Is the Medicare Competitive Bidding Program of Durable Medical Equipment, Orthotics, Prosthetics, and Supplies an Effective Auctioning Process?

A thesis by

Edyta Dziekonska

Thesis Advisor: Dr. Peter Cramton

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1. Introduction

The Center for Medicare and Medicaid Services (CMS) has created a Competitive Bidding Program of Durable Medical Equipment, Prosthetics, Orthotics, and Supplies (DMEPOS). There has been a Round 1 Rebid auction, where 356 suppliers won contracts to supply durable medical equipment and was taken into effect in January 2011.

That same month, Obama released his January 18th Executive Order, which stated “Our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. It must be based on the best available science...It must identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends.” Unfortunately, there is concern pertaining to this auction as it was created without the help of any auctioning experts, thus not using “the best available science”. Additionally, there are several rules associated with this auction that can lead to negative outcomes.

On September 26th 2010, a letter signed by 167 auction experts outlined the four flaws associated with the Medicare Auction, which include the non-binding bid rule, median pricing rule, composite bid, and a lack of transparency. Evidence through theoretical models by Cramton, Ellermeyer, and Katzman explain why the median pricing rule and non-binding rule are deficient in an auction. In addition, there is evidence by experiments conducted by Merlob, et al. that support these theoretical findings.

This paper will focus on the lack of transparency associated with this auction, and the outcomes this produces. Even though the winners of the auction have been disclosed along with the prices of the products, no other data has been given during or after the auction.
Because of this, I conducted a survey with the winning suppliers in order to examine the market structural changes due to this auction. Even this was difficult as I was able to only collect limited data. However, this will further show how negatively the lack of transparency plays into the bidding program.

Furthermore, this paper will examine an alternative auction design created by Peter Cramton, where the four flaws are taken out and replaced by rules that theory and practice have proven to be successful. Here, an analysis of the actual and theoretical data from a mock auction conducted will show that the actual data is very close to the theoretical data and is more effective and transparent than the current auction for Medicare DMEPOS.

The outline of this paper is as follows: Section 2 provides background information on the bidding program. Section 3 discusses the four detrimental flaws associated with the auction. Section 4 examines the theoretical model presented by Cramton, Ellermeyer, and Katzman showing the inefficiencies of the median pricing and non-binding rule, as well as further evidence supporting their findings. Section 5 presents the results of the bidding program so far. Section 6 provides the results of the survey I conducted. Lastly, Section 7 analyzes the theoretical and observed data from the mock auction, which is a proposed alternative to the current one.
2. Background Information

The Center for Medicare and Medicaid Services (CMS) has established a competitive bidding program for Medicare Part B of durable, medical equipment, prosthetics, orthotics and supplies (DMEPOS). This program establishes prices and allots contracts for the rights to supply these products to Medicare beneficiaries. The bidding program arose due to the Medicare Prescription Drug, Improvement, and Modernization Act of 2003.

Previously, prices of durable medical equipment were set to a fee schedule where prices were determined from over 20 years ago. These prices were paid to the suppliers by beneficiaries paying 20% of the cost and Medicare paying 80%. Many believed the fee schedule to be outdated, causing inflation of the prices for durable medical equipment. Numerous products paid through this schedule were higher than retail prices; therefore, a new implementation for the establishment of prices and suppliers was put into action.

CMS decided to slowly phase in the program by implementing it in nine competitive bidding areas (CBAs). This bidding program was started in 2007, and was launched in January 2011.

CMS created a competitive bidding program with the following objectives:

1. To implement competitive bidding programs for certain DMEPOS items.
2. To assure beneficiary access to quality DMEPOS as a result of the program.
3. To reduce the amount Medicare pays for DMEPOS and create a payment structure under competitive bidding that is more reflective of a competitive market.
4. To limit the financial burden on beneficiaries by reducing their out-of-pocket expenses for DMEPOS they obtain through the program.
5. To contract with suppliers that conduct business in a manner that is beneficial for the program and for Medicare beneficiaries. (Federal Register Rules and Regulations, 2007)

However, as theory and further evidence will show, the way CMS structured the program, may not be an effective way to meet these objectives. First it is imperative to explain the rules in this program and why CMS decided to use such rules.

There are two central rules in the competitive bidding program: the composite bid, which is how winning bidders are selected, and the median pricing rule, which is how prices for the products are selected.

First, we will examine how CMS evaluated the bids. When a supplier would like to bid on a certain item, they must bid on every item in that category, but not for every product category. In this auction, there are 8 product categories, which include Oxygen, Standard mobility devices, Complex Mobility devices, Mail-order diabetic supplies, Enternal nutrients and supplies, CPAP and respiratory devices, Hospital beds, and Walkers. Each of these categories has a certain number of products that fall under them (for example Oxygen has 12 products while CPAP has 70 products). In order to determine the demand and needed supply in each CBA, CMS calculated the estimated demand for each product. They did this by analyzing the claims data for the number of units supplied for Medicare Beneficiaries, as well as the number of beneficiaries who entered the market in the past two years, which was calculated in 2007.

This information was further used for the composite bid. Since suppliers would be bidding on multiple products in a category, it was decided that looking at individual bids would not be indicative by how suppliers would be selected because different suppliers would bid lowest for different items. Thus, a composite bid was used in order to compare the suppliers’ bids for each
product category. CMS (2007) stated, “using a composite bid would be a way to aggregate a
supplier’s bids for individual items within a product category into a single bid for the whole
product category. This would allow us to determine which suppliers can offer the lowest
expected costs to Medicare for all items in a product category”.

