9.62016	0.97946	0.34193	-10.97125	29.81642

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	2034.44	1017.22	1.53890	0.24476
Residual	16	10576.09	661.01		
Total	18	12610.53			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	30.0000	43.3955	-13.3955
2	10.0000	73.8861	-63.8861
3	30.0000	64.4635	-34.4635
4	40.0000	63.7225	-23.7225
5	40.0000	73.8861	-33.8861
6	80.0000	64.4635	15.5365
7	85.0000	73.8861	11.1139
8	100.0000	73.8861	26.1139
9	70.0000	73.8861	-3.8861
10	80.0000	53.5590	26.4410
11	90.0000	83.3086	6.6914
12	70.0000	54.2999	15.7001
13	75.0000	73.8861	1.1139
14	60.0000	64.4635	-4.4635
15	75.0000	63.7225	11.2775
16	100.0000	84.0496	15.9504
17	100.0000	83.3086	16.6914
18	70.0000	64.4635	5.5365
19	90.0000	64.4635	25.5365

Model Inputs:
VAR242
VAR28; VAR128
PU3
PU3, PU3

Regression Results

OVERALL FIT

Multiple R	0.21849	Maximum Log Likelihood	-81.70009
R-Square	0.04774	Akaike Info Criterion (AIC)	8.91580
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.06492
Standard Error	24.00117	Hannan-Quinn Criterion (HQC)	8.94104
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	53.16162	39.14919	1.35792	0.19333	-29.83096	136.15419
VAR X1	-1.96296	7.72911	-0.25397	0.80275	-18.34795	14.42202
VAR X2	7.38047	8.44847	0.87359	0.39527	-10.52949	25.29043

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	462.05	231.02	0.40104	0.67617
Residual	16	9216.90	576.06		
Total	18	9678.95			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	50.0000	69.4141	-19.4141
2	30.0000	74.8316	-44.8316
3	20.0000	69.4141	-49.4141
4	50.0000	76.7946	-26.7946
5	60.0000	76.7946	-16.7946
6	90.0000	71.3771	18.6229
7	85.0000	76.7946	8.2054
8	100.0000	67.4512	32.5488
9	80.0000	67.4512	12.5488
10	70.0000	78.7576	-8.7576
11	100.0000	84.1751	15.8249
12	75.0000	69.4141	5.5859
13	75.0000	74.8316	0.1684
14	70.0000	74.8316	-4.8316
15	80.0000	74.8316	5.1684
16	100.0000	78.7576	21.2424
17	100.0000	82.2121	17.7879
18	80.0000	67.4512	12.5488
19	90.0000	69.4141	20.5859

Model Inputs:
VAR243
VAR29; VAR129
PU4
PU4, PU4

Regression Results

OVERALL FIT

Multiple R	0.35948	Maximum Log Likelihood	-83.29870
R-Square	0.12922	Akaike Info Criterion (AIC)	9.08407
Adjusted R-Square	0.02038	Bayes Schwarz Criterion (BSC)	9.23320
Standard Error	26.23028	Hannan-Quinn Criterion (HQC)	9.10931
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	33.01134	40.53824	0.81433	0.42741	-52.92588	118.94856
VAR X1	-1.99286	7.09084	-0.28105	0.78228	-17.02478	13.03906
VAR X2	13.14364	8.66782	1.51637	0.14893	-5.23132	31.51860

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	1633.66	816.83	1.18721	0.33056
Residual	16	11008.44	688.03		
Total	18	12642.11			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	60.0000	79.6073	-19.6073
2	20.0000	77.6144	-57.6144
3	10.0000	53.3200	-43.3200
4	50.0000	77.6144	-27.6144
5	60.0000	79.6073	-19.6073
6	90.0000	81.6002	8.3998
7	85.0000	79.6073	5.3927
8	100.0000	77.6144	22.3856
9	90.0000	64.4708	25.5292
10	75.0000	83.5930	-8.5930
11	100.0000	92.7509	7.2491
12	80.0000	66.4637	13.5363
13	75.0000	77.6144	-2.6144
14	70.0000	77.6144	-7.6144
15	90.0000	77.6144	12.3856
16	100.0000	81.6002	18.3998
17	100.0000	90.7581	9.2419
18	100.0000	64.4708	35.5292
19	95.0000	66.4637	28.5363

Model Inputs:
VAR244
VAR30; VAR130
PEOU1
PEOU1, PEOU1

Regression Results

OVERALL FIT

Multiple R	0.10280	Maximum Log Likelihood	-79.95529
R-Square	0.01057	Akaike Info Criterion (AIC)	8.73214
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.88126
Standard Error	21.78386	Hannan-Quinn Criterion (HQC)	8.75737
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	68.75096	43.20200	1.59138	0.13108	-22.83318	160.33510
VAR X1	0.08071	8.54105	0.00945	0.99258	-18.02550	18.18692
VAR X2	2.77863	6.72523	0.41317	0.68497	-11.47821	17.03548

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	81.10	40.55	0.08545	0.91851
Residual	16	7592.58	474.54		
Total	18	7673.68			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	80.1076	19.8924
2	40.0000	80.1883	-40.1883
3	80.0000	74.6311	5.3689
4	60.0000	77.4097	-17.4097
5	60.0000	80.1883	-20.1883
6	80.0000	80.1076	-0.1076
7	85.0000	77.4097	7.5903
8	40.0000	80.1883	-40.1883
9	100.0000	80.1883	19.8117
10	80.0000	80.1076	-0.1076
11	100.0000	82.9669	17.0331
12	95.0000	77.4097	17.5903
13	50.0000	80.1883	-30.1883
14	80.0000	82.8862	-2.8862
15	100.0000	80.1076	19.8924
16	100.0000	83.0477	16.9523
17	100.0000	80.2690	19.7310
18	75.0000	80.1883	-5.1883
19	90.0000	77.4097	12.5903

Model Inputs:
VAR245
VAR31; VAR131
PEOU2
PEOU2, PEOU2

Regression Results

OVERALL FIT

Multiple R	0.10961	Maximum Log Likelihood	-82.30150
R-Square	0.01202	Akaike Info Criterion (AIC)	8.97910
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.12823
Standard Error	24.81664	Hannan-Quinn Criterion (HQC)	9.00434
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	85.89744	28.19281	3.04678	0.00769	26.13134	145.66353
VAR X1	-1.06838	7.53207	-0.14184	0.88897	-17.03566	14.89891
VAR X2	-2.22222	5.51481	-0.40296	0.69231	-13.91309	9.46865

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	119.84	59.92	0.09729	0.90782
Residual	16	9853.85	615.87		
Total	18	9973.68			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	74.8718	25.1282
2	10.0000	76.0256	-66.0256
3	90.0000	73.8034	16.1966
4	90.0000	77.1795	12.8205
5	60.0000	77.1795	-17.1795
6	80.0000	73.8034	6.1966
7	95.0000	81.5385	13.4615
8	40.0000	71.5812	-31.5812
9	90.0000	77.0940	12.9060
10	70.0000	76.0256	-6.0256
11	100.0000	70.5128	29.4872
12	70.0000	79.3162	-9.3162
13	75.0000	72.7350	2.2650
14	75.0000	74.8718	0.1282
15	50.0000	73.8034	-23.8034
16	80.0000	74.8718	5.1282
17	100.0000	76.0256	23.9744
18	60.0000	73.8034	-13.8034
19	95.0000	74.9573	20.0427

Model Inputs:
VAR246
VAR32; VAR132
PEOU3
PEOU3, PEOU3

Regression Results

OVERALL FIT

Multiple R	0.14188	Maximum Log Likelihood	-81.18086
R-Square	0.02013	Akaike Info Criterion (AIC)	8.86114
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.01027
Standard Error	23.31872	Hannan-Quinn Criterion (HQC)	8.88638
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	99.15448	42.32788	2.34253	0.03241	9.42339	188.88556
VAR X1	-3.06905	6.57814	-0.46655	0.64711	-17.01408	10.87599
VAR X2	-3.19778	8.73855	-0.36594	0.71920	-21.72267	15.32712

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	178.74	89.37	0.16436	0.84985
Residual	16	8700.20	543.76		
Total	18	8878.95			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	90.0000	77.1562	12.8438
2	10.0000	70.8894	-60.8894
3	80.0000	77.2850	2.7150
4	40.0000	77.2850	-37.2850
5	60.0000	77.1562	-17.1562
6	70.0000	77.2850	-7.2850
7	90.0000	77.1562	12.8438
8	100.0000	74.0872	25.9128
9	90.0000	71.0181	18.9819
10	85.0000	83.2943	1.7057
11	90.0000	77.2850	12.7150
12	75.0000	77.2850	-2.2850
13	75.0000	74.0872	0.9128
14	60.0000	77.1562	-17.1562
15	100.0000	77.1562	22.8438
16	100.0000	70.8894	29.1106
17	80.0000	74.0872	5.9128
18	70.0000	74.0872	-4.0872
19	80.0000	80.3540	-0.3540

Model Inputs:
VAR247
VAR33; VAR133
PEOU4
PEOU4, PEOU4

Regression Results

OVERALL FIT

Multiple R	0.10977	Maximum Log Likelihood	-82.60700
R-Square	0.01205	Akaike Info Criterion (AIC)	9.01126
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.16039
Standard Error	25.24143	Hannan-Quinn Criterion (HQC)	9.03650
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	98.47905	64.91439	1.51706	0.14876	-39.13331	236.09141
VAR X1	-4.50820	10.21996	-0.44112	0.66503	-26.17354	17.15715
VAR X2	-1.07468	11.99606	-0.08959	0.92973	-26.50520	24.35583

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	124.34	62.17	0.09758	0.90757
Residual	16	10194.08	637.13		
Total	18	10318.42			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	80.6557	19.3443
2	20.0000	77.2222	-57.2222
3	90.0000	77.2222	12.7778
4	50.0000	77.2222	-27.2222
5	60.0000	80.6557	-20.6557
6	80.0000	77.2222	2.7778
7	90.0000	81.7304	8.2696
8	30.0000	71.6393	-41.6393
9	100.0000	72.7140	27.2860
10	70.0000	80.6557	-10.6557
11	100.0000	77.2222	22.7778
12	75.0000	77.2222	-2.2222
13	75.0000	76.1475	-1.1475
14	70.0000	80.6557	-10.6557
15	100.0000	76.1475	23.8525
16	100.0000	76.1475	23.8525
17	100.0000	76.1475	23.8525
18	70.0000	76.1475	-6.1475
19	90.0000	77.2222	12.7778

Model Inputs:
VAR248
VAR34; VAR134
IU1
IU1, IU1

Regression Results

OVERALL FIT

Multiple R	0.30137	Maximum Log Likelihood	-85.71785
R-Square	0.09082	Akaike Info Criterion (AIC)	9.33872
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.48784
Standard Error	30.00343	Hannan-Quinn Criterion (HQC)	9.36396
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	50.05657	33.94869	1.47448	0.15976	-21.91143	122.02457
VAR X1	9.08203	7.60715	1.19388	0.24993	-7.04441	25.20846
VAR X2	-1.90023	9.40337	-0.20208	0.84240	-21.83449	18.03403

