

MEDICARE PAYMENT ADVISORY COMMISSION

PUBLIC MEETING

The Horizon Ballroom
Ronald Reagan Building
International Trade Center
1300 Pennsylvania Avenue, N.W.
Washington, D.C.

Thursday, March 20, 2003

9:17 a.m.

COMMISSIONERS PRESENT:

GLENN M. HACKBARTH, Chair
ROBERT D. REISCHAUER, Ph.D., Vice Chair
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AUTRY O.V. "PETE" DeBUSK
NANCY-ANN DePARLE
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DAVID A. SMITH
RAY A. STOWERS, D.O.
MARY K. WAKEFIELD, Ph.D.
NICHOLAS J. WOLTER, M.D.

AGENDA ITEM:

Sources of variation in hospital financial performance under prospective payment

-- Kathleen Dalton

Cecil G. Sheps Center for Health Services, UNC

-- Julian Pettengill

MR. PETTENGILL: Good morning.

The discussion this morning, as Glenn noted, is about sources of variation in financial performance among hospitals under PPS. I'd like to introduce Kathleen Dalton, to my right here. She is out of the Sheps Center for Health Services Research at the University of North Carolina, and she has been doing a lot of work on this topic for us, keeping her occupied most of the past year. Before that, she's done valuable work for us on the indirect medical education adjustment, methods and findings; and also on the PPS wage index.

The work we're about to describe this morning is a follow-on to the material you saw that Jack Ashby presented at the October meeting when he presented descriptive information about variations in hospital financial performance. There's probably not anything here that is going to be shockingly new, but it is different in the sense that Jack was talking about descriptive data, relating performance to individual variables, and this is a multivariate analysis where we look at the effect of an individual variable while controlling for others that also affect performance.

The work from this project will, along with some additional work that we will do between now and the April meeting, will be included in a chapter in the June report.

For the presentation this morning, I'm going to talk a little bit about the background and motivation for this work and then Kathleen is going to talk about the objectives, methods, and preliminary findings from the work. And then I'll come back at the end and talk about next steps.

The motivation for this project begins with this picture, which is one that you've seen before, or something very like it. This shows the distributions of hospital's inpatient margins under PPS and Medicare margins, overall Medicare margins, in blue and red respectively, I think. It looks like red and orange, actually. So much for that. I'm color blind anyway.

The lower of the two, the wider and lower of the two distributions, is the inpatient margin.

In both cases, the variation is very wide, as you can see. The 10th percentile inpatient PPS margin value is minus 14 percent. The 90th percentile is 27 percent. For the overall margin, the comparable figures are minus 16 and plus 16.

Every year we see the same thing, and again, it's consistent with the data that Jack presented in October and you saw something similar in January when we were talking about the update.

In addition to that, we have perennially systematic

differences in margin levels across groups of hospitals, as shown in the next -- wait a minute. They're out of order. Apparently, this is a slightly different file than the one we expected to have. Sorry, technical difficulties.

Okay. It's really nice to have somebody around who knows what they're doing with this thing. It isn't me.

Okay. Now you see why I was calling them blue and red. No?

[Laughter.]

MR. PETTENGILL: I am color blind, forget it. Or color challenged, or something. Now they're in the right order.

Here we have, on the left-hand side, inpatient PPS margins for four simple groups, rural and urban hospitals with and without the special policy-driven PPS payment factors or payment adjustments, which include the IME adjustment above the cost relationship, disproportionate share of payments, and special adjustments for certain rural hospitals.

The right side shows what are called box and whiskers diagrams that indicate the amount of variability within each of those groups in inpatient PPS margins. On those, the higher horizontal line on the box is the 75th percentile. The lowest line on the box is the 25th percentile. 25th and 75th percentile, respectively.

The other horizontal line are just ways of identifying outlier observations.

The unit of observation here is the hospital. It's important to remember that. How margins are distributed across hospitals is different from how they would be distributed if you weighted by the number of Medicare beneficiaries receiving care in the hospital. In fact, if you think about the overall margin, for example, roughly 49 percent of hospitals have an overall margin that is below zero, negative. They account for 37 percent of Medicare patients treated in hospitals.

49 percent of the hospitals have an overall Medicare margin that is negative, but they account for 37 percent of the patients. So patients are disproportionately receiving care in hospitals that have positive margins.

Of course, the same thing applies within these groups. These diagrams are not weighted by discharges, but they could be. For example, the urban hospitals that receive special adjustments account for 41 percent of all hospitals, but they treat 64 percent of the patients. That's that last bar and the corresponding box on the far right.

What to make of all this variability depends on why it's occurring, and different people look at the variability and -- yes.

MS. DePARLE: Julian, that last chart, is that overall Medicare margins on the left?

MR. PETTENGILL: That was overall, yes.

People look at the variability and they sometimes make inappropriate inferences about that, attributing much of the variability to the payment system. Part of the purpose of this study is to find out to what degree that payment systems factors are, in fact, responsible for the variability. And also, what else seems to matter.

Variability is not either unexpected or undesirable. Remember that there was no variability, or almost none, under cost reimbursement. The fact that we have variability is actually, in some ways, a good thing because it represents the reward that people get for producing care efficiently.

Some of the things we already know are that we have policy-driven payment factors that make a bit difference and Kathleen will talk more about that in a few minutes.

Other differences that we may find may indicate that the payment system is either not operating exactly as it was intended. For example, if we find errors in the way some of the variables are constructed or the way they're applied. But it's certainly possible that we also find that, for example, there are market factors that the system does not now account for that we might want to think about adding to the payment system.

Then, of course, there are other possibilities that we find, management behaviors that account for part of the variability and performance and we probably wouldn't want to do anything about that.