In order to compute the composite bid, a supplier’s bid for each individual item in a
category is multiplied by the item’s weight and then these numbers are summed across all the
items. For example, let’s say in one category there are three items with the following weights,
and a supplier bids the following for each item:

<table>
<thead>
<tr>
<th>Item</th>
<th>Bid</th>
<th>Weight</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$3.00</td>
<td>.25</td>
<td>$.75</td>
</tr>
<tr>
<td>2</td>
<td>$5.00</td>
<td>.50</td>
<td>$2.50</td>
</tr>
<tr>
<td>3</td>
<td>$6.00</td>
<td>.25</td>
<td>$1.50</td>
</tr>
</tbody>
</table>

The composite bid is then $4.75 for that particular category. The weight of the item is
determined by the utilization of the item compared to other items in that product category,
which is based on historic Medicare claims. CMS believes that the weights of individual items
reflect the market importance of that item in an individual product category. Item weights were
selected to “insure that the composite bid is directly comparable to the costs that Medicare
would pay if it bought the expected bundle of items in the product category from the supplier.”

Thus, the sum of a supplier’s weighted bid for each item becomes the supplier’s composite bid
for that particular product category. Bid selection then is ordered from lowest to highest.

(Federal Register Rules and Regulations, 2007)

Next the pivotal bid is computed. The pivotal bid is “the highest composite bid based on bids submitted by suppliers for a product category that will include sufficient number of suppliers to meet beneficiary demand for the items in that product category.” (Federal Register Rules and Regulations, 2007) The winning bidders are those, which have a composite bid at the pivotal bid and below.

The composite bid, however, does not determine the price at which the suppliers will sell the products. There were two principles which CMS abided by in order to pick a pricing rule that satisfied these principles: first, bid amounts from all winning bidders for a single item would be used to set the single price for that item. Second, CMS expects to pay less for each individual item than it would have paid under the current fee schedule. (Federal Register Rules and Regulations, 2007)

The median pricing rule is used to determine the price. The winning composite bids are taken, and then the price for an individual item is evaluated as the median price of all the winning bids for that item. If there are an even amount of suppliers for a particular product category, then the average of the two middle bids is set as the payment amount.

This rule was chosen among others because the single payment amount would be based on solely the bids submitted and accepted, in addition to representing all accepted bids not just the highest and the lowest of the winning bids. (Federal Register Rules and Regulations, 2007) These rules are not popular rules in auctions because they can be quite inefficient.
Four Fatal Flaws

Even though CMS took a great deal of time and effort to come up with this competitive bidding program, it still has major flaws associated with it. Many of these flaws, as pointed out by 167 auction experts (“Letter from”, 2010) are quite detrimental to the system.

The first flaw of the program is non-binding bid rule. This is an issue because if bids are not binding, bidding in the program bears little cost to the supplier. This rule particularly encourages low-ball bidding (bidding extremely low amounts, such as below cost). Suppliers are able to bid below their cost and then not accept contracts if they witness the prices set being below their expected cost. The issue of a shortage of suppliers comes up if not all the suppliers selected would accept a contract.

The next flaw is the median pricing rule. The main issue arises mainly because the median pricing rule causes the price to be lower than 50 percent of the winning supplier’s bids. Theoretically, these 50 percent of suppliers would not be able to supply at such a price. Again, just like the non-binding rule, this rule encourages low-ball bidding since a very low bid would have a virtually insignificant impact on price given that the median of the prices is taken. However, if each supplier were to use this strategy, the price would be shifted downward. If the price is driven downward because of these rules, the issue of bankruptcy comes up, how long would suppliers be able to supply the products at such low prices and at what quality?

It is stated in the Federal register final rule document that consideration was given to select the lowest bid as the price for all suppliers, however, it was not chosen since “we also did not consider it as being reflective of the actual bids accepted because it is only reflective of the lowest bid. The lowest bid would not be reflective of what suppliers would sell the item for
as most of them bid higher.” (Federal Register Rules and Regulations, 2007) It is interesting that CMS would not consider a rule because the price would be lower than most of the suppliers’ bids, when the median rule does just that.

When considering taking the maximum of the winning bids and setting it as the price for each item (like a clearing price auction), CMS claims that “this approach would have led to program payment amounts that were higher than necessary because some suppliers were willing to provide these items to beneficiaries at a lower cost.” (Federal Register Rules and Regulations, 2007) Even though this may be true, as we will see in sections 3 and 4, prices may not be entirely “higher than necessary”, but that they would be at a more sustainable level.

The next flaw is the composite bid. Since each individual bid is weighted, it encourages bid skewing, where suppliers distort their bids. This way suppliers can place lower bids on items where the government overestimated demand and higher bids where government underestimated demand, thus not adhering to their true cost. Theoretical models show that there are few multi-unit auctions that possess the same efficiency as single unit auctions. (Katzman and McGeary, 2008)

The last flaw in this auction is the lack of transparency. It is unclear how demand is determined for the weights associated with the composite bid in addition to the standards and obligations that must be maintained. CMS did not disclose how they determined the supplying capacities of the winning suppliers. This flaw allowed CMS to arbitrarily alter the slope of the supply curve and effectively pick almost any price within a broad range. This ability to alter the slope of the supply curve was indeed applied by CMS in the Round 1 Rebid (Cramton, 2011b).
Furthermore, the winners weren’t disclosed until a year after the auction took place! Nor was there any information or data disclosed after the fact, such as the bids. This form of opacity is detrimental to an auction because it causes prices to become virtually arbitrary. Thus how can a bidder place bids sensibly? It is vital for bidders in an auction to understand and trust the process so they can bid in an intelligent and coherent manner.