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	1438.81	719.41	0.79916	0.46686
Residual	16	14403.29	900.21		
Total	18	15842.11			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	80.0000	69.7017	10.2983
2	10.0000	78.7837	-68.7837
3	10.0000	71.6020	-61.6020
4	30.0000	69.7017	-39.7017
5	50.0000	69.7017	-19.7017
6	80.0000	55.3381	24.6619
7	90.0000	78.7837	11.2163
8	100.0000	87.8658	12.1342
9	100.0000	82.5842	17.4158
10	90.0000	60.6197	29.3803
11	100.0000	85.9655	14.0345
12	90.0000	87.8658	2.1342
13	100.0000	78.7837	21.2163
14	70.0000	78.7837	-8.7837
15	80.0000	76.8835	3.1165
16	100.0000	87.8658	12.1342
17	100.0000	76.8835	23.1165
18	80.0000	80.6840	-0.6840
19	90.0000	71.6020	18.3980

Model Inputs:
VAR249
VAR35; VAR135
IU2
IU2, IU2

Regression Results

OVERALL FIT

Multiple R	0.18090	Maximum Log Likelihood	-84.25956
R-Square	0.03273	Akaike Info Criterion (AIC)	9.18522
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.33434
Standard Error	27.66852	Hannan-Quinn Criterion (HQC)	9.21045
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	82.89357	35.14100	2.35888	0.03138	8.39797	157.38917
VAR X1	-6.13636	8.34237	-0.73557	0.47264	-23.82140	11.54868
VAR X2	3.22062	10.30001	0.31268	0.75856	-18.61443	25.05567

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	414.41	207.20	0.27066	0.76630
Residual	16	12248.75	765.55		
Total	18	12663.16			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	80.0000	74.1463	5.8537
2	10.0000	71.2306	-61.2306
3	10.0000	74.1463	-64.1463
4	50.0000	74.1463	-24.1463
5	60.0000	77.3670	-17.3670
6	80.0000	83.1984	-3.1984
7	90.0000	68.0100	21.9900
8	70.0000	68.0100	1.9900
9	100.0000	74.1463	25.8537
10	80.0000	83.5033	-3.5033
11	100.0000	74.1463	25.8537
12	85.0000	74.1463	10.8537
13	75.0000	71.2306	3.7694
14	70.0000	71.2306	-1.2306
15	80.0000	71.2306	8.7694
16	100.0000	83.5033	16.4967
17	100.0000	74.4512	25.5488
18	75.0000	68.0100	6.9900
19	95.0000	74.1463	20.8537

Model Inputs:
VAR250
VAR36; VAR136
IU3
IU3, IU3

Regression Results

OVERALL FIT

Multiple R	0.43101	Maximum Log Likelihood	-87.77373
R-Square	0.18577	Akaike Info Criterion (AIC)	9.55513
Adjusted R-Square	0.08399	Bayes Schwarz Criterion (BSC)	9.70425
Standard Error	33.63365	Hannan-Quinn Criterion (HQC)	9.58037
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	26.93521	20.60401	1.30728	0.20959	-16.74333	70.61376
VAR X1	5.89246	6.33476	0.93018	0.36610	-7.53664	19.32156
VAR X2	-7.69651	5.46678	-1.40787	0.17830	-19.28557	3.89255

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	4129.39	2064.70	1.82519	0.19319
Residual	16	18099.55	1131.22		
Total	18	22228.95			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	0.0000	-5.6549	5.6549
2	5.0000	6.1300	-1.1300
3	50.0000	36.9161	13.0839
4	0.0000	17.4347	-17.4347
5	0.0000	17.4347	-17.4347
6	0.0000	25.1312	-25.1312
7	0.0000	31.0236	-31.0236
8	0.0000	36.9161	-36.9161
9	70.0000	25.1312	44.8688
10	20.0000	25.1312	-5.1312
11	100.0000	48.7010	51.2990
12	0.0000	-5.6549	5.6549
13	0.0000	42.8085	-42.8085
14	0.0000	31.0236	-31.0236
15	50.0000	42.8085	7.1915
16	0.0000	21.5231	-21.5231
17	80.0000	25.1312	54.8688
18	80.0000	23.3271	56.6729
19	0.0000	9.7381	-9.7381

Model Inputs:
VAR251
VAR37; VAR137
PU1
PU1, PU1

Regression Results

OVERALL FIT

Multiple R	0.27872	Maximum Log Likelihood	-82.86884
R-Square	0.07768	Akaike Info Criterion (AIC)	9.03882
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.18795
Standard Error	25.61129	Hannan-Quinn Criterion (HQC)	9.06406
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	96.58687	43.21243	2.23516	0.04002	4.98060	188.19313
VAR X1	1.08755	7.21418	0.15075	0.88206	-14.20582	16.38092
VAR X2	-9.61012	8.50785	-1.12956	0.27531	-27.64596	8.42571

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	883.94	441.97	0.67380	0.52365
Residual	16	10495.01	655.94		
Total	18	11378.95			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	80.0000	72.1067	7.8933
2	40.0000	51.7989	-11.7989
3	90.0000	62.4966	27.5034
4	70.0000	61.4090	8.5910
5	80.0000	62.4966	17.5034
6	30.0000	50.7114	-20.7114
7	75.0000	60.3215	14.6785
8	100.0000	61.4090	38.5910
9	60.0000	62.4966	-2.4966
10	60.0000	72.1067	-12.1067
11	20.0000	53.9740	-33.9740
12	75.0000	69.9316	5.0684
13	100.0000	62.4966	37.5034
14	60.0000	72.1067	-12.1067
15	90.0000	62.4966	27.5034
16	40.0000	71.0192	-31.0192
17	80.0000	72.1067	7.8933
18	25.0000	61.4090	-36.4090
19	40.0000	72.1067	-32.1067

Model Inputs:
VAR252
VAR38; VAR138
PU2
PU2, PU2

Regression Results

OVERALL FIT

Multiple R	0.23342	Maximum Log Likelihood	-83.11941
R-Square	0.05449	Akaike Info Criterion (AIC)	9.06520
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.21432
Standard Error	25.97031	Hannan-Quinn Criterion (HQC)	9.09044
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	110.70529	49.67523	2.22858	0.04053	5.39850	216.01208
VAR X1	-6.24685	7.87460	-0.79329	0.43921	-22.94025	10.44655
VAR X2	-5.66751	9.39904	-0.60299	0.55497	-25.59258	14.25757

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	621.85	310.92	0.46100	0.63877
Residual	16	10791.31	674.46		
Total	18	11413.16			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	62.4685	37.5315
2	50.0000	69.2947	-19.2947
3	90.0000	63.0479	26.9521
4	80.0000	56.8010	23.1990
5	90.0000	63.0479	26.9521
6	30.0000	57.3804	-27.3804
7	75.0000	63.0479	11.9521
8	100.0000	63.0479	36.9521
9	30.0000	62.4685	-32.4685
10	60.0000	68.7154	-8.7154
11	20.0000	57.3804	-37.3804
12	80.0000	81.2091	-1.2091
13	75.0000	63.0479	11.9521
14	60.0000	68.7154	-8.7154
15	80.0000	63.0479	16.9521
16	40.0000	56.8010	-16.8010
17	80.0000	69.2947	10.7053
18	40.0000	68.7154	-28.7154
19	40.0000	62.4685	-22.4685

Model Inputs:
VAR253
VAR39; VAR139
PU3
PU3, PU3

Regression Results

OVERALL FIT

Multiple R	0.47186	Maximum Log Likelihood	-83.19208
R-Square	0.22265	Akaike Info Criterion (AIC)	9.07285
Adjusted R-Square	0.12548	Bayes Schwarz Criterion (BSC)	9.22197
Standard Error	26.07536	Hannan-Quinn Criterion (HQC)	9.09809
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	137.66764	37.11724	3.70899	0.00191	58.98261	216.35267
VAR X1	-6.74927	7.24780	-0.93122	0.36558	-22.11392	8.61538
VAR X2	-14.91983	7.80739	-1.91099	0.07409	-31.47075	1.63110

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	3115.95	1557.97	2.29139	0.13333
Residual	16	10878.79	679.92		
Total	18	13994.74			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	90.0000	72.6603	17.3397
2	40.0000	50.9913	-10.9913
3	80.0000	57.7405	22.2595
4	75.0000	57.7405	17.2595
5	90.0000	57.7405	32.2595
6	20.0000	56.3192	-36.3192
7	75.0000	64.4898	10.5102
8	100.0000	79.4096	20.5904
9	50.0000	50.9913	-0.9913
10	60.0000	65.9111	-5.9111
11	10.0000	36.0714	-26.0714
12	75.0000	94.3294	-19.3294
13	75.0000	57.7405	17.2595
14	30.0000	65.9111	-35.9111
15	70.0000	50.9913	19.0087
16	40.0000	42.8207	-2.8207
17	100.0000	57.7405	42.2595
18	20.0000	57.7405	-37.7405
19	50.0000	72.6603	-22.6603

Model Inputs:
VAR254
VAR40; VAR140
PU4
PU4, PU4

Regression Results

OVERALL FIT

Multiple R	0.15186	Maximum Log Likelihood	-87.11732
R-Square	0.02306	Akaike Info Criterion (AIC)	9.48603
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.63516
Standard Error	32.42923	Hannan-Quinn Criterion (HQC)	9.51127
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	44.33761	41.85366	1.05935	0.30517	-44.38818	133.06341
VAR X1	4.09541	8.00401	0.51167	0.61587	-12.87232	21.06315
VAR X2	1.93394	11.52212	0.16785	0.86881	-22.49187	26.35976

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	397.21	198.60	0.18885	0.82973
Residual	16	16826.48	1051.65		
Total	18	17223.68			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	70.6165	29.3835
2	50.0000	68.4550	-18.4550
3	80.0000	68.4550	11.5450
4	100.0000	68.4550	31.5450
5	90.0000	64.3596	25.6404
6	20.0000	54.2349	-34.2349
7	75.0000	60.2642	14.7358
8	100.0000	58.3303	41.6697
9	50.0000	66.5211	-16.5211
10	60.0000	64.3596	-4.3596
11	10.0000	70.3890	-60.3890
12	70.0000	56.3963	13.6037
13	100.0000	64.3596	35.6404
14	30.0000	66.5211	-36.5211
15	75.0000	68.4550	6.5450
16	50.0000	62.4257	-12.4257
17	100.0000	68.4550	31.5450
18	10.0000	62.4257	-52.4257
19	60.0000	66.5211	-6.5211

Model Inputs:
VAR255
VAR41; VAR141
PEOU1
PEOU1, PEOU1

Regression Results

OVERALL FIT

Multiple R	0.73580	Maximum Log Likelihood	-72.32860
R-Square	0.54141	Akaike Info Criterion (AIC)	7.92933
Adjusted R-Square	0.48408	Bayes Schwarz Criterion (BSC)	8.07845
Standard Error	14.26009	Hannan-Quinn Criterion (HQC)	7.95456
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	52.70366	20.69753	2.54637	0.02156	8.82686	96.58046
VAR X1	16.55254	4.47291	3.70062	0.00194	7.07040	26.03468
VAR X2	-12.99882	4.07992	-3.18605	0.00574	-21.64786	-4.34978

