Naval Center for Cost Analysis (NCCA)

Department of Defense (DoD) Commercial-Off-the-Shelf (COTS) Pricing Analysis

ICEAA 2016

Atlanta, GA

7 June 2016

Heather Brown

Outline

- **Past Effort**
  - What is the DoD Enterprise Software Initiative (ESI)?
  - Consolidated Database Development
- **Present Effort**
  - Objective
  - DoD ESI Database
  - Normalization
  - Product Description Categories
  - Licensed Product Price Fluctuation
    - Data Selected
    - Across End User Agencies or Services
    - Across Resellers
  - Price of Maintenance and Support
  - ESI, GSA and Vendor Price Comparison
- **Future Effort**
  - Terms and Conditions

Past Effort

What is the DoD ESI?

- "The Department of Defense (DoD) Enterprise Software Initiative (ESI) is a joint Information Technology (IT) Strategic Sourcing Initiative of the DoD Chief Information Officer (CIO)."

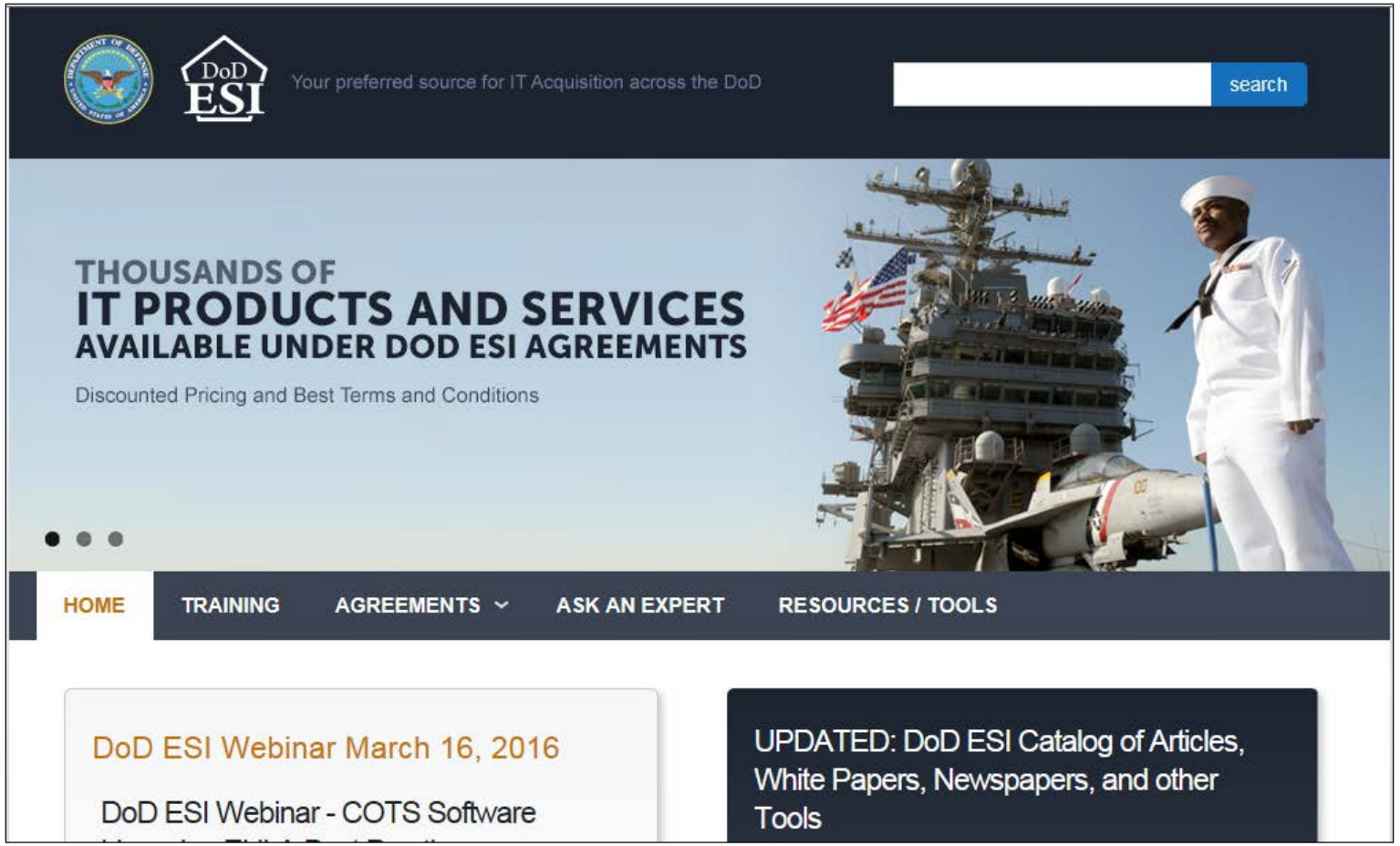
- "Now in its 17th year…ESI seeks to reduce the cost and risk of acquiring commercial software."

- "Smart purchasing practices and incorporating best practices have resulted in better contracting terms and conditions for DoD programs and users of ESI Enterprise Software Agreements (ESAs). These ESAs include negotiated discounts from list prices for software…"

Source: "DoD ESI Historical Purchase Prices Database: An Unprecedented Tool for Software Buyers and Cost Analysts"
Armed Forces Comptroller Volume 61, Number 1
8 January 2016

What is the DoD ESI?

- Visit http://www.esi.mil/



Data access restricted to government personnel.

Consolidated Database Development

- "In 2014, the Software Product Managers (SPMs) began the development and sustainment of a relational Structured Query Language (SQL) database…As SPMs continually improve the quantity and accuracy of this historical data set, the maintenance of individual Excel records continues to migrate to a structured, consolidated database."

- "At six-month intervals, this growing database and its contents are shared with the NCCA."

- "Given that one of NCCA's missions is to improve the accuracy, credibility, and completeness of independent cost estimates, ESI data is a rich resource for analyst use in comparing commercial software prices."

