Physician Volume & Intensity Response

Memorandum

Date: August 13, 1998
From: Volume-and-Intensity Response Team, Office of the Actuary, HCFA
Subject: Estimated Volume-and-Intensity Response to a Price Change for Physicians’ Services
To: Richard S. Foster, Chief Actuary

I. Introduction

Among other functions, The Office of the Actuary has the responsibility to (a) estimate the financial effects of legislative or regulatory changes, and (b) assess budget neutrality in rate setting. Central to both jobs is the determination of our best estimate of the impact on Medicare expenditures when Medicare prices change. Our task is all the more challenging because of some of the special features of health care services.

In a normally functioning competitive market, a decline in the prices that purchasers are willing to pay for a given service can be expected to result in a decrease in the quantity of such services that suppliers would be willing to furnish, and thus a decline in overall expenditures on these services. The reaction to reductions in Medicare physician fees has generally not followed this pattern. Rather, reduced fees are likely to be met by a combination of an increase in volume and a shift in the mix or intensity of services furnished to Medicare beneficiaries.

There are at least three key characteristics of the market for medical services which tend to encourage this response. First, patients often have very little information about the nature of care which they require. Second, patients (including Medicare beneficiaries) directly bear very little of the cost of services furnished, and thus have little incentive to monitor costs or question the necessity of services. Third, uncertainties in the practice of medicine allow for alternative practice styles within and across areas (e.g., two nearby cities may have very different rates of coronary artery bypass surgery). As a result, physician practice modes vary widely.

Because medicine is complicated and patients generally do not have detailed information about the types of services they are purchasing or their own needs, the physician serves as an “agent” for the patient, assessing the patient’s diagnoses, selecting the appropriate mix of services and balancing cost considerations against the benefit which the patient will derive. However, the physician may not be able to serve as a perfect agent for the patient, especially given variations in practice styles: within the scope of acceptable practice, the physician’s recommendations about services to be furnished could also have an effect on the physician’s income.

These characteristics of medical services often give physicians substantial latitude in recommending services toward areas where fees appear more attractive, and/or to increase the volume of services furnished. This discussion is not intended to be a commentary on the ethics of such behavior or whether it differs in any significant way from other professions. Our intent is to understand the reasons such behavior might occur in the provision of medical care services.
This discussion does not intend to imply that patients are uninvolved bystanders having no impact on the volume and/or intensity of services provided. Clearly patients initiate contact with physicians. And the cost of medical care services can influence a patient’s decision about whether or not to have such services furnished. Thus, changes in Medicare’s prices of services can have an effect on beneficiary demand. A reduction in price would translate into a reduction in out-of-pocket expenses for the beneficiary through lower coinsurance. Lower out-of-pocket expenses could result in an increase in the demand for services.

Whether a response to Medicare price changes occurs because of behavior by physicians or beneficiaries or both is not material for our purposes. We are only concerned with the aggregate response to Medicare price changes.

To this point, for both pricing legislative changes and rate setting, we have generally used a model that assumed that 50 percent of the reduced Medicare revenue to physicians would be offset through increases in the volume and intensity of services. In addition, we assumed no response to payment increases (i.e., no reduction in the volume and intensity of services if Medicare fees are raised). There is often misunderstanding and mischaracterization of our model. As an example of how the model works, suppose Medicare price changes caused a particular physician practice that formerly received $10,000 in Medicare revenues to now receive $9,000. Then we would assume that 50 percent of their $1,000 loss, or $500, would be offset through increased volume and intensity of Medicare services. This does not mean that there is a 50 percent reduction in Medicare payment rates, as is often alleged. Volume-and-intensity changes are also assumed to occur in response to Medicare provisions affecting the aggregate revenue of other health care providers.

Our customary 50 percent offset assumption has been based on studies which have established a connection between Medicare payment reductions and volume increases. Many of those studies observed a volume-and-intensity response when Medicare physician expenditures were growing rapidly prior to the start of the Medicare fee schedule. Now that the Medicare fee schedule is in effect and that Medicare physician expenditures are growing less rapidly, we have reviewed our model of volume-and-intensity response to price changes.