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	3841.14	1920.57	9.44464	0.00196
Residual	16	3253.60	203.35		
Total	18	7094.74			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	90.0000	83.4711	6.5289
2	30.0000	50.3660	-20.3660
3	60.0000	83.4711	-23.4711
4	90.0000	79.9174	10.0826
5	80.0000	79.9174	0.0826
6	80.0000	83.4711	-3.4711
7	80.0000	79.9174	0.0826
8	50.0000	46.8123	3.1877
9	80.0000	76.3636	3.6364
10	70.0000	66.9185	3.0815
11	70.0000	53.9197	16.0803
12	90.0000	96.4699	-6.4699
13	50.0000	66.9185	-16.9185
14	50.0000	53.9197	-3.9197
15	100.0000	66.9185	33.0815
16	100.0000	83.4711	16.5289
17	50.0000	53.9197	-3.9197
18	50.0000	53.9197	-3.9197
19	70.0000	79.9174	-9.9174

Model Inputs:
VAR256
VAR42; VAR142
PEOU2
PEOU2, PEOU2

Regression Results

OVERALL FIT

Multiple R	0.54771	Maximum Log Likelihood	-76.53012
R-Square	0.29999	Akaike Info Criterion (AIC)	8.37159
Adjusted R-Square	0.21249	Bayes Schwarz Criterion (BSC)	8.52071
Standard Error	18.00919	Hannan-Quinn Criterion (HQC)	8.39683
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	109.70750	24.79647	4.42432	0.00043	57.14134	162.27365
VAR X1	3.94751	4.11591	0.95908	0.35179	-4.77784	12.67286
VAR X2	-14.65004	5.67340	-2.58223	0.02005	-26.67710	-2.62297

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	2223.87	1111.93	3.42839	0.05766
Residual	16	5189.29	324.33		
Total	18	7413.16			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	70.8449	29.1551
2	30.0000	48.2998	-18.2998
3	70.0000	66.8974	3.1026
4	90.0000	66.8974	23.1026
5	100.0000	66.8974	33.1026
6	80.0000	85.4949	-5.4949
7	90.0000	88.3024	1.6976
8	70.0000	85.4949	-15.4949
9	80.0000	66.8974	13.1026
10	70.0000	81.5474	-11.5474
11	30.0000	56.1948	-26.1948
12	75.0000	70.8449	4.1551
13	50.0000	59.0024	-9.0024
14	70.0000	59.0024	10.9976
15	50.0000	66.8974	-16.8974
16	80.0000	70.8449	9.1551
17	50.0000	56.1948	-6.1948
18	70.0000	66.8974	3.1026
19	60.0000	81.5474	-21.5474

Model Inputs:
VAR257
VAR43; VAR143
PEOU3
PEOU3, PEOU3

Regression Results

OVERALL FIT

Multiple R	0.45478	Maximum Log Likelihood	-80.12070
R-Square	0.20683	Akaike Info Criterion (AIC)	8.74955
Adjusted R-Square	0.10768	Bayes Schwarz Criterion (BSC)	8.89867
Standard Error	21.98497	Hannan-Quinn Criterion (HQC)	8.77478
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	121.56686	29.51144	4.11931	0.00080	59.00541	184.12832
VAR X1	-0.61775	5.26163	-0.11741	0.90800	-11.77190	10.53640
VAR X2	-12.66154	6.21829	-2.03618	0.05864	-25.84372	0.52064

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	2016.58	1008.29	2.08609	0.15665
Residual	16	7733.42	483.34		
Total	18	9750.00			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	80.4935	19.5065
2	40.0000	56.4059	-16.4059
3	90.0000	81.1112	8.8888
4	90.0000	81.1112	8.8888
5	90.0000	94.3905	-4.3905
6	90.0000	81.1112	8.8888
7	85.0000	82.3467	2.6533
8	100.0000	81.7290	18.2710
9	80.0000	69.6852	10.3148
10	90.0000	69.6852	20.3148
11	50.0000	80.4935	-30.4935
12	60.0000	69.0675	-9.0675
13	50.0000	69.6852	-19.6852
14	40.0000	56.4059	-16.4059
15	100.0000	69.0675	30.9325
16	100.0000	82.3467	17.6533
17	70.0000	55.7882	14.2118
18	30.0000	81.7290	-51.7290
19	70.0000	82.3467	-12.3467

Model Inputs:
VAR258
VAR44; VAR144
PEOU4
PEOU4, PEOU4

Regression Results

OVERALL FIT

Multiple R	0.31516	Maximum Log Likelihood	-80.84954
R-Square	0.09933	Akaike Info Criterion (AIC)	8.82627
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	8.97539
Standard Error	22.89343	Hannan-Quinn Criterion (HQC)	8.85151
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	35.77345	37.51409	0.95360	0.35447	-43.75287	115.29976
VAR X1	7.53350	5.67786	1.32682	0.20319	-4.50304	19.57003
VAR X2	2.31425	7.32283	0.31603	0.75606	-13.20946	17.83796

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	924.78	462.39	0.88224	0.43305
Residual	16	8385.75	524.11		
Total	18	9310.53			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	100.0000	80.3837	19.6163
2	40.0000	67.6309	-27.6309
3	80.0000	75.1644	4.8356
4	90.0000	72.8502	17.1498
5	90.0000	65.3167	24.6833
6	80.0000	75.1644	4.8356
7	85.0000	57.7832	27.2168
8	50.0000	65.3167	-15.3167
9	80.0000	78.0694	1.9306
10	85.0000	72.8502	12.1498
11	50.0000	78.0694	-28.0694
12	70.0000	67.6309	2.3691
13	50.0000	60.0974	-10.0974
14	50.0000	72.8502	-22.8502
15	100.0000	82.6979	17.3021
16	100.0000	82.6979	17.3021
17	80.0000	69.9452	10.0548
18	20.0000	75.1644	-55.1644
19	65.0000	65.3167	-0.3167

Model Inputs:
VAR259
VAR45; VAR145
IU1
IU1, IU1

Regression Results

OVERALL FIT

Multiple R	0.22485	Maximum Log Likelihood	-88.10298
R-Square	0.05056	Akaike Info Criterion (AIC)	9.58979
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.73891
Standard Error	34.25452	Hannan-Quinn Criterion (HQC)	9.61502
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	47.79453	40.20026	1.18891	0.25182	-37.42622	133.01528
VAR X1	-4.79488	7.56224	-0.63406	0.53501	-20.82612	11.23636
VAR X2	6.59362	9.00277	0.73240	0.47452	-12.49141	25.67864

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	999.73	499.86	0.42601	0.66031
Residual	16	18773.96	1173.37		
Total	18	19773.68			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	50.0000	50.1946	-0.1946
2	20.0000	59.7844	-39.7844
3	70.0000	48.3959	21.6041
4	90.0000	54.9895	35.0105
5	100.0000	59.7844	40.2156
6	0.0000	56.1869	-56.1869
7	85.0000	59.7844	25.2156
8	100.0000	64.5792	35.4208
9	50.0000	54.9895	-4.9895
10	50.0000	48.3959	1.6041
11	10.0000	56.7882	-46.7882
12	75.0000	41.8022	33.1978
13	100.0000	64.5792	35.4208
14	50.0000	41.8022	8.1978
15	75.0000	66.3780	8.6220
16	25.0000	43.6010	-18.6010
17	50.0000	54.9895	-4.9895
18	0.0000	59.7844	-59.7844
19	40.0000	53.1907	-13.1907

Model Inputs:
VAR260
VAR46; VAR146
IU2
IU2, IU2

Regression Results

OVERALL FIT

Multiple R	0.42708	Maximum Log Likelihood	-86.40853
R-Square	0.18240	Akaike Info Criterion (AIC)	9.41142
Adjusted R-Square	0.08020	Bayes Schwarz Criterion (BSC)	9.56055
Standard Error	31.17707	Hannan-Quinn Criterion (HQC)	9.43666
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	16.92773	38.29252	0.44206	0.66436	-64.24879	98.10424
VAR X1	15.39816	8.22775	1.87149	0.07968	-2.04388	32.84021
VAR X2	-4.30355	9.38788	-0.45842	0.65282	-24.20497	15.59787

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	3469.53	1734.76	1.78472	0.19968
Residual	16	15552.16	972.01		
Total	18	19021.68			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	80.0000	81.0079	-1.0079
2	40.0000	45.9080	-5.9080
3	80.0000	61.3062	18.6938
4	98.0000	65.6097	32.3903
5	100.0000	45.9080	54.0920
6	0.0000	19.4152	-19.4152
7	85.0000	39.1170	45.8830
8	20.0000	34.8134	-14.8134
9	30.0000	50.2116	-20.2116
10	40.0000	50.2116	-10.2116
11	10.0000	41.6045	-31.6045
12	60.0000	54.5151	5.4849
13	50.0000	45.9080	4.0920
14	40.0000	69.9133	-29.9133
15	75.0000	61.3062	13.6938
16	25.0000	65.6097	-40.6097
17	100.0000	50.2116	49.7884
18	10.0000	50.2116	-40.2116
19	40.0000	50.2116	-10.2116

Model Inputs:
VAR261
VAR47; VAR147
IU3
IU3, IU3

Regression Results

OVERALL FIT

Multiple R	0.46361	Maximum Log Likelihood	-86.36928
R-Square	0.21493	Akaike Info Criterion (AIC)	9.40729
Adjusted R-Square	0.11680	Bayes Schwarz Criterion (BSC)	9.55641
Standard Error	31.10915	Hannan-Quinn Criterion (HQC)	9.43253
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	34.21838	21.35004	1.60273	0.12855	-11.04169	79.47846
VAR X1	-10.94921	6.28627	-1.74177	0.10074	-24.27552	2.37709
VAR X2	4.11681	7.09439	0.58029	0.56980	-10.92263	19.15625

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	4239.22	2119.61	2.19018	0.14430
Residual	16	15484.46	967.78		
Total	18	19723.68			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	75.0000	35.6196	39.3804
2	10.0000	13.7212	-3.7212
3	0.0000	16.4368	-16.4368
4	0.0000	31.5028	-31.5028
5	80.0000	31.5028	48.4972
6	50.0000	43.8532	6.1468
7	0.0000	16.4368	-16.4368
8	0.0000	5.4876	-5.4876
9	0.0000	31.5028	-31.5028
10	0.0000	27.3860	-27.3860
11	0.0000	5.4876	-5.4876
12	0.0000	27.3860	-27.3860
13	0.0000	-5.4617	5.4617
14	0.0000	-16.4109	16.4109
15	50.0000	27.3860	22.6140
16	0.0000	9.6044	-9.6044
17	100.0000	27.3860	72.6140
18	20.0000	20.5536	-0.5536
19	0.0000	35.6196	-35.6196

15. Nonlinear Econometric Model I: Direct-Controlled System

Model Inputs:
VAR296
VAR15; VAR16; VAR17; VAR18; VAR19; VAR20; VAR21; VAR22; VAR23; VAR24; VAR25
SUSA
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.88698	Maximum Log Likelihood	-50.61399
R-Square	0.78673	Akaike Info Criterion (AIC)	6.59095
Adjusted R-Square	0.45159	Bayes Schwarz Criterion (BSC)	7.18743
Standard Error	6.45230	Hannan-Quinn Criterion (HQC)	6.69190
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	146.43508	29.41873	4.97761	0.00161	76.87085	215.99932
VAR X1	-15.92684	20.10171	-0.79231	0.45419	-63.45984	31.60615
VAR X2	7.98807	16.69306	0.47853	0.64686	-31.48474	47.46087
VAR X3	-49.53203	22.05808	-2.24553	0.**05959**	-101.69111	2.62705
VAR X4	-29.58373	18.72588	-1.57983	0.15816	-73.86340	14.69595
VAR X5	-8.65419	21.14538	-0.40927	0.69457	-58.65508	41.34669
VAR X6	-19.78808	9.88119	-2.00260	**0.08529**	-43.15338	3.57721
VAR X7	1.10349	14.73959	0.07487	0.94242	-33.75010	35.95707
VAR X8	5.39198	10.32642	0.52215	0.61767	-19.02612	29.81008
VAR X9	56.25472	15.24177	3.69083	**0.00775**	20.21366	92.29579
VAR X10	1.59737	11.14620	0.14331	0.89008	-24.75920	27.95394
VAR X11	-11.78828	3.82514	-3.08179	**0.01777**	-20.83330	-2.74327