Source: "DoD ESI Historical Purchase Prices Database: An Unprecedented Tool for Software Buyers and Cost Analysts"
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8 January 2016

Past Effort Takeaways

- The initial evaluation of the database exposed the potential for developing and assessing **COTS price estimates**.

- The potential for developing **uncertainty distributions** for COTS price estimates was also exposed.

Present Effort

Objective

- DoD COTS Pricing Analysis
  - **Licensed Product Price Fluctuation**
    - Do the records within the DoD ESI database exhibit significant trends when evaluating a single licensed product?
  - **Price of Maintenance and Support**
    - Is there a relationship between the price of a licensed product and the price of its associated maintenance and support?
  - **ESI, GSA, and Vendor Price Comparison**
    - How do the prices of licensed products compare across providers?

The following analysis is based upon records found within the DoD ESI database.

DoD ESI Database

- The database is cumulative from 2002 through 2015 and does not reflect purchases of software outside of the DoD ESI. ESAs were awarded at various times during this 13-year period. Completeness and consistency in reporting vary within the database.

254,122 records*

- 17 End User Agencies or Services
  - Army, Navy, Marine Corps, Air Force, along with other DoD and federal entities
- 38 Vendors
  - the Original Equipment Manufacturer (OEM) that owns the Intellectual Property (IP)
- 47 Resellers
  - the Vendor's sales channel that was awarded an ESA/Component Enterprise License Agreement/Joint Enterprise License Agreement to sell the product under a Blanket Purchase Agreement (BPA)

*as of 19 May 2015

Normalization

- With the NCCA Joint Inflation Calculator (JIC), prices have been normalized to base year 2016 using the raw indices of Other Procurement, Navy (OPN).

- Because the prices have been negotiated for each of the years of the contract's period of performance, outlays have not been applied.

- In addition, the prices represent actual expenditures.

Source: *Mr. Thomas Tannery of NCCA*

Product Description Categories

- Each product description can be categorized as a
  - **Licensed Product**
    - a set of rights granted by a publisher to a buyer for use of the publisher's software
  - **Maintenance and Support**
    - a standard vendor offering that entitles a customer to ongoing development and delivery of software bug fixes and product upgrades
  - **Service**
    - expertise from a vendor that enables an organization to develop, manage, or optimize their system; a vendor may offer additional personnel for training, consulting, etc.

Source: *DoD ESI Commercial Software License Acquisition Training*

Data Selected for Price Fluctuation Analysis

- More specifically, we have
  - 19,215 Vendor A records
    - 186 of these Vendor A records refer to a particular product, Product A
      - 122 of these records fall under the category, Licensed Product
        - 113 records are usable
        - 9 records are unusable
          - 8 records are without a Unit Price on Order
          - 1 record is questionable
            - » Product A has two license types: License A and License B; 81 of these records are considered License A