And then, of course, there's purely random variation which also will exist, and I assure you we'll find that, too.

Now Kathleen will talk about what she actually did.

MS. DALTON: Thank you.

We had two major objectives in designing this study on the variation in the margins. First, we wanted to disentangle the contributions of the payment system from the contributions of the hospitals, as Julian just described, both the contributions that the hospital's own decisions made, and also those that might be related to the external environment in which the hospital functions, most of which I think we would assume is not under the hospital's control and is therefore a different policy issue.

But second, we wanted to develop an approach that would be generalizable, that we could apply to other PPS settings when we get comfortable with it now that we have that payment in several other areas, and also that we could apply over multiple years.

This is a diagram of the way we approached variation. It pretty much reflects the way we structured our model here. We can think of three main sources for the variation in performance. As we just said, those related to the payment system, those related to the hospital itself, and those that are related to chance, which is to say the random influences.

Now the PPS formulas, as you know, have several components that are intended to match the payments to cost. So one of the problems can be measurement error in those components where they're not functioning as we think they should be.

We also have several components that are not intentionally linked to cost. So those are areas where we have to some policy-related reason for directing resources to some hospitals in excess of cost or theoretically it could work the other direction. So I tend to refer to those as policy components to the payment formula throughout here. And both of those would affect the margins.

On the hospital side, we're going to divide those hospital characteristics into the sort that reflect the environment. So

those would be market conditions, the demographics of the patients served, supply characteristics in that area, competition, those sorts of characteristics. We're going to separate those from the characteristics that we think reflect management decisions. So those would involve product mix or efficiency and issues of quality. Mind you, issues of quality are not really easily measured and we recognize that. So of the hospital characteristics, some can be measured and incorporated into the model but quite a bit is what we call unobserved. That is to say, unobserved to those of us who are constructing the model.

The random error that's left over has to do with what's unobserved that we have failed to include in our model but it also has to do with a variety of very small things that would affect any individual hospital in any individual year. Because this is a one year analysis, a cross-sectional analysis of the differences across hospitals, what we've got here is a model where random fluctuation from year to year would show up as unexplained. So in this particular instance, year to year volatility would also be part of the random component here.

The analytic approach we took is very similar to the Medicare average cost function. Many of you are probably familiar with that because that's the one that's used to estimate the IME coefficient. Except that, in this case, what we're interested in predicting is the margin, not the average cost per case.

So what we did is we used a two-equation approach. We have two equations that are simultaneously estimated, one for payments and one for costs. The approach, because it's simultaneously done indirectly, it produces a performance measure and the performance measure is the ratio of payments to costs. It's a little like your Medicare margin that you've been looking at. It uses the same data. It's a slightly different ratio.

For example, a payment ratio of 1.2 simply tells you the payments are 20 percent above cost and a payment ratio of .85 would tell you that payments are 15 percent below cost.

Throughout this talk I'm going to tend to use payment ratio and margin interchangeably. They really have slightly different interpretations in an accounting and a financial sense, but don't hold me to them because I tend to use of them synonymously.

I don't want to spend much time going into the methods here but I'll just quickly talk about some of the advantages of the approach that we took. We could have just estimated the payment margin directly in a regression, but separating the estimates the way we have, separating the numerator and the denominator from that ratio, has a few advantages. It allows us to include what we already know about the payment formula in the model and we can include them as what we would call constraints or forced assumptions in the payment estimate.

So, for example, we know exactly how a case-mix index, or rather the DRG weight, affects a particular payment. So we can force that into the model and that eliminates some of the estimation and makes it a little more accurate.

At the same time it keeps the flexibility of the original

cost model, so that we are able to, for example, test the effects of other cost factors, those that are not already in the PPS formula. And we can test whether the effect of a particular factor is uniform across different ranges in the values. So we can look at the effect, for example, of case mix on cost. We can look at it separately for low case-mix hospitals or high case-mix hospitals.

We can also test the extent to which some of these factors which occur jointly in our hospitals may be influencing each other. So that when you find them together they may have a different sort of an influence on the hospital than if you find it alone.

So all of those are the characteristics of a cost model that we can include in this two-equation approach.

The data we used are all the standard PPS system files that you've seen used before. We have hospital cost reports. We took operating cost and operating payment data from these.

But in addition, we had used some data from the Part A claims file. We took this data and constructed a new length of stay variable for the hospitals. It's a measure of the ratio of the hospital's actually length of stay to the expected length of stay, defining expected as what would have occurred if that hospital had had the national average length of stay for each DRG. So you go back to each hospital's mix of DRGs and recompute what its average would have been if every case had stayed the average, the national average for that DRG. So we found that to be a fairly helpful tool to control for the difference in case mix but still consider what the hospital's length of stay was relevant to others.

Now for purposes of model development, we've used data from the federal 1998 year. At this time, we're updating it with some 1999 data and we'll probably run it for some early years. Probably the earliest would be 1992 because we're interested in looking at the stability over time. The choice of the year simply had to do with when we began the analysis. We would like to say that whatever findings we have, whatever that structural relationship is, is consistent from year to year. So actually the choice of the year is not that important, or should not be that important, we would hope.

So this is what we want to ask of the model. We're interested in what the independent effects are of each factor -- so hence the multivariate modeling -- of PPS profitability. We want to know if some of the factors influence each other -- if some of those factors are different when they occur together, they influence each other, then we also want to know what are the effects on profitability. Mainly we want to know are the payment factors operating as we intended them?

In addition, I think, we asked the model to help us understand what was practically significant. So not necessarily what is statistically significant but what was practically significant in our findings.

We want to know how important the effect of any one variable on the margins is, in context, given the total range of PPS profitability and how many different factors we have operating at

once.