These four flaws have created quite a concern over what will happen to the winning suppliers as well as beneficiaries. It raises concern of what kind of suppliers have won contracts due to the low-ball bid and bid skewing strategies, as well as the size and legitimacy of these suppliers. Economies of scale are placed into question, in addition to the quality of these products.

4. Theoretical and Empirical Analysis of Auction’s Rules

The two main problems of the bidding program are non-binding rule and the median pricing rule. It is explained above how each rule is inefficient on its own; therefore, it can be inferred that the combination of the non-binding and median pricing rule would further cause problems when combined.

Cramton, Ellermeyer, and Katzman (2011) form a theoretical model in “Designed to Fail: The Medicare Auction for Durable Medical Equipment”, which shows their negative effects.

When a clearing price auction is used with a non-binding rule, an equilibrium that originates is that every bidder bids the lowest allowed bid. When looking at a full information environment, where all bidders know the costs, and bids are binding the following outcomes arise: if there are greater than or equal to seven winners (M), the equilibrium would be for the M-2 lowest cost bidders to bid the cost of M-2 and the remainder of the bidders would not bid
due to their inability to provide products at such a low price. (Cramton et al., 2011) This would then cause a shortage in suppliers. When bids are non-binding, the option of bidding the lowest possible bid is now the equilibrium since suppliers would be able to refrain from accepting the contract.

When looking at incomplete information, Cramton, Ellermeyer, and Katzman show that with binding bids “A strictly increasing, symmetric equilibrium bid function does not exist in the median-pricing auction with binding.” The same attribute is proven when looking at a median-pricing auction that is non-binding. If all other bidders bid the lowest possible bid (b), the median price will be so, therefore, it doesn't matter what an individual bidder bids, since b is the equilibrium. (Cramton et al. 2011) In addition, it is proven that when (M+1)/2 bidders bid the lowest possible bid, the price is set to the low bid regardless of what the remainder of bidders do. This is mainly due to the non-binding rule, which easily gives the bidders the option of declining the contract if they cannot supply at such a low price.

Further Cramton, Ellermeyer, and Katzman conclude that even though the non-binding rule causes low ball bidding strategies, eliminating the rule would not cause an efficient auction, the median-pricing rule would still cause high inefficiencies.

The theoretical findings are supported in a study conducted by Merlob, Peters, Plott, Pradhana, and Zhang (2010) at the California Institute of Technology. The experiments conducted were specifically looking at auctions similar to the Medicare competitive bidding program. In the study several auctions were conducted.

One auction studied contained the median pricing rule with a cancellation option. The results concluded that one out of 20 auctions attained the desired amount of procurement. In
addition, on average the price was 54.3% of the competitive price. This shows that the supplier’s efficiency is quite low, with a seller surplus of 29.3%. (Merlob et al., 2010)

Auctions with the median pricing rule but no cancellation option had 100% procurement success, and prices were 88.6% of the competitive price. This shows the non-binding rule is harmful as it causes shortages of suppliers and clearly encourages low-ball bidding. We see that bidders are low-ball bidding as both prices in the auctions are lower, and the procurement percentage is lower as well, showing that bidders are not bidding their true cost. In the binding auction, they have to bid closer to their true amount since they have accepted the median price.

The study concluded the most efficient auction for both the supplier and government was a Vicrey-Clarke-Groves mechanism, where the price is set as the first excluded bid, and bids are binding. This auction had much higher success rates with total demand being fulfilled, and prices being set on average of 105.7% of the competitive price. (Merlob et al., 2010)

Since the first two auctions have lower percentages of accepted contracts and such low prices, questions arise as to whether these are feasible prices. It raises concern for the durable medical equipment suppliers regarding their financial standing and whether those that are willing to accept such low prices, in the long run, would still be able to do so and at what cost to the beneficiaries?

5. Winning Suppliers of the Competitive Bidding Program

On November 3rd, 2010 CMS announced the winners of the Round 1 Rebid of the Medicare Competitive Bidding Program. The winners were announced by competitive bidding area in which they won contracts. 1,217 contracts were awarded to 356 suppliers. The negative
implications of the program were already seen. The results show the issues portrayed in the previous sections, mainly on how the market will change due to the flawed rules. There are many questions about what kind of suppliers are winning the auction, how large they are, and if they can in fact meet the demands of the beneficiaries. The following figures are from Cramton’s (2011) “Medicare Auction Failure: Early Evidence from the Round 1 Rebid” which show the market structure from the Round 1 Rebid:
Figure 1. Change in market structure from the Round 1 Rebid: market share by product category and Competitive Bidding Area
2008 number of suppliers is shown. Existing suppliers that won contracts in the Round 1 Rebid are in green; existing suppliers that lost are in red; new suppliers in gray. The vast majority of existing suppliers will be excluded from supplying Medicare beneficiaries.

**Source:** Compiled by Peter Cramton [http://www.cramton.umd.edu/], 9 Dec 2010. Provider volumes in 2008 from the Medicare 5% Limited Data Set (5%LDS) Standard Analytic File (SAF). Providers with a claim count of ten or less were aggregated into “Other” per Medicare privacy requirements. Winning suppliers from CMS.