Data Selected for Price Fluctuation Analysis

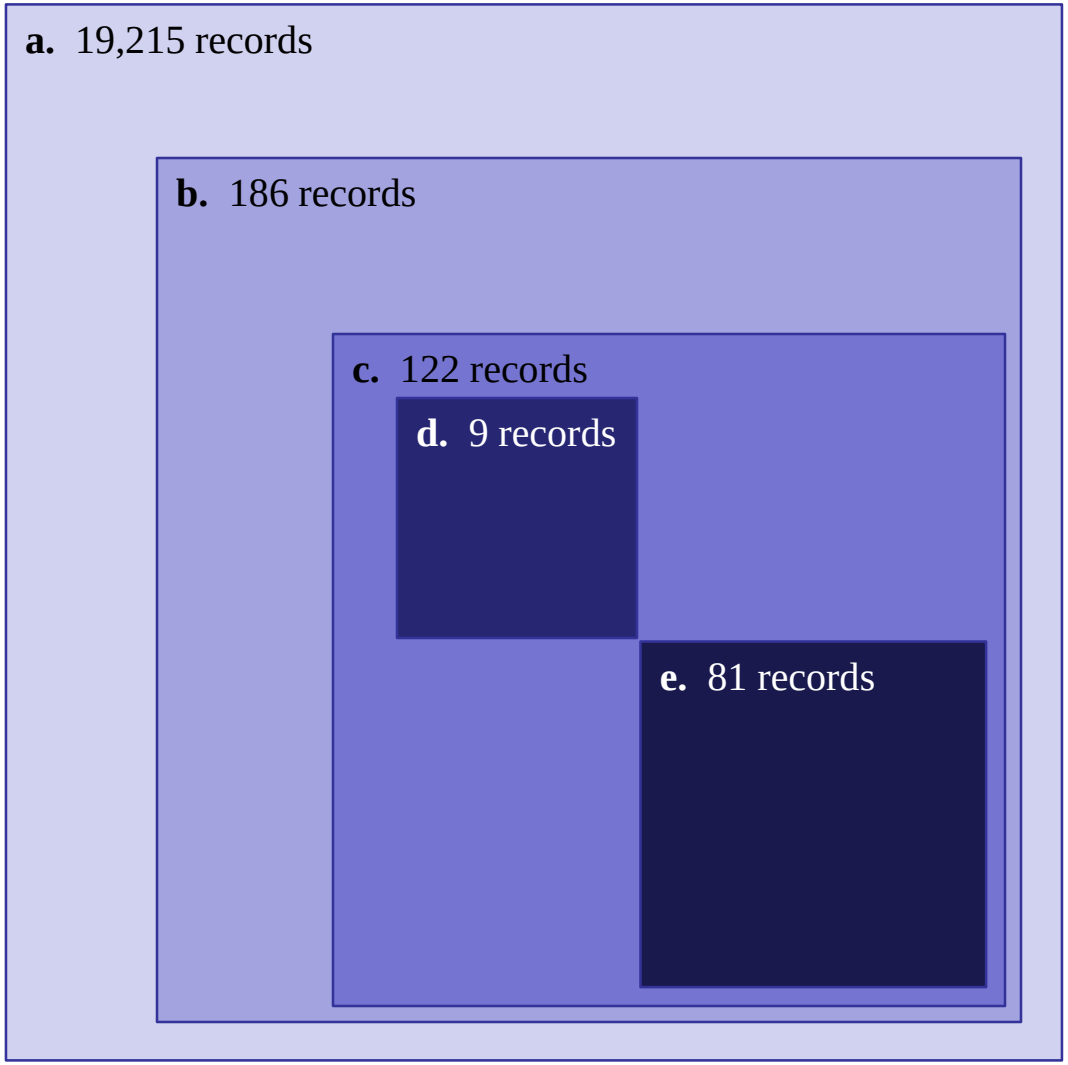
a. Vendor A

b. Vendor A, Product A

c. Vendor A, Product A, Licensed Product

d. Vendor A, Product A, Licensed Product, Unusable

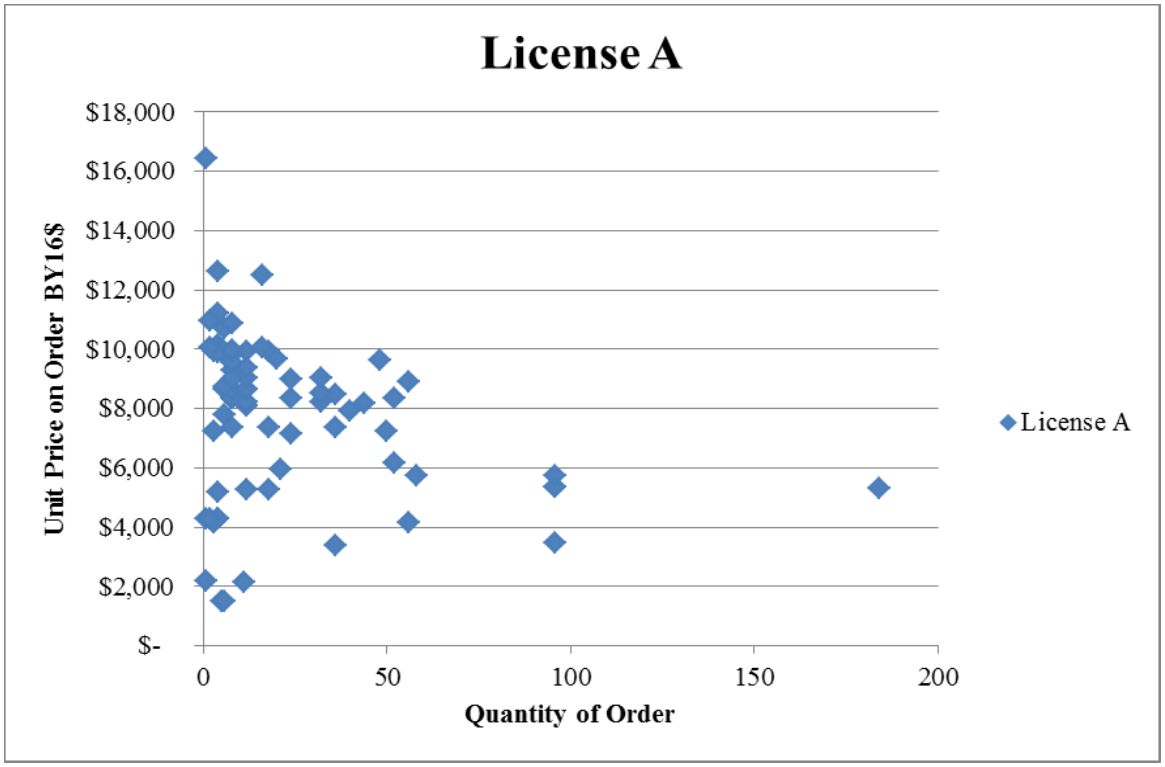
e. Vendor A, Product A, Licensed Product, Usable, License A



Licensed Product Price Fluctuation

Single Licensed Product

- 81 Vendor A, Product A, License A records



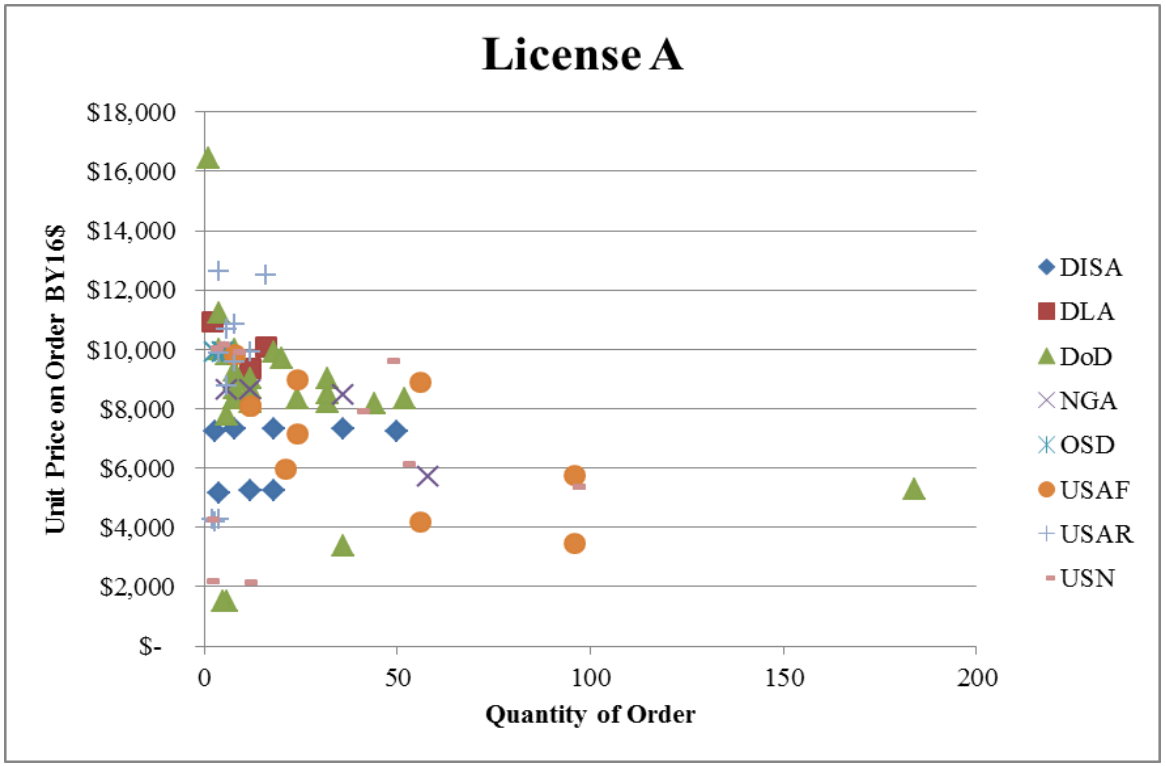
License A		
Mean	$	7,766
Standard Error	$	301
Median	$	8,329
Mode	$	8,329
Standard Deviation	$	2,706
Sample Variance	$	7,322,656
Kurtosis	$	1
Skewness	$	(0)
Range	$	14,928
Minimum	$	1,503
Maximum	$	16,432
Sum	$	629,044
Count		81