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	1075.02	97.73	2.34745	0.13337
Residual	7	291.43	41.63		
Total	18	1366.45			

Model Inputs:
VAR296
VAR115; VAR116; VAR117; VAR118; VAR119; VAR120; VAR121; VAR122; VAR123; VAR124; VAR125
SUSA
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.86067	Maximum Log Likelihood	-52.37119
R-Square	0.74074	Akaike Info Criterion (AIC)	6.77591
Adjusted R-Square	0.33334	Bayes Schwarz Criterion (BSC)	7.37240
Standard Error	7.11396	Hannan-Quinn Criterion (HQC)	6.87686
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	94.81437	18.17782	5.21594	0.00123	51.83066	137.79807
VAR X1	10.70905	12.97276	0.82550	0.43631	-19.96666	41.38477
VAR X2	-24.91218	13.62315	-1.82866	0.11016	-57.12582	7.30146
VAR X3	-3.18640	6.36412	-0.50068	0.63195	-18.23514	11.86234
VAR X4	0.18369	11.59050	0.01585	0.98780	-27.22348	27.59086
VAR X5	8.56411	13.76690	0.62208	0.55360	-23.98944	41.11765
VAR X6	6.20791	7.11861	0.87207	0.41208	-10.62493	23.04075
VAR X7	-27.14627	11.09639	-2.44641	**0.04434**	-53.38506	-0.90749
VAR X8	-2.94944	11.57757	-0.25475	0.80623	-30.32604	24.42715
VAR X9	32.25088	13.40786	2.40537	**0.04709**	0.54634	63.95543
VAR X10	-14.35025	9.32444	-1.53899	0.16770	-36.39905	7.69855
VAR X11	5.53039	3.60408	1.53448	0.16878	-2.99190	14.05267

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	1012.19	92.02	1.81822	0.21912
Residual	7	354.26	50.61		
Total	18	1366.45			

Model Inputs:
VAR296
VAR17; VAR23; VAR25
SUSA
PU3, IU1, IU3

Regression Results

OVERALL FIT

Multiple R	0.73016	Maximum Log Likelihood	-57.66530
R-Square	0.53313	Akaike Info Criterion (AIC)	6.49108
Adjusted R-Square	0.43976	Bayes Schwarz Criterion (BSC)	6.68991
Standard Error	6.52151	Hannan-Quinn Criterion (HQC)	6.52473
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	110.18471	10.55925	10.43490	0.00000	87.67821	132.69121
VAR X1	-46.61365	13.13907	-3.54771	**0.00292**	-74.61893	-18.60838
VAR X2	24.30736	7.75903	3.13278	**0.00684**	7.76938	40.84535
VAR X3	-6.35901	2.86529	-2.21933	**0.04230**	-12.46622	-0.25180

ANOVA

	DF	SS	MS	F	p-Value
Regression	3	728.50	242.83	5.70965	0.00821
Residual	15	637.95	42.53		
Total	18	1366.45			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 5.416965
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.287382
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.489788

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	95.0000	92.6715	2.3285
2	72.5000	72.2755	0.2245
3	70.0000	72.2755	-2.2755
4	75.0000	79.2616	-4.2616
5	75.0000	85.6787	-10.6787
6	82.5000	77.8746	4.6254
7	67.5000	74.8539	-7.3539
8	80.0000	78.6927	1.3073
9	75.0000	74.2841	0.7159
10	72.5000	68.8601	3.6399
11	80.0000	74.4512	5.5488
12	85.0000	84.6857	0.3143
13	72.5000	67.8611	4.6389
14	85.0000	74.8539	10.1461
15	87.5000	79.2616	8.2384
16	57.5000	67.2980	-9.7980
17	67.5000	75.8230	-8.3230
18	70.0000	72.2755	-2.2755
19	82.5000	79.2616	3.2384

16. Nonlinear Econometric Model II: Remote Control

```
Model Inputs:
VAR297
VAR26; VAR27; VAR28; VAR29; VAR30; VAR31; VAR32; VAR33; VAR34; VAR35; VAR36
SUSB
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT
Multiple R              0.45524      Maximum Log Likelihood             -74.67787
R-Square                0.20724      Akaike Info Criterion (AIC)          9.12399
Adjusted R-Square       0.00000      Bayes Schwarz Criterion (BSC)        9.72047
Standard Error         24.56490      Hannan-Quinn Criterion (HQC)         9.22494
Observations                 19
```

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	71.55895	81.10619	0.88229	0.40690	-120.22671	263.34460
VAR X1	-18.72997	81.41096	-0.23007	0.82462	-211.23630	173.77635
VAR X2	4.86021	34.54625	0.14069	0.89208	-76.82870	86.54912
VAR X3	32.81394	120.40717	0.27252	0.79308	-251.90379	317.53166
VAR X4	8.98179	166.39394	0.05398	0.95846	-384.47737	402.44094
VAR X5	-14.12159	159.46387	-0.08856	0.93191	-391.19372	362.95054
VAR X6	-6.53891	35.44997	-0.18445	0.85889	-90.36476	77.28695
VAR X7	-0.30819	143.28494	-0.00215	0.99834	-339.12324	338.50686
VAR X8	2.67003	71.91777	0.03713	0.97142	-167.38847	172.72853
VAR X9	26.73597	68.18188	0.39213	0.70663	-134.48854	187.96049
VAR X10	-42.49615	178.53957	-0.23802	0.81868	-464.67514	379.68284
VAR X11	-5.46950	23.57506	-0.23200	0.82317	-61.21567	50.27667

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	1104.25	100.39	0.16636	0.99546
Residual	7	4224.04	603.43		
Total	18	5328.29			

```
Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924
```

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	70.0000	69.7275	0.2725
2	17.5000	58.9293	-41.4293
3	62.5000	56.8276	5.6724
4	52.5000	62.1410	-9.6410
5	40.0000	54.8876	-14.8876
6	77.5000	74.8609	2.6391
7	65.0000	56.4832	8.5168
8	47.5000	65.4910	-17.9910
9	82.5000	80.3418	2.1582
10	50.0000	54.0014	-4.0014
11	80.0000	60.4216	19.5784
12	72.5000	77.7470	-5.2470
13	50.0000	55.4746	-5.4746
14	65.0000	67.1813	-2.1813
15	80.0000	60.1088	19.8912
16	57.5000	61.7859	-4.2859
17	87.5000	61.7870	25.7130
18	72.5000	61.1469	11.3531
19	65.0000	55.6557	9.3443

Model Inputs:
VAR297
VAR126; VAR127; VAR128; VAR129; VAR130; VAR131; VAR132; VAR133; VAR134; VAR135; VAR136
SUSB
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.71362	Maximum Log Likelihood	-70.36150
R-Square	0.50926	Akaike Info Criterion (AIC)	8.66963
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.26612
Standard Error	19.32733	Hannan-Quinn Criterion (HQC)	8.77058
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	144.15681	68.43138	2.10659	0.07316	-17.65769	305.97131
VAR X1	-19.85530	14.77429	-1.34391	0.22090	-54.79094	15.08034
VAR X2	9.77247	13.47704	0.72512	0.49190	-22.09566	41.64059
VAR X3	-18.03786	27.35753	-0.65934	0.53076	-82.72814	46.65241
VAR X4	4.35736	19.03998	0.22885	0.82553	-40.66504	49.37976
VAR X5	23.41367	15.12588	1.54792	0.16557	-12.35336	59.18070
VAR X6	-6.98935	6.99968	-0.99852	0.35128	-23.54096	9.56227
VAR X7	-23.35786	12.56216	-1.85938	0.10531	-53.06264	6.34692
VAR X8	-1.18514	20.97284	-0.05651	0.95652	-50.77802	48.40774
VAR X9	9.73763	13.78441	0.70642	0.50275	-22.85733	42.33259
VAR X10	1.09762	18.07236	0.06073	0.95327	-41.63673	43.83197
VAR X11	-3.22113	4.87714	-0.66046	0.53009	-14.75373	8.31146

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	2713.47	246.68	0.66037	0.74162
Residual	7	2614.82	373.55		
Total	18	5328.29			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	70.0000	60.8043	9.1957
2	17.5000	28.6807	-11.1807
3	62.5000	62.8903	-0.3903
4	52.5000	67.5379	-15.0379
5	40.0000	67.5062	-27.5062
6	77.5000	67.8865	9.6135
7	65.0000	54.3905	10.6095
8	47.5000	66.6995	-19.1995
9	82.5000	77.8860	4.6140
10	50.0000	43.8826	6.1174
11	80.0000	82.5926	-2.5926
12	72.5000	61.7825	10.7175
13	50.0000	56.7486	-6.7486
14	65.0000	70.3898	-5.3898
15	80.0000	66.4862	13.5138
16	57.5000	50.3621	7.1379
17	87.5000	70.6651	16.8349
18	72.5000	66.4555	6.0445
19	65.0000	71.3531	-6.3531

17. Nonlinear Econometric Model III: Autonomous

Model Inputs:
VAR298
VAR37; VAR38; VAR39; VAR40; VAR41; VAR42; VAR43; VAR44; VAR45; VAR46; VAR47
SUSC
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.89265	Maximum Log Likelihood	-58.45594
R-Square	0.79683	Akaike Info Criterion (AIC)	7.41641
Adjusted R-Square	0.47756	Bayes Schwarz Criterion (BSC)	8.01290
Standard Error	9.97518	Hannan-Quinn Criterion (HQC)	7.51736
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	124.03364	47.11869	2.63237	0.03380	12.61564	235.45164
VAR X1	0.68233	6.42648	0.10617	0.91842	-14.51389	15.87854
VAR X2	-5.33325	6.05009	-0.88151	0.40729	-19.63944	8.97295
VAR X3	-14.79477	12.09981	-1.22273	0.26100	-43.40627	13.81673
VAR X4	-3.88013	8.19348	-0.47356	0.65023	-23.25463	15.49437
VAR X5	-5.32504	5.18321	-1.02736	0.33844	-17.58139	6.93131
VAR X6	-18.70452	5.38859	-3.47113	**0.01039**	-31.44652	-5.96252
VAR X7	5.37888	4.56624	1.17797	0.27730	-5.41856	16.17632
VAR X8	11.61093	6.83245	1.69938	0.13305	-4.54524	27.76711
VAR X9	5.63244	4.01871	1.40155	0.20380	-3.87030	15.13517
VAR X10	7.98640	6.32898	1.26188	0.24741	-6.97925	22.95205
VAR X11	-6.74464	2.74341	-2.45849	**0.04356**	-13.23178	-0.25751