Our analyses, together with several independent research studies, indicate that there is a statistically significant relationship between Medicare price reductions for physicians’ services and partially offsetting increases in the volume and intensity of such services. These results also suggest that the magnitude of this relationship may have decreased over time, possibly in response to the changes in Medicare’s reimbursement mechanism. Based on this evidence, we are recommending a 30 percent volume-and-intensity response assumption to price reductions for future financial estimates and for establishing Medicare reimbursement rates for physician services. There continues to be minimal evidence supporting a volume-and-intensity response to price increases.

II. Illustration

In actual practice, there is substantial evidence of volume-and-intensity responses to price changes. We have selected two specific physician practices and their actual 1994 and 1996 Medicare claims data for the following examples. Table 1 is a simple example of how an orthopedic surgeon from Illinois maintained a substantial portion of his or her Medicare revenue, even after a significant Medicare price reduction, by increasing volume. The number of visits billed increased 84 percent while there was only a small increase in the number of surgical services provided. Obviously the volume of some services such as office visits and laboratory tests are more easily controlled by the physician than other services such as surgical procedures.¹ (Attachment 1 shows a full listing of this practice’s Medicare billing in 1994-1996.)

¹ In this example and the others used in this memo, price change is calculated based on the actual mix of services performed in 1994 and the specific changes in Medicare fees in the area for each service. Changes in allowed charges will also reflect changes in the volume of each type of service.
Physicians could also increase their Medicare revenue by increasing the intensity of the services that they provide. That is, they could substitute higher-priced services for lower-priced services. This practice is very apparent when examining the billings for physician visits. The procedure codes for different types of visits have different reimbursement levels depending on the comprehensiveness of the examination and history and the level of medical decision making involved. The average level of procedure code billed has been increasing over time and is more frequently observed in physician practices that have had price reductions. In addition, there has been a shift in the billing of visit codes from less expensive office visits to more expensive consultations.

Table 2 is an illustration of how a physician practice can offset revenue lost due to payment reductions by increasing the intensity of services they provide. This table displays the Medicare services performed by a particular ophthalmology practice in North Dakota in 1994 and 1996. Due to the reductions in the payments for eye procedures, most notably cataract surgery, the practice incurred a 17 percent price decrease. However, the revenue that this practice received from Medicare was only reduced by 4 percent. The price cut was largely counteracted by increases in volume and intensity. In particular, the intensity change in office visits generated a 63 percent increase in revenue from that type of service. (Attachment 2 shows a full listing of this practice’s Medicare billing in 1994-1996.)

Table 3, the office visit intensity change from Table 2 is examined in more detail. This particular example portrays how a physician can increase his or her revenue without increasing volume. The total allowed charges for these office visits nearly doubled even though the price increase was only 5 percent and the volume increase was only 8 percent. Note in particular that code 99203 new visits (at $52.48 each) virtually ceased from 1994 to 1996 while code 99204 new visits (at $79.80 each) increased by a roughly comparable number. Similarly, substantial reductions in the number of return visits (codes 99211-99214) with lower reimbursement levels were matched almost exactly by the increase in the number of code 99215 visits at a much higher reimbursement level. This phenomenon of generating additional Medicare revenue by increasing the intensity of office visits performed or other categories of services is referred to as upcoding.
Table 3 - Illustration of office visit upcoding

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<td>99201</td>
<td>Office Visit, New</td>
<td>$24.46</td>
<td>$0</td>
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<td>99202</td>
<td>Office Visit, New</td>
<td>$37.05</td>
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<td>2</td>
<td>6</td>
<td>8%</td>
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<td>99203</td>
<td>Office Visit, New</td>
<td>$52.48</td>
<td>$5,136</td>
<td>$333</td>
<td>98</td>
<td>6</td>
<td>6%</td>
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<td>99204</td>
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<td>Office Visit, New</td>
<td>$96.54</td>
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<td>10</td>
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<td>99211</td>
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<td>99212</td>
<td>Office Visit, Estab</td>
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<td>99213</td>
<td>Office Visit, Estab</td>
<td>$29.30</td>
<td>$12,862</td>
<td>$6,458</td>
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<td>99214</td>
<td>Office Visit, Estab</td>
<td>$47.23</td>
<td>$3,769</td>
<td>$669</td>
<td>80</td>
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<td>99215</td>
<td>Office Visit, Estab</td>
<td>$73.44</td>
<td>$9,465</td>
<td>$44,946</td>
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<td>TOTAL</td>
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<td>$38,099</td>
<td>$69,773</td>
<td>1,097</td>
<td>1,182</td>
<td>5%</td>
<td>8%</td>
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While increases in the volume and intensity of physician services may be warranted for medical reasons, these data also illustrate a probable causal relationship between price reductions and increases in volume and intensity.