No significant trend exists. Could the fluctuation in prices be explained by identifying the licensed product by the End User Agency or Service?

Licensed Product Price Fluctuation

Identified by End User Agency or Service

- 81 Vendor A, Product A, License A records



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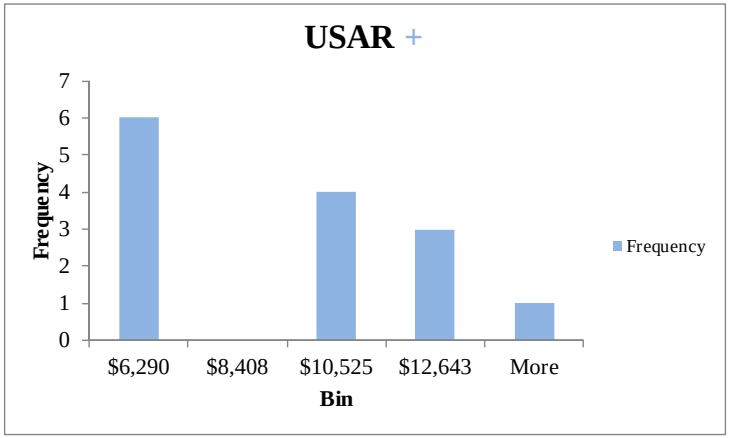
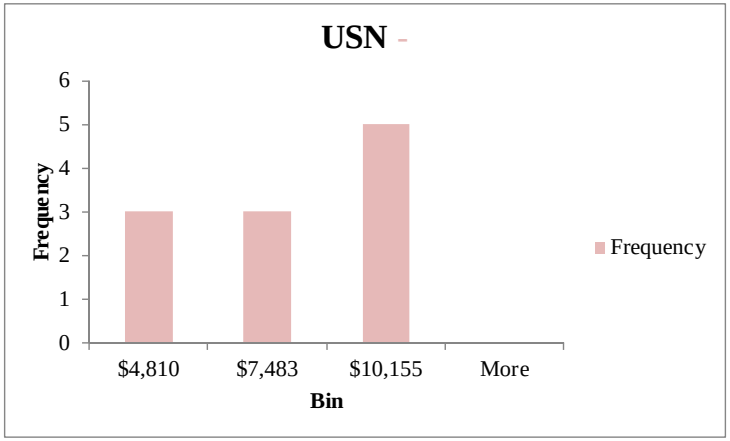
Licensed Product Price Fluctuation

USAR & USN



Bin		Frequency	
$	6,290	6	43%
$	8,408	0	0%
$	10,525	4	29%
$	12,643	3	21%
More		1	7%
		14	



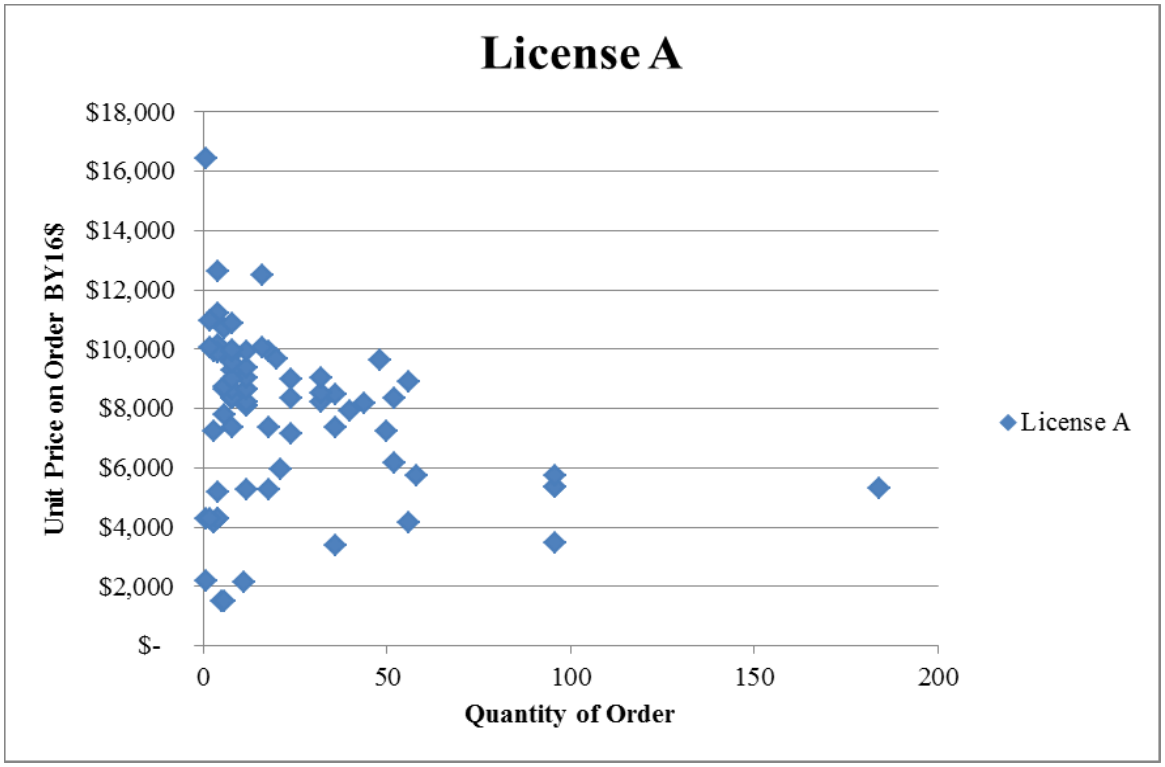
Bin		Frequency	
$	4,810	3	27%
$	7,483	3	27%
$	10,155	5	45%
More		0	0%
		11	