Now this is actually a more difficult task. First of all, because a lot of these factors are correlated and they're distributed differently across the sample. So to try and make the results more intuitive what we did is we used a simulating procedure. So we created simulations where we could hold the effects of all of the other factors constant and then trace out what happens to a typical hospital if we just change one factor at a time. In that way we could get a sense of the relative impact of any one or the other.

So the steps on the simulations were first that we needed to figure out what was a realistic, what we call a base case hospital, something that we could hold constant. Then, having defined a base case hospital, we would use the model results to predict its payments and its costs and then we would start to alter the value of one factor at a time and trace out -- in this case we give you graphs -- the effect of that one factor on that base case hospital.

As you can see from the first bullet, we tried to pick attributes for sort of a garden variety facility, with an average case mix, one in an area where the wage index was one, one that did not receive any special policy adjusts for teaching or disproportionate share or any of the special rural adjustments. So it was just receiving the base DRG.

However, it's probably important to stress that the definition of the base case isn't really central to the analysis. If you change the base case, you're only going to change your starting point. What we're after here is the change. So if you consider, if you wanted to consider how this would look at a very small rural hospital or a very large academic teaching center, you would certainly have to consider the effect of the variables that are more likely to occur there, such as the teaching adjustment. But you would also have to alter your starting point. But you would not necessarily alter the rate at which the factors change profitability.

I'll walk you through a couple of examples. I'm going to build the graphs slowly to try to orient us all. For the walk-through, for the examples, I picked two variables. I picked a case-mix index first because it's a good example of a pure cost adjustment. It's only supposed to account for cost differences. It has no other function in the system.

And then I picked the IME payments because that has an additional policy component where it's supposed to adjust for cost plus something else. So I thought it would be a good example to see how both of them work.

So this is a hypothetical example, what we're going to start on, and it's probably best if you focus on the graphs for a while. This is not the data. That's what I mean by hypothetical. I'm just going to show how it would look in theory, if everything was working perfectly.

On the left you see two parallel lines. Again, the top one is supposed to be red. It's red on my screen. I'm not sure what happened in the translation. And the bottom is dashed. It's a good thing I dashed it, so at least you can see the difference.

As we know, the case mix is supposed to be cost-based. So if it were, what you would see is that these two lines should have exactly the same slope. They should be parallel. And before anybody points it out, I know they don't look parallel on that. They're supposed to be parallel. Just pretend that they're parallel. I've been staring at it for a while.

That's a good one, the Doppler effect. I'll think of that for my next excuse. I can't explain it.

As I say, what we're interested in for this model are the slopes of the two lines. If they're parallel then we can say the effect of that one factor, in this case the factor is the thing that's at the bottom across the X axis of the graph of the case-mix index. The effect of that factor will not influence the margin.

Sure enough, if you look to the right, in the square on the right, there you've got the predicted -- I called it predicted margin. It's actually the payment-to-cost ratio. So payments and costs move in the same direction. That's going to be a flat line. So that would be your ideal setup. And this is if case mix, which is to say the DRG weights, are working perfectly.

Now before we move on, I'll just comment on that right-hand line and whether or not it should be at one. It doesn't matter how high or low that line is right now. Whether it's above one or below one, that is to say whether that base case hospital is operating at a profit or operating at a loss, has only to do with the characteristics we chose for the base case and it has to do with the underlying adequacy of the standard rate. But again, that's not the focus of the analysis so much. That's just our starting point.

You can see this particular base case is slightly over one. My recollection is that payments were about 6 percent over costs.

Now, this is the same set of graphs but this is the actual data. You know what, I think I've bypassed entirely, when I was talking about data, so I'm going to raise it right now, an important thing.

When we went to the 1998 sample, we removed the hospitals that have since that time converted to critical access hospital status. They're no longer paid under PPS so we thought that that would be an appropriate thing to do. It is important to keep in mind, though, that that's a large group of very select hospitals who were doing very poorly under PPS. So that act, removing them, does in fact change our results somewhat.

I want to try to remember that. I'll point it out when we get to a point where the result really look different than they would have, had we left these very small rural facilities in.

So now we're looking at the actual results on the case-mix index. The first thing you want to note is, of course, that the lines are not parallel. That dashed line, which is the lower one on the left-hand box, is flatter than the payment line. That indicates that the change in predicted costs per case is less than the change in the payment per case for every increase you've got in that DRG weight.

You can see then on the right side, where we've got the margin plotted, that as the CMI increases this base facility

would get a higher and higher margin.

Now what you might also notice here is that that bottom line does not appear -- you might need really good eyes to see it. But this line right here doesn't have exactly the same slope all the way up. Now this is because of the way we structured the model. I know you probably can't see it, but take my word for it.

We really had, we thought, reason to believe that perhaps the way the relationship between the DRG weights and average cost per case might be different in a low case-mix hospital than in a high case-mix hospital.

So what we did is divided the sample into pieces. And we estimated the bottom piece separately. It's actually three pieces and there's a break right about there, I think, where the case mix, it would be about 1.08. And there's another break where the case-mix is about 1.4. And sure enough, we did find that for this bottom area right down here, actually the case-mix weights work pretty well. Those two lines are effectively parallel. The slopes are not statistically significantly different, is what we would say. Above 1.8, the slope here, this slope is flatter than this slope.

So above here what we could actually say, the implication is that the DRG weights are overstating the cost differences. That would be the message to carry away from that particular difference.

And you can see over here that this line is fairly flat, below 1.8. As I just said, they don't seem to affect it. And then the margin starts to increase here because of the difference in the way that the index payments and the way that it affects cost.

Now I put a line in here, right here at 1.25, just to help orient you because that's the value of the case mix we chose for the base case hospital. That's the only reason that line is there. And I put a here just -- it's a horizontal line -- just to help you to focus on the difference. That's all that is.