III. Studies on Physician Behavioral Responses

Several studies have been performed to investigate the issue of physicians’ behavioral responses to changes in Medicare fees. One such study used Medicare claims in the state of Colorado to attempt to measure a “volume offset” to price reductions (Christensen, 1992). The analysis was conducted using data on payments to general practitioners and internists from 1976 to 1978. This time period was selected because there were significant price changes to these two specialty groups beginning in 1977. Regression equations were utilized to determine if a certain change in price had an effect on the volume of services performed by physician practices in the area. The estimate controlled for other factors that could affect the volume of physician expenditures, such as experience, certifications, gender, health sector wages, number of physicians, etc. Christensen concluded that in aggregate about half of a price decrease would be offset by a volume increase and about one third of a price increase would be offset by a volume decrease.

A longitudinal study of a panel of physicians in New York and Washington for 1987 through 1989 analyzed the affects of Medicare price reductions on the volume and intensity of Medicare services provided, as well as the effects on the private sector (Yip, 1994). The first section of the report examines coronary artery bypass graftings (CABG) which received Medicare price reductions as a result of Omnibus Budget Reconciliation Act (OBRA) of 1987 during this period. Yip found a large and statistically significant increase in the volume and intensity of the CABGs performed in response to this price cut. The second section of the report examines ten other procedures affected by the OBRA 1987 legislation. Yip did not find a significant volume-and-intensity response for these procedures. The final section of the report looks at the entire episode of care associated with performing a CABG. The results showed an increase in the billings for the other component services associated with the CABG episode, thereby augmenting the volume and intensity response to the price reduction.

Another study of physician behavioral responses to Medicare price changes was conducted to ascertain the effects of Medicare fee reductions imposed in OBRA 1989 (Nguyen and Derrick, 1997). This study used Medicare physician data for 1989 and 1990 for individual physician practices. For the price variable, the authors used a Fisher Index of the Medicare average allowed charges. The results of using this model estimate the volume response to a price change as twofold. First, the estimated behavioral response was statistically significant only for those practices receiving a price reduction. The magnitude of this response was about 40 percent. The authors concluded that the estimated behavioral response for those practices not receiving a price decrease was insignificant. The limitation of this latter finding is that there were no practices that received a price increase, only practices that had no change in price. The second finding was that the behavioral response seemed to vary by specialty groups. They concluded that some specialty groups may have more opportunities to increase volume than others.

The Physician Payment Review Commission (PPRC, now MedPAC) examined data from 1991 and 1992 in an attempt to measure the effect of price changes on the quantity of services delivered (PPRC, 1993). Regression
analysis was performed using price decreases to predict the growth in the volume of services. Because there were few price increases during this period, there was no analysis of price increases. For this study, each observation consisted of aggregate Medicare reimbursement for a physician specialty within a Medicare carrier. The average offset determined from this investigation was 36 percent. Previously, PPRC had done similar studies to measure the volume response of Medicare price reductions resulting from OBRA 87 and OBRA 89 (PPRC 1991 and 1992). The volume response from these studies was estimated to be between 30 percent and 40 percent. In addition, the volume responses were found by these studies to decrease over time.

Another study of behavioral responses to Medicare price changes was conducted in order to examine the effects of the implementation of the Medicare physician fee schedule (Verrilli and Zuckerman, 1995). It examined national trends in the volume and intensity of physicians’ services per beneficiary for the years 1986-1991 and 1991-1992. Annual changes were presented by broad type of service group. In addition, these same annual changes were examined for three impact groups; “gainers,” “small losers,” and “large losers.” The impact groups were subdivided by Medicare payment localities. These impact groups were based on the long-run impact of the fee schedule on payments per service as estimated by HCFA. The study demonstrated that the growth in the volume and intensity of Medicare physicians’ services slowed during the first year of the fee schedule when compared to the five years prior to implementation. Verrilli and Zuckerman concluded that there was insufficient evidence of a behavioral response to price changes by type of service. However, a significant limitation of this study was the attempt to measure behavioral response by type of service as opposed to analyzing the billing practices of individual physicians.