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	2731.76	248.34	2.49579	0.11717
Residual	7	696.53	99.50		
Total	18	3428.29			

Hypothesis Test
  Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
  Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
  Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting

Period	Actual (Y)	Forecast (F)	Error (E)
1	72.5000	62.4626	10.0374
2	42.5000	34.8846	7.6154
3	47.5000	53.0272	-5.5272
4	55.0000	59.0813	-4.0813
5	42.5000	38.3684	4.1316
6	45.0000	40.0761	4.9239
7	60.0000	61.3668	-1.3668
8	20.0000	21.1984	-1.1984
9	50.0000	43.1607	6.8393
10	37.5000	35.4381	2.0619
11	30.0000	33.4265	-3.4265
12	47.5000	47.9480	-0.4480
13	40.0000	32.9212	7.0788
14	52.5000	55.3537	-2.8537
15	47.5000	50.9017	-3.4017
16	35.0000	31.9282	3.0718
17	32.5000	32.1283	0.3717
18	27.5000	42.5523	-15.0523
19	15.0000	23.7761	-8.7761

Model Inputs:
VAR298
VAR137; VAR138; VAR139; VAR140; VAR141; VAR142; VAR143; VAR144; VAR145; VAR146; VAR147
SUSC
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.51129	Maximum Log Likelihood	-70.07211
R-Square	0.26142	Akaike Info Criterion (AIC)	8.63917
Adjusted R-Square	0.00000	Bayes Schwarz Criterion (BSC)	9.23566
Standard Error	19.01909	Hannan-Quinn Criterion (HQC)	8.74012
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	26.52106	58.26404	0.45519	0.66276	-111.25150	164.29363
VAR X1	16.65121	39.99706	0.41631	0.68965	-77.92681	111.22924
VAR X2	-7.85126	50.67046	-0.15495	0.88124	-127.66786	111.96533
VAR X3	-7.97742	35.82501	-0.22268	0.83014	-92.69009	76.73526
VAR X4	45.76043	45.08675	1.01494	0.34392	-60.85280	152.37365
VAR X5	-11.55287	25.66697	-0.45011	0.66624	-72.24561	49.13987
VAR X6	28.46720	31.84911	0.89381	0.40111	-46.84398	103.77839
VAR X7	-8.99679	26.39438	-0.34086	0.74321	-71.40959	53.41600
VAR X8	3.76567	24.20346	0.15558	0.88075	-53.46641	60.99774
VAR X9	-2.33263	24.59708	-0.09483	0.92710	-60.49548	55.83022
VAR X10	-51.01494	36.73991	-1.38854	0.20755	-137.89102	35.86114
VAR X11	5.56403	11.63606	0.47817	0.64710	-21.95089	33.07895

ANOVA

	DF	SS	MS	F	p-Value
Regression	11	896.21	81.47	0.22524	0.98587
Residual	7	2532.08	361.73		
Total	18	3428.29			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.538166
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.603037
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.683924

Forecasting Period	Actual (Y)	Forecast (F)	Error (E)
1	72.5000	42.2323	30.2677
2	42.5000	47.5127	-5.0127
3	47.5000	36.5990	10.9010
4	55.0000	56.7009	-1.7009
5	42.5000	45.6727	-3.1727
6	45.0000	40.0054	4.9946
7	60.0000	53.7970	6.2030
8	20.0000	33.7852	-13.7852
9	50.0000	46.3644	3.6356
10	37.5000	39.1774	-1.6774
11	30.0000	35.5826	-5.5826
12	47.5000	44.9202	2.5798
13	40.0000	33.3397	6.6603
14	52.5000	51.2475	1.2525
15	47.5000	32.8192	14.6808
16	35.0000	35.3969	-0.3969
17	32.5000	45.8326	-13.3326
18	27.5000	40.9769	-13.4769
19	15.0000	38.0374	-23.0374

Model Inputs:
VAR298
VAR42; VAR47
SUSC
PEOU2, IU3

Regression Results

OVERALL FIT

Multiple R	0.38595	Maximum Log Likelihood	-71.34765
R-Square	0.14896	Akaike Info Criterion (AIC)	7.82607
Adjusted R-Square	0.04258	Bayes Schwarz Criterion (BSC)	7.97519
Standard Error	13.50374	Hannan-Quinn Criterion (HQC)	7.85131
Observations	19		

	Coeff	Std. Error	T-stat	P-value	Lower 5%	Upper 95%
Intercept	72.03358	18.16593	3.96531	0.00111	33.52353	110.54363
VAR X1	-5.58635	3.52730	-1.58375	0.13282	-13.06390	1.89119
VAR X2	-3.89392	3.03878	-1.28141	0.21831	-10.33585	2.54801

ANOVA

	DF	SS	MS	F	p-Value
Regression	2	510.67	255.34	1.40024	0.27517
Residual	16	2917.62	182.35		
Total	18	3428.29			

Hypothesis Test
Critical F-statistic (99% confidence with DFR1 and DFR2) : 6.226235
Critical F-statistic (95% confidence with DFR1 and DFR2) : 3.633723
Critical F-statistic (90% confidence with DFR1 and DFR2) : 2.668171

18. Principal Component Analysis and Factor Analysis

```
Model Inputs: VAR1; VAR2; VAR3; VAR4; VAR5; VAR6; VAR7; VAR8; VAR9; VAR10; VAR11
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

* indicates negative values
Standard Deviations:
8.0854    4.9232    4.8809    4.8809    11.7982   17.1356   12.4438   13.5315   16.8051   9.7336    36.8346

Reduced Data Matrix:

0.1045    0.0858    0.0742    0.0742    0.0102    0.0528    0.0679    0.2365    0.0970    0.1017    *0.1180
*0.7467   *0.3801   *0.8658   *0.8658   *0.4759   *0.0810   *0.3008   *0.2722   *0.7221   *0.8411   *0.0557
0.1045    0.0858    0.0742    0.0742    *0.2814   0.0528    0.0679    *0.1026   0.0970    0.1017    *0.1180
0.1045    0.0858    0.0742    0.0742    0.1075    0.1867    *0.1164   0.0669    *0.0395   0.0546    *0.1180
0.1045    0.0858    0.0742    0.0742    *0.2814   0.0528    *0.6695   *0.6112   0.0970    0.1017    *0.1180
0.1045    0.0858    0.0742    0.0742    0.1075    0.0528    0.0679    *0.0178   0.0970    0.1017    *0.1180
0.1045    0.0858    0.0742    0.0742    0.1075    0.3206    0.1601    0.1517    0.0287    *0.0161   *0.1180
0.1045    0.0858    0.0742    0.0742    *0.0870   *0.6166   0.2523    *0.1026   0.0970    *0.1340   *0.1180
0.1045    0.0858    0.0742    0.0742    *0.2814   *0.0810   0.0679    0.2365    0.0970    0.1017    *0.1180
0.1045    0.0858    0.0742    0.0742    0.1075    0.0528    *0.0243   0.0669    0.0970    0.1017    *0.1180
0.1045    0.0858    0.0742    0.0742    0.1075    0.3206    0.2523    0.2365    0.0970    0.1017    0.5048
*0.1792   *0.1472   *0.3958   *0.3958   0.3019    0.1867    *0.0243   *0.0178   0.0970    *0.0161   *0.1180
0.1045    0.0858    0.0742    0.0742    0.3019    *0.0141   *0.2086   *0.1874   0.0970    0.1017    0.5048
0.1045    0.0858    0.0742    0.0742    *0.0870   *0.0141   0.0679    *0.1026   0.0970    0.1017    *0.1180
0.1045    0.0858    0.0742    0.0742    0.3019    *0.3488   0.0679    0.1517    0.0970    0.1017    0.5048
0.1045    0.0858    0.0742    0.0742    0.3019    0.0528    0.2523    0.2365    0.0970    0.1017    *0.1180
*0.4629   *0.8461   0.0742    0.0742    *0.0870   *0.0810   0.2523    0.2365    *0.5856   0.1017    *0.1180
*0.1792   0.0858    0.0742    0.0742    *0.2814   *0.3488   *0.3008   *0.3569   *0.0395   *0.3697   0.1934
0.1045    0.0858    0.0742    0.0742    0.1075    0.2537    0.0679    0.1517    0.0970    0.1017    *0.1180
```

Correlation Matrix:

1.0000	0.8211	0.7862	0.7862	0.4486	0.1609	0.2051	0.2038	0.9307	0.7677	0.0930
0.8211	1.0000	0.4265	0.4265	0.2325	0.0698	*0.0893	*0.0894	0.8596	0.3009	0.1634
0.7862	0.4265	1.0000	1.0000	0.3055	*0.0116	0.2942	0.2642	0.6332	0.7982	0.1079
0.7862	0.4265	1.0000	1.0000	0.3055	*0.0116	0.2942	0.2642	0.6332	0.7982	0.1079
0.4486	0.2325	0.3055	0.3055	1.0000	0.2826	0.3991	0.4897	0.4656	0.5485	0.3257
0.1609	0.0698	*0.0116	*0.0116	0.2826	1.0000	0.0367	0.2846	0.1219	0.3175	*0.1400
0.2051	*0.0893	0.2942	0.2942	0.3991	0.0367	1.0000	0.8435	0.1202	0.3554	*0.0429
0.2038	*0.0894	0.2642	0.2642	0.4897	0.2846	0.8435	1.0000	0.0908	0.4301	*0.0031
0.9307	0.8596	0.6332	0.6332	0.4656	0.1219	0.1202	0.0908	1.0000	0.6636	0.1240
0.7677	0.3009	0.7982	0.7982	0.5485	0.3175	0.3554	0.4301	0.6636	1.0000	0.0226
0.0930	0.1634	0.1079	0.1079	0.3257	*0.1400	*0.0429	*0.0031	0.1240	0.0226	1.0000

Covariance Matrix:

65.3740	32.6870	31.0249	31.0249	42.7978	22.2992	20.6371	22.2992	126.4543	60.4155	27.7008
32.6870	24.2382	10.2493	10.2493	13.5042	5.8864	*5.4709	*5.9557	71.1219	14.4183	29.6399
31.0249	10.2493	23.8227	23.8227	17.5900	*0.9695	17.8670	17.4515	51.9391	37.9224	19.3906
31.0249	10.2493	23.8227	23.8227	17.5900	*0.9695	17.8670	17.4515	51.9391	37.9224	19.3906
42.7978	13.5042	17.5900	17.5900	139.1967	57.1330	58.5873	78.1856	92.3130	62.9917	141.5512
22.2992	5.8864	*0.9695	*0.9695	57.1330	293.6288	7.8255	65.9972	35.1108	52.9640	*88.3657
20.6371	*5.4709	17.8670	17.8670	58.5873	7.8255	154.8476	142.0360	25.1385	43.0471	*19.6676
22.2992	*5.9557	17.4515	17.4515	78.1856	65.9972	142.0360	183.1025	20.6371	56.6482	*1.5235
126.4543	71.1219	51.9391	51.9391	92.3130	35.1108	25.1385	20.6371	282.4100	108.5457	76.7313
60.4155	14.4183	37.9224	37.9224	62.9917	52.9640	43.0471	56.6482	108.5457	94.7424	8.0886
27.7008	29.6399	19.3906	19.3906	141.5512	*88.3657	*19.6676	*1.5235	76.7313	8.0886	1356.7867

Eigenvalues:

5.0961	2.0709	1.1685	1.1918	0.7425	0.4145	0.1522	0.1187	0.0398	0.0049	*0.0000

Proportions:

46.33%	18.83%	10.62%	10.83%	6.75%	3.77%	1.38%	1.08%	0.36%	0.04%	*0.00%

Cum Proportions:

46.33%	65.15%	75.78%	86.61%	93.36%	97.13%	98.51%	99.59%	99.96%	100.00%	100.00%

Eigenvectors:

0.4170	0.1831	0.0781	*0.0559	0.1468	*0.0400	0.0719	0.0541	*0.5894	0.6362	*0.0000
0.2838	0.3933	*0.0214	*0.2405	0.4625	*0.2607	*0.2374	0.1064	*0.1635	*0.5745	0.0000
0.3849	0.0590	0.0588	0.3617	*0.2746	*0.1070	*0.3192	*0.0768	0.1382	*0.0174	0.7071
0.3849	0.0590	0.0588	0.3617	*0.2746	*0.1070	*0.3192	*0.0768	0.1382	*0.0174	*0.7071
0.2667	*0.2458	*0.3416	*0.3746	*0.0331	0.6638	*0.4049	*0.0606	*0.0363	*0.0284	0.0000
0.0913	*0.2025	0.3854	*0.6702	*0.3534	*0.3863	*0.0968	*0.2534	0.0617	0.0391	0.0000
0.1799	*0.5343	*0.0816	0.2102	0.4074	*0.1510	0.1484	*0.6285	*0.1162	*0.1101	0.0000
0.1888	*0.5804	*0.0431	*0.0023	0.2027	*0.2709	*0.0697	0.6848	0.1700	0.0918	*0.0000
0.3810	0.2461	0.0148	*0.1663	0.2718	0.1229	0.3580	*0.0952	0.7000	0.2241	*0.0000
0.3894	*0.1123	0.1543	0.0230	*0.3442	0.2321	0.6061	0.1767	*0.2236	*0.4365	0.0000
0.0708	0.0887	*0.8299	*0.1241	*0.2972	*0.3905	0.1975	*0.0439	*0.0146	0.0310	*0.0000

Eigenvalues (Arranged and Ranked):

5.0961	2.0709	1.1918	1.1685	0.7425	0.4145	0.1522	0.1187	0.0398	0.0049	*0.0000

Proportions Ranked:

46.33%	18.83%	10.83%	10.62%	6.75%	3.77%	1.38%	1.08%	0.36%	0.04%	*0.00%

Cum Proportions Ranked:

46.33%	65.15%	75.99%	86.61%	93.36%	97.13%	98.51%	99.59%	99.96%	100.00%	100.00%

Eigenvectors (Arranged and Ranked):

0.4170	0.1831	*0.0559	0.0781	0.1468	*0.0400	0.0719	0.0541	*0.5894	0.6362	*0.0000
0.2838	0.3933	*0.2405	*0.0214	0.4625	*0.2607	*0.2374	0.1064	*0.1635	*0.5745	0.0000
0.3849	0.0590	0.3617	0.0588	*0.2746	*0.1070	*0.3192	*0.0768	0.1382	*0.0174	0.7071
0.3849	0.0590	0.3617	0.0588	*0.2746	*0.1070	*0.3192	*0.0768	0.1382	*0.0174	*0.7071
0.2667	*0.2458	*0.3746	*0.3416	*0.0331	0.6638	*0.4049	*0.0606	*0.0363	*0.0284	0.0000
0.0913	*0.2025	*0.6702	0.3854	*0.3534	*0.3863	*0.0968	*0.2534	0.0617	0.0391	0.0000
0.1799	*0.5343	0.2102	*0.0816	0.4074	*0.1510	0.1484	*0.6285	*0.1162	*0.1101	0.0000
0.1888	*0.5804	*0.0023	*0.0431	0.2027	*0.2709	*0.0697	0.6848	0.1700	0.0918	*0.0000
0.3810	0.2461	*0.1663	0.0148	0.2718	0.1229	0.3580	*0.0952	0.7000	0.2241	*0.0000
0.3894	*0.1123	0.0230	0.1543	*0.3442	0.2321	0.6061	0.1767	*0.2236	*0.4365	0.0000
0.0708	0.0887	*0.1241	*0.8299	*0.2972	*0.3905	0.1975	*0.0439	*0.0146	0.0310	*0.0000

Revised Data:

0.2577	*0.1231	0.1313	0.0025	0.0973	*0.0487	*0.0028	0.1225	0.0269	0.0043	*0.0000
*1.9322	*0.0245	*0.0786	*0.2156	0.1666	*0.1134	*0.0152	0.0267	*0.0528	*0.0045	0.0000
0.1159	0.1454	0.2455	0.1126	0.0382	*0.1505	0.1389	*0.0920	*0.0201	*0.0185	0.0000
0.1603	*0.0055	0.1627	*0.1404	*0.0836	0.0101	*0.1481	0.0872	*0.0608	0.0015	*0.0000
*0.1127	0.8346	0.3275	*0.0413	*0.3653	0.0986	0.0649	0.0232	*0.0209	0.0160	*0.0000
0.2356	0.0006	0.1090	*0.0333	0.0425	0.0847	*0.0245	*0.0575	*0.0198	*0.0218	0.0000

0.2368	*0.2048	0.1782	*0.1851	0.0418	*0.1143	*0.1444	*0.0815	*0.0066	0.0302	*0.0000
0.0481	0.1611	*0.1303	0.5217	0.4246	0.1546	0.0095	*0.0917	*0.0372	0.0324	*0.0000
0.1677	*0.0243	0.1793	0.2015	0.1543	*0.1906	0.1282	0.1741	0.0293	0.0073	*0.0000
0.2350	0.0006	0.1129	*0.0529	0.0222	0.0756	*0.0441	0.0585	0.0053	*0.0039	*0.0000
0.3853	*0.2445	*0.3307	*0.2519	*0.1105	*0.3587	0.0822	*0.0944	0.0094	0.0110	0.0000
*0.3091	*0.2108	0.0111	*0.4861	0.1006	0.3213	0.1337	*0.0341	0.0938	0.0091	0.0000
0.2437	0.2678	*0.4703	*0.1963	*0.2724	0.0840	*0.0030	*0.0220	*0.0368	0.0042	*0.0000
0.1617	0.1111	0.1533	0.0846	0.0554	0.0044	0.0667	*0.0868	*0.0313	*0.0267	0.0000
0.3269	*0.0090	*0.6364	0.0853	0.0273	0.0797	0.0468	0.1213	*0.0319	*0.0082	*0.0000
0.3686	*0.2933	0.0166	*0.0680	0.1627	0.1170	*0.0936	*0.0110	*0.0051	*0.0243	0.0000
*0.5085	*0.8091	0.0633	0.5369	*0.4770	0.0924	0.0129	*0.0184	0.0099	0.0030	*0.0000
*0.3669	0.5663	*0.2236	0.2939	*0.0307	*0.1073	*0.1527	*0.0319	0.1272	*0.0127	*0.0000
0.2860	*0.1385	0.1791	*0.1683	0.0059	*0.0388	*0.0557	0.0077	0.0214	0.0016	*0.0000

Model Inputs: VAR12; VAR13; VAR14; VAR15; VAR16; VAR17; VAR18; VAR19; VAR20; VAR21; VAR22
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

* indicates negative values

Standard Deviations:

22.2645	25.7626	22.5703	25.7948	20.0967	22.9114	21.6174	23.3040	28.8755	25.8163	34.2045

Reduced Data Matrix:

*0.2820	*0.3398	*0.2434	*0.1451	0.2313	0.2477	0.1480	0.2228	0.0293	0.0514	*0.1606
*0.4881	*0.5179	*0.4467	*0.5009	*0.4536	*0.6535	*0.7010	*0.5648	*0.5269	*0.5706	*0.1271
*0.4881	*0.3398	*0.5483	*0.5898	0.0030	0.1476	0.0419	0.1244	*0.5269	*0.5706	0.1747
*0.2820	*0.2507	*0.2434	*0.2340	*0.2253	0.1476	*0.3826	*0.2694	*0.3680	*0.2151	*0.1606
*0.1790	*0.2507	*0.1418	*0.1451	*0.2253	*0.1528	*0.1704	*0.1710	*0.2091	*0.1263	*0.1606
0.2332	0.1055	0.1632	0.1217	0.0030	0.0474	*0.0642	0.0259	0.0293	0.0514	*0.1606
0.0786	0.1500	0.1123	0.0772	0.0601	0.1976	0.1480	0.1244	0.1087	0.1403	*0.1606
0.2332	0.2836	0.2648	0.2106	*0.4536	*0.3531	0.2541	*0.4663	0.1882	*0.0374	*0.1606
0.0271	0.0164	0.0615	0.1217	0.2313	0.1476	0.1480	0.2228	0.1882	0.2292	0.3089
0.2332	0.1055	*0.0401	*0.0117	0.0030	*0.0527	0.0950	*0.0725	0.1087	0.0514	*0.0265
0.0271	0.1945	0.2648	0.2106	0.2313	0.2477	0.1480	0.2228	0.1882	0.2292	0.5101
0.0271	0.0164	0.0107	0.0328	0.1742	*0.0527	*0.0112	*0.0233	0.1087	0.0959	*0.1606
*0.0244	0.0609	0.0107	*0.0117	*0.3395	*0.0026	*0.0112	*0.0233	0.1882	0.0070	*0.1606
0.0271	*0.0726	*0.0401	*0.0562	0.0030	*0.0026	*0.1704	*0.0725	*0.0502	*0.0374	*0.1606
0.1302	0.0609	0.0615	0.1217	0.2313	*0.2530	0.2541	0.2228	0.0293	0.0514	0.1747
0.2332	0.2836	0.2648	0.2106	0.2313	0.0474	0.2541	0.2228	0.1882	0.2292	*0.1606
0.2332	0.2836	0.2648	0.2106	0.2313	0.2477	0.0419	0.2228	0.1882	0.2292	0.3760
0.1302	0.0164	0.0615	0.2106	*0.0541	*0.1528	*0.0642	*0.0725	0.0293	0.0070	0.3760
0.1302	0.1945	0.1632	0.1662	0.1172	0.1976	0.0419	0.1244	0.1087	0.1847	*0.1606

Correlation Matrix:

1.0000	0.9275	0.9162	0.9179	0.3308	0.1458	0.5990	0.2986	0.8486	0.8045	0.1208
0.9275	1.0000	0.9448	0.8966	0.3472	0.2884	0.6839	0.3798	0.8576	0.8010	0.2024
0.9162	0.9448	1.0000	0.9697	0.3446	0.2346	0.5929	0.3400	0.8864	0.8702	0.1980
0.9179	0.8966	0.9697	1.0000	0.4068	0.2399	0.6205	0.3844	0.9110	0.9085	0.2491
0.3308	0.3472	0.3446	0.4068	1.0000	0.6517	0.5761	0.9060	0.4427	0.6311	0.4226
0.1458	0.2884	0.2346	0.2399	0.6517	1.0000	0.4378	0.7579	0.3356	0.5053	0.2220
0.5990	0.6839	0.5929	0.6205	0.5761	0.4378	1.0000	0.6689	0.7271	0.6616	0.2453
0.2986	0.3798	0.3400	0.3844	0.9060	0.7579	0.6689	1.0000	0.4744	0.6133	0.4224
0.8486	0.8576	0.8864	0.9110	0.4427	0.3356	0.7271	0.4744	1.0000	0.9316	0.1613
0.8045	0.8010	0.8702	0.9085	0.6311	0.5053	0.6616	0.6133	0.9316	1.0000	0.2017
0.1208	0.2024	0.1980	0.2491	0.4226	0.2220	0.2453	0.4224	0.1613	0.2017	1.0000