We can look at the same data here for indirect medical education. And we have a slightly different thing on. You can see for IME, this bottom dashed line here, that's the cost line. So you can see that as the teaching intensity goes up, the cost goes up. So we all know that. We're familiar with that phenomenon, that there is a significant cost differential according to the level of teaching.

This is the payment line, however. You can see the payment line goes up considerably faster. So the result is the higher your intensity of teaching is, the higher your margins. So this is the contribution to the margin that is there because the adjustment for teaching is greater than cost.

Now in this particular instance, unlike the case-mix index, this may be the intention. There's a part of that IME formula, in fact, that's deliberately made over cost. So you can't entirely say that this is a problem in the formula. Some of it is intentional. But with this data I couldn't identify what was intentional and what was not intentional, simply that it's there.

So what I've done here is -- I should probably backup and

just ask if there are any questions about this approach because I'm about to use it for three or four slides in a row.

What I've done here is simply plotted the margin graphs of the three main cost-related components to the system together. And I've added a couple of lines here to help orient us. The horizontal and the vertical lines here are placed at the 25th and the 75th percentiles for the distributions. So those horizontal lines show you what is the interquartile range for payment-to-cost margins for all the hospitals in the sample. So that just helps you understand where the important range is, where you want to focus. Then again, the vertical lines show you for each of the different factors what the 25th and the 75th percentiles are.

You can see the line we've already looked at for case-mix index but hopefully the little box in the middle shows you where the bulk of the hospitals are.

You can see, on the wage index, we have a similar sort of picture actually. In the wage index we also estimated it in pieces. We estimated the piece for hospitals in labor markets with an index value below one and then we estimated it for above one.

We found, quite interestingly, that the relationship between the payment adjustment and cost adjustment was quite similar, below one. But above one what happened is the payments went up a lot faster than the costs. So at this point we have another instance where it looks like there's a measurement problem in the formula that contributes to the variation.

Another example is the outlier, but of course what we're expecting to see in the outlier is a little different than what we expect to see in the other two. On these top two graphs, if everything worked perfectly, as I said, this would be a flat line.

Down here, if the outlier policy worked perfectly we still wouldn't have a flat line because this is a stop-loss sort of an arrangement. You're expected to lose a little something on every outlier case. So you would expect this line to be slanting down just the way it is.

I cut this graph at .3. That's about the 99th percentile of the distribution of the proportion. The .3 would mean a hospital has -- 30 percent of their payments are, in fact, outlier payments. Let me rephrase that. Outlier payments were 30 percent of the DRG payments. That's fairly high and that includes 99 percent of hospitals. We have a few hospitals who get more. The graph was just difficult to see if I put it in there. It extended all the way to .8 or .7, I think.

Anyway, I think the important point here is that by putting the graphs together and putting them on a similar scale over there on the left, that payment-to-cost margin scale, you can compare the slopes of them and you can get a sense of the relative importance, how much is one contributing compared to the other.

Until I did this, I would have probably guessed that outlier payments reduced the margins in large hospitals a lot more than I can see here. That line is flatter than I thought it would be. The wage index, of course, that line is more steeply sloped than

I thought it would be. And I really didn't know what to expect for case mix, so I couldn't tell you.

But I think the idea of putting them on one graph with the same Y axis, the idea is to help you compare the relative influence.

We have the next graph does the same thing but I've put the three main policy adjustments. And you can see that these lines are a lot steeper than the earlier cost-based ones, which means only that the policy related adjustments contribute more heavily to the variation in margins than whatever it is that we found in the cost-based adjustment.

Again, this is exactly what we knew. I mean, this is not surprising. We all knew that each of these -- certainly that IME and DSH contributed to the differences in the margin. It was interesting to me that the rural hospital-specific payment amounts, those are the special payments we make to sole community providers and Medicare-dependent providers. For those that receive them, those are also appear important contributors to the variation in margin. I was surprised to see how much that was.

I should also just mention that I told you that these vertical lines were the interquartile range for whatever this variable is. But in this case, for these three graphs, it's the 25th and 75th percent for hospitals that actually get that policy adjustment. 80 percent of hospitals don't get IME, I think. It might be 75. And I would think over half of hospitals don't get DSH.

MR. PETTENGILL: It's about half.

MS. DALTON: About half? So you're looking at the 25th and 75th percentile just for the group that gets it.

We're going to have one more of these. Bear with me. This is the equivalent graph, but I've plotted the effect of some of the hospital characteristics, the operating characteristics, that are not part of the payment system.

I'll talk a little bit about each of these. Volume is obviously a fairly important variable to investigate and to control for if you're looking at anything that's based on a hospital's cost per case. We did look at the volume again in four pieces. We divided it into hospitals with fewer than 1,000 discharges and hospitals with between, I believe, 1,000 and 10,000, 10,000 to 20,000, and over 20,000, something like that.

What we found is, as suspected, there is an effect, it's what we would call an economy of scale. There is in effect a volume on costs per case. But since volume is not part of the payment formula that means also there's an effective volume on margin. But it only exists right here in the middle area.

Down here, it's hard to say because the scale of discharges is so wide across our hospitals that this graph is compressed. But down here, if you were to look at the group of hospitals below 1,000 discharges per year -- and that's pretty small now. That's an average census of probably between 10 and 15 patients per day.

Down below 1,000 it's actually quite flat. Now that's something that is different now that we've pulled the CAH hospitals out. If I had left the CAH hospitals in the sample you

would have seen something that was quite consistent with what you saw a few years ago, when we were talking about the low volume adjustment. But that difference is now gone. It's gone for good reason because we pulled 500 or 600 of the lowest performing hospitals -- lowest performing from the prospective of prospective payment, at least -- out of the sample.