The majority of these studies looked at the volume-and-intensity response to price decreases only, and did not consider potential changes in response to price increases. Another limitation of these studies is that most of the analyses were done on physician claims data before the implementation of the Medicare fee schedule. Evidence suggests that growth in physician volume and intensity has slowed since the fee schedule began in 1992. The volume and intensity of services grew by an average of 7.1 percent in the ten years preceding the Medicare fee schedule and by an average of 3.5 percent in the five years since. Therefore, the introduction of the Medicare fee schedule may have affected the level of volume-and-intensity growth and/or the volume-and-intensity response to a price change.

IV. The OACT Study

Our study used data on Medicare expenditures for a five percent sample of physicians from 1994 through 1996. This time period was selected for three reasons. First, in addition to being the most recent data available, it reflects experience under the Medicare physician fee schedule. This is desirable because the fee schedule also entailed a uniform set of payment policies. Second, beginning in 1994, Medicare supplied its carriers with the exact prices paid for each procedure. Prior to 1994, the carriers determined the price that was paid based on a formula specified in law. However, some of the prices were not computed correctly. Accurate price information is integral to any analysis of the effects of price changes on volume and intensity. Finally, there are both increases and decreases in Medicare payments in these years because Medicare physician payments were transitioned from the prior reimbursement mechanism to the fee schedule from 1992 to 1996. Having significant price changes, in both directions, provides an excellent basis to analyze response to price changes.

The actual prices paid by Medicare for each procedure and each practice were then aggregated for each practice. Price indices were calculated for each practice based on their mix of services in 1994, using the Lespeyres index methodology. Change in volume and intensity is measured by the aggregate increase in expenditures less the price index. Additional variables that could possibly affect the volume and/or intensity increases were gathered for every locality. These variables included: fee-for-service enrollment, hospital admissions, number of physicians, population, personal income, unemployment, inpatient hospital days, hospital beds, and number of hospitals.

While analyzing the physician practice data, we noticed that some physicians were billing for a disproportionately large number of services. We concluded that multiple physicians must have been using the same “unique provider identification number” (UPIN) to bill Medicare. To eliminate this problem, the expenditures were aggregated at the locality level by specialty. (Locality is the smallest level for which Medicare determines unique prices through the geographic adjustments.)
Using the available information, regression models were specified to test both a symmetric response as well as an asymmetric response using the same methodology as in the Nguyen and Derrick study (Nguyen and Derrick, 1997). For the asymmetric model, the price changes were adjusted for the growth in the Medicare Economic Index, and the observations with price increases were considered separately from the observations with price decreases. The only variables that were significant in predicting volume and intensity growth were price changes and the change in fee-for-service enrollment. All of the other variables were found to be insignificant. Therefore, the models used in this study are:

**Symmetric:** \[ VI = a_1 + a_2 \times \text{FFS} + a_3 \times P \]

**Asymmetric:** \[ VI = a_1 + a_2 \times \text{FFS} + a_3 \times P + a_4 \times (P \times D) + a_5 \times D \]

where:
- \( VI \) = change in the volume and intensity of services
- \( \text{FFS} \) = change in fee-for-service enrollment
- \( P \) = change in price
- \( D \) = dummy variable (1 for price increases, 0 for price decreases)

Table 4 shows the results of the regression analyses. Both the symmetric model and the asymmetric model found statistically significant offsets to price changes. The results of the symmetric model yielded a 23 percent volume-and-intensity response for all specialties. The volume-and-intensity response from the regression on medical specialties only was 34 percent. The symmetric regression on surgical specialties did not yield significant results. For the asymmetric model, the volume-and-intensity response to price decreases for all specialties was 31 percent. The volume-and-intensity response to a price increase was not statistically significant, indicating that it may not be different than the volume-and-intensity response to a price decrease. The regressions on medical specialties and surgical specialties for the asymmetric model produced similar results. (Attachment 3 shows the details of the regression analyses.)