The price of a single licensed product fluctuates greatly within a single entity.

Licensed Product Price Fluctuation

Single Licensed Product

- 81 Vendor A, Product A, License A records



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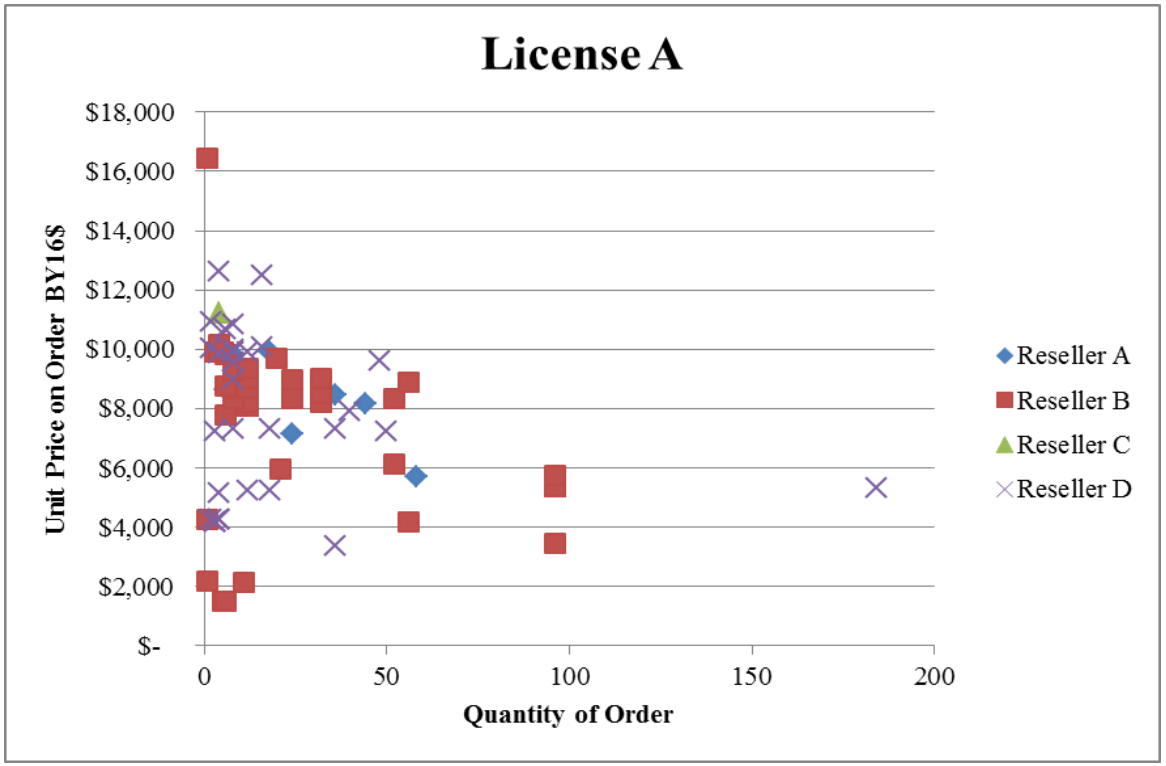
Range	$	14,928
Minimum	$	1,503
Maximum	$	16,432
Sum	$	629,044
Count		81

No significant trend exists. Could the fluctuation in prices be explained by identifying the licensed product by the Reseller?

Licensed Product Price Fluctuation

Identified by Reseller

- 81 Vendor A, Product A, License A records



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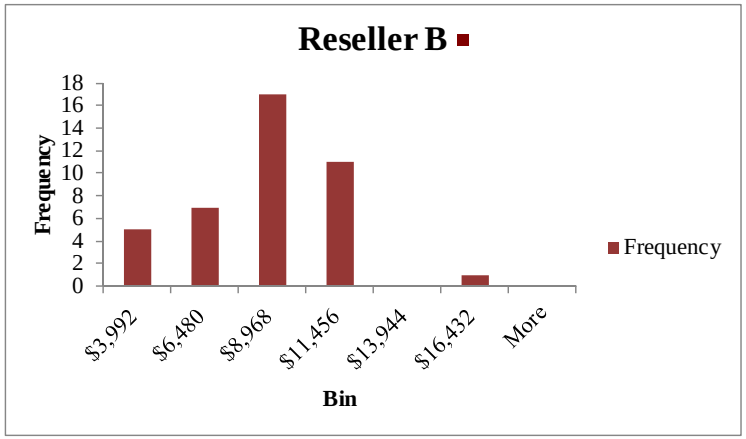
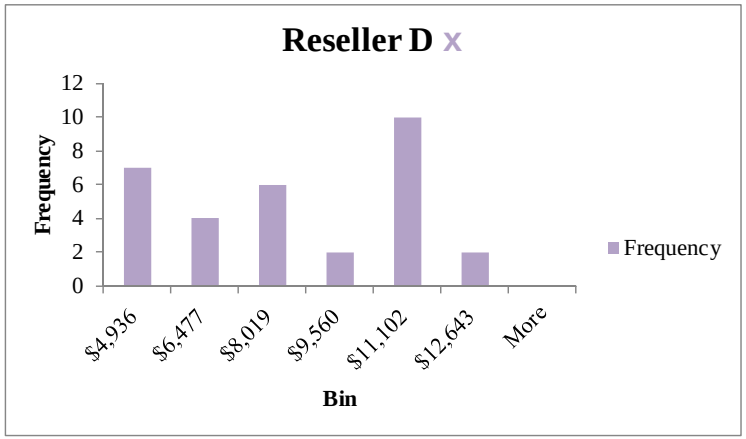
Sample Variance	$	7,322,656
Kurtosis	$	1
Skewness	$	(0)
Range	$	14,928
Minimum	$	1,503
Maximum	$	16,432
Sum	$	629,044
Count		81