<table>
<thead>
<tr>
<th>Category</th>
<th>Charleston-Gastonia-Concord, NC-SC</th>
<th>Cincinnati-Middletown, OH-KY-IN</th>
<th>Cleveland-Elyria Mentor, OH</th>
<th>Dallas-Fort Worth-Abilene / Dallas-Pantego, TX</th>
<th>Kansas City, MO-KS</th>
<th>Miami-Fort Lauderdale-Pompano Beach / Miami-Miami Beach-Kendall, FL</th>
<th>Orando / Orlando-Kissimmee, FL</th>
<th>Pittsburgh, PA</th>
<th>Riverside-San Bernardino-Ontario, CA</th>
<th>Grand Total</th>
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<td>Support Surfaces (Miami only)</td>
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Figure 2. Change in market structure from the Round 1 Rebid: market share by product category and Competitive Bidding Area

2008 number of suppliers is shown. Existing suppliers that won contracts in the Round 1 Rebid are in green; existing suppliers that lost are in red; new suppliers in gray. The vast majority of existing suppliers will be excluded from supplying Medicare beneficiaries.

**Source:** Compiled by Peter Cramton, 9 Dec 2010. Provider volumes in 2008 from the Medicare 5% Limited Data Set (5%LDS) Standard Analytic File (SAF). Providers with a claim count of ten or less were aggregated into “Other” per Medicare privacy requirements. **Winning suppliers** from CMS.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPAP Devices, Respiratory Assist Devices &amp; Related Supplies</td>
<td>5</td>
</tr>
<tr>
<td>External Nutrients, Equipment &amp; Supplies</td>
<td>19</td>
</tr>
<tr>
<td>Hospital Beds &amp; Related Accessories</td>
<td>7</td>
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<td>Mail-Order Diabetes Supplies</td>
<td>2</td>
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<tr>
<td>Oxygen Supplies &amp; Equipment</td>
<td>12</td>
</tr>
<tr>
<td>Standard Power Wheelchairs, Scooters &amp; Related Accessories</td>
<td>14</td>
</tr>
<tr>
<td>Support Surfaces (Miami only)</td>
<td>13</td>
</tr>
<tr>
<td>Wheelchairs &amp; Related Accessories</td>
<td>13</td>
</tr>
<tr>
<td>Total number of suppliers by CSA</td>
<td>64</td>
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As can be seen in the above two figures, a vast number of current suppliers did not win contracts. This may pose as a problem for beneficiaries, especially if they have to go forth and get products from new, inexperienced suppliers. Additionally, the figures portray the inefficiencies of the bidding program, since it seems implausible that an efficient market would have so many existing suppliers not win contracts. Even though the program was set to make the market more competitive, it comes into question if it actually will be with so many past suppliers excluded from the market. Lincare, one of the largest suppliers of DME, won only two contracts when it had bid on over 70. Although it is a good thing that there are new incoming suppliers coming into the sector, it isn’t good that there are so many; and so many large suppliers are excluded. In a short amount of time it drastically changes the market structure of this business, and refrains many existing, settled suppliers from participating in a market that may be their whole source of profit. In addition, some of the suppliers who are pre-existing suppliers, won contracts in areas and/or product categories they have never supplied in before. The following graph depicts this.
Figure 3. Change in market structure from the Round 1 Rebid: number of contract suppliers by product category and Competitive Bidding Area

Number of contract suppliers is shown. Existing suppliers that won contracts in the Round 1 Rebid are in green; contract suppliers that have not received any reimbursement in a particular Competitive Bidding Area in blue; contract suppliers that have not received any reimbursement in a particular product category in orange; contract suppliers that have not received any reimbursement in any Competitive Bidding Area and product category in red. The vast majority of contract suppliers do not have experience in providing DME. Source: Compiled by Peter Cramton, 9 Mar 2011. Provider volumes in 2010 from the Procedure Code Utilization data. Winning suppliers from CMS.

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<th>Dallas-Fort Worth, Arlington / Dallas-Palo Alto, TX</th>
<th>Kansas City, MO-KS</th>
<th>Miami- Fort Lauderdale- Pompano Beach</th>
<th>Orlando / Orlando- Kissimmee, FL</th>
<th>Pittsburgh, PA</th>
<th>Riverside-San Bernardino- Ontario, CA</th>
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<td>New to product</td>
<td>New to medicare</td>
<td>Supplier Type</td>
<td>New to area</td>
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<td>CPAP Devices, Respiratory Assist Devices &amp; Related Supplies &amp; Accessories</td>
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<td>Hospital Beds &amp; Related Accessories</td>
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<td>Walkers &amp; Related Accessories</td>
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In this figure, we still see a great deal of new suppliers to Medicare, and many others, which are new to the area. This can be a burden to beneficiaries since these are suppliers who have never supplied in certain areas, and may have their business in another area. Furthermore, a new study by INVACARE (2010) shows that 34% of winning suppliers have questionable financial standing, where 8.5 percent have credit limits of less than $10,000, 5.4 percent are on credit hold, 6.7 percent are so far behind on their payments that their accounts have been turned over for collections or legal process, and 14 percent have no account with the company (meaning they may be brand new and inexperienced firms).

All this evidence puts into question the thoroughness and effectiveness of this bidding program. If so many suppliers are new and inexperienced, and 8.5% have a low limit of how many products they can purchase how can these suppliers meet the demand of the beneficiaries?

