

HCFE Working Paper

HCFE WP# 2011-02

Estimating Hospital Cost Shift Rates: A Practitioners' Guide

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December 2010

This work was funded by the Department of Veterans Affairs, Veterans Health Administration, Health Services Research and Development Services. This report presents the findings and conclusions of the authors and does not necessarily represent VA or HSR&D.



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A companion to “How much do hospitals cost shift? A review of the evidence,” by Austin Frakt, (*The Milbank Quarterly* 89(1), 2011). A working paper version is available at http://www.hcfe.research.va.gov/working_papers.asp.

22 December 2010

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Acknowledgements: This work has been supported Grant Number 63744 from the Robert Wood Johnson Foundation's Changes in Health Care Financing and Organization Initiative. The statements expressed in this article are those of the authors and do not necessarily reflect the views or policies of the VA Boston Healthcare System or the BU School of Public Health. The author thanks Uwe Reinhardt for his encouragement in conducting this research, and Michael Morrissey, Vivian Ho, and Steven Pizer for their comments on an early draft.

1.0 Introduction

This paper is a companion to Frakt (2011), which is a non-technical review of the academic literature on hospital cost shifting over the last 15 years (since 1996). The purpose of this paper is to serve as a guide to researchers considering estimating cost shift rates or wishing a more detailed, econometric interpretation of the literature that does. Thus, though this paper covers some of the same material as Frakt (2011), it does not provide any policy or historical context or background, and goes into greater technical depth on econometric specifications and technique. As such, I do not draw any policy conclusions from the literature surveyed below and encourage readers to consult Frakt (2011). In fact, I assume the reader has read Frakt (2011) and is therefore familiar with the term “cost shifting” and how it differs from price discrimination, as well as details of how the literature search was conducted. Moreover, I use economic and econometric terms freely in this document, presuming readers requiring definitions are able to find them elsewhere.

2.0 Cost Shifting Theory

My purpose in reviewing cost shifting theory is to identify non-price factors potentially relevant to the phenomenon. Such factors should be considered in empirical studies (reviewed in Section 3) to provide an unbiased estimate of cost shifting. Section 2.1 illuminates the role of provider and insurer market power and the implications of an assumption of profit maximizing behavior by providers. Section 2.2, considers what can happen when providers maximize a utility function that includes factors other than profit.

2.1 Market Power and Profit Maximization

Cost shifting theory is concerned with a health care provider that treats patients of two types, “public” and “private.” These two types differ in their health coverage by entities with distinct contracting and payment practices. Public payers set provider payments by fiat and accept any willing provider. Medicare is the prototypical public payer, though Medicaid programs have similar characteristics. Private payers negotiate payments with providers using their ability to selectively contract (form contracting networks) with a subset of them as a source of negotiating power. An insurance firm is the prototypical private payer (Glazer and McGuire 2002).

This distinction highlights the role of “excludability” in the cost shift dynamic. Providers—which can be hospitals, physician groups, nursing homes, or any firm providing health services—in markets for which good substitutes exist are more easily excluded from insurers’ contracting networks. This is a source of leverage for insurers and drives private prices downward. In contrast, high prestige or “must have” providers can exercise brand power and command high private prices. Similarly, a hospital with a local monopoly (due, say, to a large distance to the closest competitor) is not excludable from insurers’ networks, driving up private payments for that hospital. Hospitals with capacity constraints can also demand higher prices (Ho 2009).

Market concentration among insurers also plays a role in private prices. A firm that commands a large share of the private insurance market will also have a large degree of power in negotiating the price of health care services. Even a relatively large hospital cannot afford to be excluded from the network of a dominant insurer, a phenomenon that pushes insurers’ input prices (provider prices) downward, though is ambiguous with respect to output prices (premiums) (Dafny, Duggan, Ramanarayanan 2009). Put another way, if insurers’ demand for provider services is perfectly elastic (demand curve is horizontal), providers have no ability to set prices above marginal costs. In such a case, there is no scope for cost shifting (Morrisey 1996).

Thus, the size of static price markups (or degree of price discrimination) depends on provider market power *relative* to that of insurers. The relative balance of power is different for different provider types. Physician groups tend to be small practices with little market power while hospitals are large and consolidated (Ginsburg 2003). Therefore, on theoretical grounds, one ought not to expect cost shifting behavior on the part of physician groups. Whether and the extent to which hospitals engage in cost shifting is an empirical question. That they *could* cost shift cannot be ruled out on an argument based on market power alone.

Since markups require market power, cost shifting or a change in markups requires a change in the degree to which market power is exercised. That is, if market power commanded by providers is not fully exploited then there is some scope for cost shifting even when the balance of provider-insurer power remains fixed. But this scope for cost shifting is not limitless. Once provider market power is fully exercised, there is no further ability to profitably raise private prices. This is why an assumption of profit maximization on the part of providers leaves no room for them to shift costs. If profits are at a maximum, they can only go down if prices are increased (Morrisey 1996).