### Table 4 - Estimated Change in Volume and Intensity of Physician Services Resulting from a Price Change

<table>
<thead>
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<th>Symmetric Response</th>
<th>Asymmetric Response</th>
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<tr>
<td></td>
<td>All Observations</td>
<td>Price Decrease</td>
</tr>
<tr>
<td><strong>All Specialties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1994-1996)</td>
<td>23%</td>
<td>significant at the 5% level</td>
</tr>
<tr>
<td><strong>Surgical Specialties</strong> (1994-1996)</td>
<td>10%</td>
<td>significant at the 5% level</td>
</tr>
<tr>
<td><strong>Medical Specialties</strong> (1994-1996)</td>
<td>34%</td>
<td>significant at the 5% level</td>
</tr>
<tr>
<td><strong>All Specialties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1994-1995)</td>
<td>12%</td>
<td>significant at the 10% level</td>
</tr>
<tr>
<td><strong>All Specialties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1995-1996)</td>
<td>32%</td>
<td>significant at the 5% level</td>
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</table>

If we examine the regression equations for 1994-1995 and 1995-1996 separately, we can observe that the equations for 1994-1995 were not significant for either the symmetric model or the asymmetric model, yet the 1995-1996 experience was similar to that of the overall 1994-1996 experience. We believe the difference between the two periods is attributable to the Medicare Volume Performance Standard (MVPS) bonus/penalty system. In 1995, there was an average bonus of 7.5 percent, and surgical procedures (which suffered the greatest fee decreases in the transition to the full fee schedule) received a 12.8 percent bonus. In contrast, the average penalty in 1996 was 1.2 percent. Because of the impact of the MVPS bonus/penalty, the 1994-1995 physician data reflects a large proportion of practices that received price increases, (73 percent) and very few that received price decreases, (27 percent). The 1995-1996 experience is just the opposite: 87 percent of the practices received price reductions. Since the regression on the 1994-1995 experience, which contained mostly price increases, was not significant, this leads us to believe that there is no discernable volume-and-intensity response for practices with price increases and therefore the

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2 The “symmetric” models test whether comparable volume-and-intensity changes would occur in response to either relative price increases or decreases. “Asymmetric” models allow for unequal responses. In either case, the null hypothesis is that there is no behavioral response. In statistical tests of this type, the “burden of proof” is on the data to show that any measured relationship is significantly different from zero. Thus, the null hypothesis is assumed to be met unless the regression coefficients are so different from zero that it could not happen by random chance except p% of the time, where p is the critical value for the statistical test (typically 5%).
Asymmetric regression is more appropriate. Furthermore, specific incidences of volume and/or intensity increases (illustrated earlier) were far more prevalent among practices with price reductions.

An analysis was done on each specialty individually in an attempt to ascertain whether the volume-and-intensity response varied by specialty. Unfortunately, the price changes within the majority of the specialties were very similar. This made it difficult to get significant regression results.

In addition, we performed various analyses looking separately at practices that had overall price decreases versus those that had price increases. The results for practices with price decreases were similar to the results in table 4, with statistically significant response coefficients in the range of 30 percent. The results for practices that had price increases were statistically insignificant, meaning that the volume-and-intensity response was not significantly different from zero. These regressions were run (a) fully separately (i.e., first on data for practices with price increases and then on the remaining practices), and (b) using a combined model specification. The results were the same in each case. The combined model specification is shown below and the detailed regression output is shown in attachment 4.

Asymmetric: \[ VI = a_1 + a_2 \times \text{FFS} + a_3 \times (P \times D1) + a_4 \times (P \times D2) + a_5 \times D2 \]

where:
- \( VI \) = change in the volume and intensity of services
- \( \text{FFS} \) = change in fee-for-service enrollment
- \( P \) = change in price
- \( D1 \) = dummy variable (0 for price increases, 1 for price decreases)
- \( D2 \) = dummy variable (1 for price increases, 0 for price decreases)

As noted above, the two approaches to testing for an asymmetric response lead to identical statistically significant conclusions regarding the existence of a volume-and-intensity response to price decreases. For price increases, however, the two approaches produce indeterminate results. The asymmetric models in table 4 fail to reject the hypothesis that the response to price increases is equal in magnitude to that for price decreases. The separate models fail to reject the hypothesis that there is zero response to price increases. Qualitatively, the strong response identified in the data for practices with price decreases, contrasted to the indeterminate response for price increases, further supports the view that there is an asymmetric response to price changes.