Covariance Matrix:

495.7064	531.9945	460.3878	527.1468	147.9917	74.3767	288.2964	154.9169	545.5679	462.3961	91.9668
531.9945	663.7119	549.3767	595.8449	179.7784	170.2216	380.8864	228.0471	637.9501	532.7562	178.3241
460.3878	549.3767	509.4183	564.5429	156.3019	121.3296	289.2659	178.8089	577.7008	507.0637	152.8393
527.1468	595.8449	564.5429	665.3740	210.8726	141.7590	345.9834	231.0942	678.5319	604.9861	219.8061
147.9917	179.7784	156.3019	210.8726	403.8781	300.0693	250.2770	424.3075	256.9252	327.4238	290.5125
74.3767	170.2216	121.3296	141.7590	300.0693	524.9307	216.8283	404.6399	222.0222	298.8920	173.9612
288.2964	380.8864	289.2659	345.9834	250.2770	216.8283	467.3130	336.9806	453.8781	369.2521	181.3712
154.9169	228.0471	178.8089	231.0942	424.3075	404.6399	336.9806	543.0748	319.2521	368.9751	336.7036
545.5679	637.9501	577.7008	678.5319	256.9252	222.0222	453.8781	319.2521	833.7950	694.4598	159.2798
462.3961	532.7562	507.0637	604.9861	327.4238	298.8920	369.2521	368.9751	694.4598	666.4820	178.1163
91.9668	178.3241	152.8393	219.8061	290.5125	173.9612	181.3712	336.7036	159.2798	178.1163	1169.9446

Eigenvalues:

6.8627	2.0948	0.8565	0.4456	0.3382	0.1983	0.0082	0.0103	0.0471	0.0709	0.0675

Proportions:

62.39%	19.04%	7.79%	4.05%	3.07%	1.80%	0.07%	0.09%	0.43%	0.64%	0.61%

Cum Proportions:

62.39%	81.43%	89.22%	93.27%	96.34%	98.15%	98.22%	98.31%	98.74%	99.39%	100.00%

Eigenvectors:

0.3300	*0.2870	*0.0298	0.0066	*0.0967	*0.4597	0.2622	*0.0074	0.3556	0.6122	*0.1308
0.3437	*0.2177	*0.0417	0.0290	0.3039	*0.4485	*0.4378	0.2237	*0.4883	*0.1457	*0.1925
0.3448	*0.2542	*0.0701	*0.1815	0.0436	*0.0895	0.6217	*0.2025	*0.0745	*0.5635	0.1344
0.3520	*0.2178	*0.1042	*0.1530	*0.1070	0.1336	*0.5764	*0.2706	0.4823	*0.1831	0.3059
0.2493	0.4511	0.0192	0.0086	*0.5879	*0.2601	*0.0412	*0.1992	*0.3780	0.1005	0.3554
0.1931	0.4535	0.3431	*0.4459	0.5924	*0.0334	0.0339	*0.1329	0.0606	0.1852	0.1780
0.3042	0.1132	0.0974	0.8102	0.2806	0.1246	0.0943	0.0912	0.0900	0.0020	0.3304
0.2559	0.4823	0.0825	0.1187	*0.1480	*0.0988	*0.0221	0.0189	0.3466	*0.3359	*0.6446
0.3543	*0.1484	0.0829	0.0397	*0.0216	0.5629	*0.0000	*0.4277	*0.3493	0.2789	*0.3794
0.3631	*0.0188	0.1277	*0.2577	*0.2242	0.3702	0.0711	0.7635	*0.0041	0.0469	0.0870
0.1240	0.2848	*0.9078	*0.0732	0.1927	0.1170	0.0597	0.0621	*0.0153	0.1250	*0.0031

Eigenvalues (Arranged and Ranked):

6.8627	2.0948	0.8565	0.4456	0.3382	0.1983	0.0709	0.0675	0.0471	0.0103	0.0082

Proportions Ranked:

62.39%	19.04%	7.79%	4.05%	3.07%	1.80%	0.64%	0.61%	0.43%	0.09%	0.07%

Cum Proportions Ranked:

62.39%	81.43%	89.22%	93.27%	96.34%	98.15%	98.79%	99.40%	99.83%	99.93%	100.00%

Eigenvectors (Arranged and Ranked):

0.3300	*0.2870	*0.0298	0.0066	*0.0967	*0.4597	0.6122	*0.1308	0.3556	*0.0074	0.2622
0.3437	*0.2177	*0.0417	0.0290	0.3039	*0.4485	*0.1457	*0.1925	*0.4883	0.2237	*0.4378
0.3448	*0.2542	*0.0701	*0.1815	0.0436	*0.0895	*0.5635	0.1344	*0.0745	*0.2025	0.6217
0.3520	*0.2178	*0.1042	*0.1530	*0.1070	0.1336	*0.1831	0.3059	0.4823	*0.2706	*0.5764
0.2493	0.4511	0.0192	0.0086	*0.5879	*0.2601	0.1005	0.3554	*0.3780	*0.1992	*0.0412
0.1931	0.4535	0.3431	*0.4459	0.5924	*0.0334	0.1852	0.1780	0.0606	*0.1329	0.0339
0.3042	0.1132	0.0974	0.8102	0.2806	0.1246	0.0020	0.3304	0.0900	0.0912	0.0943
0.2559	0.4823	0.0825	0.1187	*0.1480	*0.0988	*0.3359	*0.6446	0.3466	0.0189	*0.0221
0.3543	*0.1484	0.0829	0.0397	*0.0216	0.5629	0.2789	*0.3794	*0.3493	*0.4277	*0.0000
0.3631	*0.0188	0.1277	*0.2577	*0.2242	0.3702	0.0469	0.0870	*0.0041	0.7635	0.0711
0.1240	0.2848	*0.9078	*0.0732	0.1927	0.1170	0.1250	*0.0031	*0.0153	0.0621	0.0597

Revised Data:

*0.1282	0.5382	0.3318	0.0922	*0.0949	0.2292	0.0091	*0.0298	0.0239	0.0257	0.0507
*1.6760	*0.3246	*0.2294	*0.0726	*0.1948	0.0153	0.0046	*0.0019	*0.0676	*0.0478	*0.0442
*0.9729	0.7536	*0.0815	0.2729	0.2351	*0.1531	*0.0042	*0.0152	*0.0128	0.0017	*0.0141
*0.7870	0.0533	0.1349	*0.2863	0.1431	*0.0403	*0.0213	0.0271	0.0256	0.0055	0.0957
*0.5663	*0.1115	0.0657	*0.0166	*0.0283	0.0642	0.0316	0.0427	0.0767	*0.0447	0.0237
0.2184	*0.1808	0.1316	*0.1141	*0.0350	*0.1490	0.0352	*0.0396	0.0749	0.0039	*0.0262
0.3430	0.0284	0.2419	*0.0003	0.0747	*0.0249	*0.0039	0.0176	*0.0068	*0.0332	*0.0037
0.1497	*0.8757	*0.0463	0.2624	0.2238	0.0509	0.0090	*0.0163	*0.0255	*0.0095	0.1013
0.4550	0.2977	*0.1661	*0.0208	*0.0439	0.1492	0.0072	0.0238	*0.0036	0.0351	0.0001
0.1500	*0.1486	0.0175	0.0985	*0.0056	*0.0553	0.0075	0.0380	*0.0299	0.1967	*0.0266
0.6619	0.2906	*0.3454	*0.1255	0.1077	0.0832	0.0198	*0.0024	*0.0598	*0.0780	0.0376
0.1071	*0.0427	0.1437	*0.0018	*0.1888	0.0189	*0.0246	*0.0200	*0.0974	0.0325	0.0362
*0.0328	*0.2471	0.1505	0.0053	0.1843	0.1604	*0.0154	*0.0038	0.0109	*0.0218	*0.1907
*0.1710	*0.0612	0.1243	*0.1121	*0.0823	*0.0594	0.0194	*0.0274	*0.0006	0.0481	*0.0048
0.3218	0.0776	*0.2122	0.2951	*0.2304	*0.0625	*0.0094	0.0198	0.0549	*0.0517	*0.0129
0.6710	*0.0577	0.1953	0.1029	*0.1033	*0.1101	*0.0020	0.0106	*0.0224	*0.0855	*0.0050
0.7116	0.1619	*0.2438	*0.1977	0.0592	*0.0804	0.0168	*0.0021	*0.0375	0.0182	*0.0412
0.1224	*0.1358	*0.4345	*0.0632	*0.0233	0.0368	*0.0407	*0.0267	0.0995	0.0500	0.0200
0.4222	*0.0155	0.2221	*0.1185	0.0027	*0.0728	*0.0388	0.0057	*0.0024	*0.0454	0.0041

Model Inputs:
VAR23; VAR24; VAR25; VAR26; VAR27; VAR28; VAR29; VAR30; VAR31; VAR32; VAR33
PU1, PU2, PU3, PU4, PEOU1, PEOU2, PEOU3, PEOU4, IU1, IU2, IU3

* indicates negative values

Standard Deviations:

24.4723	24.5090	27.1397	30.1083	19.3237	19.7526	22.6530	22.1366	32.2602	31.6408	32.2194

Reduced Data Matrix:

0.1505	0.3350	0.2491	0.2687	0.2312	0.3576	0.2532	0.2918	*0.0337	0.2049	0.3897
*0.2245	*0.1330	*0.1735	*0.1123	*0.4811	*0.4554	*0.3545	*0.3300	*0.2470	*0.0851	*0.0731
0.2442	0.2414	0.1646	0.1163	*0.1250	0.0092	0.1519	0.0845	0.1085	0.2049	*0.1443
0.0567	0.1478	0.1223	0.2687	0.2312	0.2415	0.1519	0.1882	0.2508	0.3354	*0.1443
0.1505	0.2414	0.2491	0.1925	0.1125	0.3576	0.1519	0.1882	0.3219	0.3499	0.4254
*0.3182	*0.3202	*0.3426	*0.3409	0.1125	0.1253	0.1519	0.0845	*0.3893	*0.3751	0.2117
0.1036	0.1010	0.1223	0.0782	0.1125	0.2415	0.1013	0.1364	0.2152	0.2412	*0.1443
0.3380	0.3350	0.3337	0.2687	*0.2437	0.0092	0.2532	*0.2264	0.3219	*0.2301	*0.1443
*0.0370	*0.3202	*0.0890	*0.1123	0.1125	0.1253	0.0506	0.0845	*0.0337	*0.1576	*0.1443
*0.0370	*0.0394	*0.0044	*0.0361	*0.0062	0.0092	0.1519	0.1364	*0.0337	*0.0851	*0.1443
*0.4120	*0.4138	*0.4271	*0.4171	*0.0062	*0.4554	*0.2532	*0.2264	*0.3181	*0.3026	*0.1443
0.1036	0.1478	0.1223	0.0401	0.2312	0.0672	*0.1519	*0.0191	0.1441	0.0599	*0.1443
0.3380	0.1010	0.1223	0.2687	*0.2437	*0.2231	*0.2532	*0.2264	0.3219	*0.0126	*0.1443
*0.0370	*0.0394	*0.2580	*0.2647	*0.2437	0.0092	*0.3545	*0.2264	*0.0337	*0.0851	*0.1443
0.2442	0.1478	0.0801	0.0782	0.3499	*0.2231	0.2532	0.2918	0.1441	0.1687	0.2117
*0.2245	*0.2266	*0.1735	*0.1123	0.3499	0.1253	0.2532	0.2918	*0.2115	*0.1939	*0.1443
0.1505	0.1478	0.3337	0.2687	*0.2437	*0.2231	*0.0506	0.0845	*0.0337	0.3499	0.5678
*0.3651	*0.2266	*0.3426	*0.4171	*0.2437	0.0092	*0.4557	*0.5373	*0.3893	*0.3026	*0.0019
*0.2245	*0.2266	*0.0890	*0.0361	*0.0062	*0.1070	*0.0506	*0.0709	*0.1048	*0.0851	*0.1443