6. Survey

Due to the lack of transparency, and lack of data provided on the competitive bidding program, it was necessary for myself to gather data through my own means. In order to further learn about the market structure as a result of the Round 1 Rebid, I conducted a survey with all the winning suppliers. The persons whom I contacted were primarily those who signed the CMS 855 form, which is the Medicare Enrollment Application for Durable Medical Equipment, Prosthetics, Orthotics, and Supplies (DMEPOS) Suppliers. I conducted the survey by calling the winning suppliers. In addition, I read from a script so the information I provided each supplier with was identical. The survey questions consisted of the following:

1. How many people does your firm employ?
2. For how many years has your firm been a supplier of the medical equipment subject to this bidding? [Skip to Question 6b if 0.]

3. Roughly what percentage of your business is devoted to the provision of durable medical equipment for Medicare beneficiaries?

4. Did you have Medicare DME reimbursements in 2009?
   4’. Roughly what were your reimbursement revenues for Medicare DME in 2009?

5. Did you have Medicare DME reimbursements in the service areas where you won a contract?
   5’. Roughly what were your Medicare DME reimbursements in 2009 for each of your winning categories?

6a. [For existing suppliers] As a result of your winning DME contracts, by what percentage do you expect your Medicare DME business to INCREASE in 2011?
6b. [For new suppliers] As a result of your winning DME contracts, what dollar amount of Medicare DME reimbursement revenues do you anticipate in 2011?

7. Would you like to provide me your email address so that I can send you the results of my survey as soon as a report is prepared?

These questions were designed to help further understand the result in change of market structure for these suppliers. The size and reimbursements tell us how large the company is, as well as the fraction devoted to each category. In addition, knowing how much the suppliers expect their business to increase gives us insight not only to the supplier’s reactions to the bidding program, but also a potential look into the price change and demand for each supplier’s services. A big question is whether these firms are large enough to supply all the demand of the beneficiaries. CMS claims that it went through financial background checks for the firms that bid in the program and carefully explored the demand and supply for the bidders, however, the evidence shows thus far that this was quite inefficient. The survey questions were designed to help better understand if these firms will be able to operate effectively.
After contacting all 356 suppliers more than once, I managed to collect 92 total responses. I contacted mainly the CEO’s, Presidents, Vice Presidents, and Chief Financial Advisors; however, I also spoke to general managers.

Of the suppliers interviewed, the majority of them have been suppliers between 5 and 20 years. The following figure shows the amount of years that these companies have been supplying DME products:

**Figure 4: Years Supplying DME of Interviewed Suppliers**

![Years Supplying DME](image)

In figures 1 and 2, a vast number of winning suppliers are new; however, all but one of the 92 suppliers I interviewed have supplied before, showing that the survey I conducted does not contain a proper representative sample of the population. However, there was no selection process. I contacted all 356 suppliers, and had done so again, left multiple messages for many people; however, rarely received returned calls. There were several suppliers who I called, that were hard to get a hold of. Many had automated answering machines, which made it difficult to allow to speak with a representative or to get a hold of the person I was trying to contact. In
addition, there were a handful of phone numbers, which resulted in constant ringing with no voicemail to leave a message, which questions the authenticity of such suppliers.

The suppliers I interviewed were most diverse in the percentage of their DME business devoted to Medicare. The following figure displays so:

**Figure 5: Percentage of DME Business Devoted to Medicare**

As can be seen above, the largest portions of suppliers individual DME businesses devoted to Medicare are between 46-50% and 96-100%. Approximately half of the suppliers I interviewed, have 50% or more of their DME business devoted to Medicare. This shows us how great of an impact any change in their business will have on them, especially the auction which can either restrict or enhance their ability to supply to Medicare beneficiaries. Therefore, looking at the number of categories won by each supplier gives us further insight into the changes suppliers may expect. The following figure shows this:
The majority of winning suppliers (48 of the 92) won solely one category, and only three suppliers who I interviewed won all seven. However, this does not necessarily show us much about how exactly these suppliers will be affected since we do not know how many and which of these categories they supplied before. For example, there were a few suppliers whose sole business was supplying Diabetic supplies, and they also won that category, thus winning one category doesn’t do much harm to them. However, there were others who supplied multiple categories, and won only one, not only that but won a category in which not many products are purchased from, as one supplier described the category he won (complex mobility) as “no-mans land”. The majority of the suppliers I interviewed had won contracts in areas they had supplied before, only three of the 91 did not win in areas they supplied in the past, and another three of the 91 supplied in some areas they won in and not in others.

The reimbursement revenues from the suppliers provides further insight into the structure of the suppliers:
Of the 92 suppliers I interviewed, only 54 told me their Medicare DME reimbursement revenue. The majority of the 54 who responded (50) had total reimbursement revenues of fewer than one million in 2009. Even though this helps us determine their Medicare DME size and capacity, it doesn’t do so entirely. If a small company with a small reimbursement rate won many categories, we don’t know if they will necessarily get more volume or if they would be able to handle that volume. Therefore, it’s important to look at the reimbursement rates of these suppliers and the amount of categories they won, in addition to how many people they employ.
There was a vast range of number employed by these suppliers, from as little as one to as many as 3500. The graph shows a general upward sloping pattern, which makes sense, however, it shows an outlier at 3500 employees, with a small reimbursement revenue. This can be explained since this supplier’s DME business is devoted to Medicare at less than 5%. Therefore, looking at their reimbursement revenues, and percentage of business devoted to Medicare gives us further information.
Figure 9: DME Medicare Reimbursement Revenue vs. % of DME Business Devoted to Medicare of Interviewed Suppliers