Since the asymmetric model found statistically significant results for all specialties with a price decrease, and similar results were attained from the regressions performed on medical specialties and surgical specialties separately, we recommend use of a 30 percent volume-and-intensity response to Medicare a price decrease for physicians' services. Since the volume-and-intensity response to a Medicare price increase was indeterminate, we continue to recommend no behavior offset for Medicare price increases.

V. Further Research
While significant evidence exists to support the view that behavioral responses occur in practice, uncertainty remains as to the extent, magnitude, etc. The regression analysis showed the statistical significance of Medicare price decreases on volume and intensity, but it failed to explain a large part of the total variation in volume-and-intensity changes over time. Also, our study was conducted using only two years worth of price changes. Therefore it would be desirable to continue studying behavioral responses. In particular, this issue could be reanalyzed using the 1997-1998 experience when it becomes available. In 1998, Medicare changed from three separate physician fee conversion factors back to a single conversion factor. This change created variations in Medicare price changes for physician practices similar to the 1994-1996 experience, again forming a solid database for analysis of both positive and negative price changes in volume and intensity.

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3 Mathematically, the two approaches are equivalent, with the exception of the assumed probability distribution for the error term of the model. The combined specification assumes a common distribution for both types of physician practices, whereas the regressions on separate data permit the error distribution to differ between the two types.
In 1998, the payment mechanism for Medicare physicians’ services was also substantially changed in another respect. Under the Balanced Budget Act of 1997, the MVPS was replaced by the Sustainable Growth Rate (SGR) system. There are two major differences between the MVPS and the SGR that are integral to this discussion. The first is the way the behavioral offset to any payment penalties is handled. Under the MVPS, the assumed behavior response to an MVPS penalty was included in the calculation of a future allowed increase. By law, this does not occur under the SGR system. The second difference lies in the allowed volume-and-intensity increase. This increase in the MVPS was equal to the average increase in the volume and intensity of services for the previous five years. Therefore, if the volume and intensity of physicians’ services increased, there would be a larger Medicare allowance for the volume and intensity of services in the future. With the SGR system, the allowed volume-and-intensity increase is equal to the increase in real per capita Gross Domestic Product (GDP), eliminating the link to the previous years’ increases in volume and intensity. These two differences notably change the long-term financial incentive for physicians to increase their volume and intensity.

In addition to continuing the study, an attempt could be made to add more explanatory variables to the regression analysis. Ideally, the study would contain revenue information on the entire physician practice, not just the Medicare physician reimbursement. Any behavioral response is probably not confined to the practice’s Medicare revenues, but more likely also includes recouping some of the lost income by increasing their private insurance revenues. While this method of recovering lost income is not relevant for determining the impact of legislative proposals on Medicare, the additional data may improve the results of the regression equation by explaining a greater portion of the variability in volume-and-intensity growth.

VI. Conclusion

Our analysis of the Medicare volume-and-intensity responses resulting from a reduction in Medicare’s physician fees suggests that practices experiencing such reductions might try to avoid or minimize revenue reductions by making offsetting changes. This possibility may be augmented by the tendency for beneficiaries to accept or seek more services when their cost-sharing is reduced as a result of lower allowable charges.

In practice, there exists considerable anecdotal evidence of behavioral responses by physician practices to price reductions. Incidences of upcoding and volume increases tend to be much more common among physician practices receiving price cuts. These apparent behavioral responses can have a marked effect on the Medicare reimbursements for individual practices and can also affect total Medicare expenditures for physicians’ services. Therefore, we must consider this effect when determining the impact of legislative proposals, when projecting Medicare expenditures under present law, and when establishing Medicare payment rates where the law specifies budget neutrality.

More important than the anecdotal evidence, formal statistical studies consistently find significant evidence supporting the hypothesis of a volume-and-intensity response to physician fee reductions. The independent studies summarized in this memorandum, as well as our own analysis, suggest that in aggregate, physicians will increase the volume and intensity of Medicare claims in such a way as to offset between 30 percent and 50 percent of the revenue reductions that would otherwise result from decreases in Medicare fees. Minimal evidence has been found to support a hypothesis of reduced volume and intensity in response to fee increases.