Licensed Product Price Fluctuation

Reseller B & Reseller D



Bin	Frequency	
$ 3,992	5	12%
$ 6,480	7	17%
$ 8,968	17	41%
$ 11,456	11	27%
$ 13,944	0	0%
$ 16,432	1	2%
More	0	0%
	41	



Bin	Frequency	
$ 4,936	7	23%
$ 6,477	4	13%
$ 8,019	6	19%
$ 9,560	2	6%
$ 11,102	10	32%
$ 12,643	2	6%
More	0	0%
	31	

The price of a single licensed product fluctuates greatly within a single entity.

Price of Maintenance and Support

- Let's take a look at how the price of Maintenance and Support compares to the price of the Licensed Product

Vendor Name	Reseller Name	End User Agency or Service	Product Description	Category	Quantity of Order	Unit Price on Order BY16$	Total Price on Order BY16$	Price of M&S* / Price of LP**
Vendor A	Reseller D	USAR	Product A, License A	Licensed Product	16	$ 12,511	$ 200,171	18%
				Maintenance and Support	16	$ 2,252	$ 36,031	
Vendor A	Reseller D	USAR	Product A, License B	Licensed Product	50	$ 214	$ 10,678	18%
				Maintenance and Support	50	$ 38	$ 1,922	
Vendor A	Reseller C	USAR	Product A, License B	Licensed Product	100	$ 229	$ 22,863	22%
				Maintenance and Support	100	$ 51	$ 5,055	
Vendor A	Reseller D	USN	Product A, License A	Licensed Product	8	$ 9,919	$ 79,349	24%
				Maintenance and Support	8	$ 2,361	$ 18,890	

*Maintenance and Support

**Licensed Product

Price of Maintenance and Support

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Vendor A	Reseller D	USN	Product A, License A	Licensed Product	8	$ 9,919	$ 79,349	24%
				Maintenance and Support	8	$ 2,361	$ 18,890	
Vendor B	Reseller E	USN	Product B	Licensed Product	160	$ 814	$ 130,288	22%
				Maintenance and Support	160	$ 179	$ 28,663	
Vendor B	Reseller E	DLA	Product C	Licensed Product	138	$ 3,419	$ 471,867	22%
				Maintenance and Support	138	$ 752	$ 103,811	
Vendor C	Reseller F	USN	Product D	Licensed Product	10	$ 8,443	$ 84,433	20%
				Maintenance and Support	10	$ 1,688	$ 16,884	

Price of Maintenance and Support

- How does the General Services Administration's (GSA's) price of maintenance and support compare?

Vendor Name	Reseller Name	Product Description	Category	Quantity of Order	Unit Price on Order BY16$	Total Price on Order BY16$	Price of M&S / Price of LP
Vendor A	Reseller D	Product A, License B	Licensed Product	50	$ 269	$ 13,432	22%
			Maintenance and Support	50	$ 59	$ 2,955	

- How does the vendor's price of maintenance and support compare?

Vendor Name	Product Description	Category	Quantity of Order	Unit Price on Order BY16$	Total Price on Order BY16$	Price of M&S / Price of LP
Vendor A	Product A, License A	Licensed Product	1	$ 23,000	$ 23,000	22%
		Maintenance and Support	1	$ 5,060	$ 5,060	
Vendor A	Product A, License B	Licensed Product	25	$ 460	$ 11,500	22%
		Maintenance and Support	25	$ 101	$ 2,530	
Vendor A	Product A, License B	Licensed Product	50	$ 437	$ 21,850	22%
		Maintenance and Support	50	$ 96	$ 4,807	

An average of 21% of the price of a Licensed Product is equal to the price of its associated Maintenance and Support.

Price Comparison

Single Licensed Product, Multiple Providers

- What do we notice?

ESI's Price

Vendor Name	Reseller Name	End User Agency or Service	Product Description	Category	Quantity of Order	Unit Price on Order BY16$	Total Price on Order BY16$
Vendor A	Reseller D	USAR	Product A, License A	Licensed Product	16	$ 12,511	$ 200,171
				Maintenance and Support	16	$ 2,252	$ 36,031
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				Maintenance and Support	8	$ 2,361	$ 18,890

GSA's Price

Vendor Name	Reseller Name	Product Description	Category	Quantity of Order	Unit Price on Order BY16$	Total Price on Order BY16$
Vendor A	Reseller D	Product A, License B	Licensed Product	50	$ 269	$ 13,432
			Maintenance and Support	50	$ 59	$ 2,955