Correlation Matrix:

1.0000	0.8871	0.8923	0.8729	0.0457	0.2324	0.4177	0.3339	0.8963	0.6440	0.1789
0.8871	1.0000	0.9027	0.8592	0.0453	0.3548	0.4100	0.3180	0.7919	0.7293	0.3185
0.8923	0.9027	1.0000	0.9583	0.0948	0.3321	0.5158	0.4342	0.8147	0.7556	0.3580
0.8729	0.8592	0.9583	1.0000	0.1133	0.2851	0.5035	0.4508	0.8276	0.7576	0.2836
0.0457	0.0453	0.0948	0.1133	1.0000	0.5389	0.6493	0.7913	0.1353	0.2232	0.1097
0.2324	0.3548	0.3321	0.2851	0.5389	1.0000	0.5440	0.5269	0.3177	0.3188	0.1699
0.4177	0.4100	0.5158	0.5035	0.6493	0.5440	1.0000	0.8449	0.3763	0.3246	0.2398
0.3339	0.3180	0.4342	0.4508	0.7913	0.5269	0.8449	1.0000	0.3028	0.5428	0.3572
0.8963	0.7919	0.8147	0.8276	0.1353	0.3177	0.3763	0.3028	1.0000	0.6491	*0.0189
0.6440	0.7293	0.7556	0.7576	0.2232	0.3188	0.3246	0.5428	0.6491	1.0000	0.4353
0.1789	0.3185	0.3580	0.2836	0.1097	0.1699	0.2398	0.3572	*0.0189	0.4353	1.0000

Covariance Matrix:

598.8920	532.0637	592.6593	643.1440	21.6066	112.3269	231.5789	180.8864	707.6177	498.6704	141.0665
532.0637	600.6925	600.4155	634.0028	21.4681	171.7452	227.6316	172.5069	626.1080	565.5817	251.5235
592.6593	600.4155	736.5651	783.0332	49.7230	178.0471	317.1053	260.8726	713.2964	648.8227	313.0194
643.1440	634.0028	783.0332	906.5097	65.9280	169.5291	343.4211	300.4848	803.8781	721.7729	275.0693
21.6066	21.4681	49.7230	65.9280	373.4072	205.6787	284.2105	338.5042	84.3490	136.4543	68.2825
112.3269	171.7452	178.0471	169.5291	205.6787	390.1662	243.4211	230.4017	202.4238	199.2659	108.1025
231.5789	227.6316	317.1053	343.4211	284.2105	243.4211	513.1579	423.6842	275.0000	232.6316	175.0000
180.8864	172.5069	260.8726	300.4848	338.5042	230.4017	423.6842	490.0277	216.2742	380.2216	254.7784
707.6177	626.1080	713.2964	803.8781	84.3490	202.4238	275.0000	216.2742	1040.7202	662.5623	*19.6676
498.6704	565.5817	648.8227	721.7729	136.4543	199.2659	232.6316	380.2216	662.5623	1001.1413	443.7535
141.0665	251.5235	313.0194	275.0693	68.2825	108.1025	175.0000	254.7784	*19.6676	443.7535	1038.0886

Eigenvalues:

6.0552	2.2509	1.0725	0.5861	0.4586	0.2184	0.1292	0.1157	0.0666	0.0320	0.0148

Proportions:

55.05%	20.46%	9.75%	5.33%	4.17%	1.99%	1.17%	1.05%	0.61%	0.29%	0.13%

Cum Proportions:

55.05%	75.51%	85.26%	90.59%	94.76%	96.74%	97.92%	98.97%	99.57%	99.87%	100.00%

Eigenvectors:

0.3537	*0.2475	*0.1379	*0.0953	0.1383	*0.3637	*0.0508	*0.4055	0.5314	*0.0935	*0.4195
0.3592	*0.2186	0.0260	0.1763	0.1098	*0.1431	*0.7667	0.1402	*0.1323	0.2344	0.2811
0.3801	*0.1765	0.0478	*0.0253	0.1609	0.1317	0.1421	0.3583	0.0835	*0.7444	0.2617
0.3743	*0.1759	*0.0093	*0.1330	0.0602	0.2436	0.3328	0.5074	0.1865	0.5655	*0.1594
0.1486	0.5550	*0.1601	*0.1403	*0.3112	*0.5516	*0.0661	0.4361	*0.0091	*0.0821	*0.1487
0.2083	0.3401	*0.1595	0.8661	0.0648	0.1364	0.1293	*0.0576	0.1391	0.0177	*0.0539
0.2747	0.3787	*0.1174	*0.2590	0.5399	0.2486	*0.0982	*0.1491	*0.4488	*0.0459	*0.3340
0.2696	0.4502	0.0628	*0.3061	*0.1200	0.2260	*0.0151	*0.3244	0.3799	0.1335	0.5421
0.3373	*0.2137	*0.3429	0.0131	*0.1609	*0.3026	0.4224	*0.2833	*0.4906	0.1091	0.3066
0.3325	*0.0666	0.2475	0.0109	*0.6880	0.3540	*0.1429	*0.1491	*0.1962	*0.1311	*0.3558
0.1527	0.0946	0.8545	0.1036	0.1821	*0.3434	0.2210	*0.0805	*0.1182	0.0792	0.0098

Eigenvalues (Arranged and Ranked):

6.0552	2.2509	1.0725	0.5861	0.4586	0.2184	0.1292	0.1157	0.0666	0.0320	0.0148

Proportions Ranked:

55.05%	20.46%	9.75%	5.33%	4.17%	1.99%	1.17%	1.05%	0.61%	0.29%	0.13%

Cum Proportions Ranked:

55.05%	75.51%	85.26%	90.59%	94.76%	96.74%	97.92%	98.97%	99.57%	99.87%	100.00%

Eigenvectors (Arranged and Ranked):

0.3537	*0.2475	*0.1379	*0.0953	0.1383	*0.3637	*0.0508	*0.4055	0.5314	*0.0935	*0.4195
0.3592	*0.2186	0.0260	0.1763	0.1098	*0.1431	*0.7667	0.1402	*0.1323	0.2344	0.2811
0.3801	*0.1765	0.0478	*0.0253	0.1609	0.1317	0.1421	0.3583	0.0835	*0.7444	0.2617
0.3743	*0.1759	*0.0093	*0.1330	0.0602	0.2436	0.3328	0.5074	0.1865	0.5655	*0.1594
0.1486	0.5550	*0.1601	*0.1403	*0.3112	*0.5516	*0.0661	0.4361	*0.0091	*0.0821	*0.1487
0.2083	0.3401	*0.1595	0.8661	0.0648	0.1364	0.1293	*0.0576	0.1391	0.0177	*0.0539
0.2747	0.3787	*0.1174	*0.2590	0.5399	0.2486	*0.0982	*0.1491	*0.4488	*0.0459	*0.3340
0.2696	0.4502	0.0628	*0.3061	*0.1200	0.2260	*0.0151	*0.3244	0.3799	0.1335	0.5421
0.3373	*0.2137	*0.3429	0.0131	*0.1609	*0.3026	0.4224	*0.2833	*0.4906	0.1091	0.3066
0.3325	*0.0666	0.2475	0.0109	*0.6880	0.3540	*0.1429	*0.1491	*0.1962	*0.1311	*0.3558
0.1527	0.0946	0.8545	0.1036	0.1821	*0.3434	0.2210	*0.0805	*0.1182	0.0792	0.0098

Revised Data:

0.7422	0.3059	0.2872	0.1672	0.1022	*0.0054	*0.0953	0.1070	0.0817	0.0459	*0.0061
*0.7107	*0.5182	0.1920	*0.1286	*0.0269	0.1608	*0.0442	0.0181	*0.0159	0.0375	0.0187
0.4098	*0.1839	*0.1244	*0.0514	0.0204	0.1429	*0.1575	*0.1020	0.0232	*0.0348	*0.0379
0.5715	0.1479	*0.2085	0.0536	*0.2343	0.1179	0.0149	0.0717	*0.0660	0.0656	*0.0331
0.7803	0.1066	0.2543	0.2454	*0.0685	*0.0621	0.1078	*0.0731	*0.1201	0.0041	0.0328
*0.6017	0.5980	0.1934	0.0682	0.2494	*0.0423	0.0281	*0.0706	0.0010	0.0377	*0.0040
0.4111	0.0855	*0.2038	0.1103	*0.1581	0.0797	*0.0030	*0.0538	*0.0304	*0.0438	*0.0064
0.4515	*0.4683	*0.3215	0.0153	0.4739	*0.0433	*0.0044	0.0494	*0.0786	*0.0174	0.0045
*0.2102	0.2809	*0.1958	0.0009	0.0165	0.0109	0.1763	*0.0672	0.0847	*0.0613	*0.0301
*0.0247	0.1427	*0.1383	*0.0871	0.0935	0.1126	*0.0299	*0.0467	0.0137	*0.0149	0.0512
*1.0692	0.0595	0.0296	*0.2485	*0.1002	*0.0828	*0.0145	0.0259	*0.0808	*0.0090	0.0073
0.1992	*0.0500	*0.1940	0.0663	*0.1853	*0.1663	*0.0588	0.1305	0.0560	*0.0604	0.0475
0.1720	*0.6651	*0.1873	*0.0883	*0.0238	*0.1183	0.1336	*0.0027	0.0870	0.0757	*0.0123
*0.4788	*0.2592	*0.0736	0.2252	*0.1170	*0.0534	*0.0711	*0.1640	0.0415	0.0389	0.0291
0.4900	0.2029	0.1147	*0.3812	*0.0547	*0.2315	*0.0860	*0.0599	*0.0343	0.0014	*0.0326
*0.2003	0.6640	*0.1683	*0.1145	0.0514	0.0618	*0.0066	0.0535	0.0456	0.0253	0.0205
0.4516	*0.3303	0.6657	*0.1421	*0.0011	0.0831	0.0681	0.0140	0.0452	*0.0508	0.0046
*1.0334	*0.1697	0.1463	0.3750	0.0097	*0.0692	*0.0466	0.0729	*0.0160	*0.0334	*0.0487
*0.3501	0.0506	*0.0677	*0.0857	*0.0471	0.1049	0.0891	0.0970	*0.0373	*0.0065	*0.0051

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