The available evidence also supports the view that the behavioral response may be decreasing over time. This may be due to random chance, or more likely may reflect the changes in the payment mechanism for Medicare physicians’ services. The studies conducted after the Medicare fee schedule was implemented in 1992 estimated the volume-and-intensity response to price reduction to be between 30 percent and 40 percent. The estimates from our own study were about 30 percent.
Because of the apparent downward trend in the behavioral response to price reductions, and the change in the incentives for such a response due to the implementation of the SGR system, we recommend a 30 percent behavioral offset to price reductions for future cost estimates involving physician payments. As always, this assumption should be used only as a guideline, and may be modified on individual proposals or determinations if appropriate.

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Actuary

John D. Shatto, ASA
Actuary
References

Nguyen, Nguyen Xuan, and Frederick William Derrick. “Physician Behavioral Response to a Medicare Price Reduction,” Health Services Research, August 1997

Physician Payment Review Commission, Annual Report to Congress, April 1993

Physician Payment Review Commission, Annual Report to Congress, April 1992


ORTHOPEDIC SURGERY

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SYMERIC MODEL REGRESSION ON ALL SPECIALTIES 1994 - 1996

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| FFSINC   | 1  | 0.85552            | 0.07936649     | 10.779                | 0.0001|
| PRICE    | 1  | -0.229888          | 0.0529594      | -4.341                | 0.0001|

ASYMMETRIC MODEL REGRESSION ON ALL SPECIALTIES 1994 - 1996

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| FFSINC    | 1  | 0.847524           | 0.07993047     | 10.603                | 0.0001|
| PRICE     | 1  | -0.306631          | 0.10238231     | -2.995                | 0.0028|
| PRICE*DUM | 1  | 0.175857           | 0.17265652     | 1.019                 | 0.3085|
| DUMMY     | 1  | -0.181397          | 0.18159091     | -0.999                | 0.3179|
### SYMMETRIC MODEL REGRESSION ON SURGICAL SPECIALTIES 1994 - 1996

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</tbody>
</table>

#### PARAMETER ESTIMATES

| Variable | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|----------|----|--------------------|----------------|-----------------------|-------|
| INTERCEPT| 1  | 0.170117           | 0.12973204     | 1.311                 | 0.1901|
| FFSINC   | 1  | 0.963093           | 0.11323124     | 8.506                 | 0.0001|
| PRICE    | 1  | -0.098097          | 0.07258519     | -1.352                | 0.1767|

### ASYMMETRIC MODEL REGRESSION ON SURGICAL SPECIALTIES 1994 - 1996

#### ANALYSIS OF VARIANCE

<table>
<thead>
<tr>
<th>Source</th>
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<th>Mean Square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
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#### PARAMETER ESTIMATES

| Variable  | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|-----------|----|--------------------|----------------|-----------------------|-------|
| INTERCEPT | 1  | 0.35415            | 0.18742348     | 1.89                  | 0.0591|
| FFSINC    | 1  | 0.955692           | 0.11338863     | 8.428                 | 0.0001|
| PRICE     | 1  | -0.28792           | 0.1530011      | -1.882                | 0.0602|
| PRICE*DUM | 1  | 0.068227           | 0.22679616     | 0.301                 | 0.7636|
| DUMMY     | 1  | -0.036653          | 0.23709411     | -0.155                | 0.8772|
### Symmetric Model Regression on Medical Specialties 1994 - 1996

**Analysis of Variance**

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<tr>
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<td>Dep Mean</td>
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<td>C.V.</td>
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<tr>
<td>Adj R-Sq</td>
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**Parameter Estimates**

| Variable  | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|-----------|----|--------------------|----------------|------------------------|--------|
| INTERCEPT | 1  | 0.649559           | 0.14101293     | 4.606                  | 0.0001 |
| FFSINC    | 1  | 0.709115           | 0.12034712     | 5.892                  | 0.0001 |
| PRICE     | 1  | -0.336706          | 0.08639856      | -3.897                 | 0.0001 |

### Asymmetric Model Regression on Medical Specialties 1994 - 1996

**Analysis of Variance**

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**Parameter Estimates**

| Variable  | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|-----------|----|--------------------|----------------|------------------------|--------|
| INTERCEPT | 1  | 0.609765           | 0.19901064     | 3.064                  | 0.0022 |
| FFSINC    | 1  | 0.716737           | 0.12267466     | 5.843                  | 0.0001 |
| PRICE     | 1  | -0.300751          | 0.15158507     | -1.984                 | 0.0475 |
| PRICE*DUM | 1  | 0.075541           | 0.29447259     | 0.257                  | 0.7976 |
| DUMMY     | 1  | -0.090988          | 0.31090738     | -0.293                 | 0.7699 |
SYMMETRIC MODEL REGRESSION ON ALL SPECIALTIES 1994 - 1995