Vendor's Price

Vendor Name	Product Description	Category	Quantity of Order	Unit Price on Order BY16$	Total Price on Order BY16$
Vendor A	Product A, License A	Licensed Product	1	$ 23,000	$ 23,000
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	Vendor A	Reseller D	Product A, License B	Licensed Product	50	$ 269	$ 13,432
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	Vendor A	Product A, License B	Licensed Product	50	$ 437	$ 21,850
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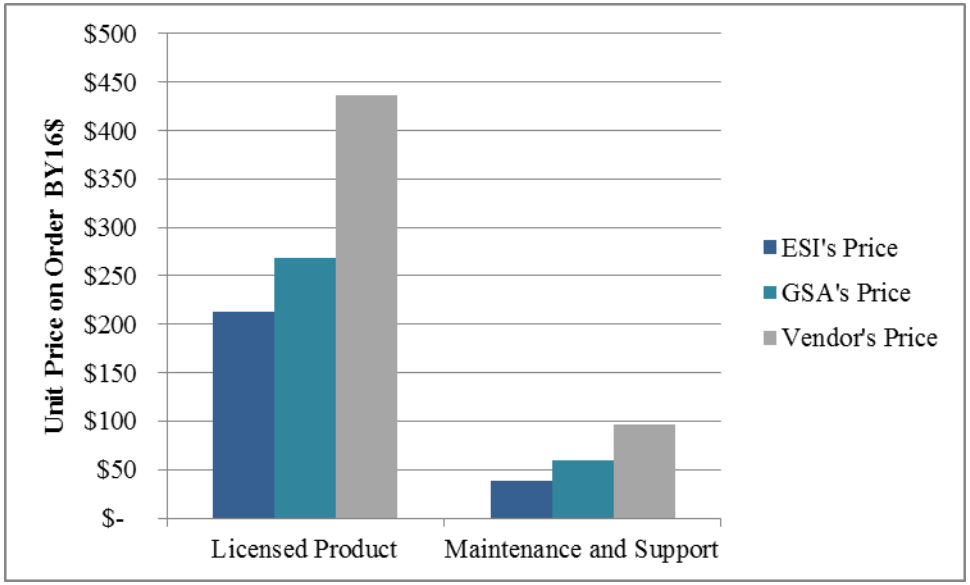

"ESI offers…reduced pricing compared to GSA's IT schedule."

Present Effort Takeaways

- For equivalent License Types of equivalent Licensed Products, **prices fluctuate** across multiple end users (e.g., the Armed Services) as well as within a single entity. Future effort will include investigating whether **terms and conditions** are responsible for the flux.

- The analysis reveals that an average of **21% of the price** of a **Licensed Product** is equal to the price of its associated **Maintenance and Support**.

- "ESI offers…**reduced pricing** compared to GSA's IT schedule."

Source: "DoD ESI Historical Purchase Prices Database: An Unprecedented Tool for Software Buyers and Cost Analysts"
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Future Effort

Future Effort

Terms and Conditions

- Along with each COTS license order are terms and conditions under which a software contract is established.
- "They include requirements and expectations on both the part of the seller and the buyer."
- NCCA and DoD ESI hope to establish a relationship between the price of an order and its terms and conditions.

- *Warranty clause*
- *Transfer rights*
- *Third-party software*
- *Self-audit rights*
- *Click-wrap licenses*
- *Automatic renewals*
- *Termination rights*
- *Governing law*
- *Order of precedence*
- *Installation restrictions*
- *Virtualization*
- *Times of conflict*

Source: *DoD ESI Commercial Software License Acquisition Training*

Future Effort Takeaways

- "Analysis has revealed a need to identify key **terms and conditions** for each entry to, in the future, perform qualitative and quantitative analysis."

- DoD ESI has developed an **End User License Agreement (EULA) Risk Assessment Tool (eRAT)** to support analysis of terms and conditions.

- Analysis should **expand beyond particular vendors and licensed products**.

Source: "DoD ESI Historical Purchase Prices Database: An Unprecedented Tool for Software Buyers and Cost Analysts"
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Acknowledgement

- **SPAWAR Systems Center Pacific**
  - Regina Baca
- **DoD Enterprise Software Initiative (ESI)**
  - Floyd Groce
- **Naval Center for Cost Analysis (NCCA)**
  - Pamela Johnson
  - Justin Moul
  - Dr. Wilson Rosa
  - Dr. Corinne Wallshein

Questions

Backup

Frequently Used Terms

- **End User Agency or Service**
  - Army, Navy, Marine Corps, Air Force, along with other DoD and federal entities
- **Vendor**
  - the Original Equipment Manufacturer (OEM) that owns the Intellectual Property (IP)
- **Reseller**
  - the vendor's sales channel that was awarded an Enterprise Service Agreement (ESA)/Component Enterprise License Agreement/Joint Enterprise License Agreement to sell the product under a Blanket Purchase Agreement (BPA)
- **Licensed Product**
  - a set of rights granted by a publisher to a buyer for use of the publisher's software; licenses may be purchased as either perpetual or as an annual subscription
- **License Type**
  - use cases, i.e., how the software will be used by the licensee
- **Maintenance and Support**
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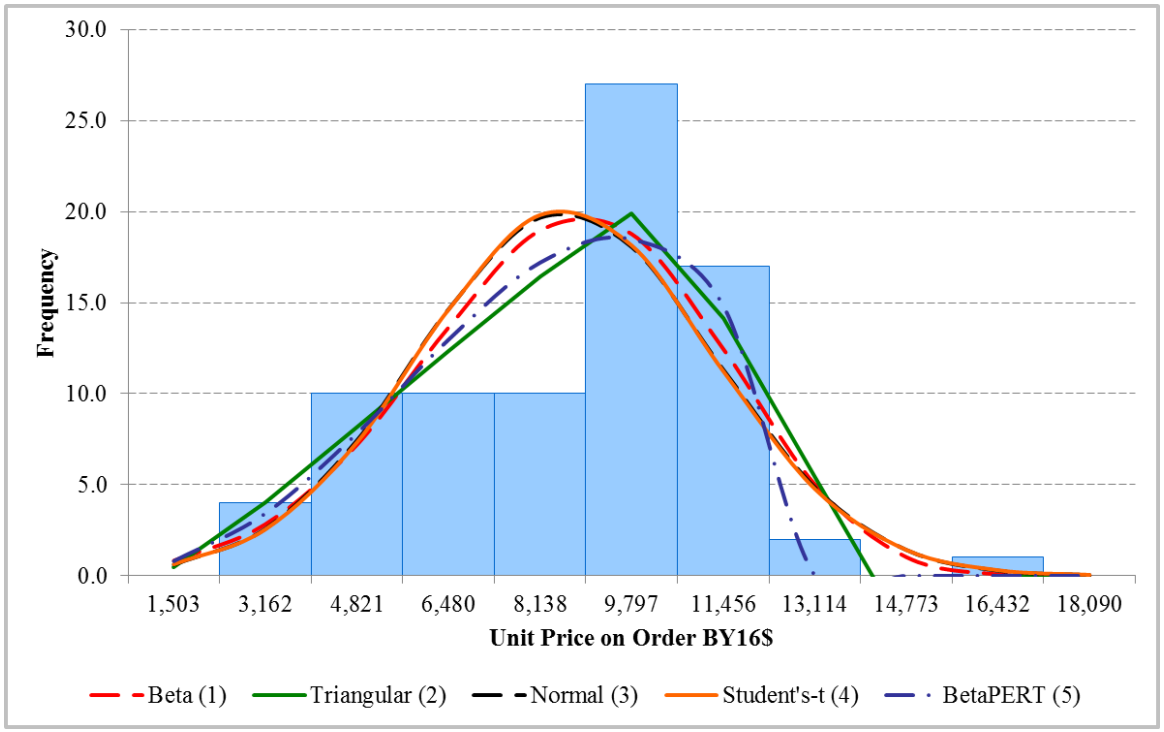
- **Service**
  - expertise from a vendor that enables an organization to develop, manage, or optimize their system; a vendor may offer additional personnel for training, consulting, etc.