At any rate, there doesn't seem to be much of a volume cost or a volume margin relationship at the low-end. There's a slight one in between. And above 10,000 it doesn't seem to make any difference, either.

This one down here is occupancy. And occupancy has an effect on the margins pretty much in the direction that we would expect. There aren't very many hospitals out in this region of occupancy rates of 70 or 80 percent or above. And they tend to be the big tertiary centers that are there.

I think, if you'd asked me before I ran the model, I would have expected this line to be a lot steeper. Either I was mistaken in my expectations or it's possible we're not very good at measuring capacity, so we don't have a very good measurement of occupancy rates.

Over here we took a look at the effect of relative wages on the margins. Now the wage index controls for market-to-market differences in relative wages, but within any given market an individual hospital's wages could be above or below its labor market average. So this is what we're looking at here. It's a ratio of the hospital's hourly wage to its labor market hourly wage. That is, the labor market used for its wage index. It ranges from about .7 to 1.4. Most of the hospitals are in this middle range here. It's pretty tightly distributed. It has a fairly substantial effect on margins, for those that are at the outer range. You can see that the 50 percent here is quite close to the middle.

Finally, we have this length of stay variable, which is the one I mentioned earlier, which is really the ratio of the hospital's actual to its expected length of stay. And you can see that has a very strong effect on the margins. The hire your length of stay is relative to the national average, for that makes the DRGs, then the lower your margin is. So all of this is as expected.

What about the effects some of the other variables, the effects of other hospital services? Well, there are other hospital characteristics in the model that aren't continuous measures. There are things that either are or aren't. The hospital either has it or doesn't, or operates it or doesn't operate it, or is located here is not.

It's a little harder to plot their impact. I can't go through the same mechanism. But you certainly can still compute the difference in the margin between a base case without it and a base case with it. And I use as an example here those that are providing certain post-acute care services. So I had to redefine my base case as a hospital that doesn't have any subproviders. And now, what happens if they offer long-term care? Here, by long-term care, I mean skilled nursing or swing beds. I'm not talking about long-term acute. The effect is about 2.4 points in

that payment-to-cost ratio.

And that base case hospital that operates nothing has a ratio that's somewhere between 1.01 and 1.02. So we're adding 2.4 to that, to give you some perspective.

If they operate the home health, the independent effect of home health was about 1.9 points. Interestingly, when they operated them together it was 4 points. So those two factors seem to add to each other.

We didn't find much effect for hospitals that were operating rehab or psychiatric subproviders.

And imported thing to keep in mind is that our model is already controlling for length of stay because we had that expected length-of-stay variable. So whatever we're seeing here, it's not because their managing discharges more quickly. It's something else.

I think the implication would be something about what we might call an economy of scope. Certainly, an ability to more effectively use your fixed costs and spread your overhead out on more programs. That might be it, although that would not account for why we don't see it in folks that are operating rehab units. I'm not quite sure what's going on here.

MR. HACKBARTH: Kathleen, since the measure of performance here is the inpatient margin, wouldn't this be distorted by the cost allocation issue? And this could be simply an artifact of cost allocation between inpatient and these post-acute services.

MS. DALTON: Right, if they operate them then they have the ability, then some of that fixed overhead will have gone there. Absolutely.

Although, I'm not sure that's artifact. I think we might equally say that they're making better use of their overhead by offering more services.

MR. HACKBARTH: Well, part of it be that but part of it could be simply how costs are allocated.

MS. DALTON: Ah, but they aggressively allocated to other areas where there used to be cost-reimbursement. Sure. Sure.

Although, I'm surprised that we haven't found it in rehab and psych. We're not quite sure, but I think that is a pretty good -- I mean, I think that's certainly a possible answer there.

Other hospital characteristics. Even with everything that we've put in the model we still find the margins show a big difference by ownership and location. If we had this model perfectly specified, we would love to see differences between the Midwest and the Northeast and the South and the West go away. We'd to know what those are, since geographic location, in and of itself, isn't a good cause for anything. Obviously we're not there.

Ownership also has a very big impact on it. And in fact, ownership and region are things that you have to group because it has a different impact in some regions than in others. So this is a case where we were careful to combine the variables before we measured them.

We see, depending on what region you're in and how you define your base case, we found the payment-to-cost margins as 18 percent higher in for-profit institutions as in public

institutions, for example.

Depending on the region, the base case margins for publicly-owned facilities ran between .95 and 1, for example. And those same facilities modeled as for-profit would raise that ratio to 1.05, somewhere between 1.05 and 1.15. So relatively speaking, that's a very big effect.

Now the thing is that when considering ownership, the difficulty with interpreting those findings on ownership is that we don't really know how much of that is what I would tend to call treatment effective and how much of it is selection effect. A little bit of jargon, but you can think of what that means, is you have to assume, for example, that the investor-owned firms are going into hospitals and identify and choosing hospitals where they think they can do well. So those are hospitals that are already going to have characteristics that make them look like winners in the Medicare situation. So a certain amount of it is selection.

On the other hand, once there, a certain amount of it certainly would be or could be aggressive management. And so that would be what I would call treatment effect. In this sort of a model where you're just looking across hospitals in a year, you're not going to be able to separate those two. But definitely it is a strong effect.

So anyway, how much of the variation so far in this sort of single-year cross-sectional analysis, have we been able to explain? Well, everything that we put in, the payment factors and all of the other characteristics, length of stay and occupancy, region, rural or urban, ownership types, all of it combined we explained about 42 percent. So that's leaving us with a chunk, certainly well over half.

What would be in there? Some of it is, I think, clearly related to market characteristics that I think we could measure and we're trying to do that. This is still preliminary and we'll build on the model some.