This doesn’t follow the same trend as figure 8, which makes it hard to conclude how some of these companies will handle changes. A large company winning many categories may be able to handle a greater increase in customers even if only 10% of their business is devoted to Medicare, rather than a small company consisting of only 4 employees. Further information would be needed to analyze this hypothesis. A small company may win multiple categories, however, it is unknown if the competitive bidding areas where the categories were won will be profitable. One supplier stated that he won a contract in only one competitive bidding area, which is only 10% of total reimbursement. Even with knowing how large the company is, the percentage of business devoted to Medicare, how many categories won, and the number of its employees, it is still unknown if they would be able to properly handle more customers and what winning certain categories means to these suppliers.
However, knowing the reimbursement revenues in each of the suppliers winning categories gives us some insight in how their business might change due to this auction. As stated before, some suppliers have won categories in which they haven’t supplied in before, or categories that do not administer much profit. Only 32 of the 92 suppliers I interviewed disclosed their revenue for each category. Of those, the average ratio of revenue in 2009 from categories won to total DME revenue was 0.47. On average, these 32 suppliers have won the right to supply in categories, which administer to only 47% of their total revenue. Nine of these 32 suppliers total revenue of categories won was at least 75% of their total revenue; however, 17 of the 32 suppliers total revenue won was at most 50% of their total revenue, where nine were less than 20%. This shows the struggle these companies may go through because of this auction. These are huge decreases, and speaking with many suppliers, they hope to offset this by gaining more customers. Regardless, there are still many hopefuls.

Question 6 of my survey asks the supplier what sort of increase they expect due to winning this auction; 18% of suppliers expect a decrease. Approximately 45% expect an increase, 20% expect a 0 increase, and 17% responded they don’t know. Even though 45% may seem like a large number of suppliers who expect an increase, the reason this may be is because of the fact that they “won” something. 18% of suppliers expecting a decrease builds concern since it shows the failure of the auctioning process on these suppliers.

In one case, a supplier has to increase business by 60% because the reimbursement rates have lowered by 23-30%. Furthermore, with CPAP there are certain extra “unfunded mandates”, one supplier commented that the patient is required to see a doctor twice and actually use the product, if the patient does not comply, the company itself has to go to the
patient's home and retrieve the product; costing the company unwanted money and time. Another supplier is also in a similar predicament due to the drastic decrease in prices (from $32 to $14.50), where he “expects patient number to double but reimbursement revenue to stay the same because of the lower rates.” Another supplier is in the process of selling their business, and yet another is cutting its’ staff from 23 to 7 employees!

Another supplier also expects a hire cut of 10% due to this auction; “…the sole contract we "won" is a very small contract. Overall our business will lose approximately $150,000 in 2011 as a result of competitive bid. This will likely result in a reduction of 10% in our staff."

These examples show the concerns of these companies, and their employees. The issue comes up of how these companies will be able to supply to all necessary Medicare beneficiaries if they are experiencing or will experience cuts in staff. There are many more issues associated with these comments, such as the reimbursement rate cuts as well. There is a great concern of the quality of these products since the reimbursement rate decreased by 23-40%.

Furthermore, I have contacted the suppliers I had surveyed (in mid-April), and asked them how their business was growing after being affected by the bidding program for four months, and if their expectation of increase in business (referring to question 6 of my survey) has changed since I spoke to them months prior, producing more anecdotal evidence suggesting failure due to this program.

The majority of suppliers have been experiencing what they expected. Two suppliers stated previously that they expect a decrease or no increase at all and are now experiencing or are expecting a small increase. However, 5 suppliers stated that they
expect to experience an increase in overall revenue, but now expect a small decrease or no increase at all. One of these suppliers stated at first that they would expect a 150% increase in business, and are experiencing no increase whatsoever, and “have no idea how our business will survive with these reimbursement rates”.

One of the things that may contribute to such things, unknown prior is that some of these suppliers only won a few or even 1 category, while others won all or almost all, thus producing a “one-stop shop”; where doctors and hospitals who purchase DME are tending to go to these “one-stop-shops”, as one supplier pointed out.

A conference on the Medicare Competitive Bidding Program, hosted by Peter Cramton on April 1st, had panelists which were suppliers in the market. One such panelist was a representative of Lincare, a major provider in the past only won 2 contracts, and is already getting calls from winning suppliers trying to sell their business and subsequently their contracts. This shows a great deal of concern already. Furthermore, a mock auction had taken place with all the participants as a possible effective auction for DME, ridding of the four flaws. The auction turned out to be a success, coming close to what theory would have predicted for such an auction.

This of course only shows a small glimpse of the winning suppliers’ market and what exactly it will mean for these suppliers and the beneficiaries. I only spoke with about 26% of the winning suppliers, all but one being a previous supplier; more information needs to be known about the new suppliers and their ability to effectively supply.

7. Theoretical and Actual Data from Mock Auction

During the Medicare Competitive Bidding Program conference, on April 1st, 2011, a mock auction was conducted. The auction design (created by Peter Cramton) addressed the
flaws in the Medicare Auction, and uses rules that have been effective in other auctions in the past as well as theoretical models that prove it to be successful.