Licensed Product Price Fluctuation

Single Licensed Product

- 81 Vendor A, Product A, License A records

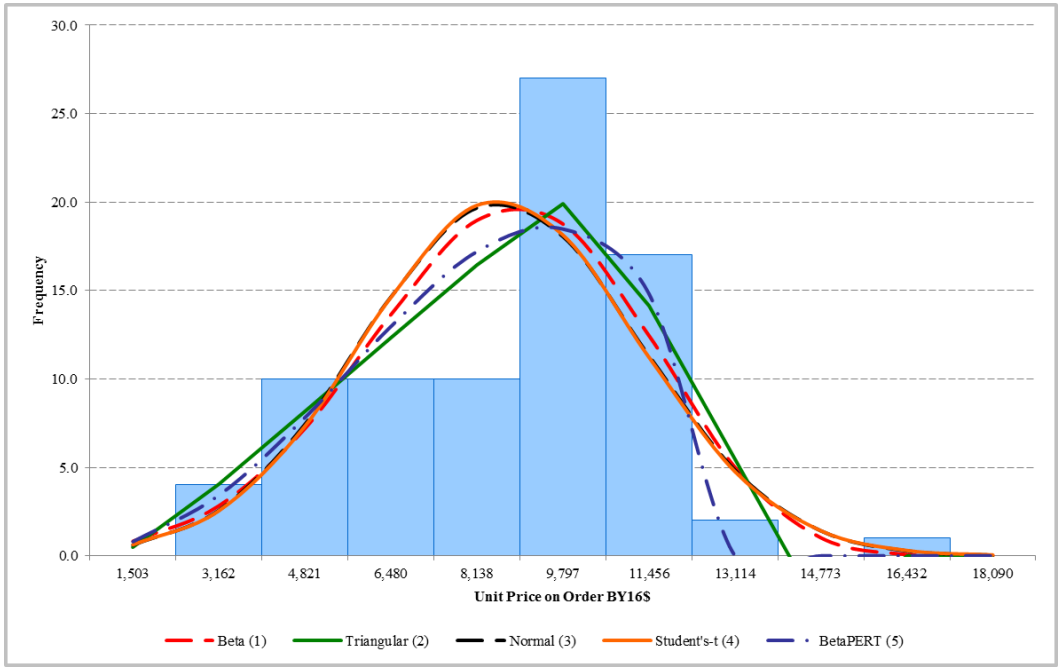


	Bin	*Frequency*	
$	3,162	4	5%
$	4,821	10	12%
$	6,480	10	12%
$	8,138	10	12%
$	9,797	27	33%
$	11,456	17	21%
$	13,114	2	2%
$	14,773	0	0%
$	16,432	1	1%
More		0	0%
		81	

No significant trend exists. Could the fluctuation in prices be explained by identifying the licensed product by the End User or the Reseller?

Licensed Product Price Fluctuation

Single Licensed Product



	Sample	Beta	Triangular	Normal	Student's-t	BetaPERT
Mean	7,765.9813	7,765.1467	7,765.1891	7,765.6342	7,765.6264	7,764.1555
StdDev	2,706.0407	2,643.4696	2,628.1113	2,642.4494	2,645.3037	2,622.6358
CV	0.3484	0.3404	0.3384	0.3403	0.3406	0.3378
Min	1,503.4857	-17,713.8222	713.2657			-1,268.6864
Mode	8,329.4789	8,111.0308	9,255.3228	7,765.6342	7,765.6264	8,689.7973
Max	16,431.6538	19,492.2432	13,326.9787			13,094.4302
Alpha		28.5966				3.7733
Beta		13.1620				2.2267
Degrees of Freedom					79	
Count or % <= 0	81	0.30%	None	0.16%	100.00%	0.06%
Standard Error of Estimate		598.1993	603.8614	612.4512	613.0171	640.9762
Rank		1	2	3	4	5
SEE / Fit Mean		7.70%	7.78%	7.89%	7.89%	8.26%
Chi^2 Fit test 11 Bins, Sig 0.05		Poor (0%)	Poor (0%)	Poor (0%)	Poor (0%)	Poor (0%)