ANALYSIS OF VARIANCE

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Statistic Value

- Root MSE: 0.15754
- Dep Mean: 1.033
- C.V.: 15.2504
- R-Square: 0.0151
- Adj R-Sq: 0.0142

PARAMETER ESTIMATES

| Variable  | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|-----------|----|--------------------|----------------|-----------------------|------|
| INTERCEPT | 1  | 0.421639           | 0.14657627     | 2.877                 | 0.0041 |
| FFSINC    | 1  | 0.741122           | 0.12832816     | 5.775                 | 0.0001 |
| PRICE     | 1  | -0.122106          | 0.07970791     | -1.532                | 0.1257 |

ASYMMETRIC MODEL REGRESSION ON ALL SPECIALTIES 1994 - 1995

ANALYSIS OF VARIANCE

<table>
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Statistic Value

- Root MSE: 0.15757
- Dep Mean: 1.033
- C.V.: 15.254
- R-Square: 0.0155
- Adj R-Sq: 0.0138

PARAMETER ESTIMATES

| Variable  | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|-----------|----|--------------------|----------------|-----------------------|------|
| INTERCEPT | 1  | 0.153508           | 0.32628981     | 0.47                  | 0.6381 |
| FFSINC    | 1  | 0.748702           | 0.12887624     | 5.809                 | 0.0001 |
| PRICE     | 1  | 0.139691           | 0.30038835     | 0.465                 | 0.642  |
| PRICE*DUM | 1  | -0.322295          | 0.33208016     | -0.971                | 0.3319 |
| DUMMY     | 1  | 0.325259           | 0.33509895     | 0.971                 | 0.3318 |
### SYMMETRIC MODEL REGRESSION ON ALL SPECIALTIES 1995 - 1996

#### ANALYSIS OF VARIANCE

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#### PARAMETER ESTIMATES

| Variable | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|----------|----|--------------------|-----------------|-----------------------|------|
| INTERCEPT| 1  | 0.404225           | 0.12151848      | 3.326                 | 0.0009|
| FFSINC   | 1  | 0.90173            | 0.10253427      | 8.794                 | 0.0001|
| PRICE    | 1  | -0.321614          | 0.07184457      | -4.477                | 0.0001|

### ASYMMETRIC MODEL REGRESSION ON ALL SPECIALTIES 1995 - 1996

#### ANALYSIS OF VARIANCE

<table>
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<tr>
<th>Source</th>
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#### PARAMETER ESTIMATES

| Variable | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|----------|----|--------------------|-----------------|-----------------------|------|
| INTERCEPT| 1  | 0.40572            | 0.13134225      | 3.089                 | 0.002 |
| FFSINC   | 1  | 0.900764           | 0.10286651      | 8.757                 | 0.0001|
| PRICE    | 1  | -0.322258          | 0.08552662      | -3.768                | 0.0002|
| PRICE*DUM| 1  | -0.061695          | 0.41016224      | -0.15                 | 0.8805|
| DUMMY    | 1  | 0.064608           | 0.42401973      | 0.152                 | 0.8789|
Attachment 4

ALTERNATIVE ASYMMETRIC MODEL REGRESSION ON ALL SPECIALTIES

ANALYSIS OF VARIANCE

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PARAMETER ESTIMATES

| Variable  | DF | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob>|T| |
|-----------|----|--------------------|----------------|------------------------|------|
| INTERCEPT | 1  | 0.489464           | 0.12997693     | 3.766                  | 0.0002|
| FFSINC    | 1  | 0.847524           | 0.07993047     | 10.603                 | 0.0001|
| PRICE*DUM1| 1  | -0.306631          | 0.10238231     | -2.995                 | 0.0028|
| PRICE*DUM2| 1  | -0.130774          | 0.13870402     | -0.943                 | 0.3459|
| DUMMY2    | 1  | -0.181397          | 0.18159091     | -0.999                 | 0.3179|