In the mock auction performed with the guests of the conference, the following rules were set into place: the bids were binding and the clearing price is the price paid to the suppliers. Having binding bids, each supplier would be obligated to certain performance obligations and suppliers would go through rigorous qualification criteria a month prior to the auction. In addition, the auction results determine the clearing price, which determines the price, paid to the suppliers. In order to determine supply, each existing supplier's capacity is determined by the past three years' capacity by category and region, with the most recent year given most weight. New suppliers are given about one percent of total volume (or one block). (Cramton, 2011b)

The price is determined when supply reaches 100 blocks or less. The clearing price is then the exit price of the bidder who dropped out, causing supply to drop to 100 blocks; and the suppliers who are still in then wins its capacity. (Cramton, 2011b)

This auction is also highly transparent. All auction rules are known two months in advance of it taking place, qualifications are known well in advance as well, capacities are determined objectively, and winners and prices are known immediately after the auction concludes. (Cramton, 2011b) All of these factors are important in order to have quality suppliers in the auction, as well as the bidders making coherent and rational bids.

On April 1st, a mock auction with these rules was conducted. Minutes from the conclusion of the auction, the prices and winners were disclosed. In order to analyze the effectiveness of the auction, an analysis of the actual outcomes compared to the theoretical outcome is done.
The prices that were determined for each product were the clearing prices. The average percentage difference of actual and theoretical price for each product category by region is -.0078%, and ranges from -9 to 9%. The following is a regression of the actual prices regressed on the theoretical prices:

**Figure 10: Regression model of actual prices from auction on theoretical prices from auction**

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<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Pr &gt; F</th>
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<td>10816293</td>
<td>20229.7</td>
<td>&lt;.0001</td>
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<tr>
<td>Error</td>
<td>52</td>
<td>27803</td>
<td>534.67477</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>53</td>
<td>10844096</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Root MSE: 23.12304
R-Square: 0.9974
Adj R-Sq: 0.9974
Dependent Mean: 380.97426
Coeff Var: 6.06945

| Variable        | DF | Parameter Estimate | Standard Error | t Value | Pr > |t| |
|-----------------|----|--------------------|----------------|---------|------|---|
| Intercept       | 1  | 2.48729            | 4.12101        | 0.60    | 0.5488|   |
| theoryprice     | 1  | 0.98605            | 0.00693        | 142.23  | <.0001|   |

The coefficient for theoretical prices is 0.98605, and has a 95% confidence interval of (0.972, 0.999953); and is statistically significant at the 1% level (with a p-value less than .0001) and hence statistically different from zero. Theory tells us that the coefficient should be one and the confidence interval shows us that we are 95% certain that the coefficient falls between 0.972 and 0.99995; which is very close to one. Even though one isn’t in the confidence interval, the standard error is quite small (at 0.00693). This shows that the theoretical model is still a good predictor for price and the data supports the theory. The following graph depicts this regression:
Further analysis is done on the actual versus theoretical payment, social cost, and gain from trade. The following tables show the results of the actual outcomes regressed on the theoretical outcomes:

**Figure 12: Regression and graph of Actual payment regressed on Theoretical payment**

```
Model: MODEL 1
Dependent Variable: actual_payment
Number of Observations Read          54
Number of Observations Used          54

Analysis of Variance

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<th>Source</th>
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<td>Error</td>
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<tr>
<td>Corrected Total</td>
<td>53</td>
<td>1.052686E11</td>
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</tbody>
</table>

Root MSE 17619   R-Square 0.8467
```
Figure 13: Regression and graph of Actual gain from trade regressed on Theoretical gain from trade

Model: MODEL1
Dependent Variable: actual_gainfromtrade

Number of Observations Read 2700
Number of Observations Used 2700

Analysis of Variance

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<tr>
<th>Source</th>
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<th>Mean Square</th>
<th>F Value</th>
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Corrected Total 2699 1.657092E14

Root MSE  94233  R-Square  0.8554
Dependent Mean 76232  Adj R-Sq  0.8554
Coef Var 123.61374

Parameter Estimates

| Variable            | DF | Parameter Estimate | Standard Error | t Value | Pr > |t| |
|---------------------|----|--------------------|----------------|---------|------|---|
| Intercept           | 1  | 4142.26428         | 1901.16329     | 2.18    | 0.0294|
| theory_gainfromtrade | 1  | 0.91317            | 0.00723        | 126.35  | <.0001|

Actual Gain from Trade vs Theoretical Gain from Trade

![Graph](image)

Figure 13: Regression and graph of Actual social cost regressed on Theoretical social cost

Model: MODEL1
Dependent Variable: actual_socialcost

Number of Observations Read 54
Number of Observations Used 54
Source                   DF       Squares   Square   F Value   Pr > F
Model                     1       89079656036   89079656036   248526   <.0001
Error                     52      18638466     358432
Corrected Total           53      89098294502

Root MSE      598.69193 R-Square   0.9998
Dependent Mean  34531 Adj R-Sq  0.9998
Coeff Var     1.73377

Parameter Estimates

| Variable          | DF | Parameter Estimate | Standard Error | t Value  | Pr > |t| |
|-------------------|----|--------------------|----------------|----------|------|---|
| Intercept         | 1  | 33.09662           | 106.89410      | 0.31     | 0.7581|
| theory_socialcost | 1  | 1.00974            | 0.00203        | 498.52   | <.0001|

Actual Social Cost vs Theoretical Social Cost

![Graph of Actual Social Cost vs Theoretical Social Cost](image)

Figure 13: Regression and graph of Actual profit regressed on Theoretical profit

Model: MODEL1
Dependent Variable: actual_profit
Number of Observations Read    1437
Number of Observations Used    1437
Analysis of Variance
Each regression has a highly significant theory variable, where each coefficient is statistically significant at the 1% level, making each coefficient statistically different from 0.
Each slope is very close to one (slope of payment is 0.89, gain from trade is 0.93, social cost is 1.0097, and profit is 1.07). In addition, the standard errors on each coefficient are again, quite small except for payment, which is a bit larger than the others, at 0.053. This, however, shows us that the theoretical and actual outcomes of the auction are still very close.