Those would include -- we do need to put more information about local market supply characteristics, more about the demographics of the population. We would certainly like to account for managed care in the area and the level of competition that way. We have county-level variables to do that. We would probably incorporate some of the measures that we saw -- was it one year ago or two, when we studied rural hospital markets? Because at that point we did construct, for 1999, some fairly elaborate demographic measures for the hospital market that was constructed from areas where the patients came from. So not just the county where the hospital was located, but the patient-origin market.

So we will try and see what that does to the model. But a great deal of it, I think, is attributable to what's unobservable. These are not quite measurable differences in quality and in management effectiveness.

There's also a random component. And as long as we're just looking at a single year, that's quite possibly a very large one because there's a lot of variation from year to year.

There's a lot of volume volatility. About a fourth of the

hospitals in this sample have fewer than 1,800 discharges a year. That's just not much. That's a very small hospital. And in other work that we've done, at my center we've done, in conjunction or under contract with the Office of Rural Health Policy, we have studied a lot of this volatility in hospitals and where it exists and how it's associated. These small hospitals have not only much more volatility, but the costs are much more sensitivity. So a given 10 percent change in your volume in a year in the number of discharges has a much bigger effect on your cost per case in a small hospital than in the larger ones.

And all of that, I think, contributes to the unexplained portion that we have here.

I also got a very helpful suggestion from Dr. Newhouse a couple of days ago, which I followed up on, where he suggested a way to get out what may be at least an upper bound of the underlying, just totally random variation that we should not expect to get to no matter much we improve on this model.

I followed his approach to it, and that might be as high as 20 percent. So you're looking at 58 percent, and it may be that as high as 20 percent is just pure random and we're just not going to get at it. So in that case, the 42 percent looks up bit better, when you could think of it as well, we've explained half of what is potentially explainable. Another way of looking at.

On that random component, you know, year-to-year variation simply cannot be captured in a cross-sectional model. As I said, there is much greater demand fluctuation in these small hospitals. I think this is something we need to be looking at in our further applications. It needs a different study design. It needs a study design with multiple years. There are ways to get at it but I think that we should focus on this in the coming -- not by June, mind you. That we could not do. Not by the June report, but perhaps in some further study.

Anyway, how to summarize all of this and pull it together a little bit. I guess we can say most of the variation that we can account for is attributable to the payment system factors. Some of the variation is due to problems in the case mix and the wage adjusters. We've seen that. But as expected, I think, the bulk of the payment system contribution belongs to the policy adjusters.

Now, because a lot of these factors are positively correlated, that is people with lots of teaching or high DSH -- not people, hospitals -- also tend to be located in the markets with high wage index and tend to have high case mix. All of these tend to occur together.

I think we may have more of an influence than it may appear when you look at these individually in the graphs the way I showed it. I think it could have a slightly more policy -- stronger policy influence because of it. The different factors may be compounding each other and that's something that we need to keep in mind.

As a group, the hospital choice variables do have a substantial effect. Not as big as the payment variables combined but still substantial. Individually, any one of them may a modest effect, certainly compared to the policy adjustment

effect.

But I think, before we do too much on the contributions of the hospital characteristics, we really need to get a better understand of what's going on those differences by region and by ownership.

I'm going to turn over the rest of this to Julian.

MR. PETTENGILL: Which will be exceedingly brief.

Basically, this slide says it all. We're going to try to deal a little bit better with some of the things that we see as current limitations in the preliminary findings, like exploring differences in market circumstances a little bit better. We'll plug in some of the variables that we have in hand. But you have to recognize that one of the main limitations there is data. It is very hard to get data that really capture a lot of the market circumstances that you would like to explore.

But we will do the best we can in the short run and try to do that for the June report and come back to you in April with a draft chapter that includes that material.

We also want to test the consistency of the findings over time because one of the key questions here is whether, as Kathleen said, if you've identified the structural relationships here among the variables then that should hold up over time.

And the other issue we want to explore for the June report is this length-of-stay variable which is very interesting and very powerful. What is associated with that? How are hospitals able to have very low ratios of actual-to-expected Medicare length of stay in places where they do that?

And then, in the longer run, I think there is some other work that really needs to be done, including exploring more fully the dynamics of performance over time. From earlier work we know there are hospitals that perform well systematically and consistently over time, and likewise there are a bunch of hospitals that perform poorly systematically over time. And then there are hospitals that move up and down and around over the course of a three or four or five year period. And we'd like to understand better what's going on with them.

So that's pretty much it.

DR. NEWHOUSE: Kathleen, thank you for doing this. There certainly are a lot of substance here to chew over.

I've been thinking about my own contribution to the Kathleen Dalton full employment act, in terms of Glenn's question about the effect of adding the post-acute facilities and the issue of whether that was economies of scope or accounting. It seems to me one way to get at that, that would also have some interest in its own right for the Commission, is to go to the most of Medicare margin. That if it's accounting, then it should mostly go away. And if it's economies of scope it shouldn't.

Then just one other observation in passing. There was a debate at the start of the PPS that mostly disappeared, but I'm sure Julian remembers, about compression. As I read your findings, with respect to CMI, you've actually find anti-compression.

MR. PETTENGILL: We stretched it.

DR. NEWHOUSE: You stretched it, yes.

MS. DALTON: Although if I could say, interestingly enough, that graph looked different when the CAH hospitals were there. So I think there's something going on at the low end that we need to understand better.

DR. NEWHOUSE: Although there's nothing in the debate about -- this is a kind of theoretical thing that would have led you to think it was an artifact of CAH hospitals.

DR. ROWE: One of my questions is I was wondering what the impact of taking the CAH hospitals out was because that's not a small proportion of rural hospitals. It's a big proportion. One of the problems with the report is you're going to have data on rural hospitals which people are going to interpret as rural hospitals when, in fact, it's a subset of the rural hospitals. When CAH's are not there, people may miss that. You might want to present data with and without them, if you can, or whatever. Some of the factors may not be relevant to them because of the way they're paid. I think that may be a big effect here and it may be misleading.

You probably covered this and I missed it, but did you take into account whether a hospital was for-profit or not?

MS. DALTON: We did.

DR. ROWE: Was that a contributor?

MS. DALTON: Oh yes, the margins for a for-profit hospital, controlling for everything else, are still considerably higher everywhere but the Northeast.

DR. ROWE: So the proportion of the unexplained variance is after you take out the proportion that's explained by whether it's for-profit?

MS. DALTON: Yes.

MR. SMITH: Kathleen and Julian, I found this very helpful and useful. A quick question on hospital choice. Does it make sense to try to add some measure of Medicare intensity? As one of the things that might -- you will be less sensitive to the Medicare margin if you are less Medicare intensive. And do we find a measure of intensity adds to some of the explanatory power of the hospital choice?

MS. DALTON: I have not -- intensity meaning Medicare utilization as a payer mix? I should put that in there. It's not one I've tried yet, and I should. It's a good suggestion.

MR. DeBUSK: Kathleen, Julian, I enjoyed this section. It certainly brings up a lot of questions, as well as lead to potentially the answer to a lot of questions. But I've got some simple questions here. What is the spread on the wage index on a national basis?

MR. PETTENGILL: It roughly runs from about .78 up to about 1.5.

MR. DeBUSK: What's the total payout in the DSH annually?

MR. PETTENGILL: Total payout?

MR. DeBUSK: Yes, by Medicare, of the disproportionate share.

DR. STOWERS: About \$5 billion.

MR. DeBUSK: About \$5 billion?

Kathleen, I find the compounding effect really interesting here. The best I recalled, the wage index comes along at the end

of the formula; right?

MS. DALTON: Right. That's one way of thinking of it, yes. They just multiplied one after each other. So yes.

MR. DeBUSK: So the synergies, when you pull that in proportion to the base, something is going on mathematically here to make this thing continue to go skyward.

MS. DALTON: Right.

MR. DeBUSK: It's hard to explain.

MS. DALTON: If you've got an advantage because of a measurement problem in the wage index, for example, and in this case what we saw in the wage index could occur for a variety of reasons. It could be because there is some systematic difference in the measurement of average wages in high wage areas versus low. Or it could be because the labor-related share of payments is set too high. I'm inclined to the latter explanation but that's not the only possible one.

But if, in fact, you're enjoying the benefit of too high a labor-related share and you're in a high-wage area, so you're getting your payments adjusted upward and you're getting too much of your payments adjusted upward, you get your whole payment including IME and DSH and the base. Everything gets adjusted upward. So the effect is bigger.

I would say that there is a fairly complicated thing going on in the interaction between eligibility for DSH and eligibility for teaching adjustments. I left them separate in this analysis. As you well know, anyone here, teaching -- this is a very complicated subject and I didn't want to get bogged down in the teaching estimate, per se. But that really needs some more careful splitting out and examining, as well.

What I was referring to is the overlap, the difference between those that get both and those that get one or the other.

DR. REISCHAUER: Kathleen, I think this is a very interesting piece of analysis and it raises all sorts of interesting further questions.

Am I right that when you were looking at the scope of hospital services, that these are dummy variables? I mean, did you try the fraction of home health and SNF business versus inpatient? As opposed to yes or no? Because it's sort of like some of these things have three SNF beds, or something like that. It's really not a big deal.

Then right along the same line, why didn't you include outpatient Medicare services versus inpatient, as also another one of these variables?

MS. DALTON: Those are all excellent suggestions. In this particular model, I didn't use the intensity of the long-term care beds, the size of it relative to the size of the inpatient operation. I could. We have that data.

With home health it's a little more difficult. The data is not that reliable because it's coming off a part of the cost report that's a little -- it's just got more problems in it where you have to look at home health revenue compared to total revenue. And you tend to lose a few more hospitals because they have clearly out-of-range values.

But you're right, I think it is important to do that,

Possibly even just to divide it into small, medium, and large on those dimensions.

The outpatient is very important. I agree with you. I think we need to capture the relative size of the inpatient from the outpatient book of business.

DR. REISCHAUER: Another question about this analysis and whether this would be a useful test. We had the effect of outlier adjustments and it slumped downward and that's the right way because you pick up a fraction of the excess costs if you're a hospital.

But I was wondering if we had multi-year data for this kind of analysis? Could you look at the change in the slopes of that line to see whether there was increased abuse of the outlier adjustment over time? That if we had 2002 data, might we find that line sloping upwards? The tenet effect.

MS. DALTON: How will I answer that? We certainly could do multiple years. The thing about the outlier line in earlier years is that the formula has changed. And so it's going to look different as we got rid of day outliers, as we change the threshold, or other factors that would make that slope differ from year-to-year.

I did try, even in this data, just testing the sensitivity. If I pulled all the hospitals for whom outliers were more than -- I think it was 50 percent DRG payments. They're not many, but I was worried that that extreme value would, in fact, influence the estimate. And it did.

If you pull them out, that line slopes downward more steeply. In other words, there are some of those hospitals whose profits are not affected by it. And so it's watering down the effect a little bit.

DR. REISCHAUER: This was the hospitals with -- what did you say, over 50 percent?

MS. DALTON: Where outlier payments were more than 50 percent --

DR. REISCHAUER: Is that of the DRG payments?

MS. DALTON: -- of the DRG payments, yes.

DR. REISCHAUER: Did they have positive inpatient margins?