The 95% confidence interval for the theoretical payment coefficient is (0.7893, 1.001), for the theoretical profit coefficient it is (0.973, 1.001). In both cases one is in the interval; therefore, the coefficients aren’t statistically different from one. Therefore concluding the theoretical model is a good predictor for the actual payment and actual profit.

The 95% confident intervals for the coefficient of theoretical gain from trade and social cost are (0.899, 0.927) and (1.006, 1.014), respectively. In both cases one does not fall into the interval, so they are statistically different from one. Theoretical gain from trade is a bit farther from one than the other coefficients, however, still fairly close. The social cost coefficient’s interval is also very close to one, by less than 0.006.

The mock auction also had another incentive for the bidders. If a bidder were to win each category in a region, they would receive a bonus of $25,000. This gives incentives for suppliers to become a “one stop shop”. During the bidding process, it gives some bidders incentive to bid below their cost, still being able to still turn a profit because of the bonus. The following is a regression of the actual profit from suppliers to the theoretical profit when it includes the bonus:

**Figure 13: Regression and graph of Actual profit with bonus regressed on Theoretical profit with bonus**
Model: MODEL1
Dependent Variable: actual_profitwithbonus

Number of Observations Read 1437
Number of Observations Used 1437

Analysis of Variance

<table>
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<tr>
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</table>

Root MSE 25182
Dependent Mean 29883
Adj R-Sq 0.9307
Coef Var 84.26803

Parameter Estimates

| Variable            | DF | Estimate  | Standard Error | t Value | Pr > |t| |
|---------------------|----|-----------|----------------|---------|------|---|
| Intercept           | 1  | -3246.89877 | 705.79827   | -4.60   | <.0001 |
| theoretical_profitwithbonus | 1  | 0.98626 | 0.00710 | 138.92 | <.0001 |

Actual Profit with Bonus vs Theoretical Profit with Bonus
In this regression, we see that the theoretical profit with bonus is statistically significant at the 1% level with a p-value of less than .001, and an intercept that is not statistically significant. The slope is very close to 1, at 0.95; and has a 95% confidence interval of (0.972, 1.0002). Again, one is in the interval so the coefficient is not statistically different from one; showing that the actual and theoretical profits with bonus are very close and the theoretical model is a good predictor of actual profits with the bonus.

Theory tells us that binding bids and clearing price rules are effective tools in an auction, the mock auction that used this rule showed results that strongly support the theory, proving an effective auction can exist for Medicare durable medical equipment, where prices are lowered, yet efficient, and result in positive outcomes.

8. Conclusion

Many flaws have been pointed out in this analysis of the Medicare Competitive Bidding Program. Theory (Cramton et al., 2011) as well as experimental data (Merlob et al., 2010) tell us the current bidding program has negative effects due to the four flaws it possesses. However, more analysis needs to be done. The lack of knowledge and data in this program is disturbing. Nothing of vital importance has been disclosed by CMS, other than the winners causing myself to gather my own data. But even then, I have still not been able to properly analyze the intricacies of this auction.

The lack of transparency in this auction is astounding; especially when so little is known after the auction took place. Any effective auction clearly states its regulations, and vital information such as how expected amount supplied is determined for each supplier, and the bids that were placed (without disclosing who bid them).
The auctioning process was created without the help of any experts, and as Obama’s January 18th Executive Order clearly states “It must be based on the best available science. It must allow for public participation and an open exchange of ideas.” Somehow, the Medicare Competitive Bidding Program isn’t doing just that. Many suppliers and beneficiaries are highly concerned with what will happen as a result of this program, and not much is being done to address this. The four main flaws are astounding causing 167 economists and auctioneering experts to agree that they are detrimental to the auctioning process, yet, again nothing is being done to address these issues.

With such a lack of information, I had to survey the suppliers to retrieve knowledge on the issues facing these suppliers, beneficiaries, and market structure. Unfortunately, no concrete formulations and conclusions were found, however, evidence from suppliers still shows that the auction so far is failing in certain respects.

Some companies are worried if they will be able to stay in business, others have to cut their staff, some already know that they will have major loses this year, and yet others are already selling or planning to sell their business! These are just some of the unfortunate effects of the auction. Many large firms did not win contracts, even when bidding low. The lack of transparency of the auction causes a lack of knowledge for the suppliers on how to bid coherently and successfully.

As in Obama’s Executive Order, if an auction took place “using the best available science”, an effective outcome could be a possibility for the suppliers, beneficiaries, as well as tax-payers. Such an auction took place on the April 1st conference. Theory tells us binding bids; setting prices to the clearing price, as well as a transparent auction are keys to having successful auction outcomes. The mock auction results went along with theory,
where prices, profits, social costs, payments, and gain from trade went along with theoretical data, proving an effective auction for Medicare DMEPOS does exist.

There is still much to learn from this program, as there hasn’t been any data disclosed from this auction and further scientific analysis needs to be done. Regardless, the evidence so far still points to the negative effects this auction is having on the suppliers now, and the most likely failures it will have in the future.
References