MS. DALTON: I don't know. I would have to look. That I didn't do. I simply took them out of the sample to see was that small group biasing this? Or was at least my estimate very sensitive to that extreme group. And the answer was yes.

MR. PETTENGILL: Bob, you have to remember, this is 1998 data for the most part and that's before the full flowering of this effect.

MS. DALTON: If anything, it's gotten worse.

MR. PETTENGILL: So it would be really interesting on 2000 or 2001.

DR. REISCHAUER: The fact that the line sloped down steeper when you took the people who were supposedly losing the most money on this out, it makes you think we should have to turn the graph around.

MR. PETTENGILL: Right, but there's a difference between what she has now and the 1998 data. Maybe you have what, 20 hospitals like that? Or maybe even fewer. Versus 120 or

whatever. It's just going to get stronger and stronger until these new policies go into effect and then it gets wiped out again.

DR. WOLTER: I was just going to say it would be interesting, if possible -- and maybe case-mix index is a proxy for this -- but it would be interesting to see if we can match any of this up with actual DRG mix. I think there's a definite sense that certain procedural and surgical DRGs have more profit associated with them than medical.

In fact, I think anecdotally there's lots of behaviors around the country aimed at marketing to certain types of patients. And then, of course, if we could put that analysis together we put could match it up with urban/rural region, for-profit/not-for-profit. I think that could be a valuable contribution, if we could put that together.

Secondly, I was just trying to connect this a little bit with the presentation on the variation in expenditure per beneficiary. Of course, that's different than inpatient PPS margins. But I think if some would take comfort in the fact that the variation in expenditure per beneficiary is reduced after payment factors and policy factors are taken away, others would take this presentation and take no comfort in it whatsoever, but rather conclude that it only proves that there's inequity.

And so, back to Dave's question earlier about how we frame that particular chapter, we may want to think about that, as well.

MR. HACKBARTH: I agree with Nick. which is one of the reasons why when were talking to David, I thought using the phrase intended variation and unintended variation is a way to get at that. This is a conscious design of policy. Then we can argue about whether it's good policy or not and make reference to this analysis in that discussion.

DR. WAKEFIELD: Kathleen, would you comment just little bit more on in the overheads random component of the unexplained variation, volume volatility specifically.

You talked about both your work here and then some other work that you're doing that -- I've tried to notes and so now I'm trying to read my notes, and it's not easy.

But you were talking, I think, about greater instability in demand year-to-year for low volume facilities. I forget what the cut-off was, but for low volume facilitates. So would it follow then that that random component is a potentially larger source of variation for low volume -- which tend to be in rural areas but not just -- for a larger source of variation in terms of impact on the margins? And then later on, I suppose, whatever implications that has. But could you comment a little bit on linking those two?

MS. DALTON: Because there is more volatility in demand and there's greater sensitivity to that volatility in demand, is what we think we've found from this other work in the low volume hospitals which are predominantly rural hospitals, then there is more of that -- what shows up in this cross-sectional analysis, it looks like unexplained variation and I've been calling it random. But of course, to the extent that I can say it belongs

to this group, it's no longer quite random. We can call it pseudo-random.

It's more fluctuation in this small group. It is there. The thing to remember about that is we're talking about fluctuation. So that's not contributing to the lower average margins that you talk about. What that contributes to is bouncing up and down. So you have people who are doing well one year and doing poorly the next year, well one year, poorly the next year.

So if you think, sort of if you lay hospitals out in a quadrant of folks who do poorly and folks who do well, and you looked at it in one year and in another year, you have some that are poor in all years, and some that are well in all years. And then you have some that bounce back and forth. That's the group that we would be talking about, to the extent that volatility affects where they are in this curve in one year.

DR. WAKEFIELD: Which then might have an impact on your hospital characteristics management decisions. I guess I'm asking. In terms of CEOs of hospitals being able to position their facility for profitability if a lot of the patients they're caring for are Medicare patients, and they're a low volume facility with a lot of that instability year-to-year. I guess these are in separate boxes but maybe there's some interplay there to them.

MS. DALTON: Certainly that probably has implications for the occupancy, since it's bouncing around.

MS. DePARLE: Nick asked my question but I'm not sure I heard the answer, which is whether it's possible to drill down more and see whether some of the variation is accounted for by hospitals that perform more of certain procedures or DRGs? Is it possible to do that?

MS. DALTON: Sure, you could have a variable that had percent cardiology DRGs to total or percent surgical to total. I hadn't thought about doing it, and that's an excellent idea. We could do that, right? That's an excellent idea and not hard to implement.

MR. PETTENGILL: Don't expect it for June.

MS. DALTON: Maybe not by June.

MR. DeBUSK: On page 17 of the handout, the summary of margin effects of other hospital characteristics; volume, occupancy, relative wages, and length of stay, I think from some of the people I've talked to in Florida right now they're -- to use the old saying, they're selling themselves out of business. They are just covered up with admissions of Medicare patients and occupancy.

The dynamics that are taking place because of this large percentage of Medicare patients, they claim, is quite unusual. And therein may lie an opportunity.

And Mark, this is one of the things I mentioned to you, is about what's going on in Florida. I think there's a real snapshot of where we're headed with some of the challenges going forward as the baby-boomers come of age.

But there's some unusual things going on down there and some big, big hospitals. And this is happening now and this data is

five or six years old. So what's going on? I'm not so sure we know what's going on. Well, we don't know what's going on.

But at this point, I think there's a real message here. There's an opportunity to look into the future perhaps somewhat, and say what is the dynamics? What's changing? What's happening in Florida where these admissions are hitting an all-time high with Medicare patients? Because there's definitely something going on in the care and the effect it has on caring for these people and the cost.

MR. HACKBARTH: Good work. We look forward to hearing the next installment.