Most economists reject the possibility of cost shifting by appealing to a profit maximization hypothesis (Morrisey and Cawley 2008). Showalter (1997) shows mathematically the consequences of this hypothesis. When public payers cut price per patient to a provider, that provider re-optimizes its profit function. The new equilibrium is one for which quantity supplied to the public payer is lower, a simple result of supply and demand: an exogenous shift downward in price translates into lower quantity supplied. The capacity is then shifted to private patients, increasing the quantity of that type served. To attract a higher volume of private patients, the provider must lower its per patient private price, again a simple consequence of supply and demand. Thus, in response to lower public payments, profit maximization predicts a *volume shift* (lower public volume, higher private volume) and a price spillover (lower private payments as well). This is the antithesis of the cost shifting theory (Rice et al. 1999; McGuire and Pauly 1991). Morrisey (1993, 1994, 1996) points out that such a response is also expected for non-profit hospitals provided they seek to maximize their charitable work.

So far we've considered the response of private prices and volumes to a change in public prices. However, it's plausible that causality runs the other way—that public prices respond to private ones. Glazer and McGuire (2002) propose such a dynamic. They imagine that all payers share the same level of quality from each provider, assumed to be profit-maximizing. Knowing this, public payers are able to benefit from the higher quality associated with higher private payment. By strategically underpaying, public programs “free ride” on private payers. This illustrates the potential endogeneity of public payment in a model of private payment. For example, Medicare is motivated to set prices low—so low that, were Medicare the only payer, the resulting quality would be socially inefficient—and then to rely on the private sector to “repair” the inefficient levels of quality.

Another result of the Glazer and McGuire (2002) model is that the degree to which a profit-maximizing provider responds to Medicare payment changes is a function of its public/private payer mix. A greater share of private payments dilutes whatever effect on quality public payment policy shift might have. The greater share of public patients, the more leverage public payment policy changes exert.

Wu (2009) characterizes the “reverse causality” story of Glazer and McGuire (that public prices respond to private ones) as a “strategy” hypothesis in the sense that public payers are behaving strategically in setting prices. In contrast, she dubs the more standard story—that hospitals with unexploited market power—as the “market power” hypothesis. The two hypotheses suggest a different response by payer mix. Under the market power

hypothesis, hospitals with a larger share of private patients would cost shift more because of their greater bargaining power. On the other hand, the strategy hypothesis suggests that hospitals with a larger share of private patients would cost shift less because they are less sensitive to (less reliant on) public payments.

Stensland, Gaumer, and Miller (2010) provide another mechanism by which public payer based hospital margins are a response to private payer based revenue. They imagine a hospital with high market power that commands high markups over marginal costs. This permits a relaxed attitude toward cost, allowing them to rise. (Alternatively, it could be the high cost structure is itself a factor in high market power, perhaps due to high quality.) High costs will cause Medicare margins to be negative.

In conclusion, the literature on cost shifting theory based on profit maximization is unambiguous. Cost shifting cannot exist if providers maximize profit. However, if they do not fully exploit their market power, theory suggests that the scope for cost shifting is still related to their degree of market power, as well as costs and quality, public/private payer mix, and insurer market power. In addition, there are reasons to think that private payment levels cause public payment levels or margins. Together these theories suggest the possibility that causality runs both ways: shifts in public payments may cause shifts in private payments *and* vice versa. Hence, in a model with private payment as the dependent variable, public payment may be endogenous.

Though we've already touched on the implications for cost shifting if providers do not maximize profit, next I consider theories that attempt to explain what they may be maximizing instead.

2.2 Utility Maximization

Eighty-five percent of beds in community hospitals are in non-profit institutions (Ginsburg 2003). There is nothing that says non-profit hospitals cannot charge profit maximizing prices. They may, for example, maximize prices to privately insured patients in order to maximize resources for charity work. In such a case, there is no scope for cost shifting (Morrisey 1993, 1994, 1996). In the remainder of this section I consider the opposite case in which such hospitals do not maximize profit, but rather optimize over other factors as well.

Clement (1997/1998), citing prior work in agency theory, argues that both non-profit and for-profit hospitals maximize utility functions with both profit and quantity components. She therefore assumes a hospital strategy governed by a model developed by Dranove (1988) for which the hospital maximizes utility with both quantity and profit components over two payers. Such a model allows for the possibility of cost shifting, provided the hospital

has underutilized market power and sets prices commensurately lower than the market could profitably bear. This result is intuitive because lower prices lead to higher volume, which is a component of the hospital's utility function. Dranove also showed that cost shifting is mitigated by competition.

Zwanziger, Melnick, and Bamezai (2000) develop a theoretical model also similar to that of Dranove (1988). The latter includes fixed average costs across payers, and the former assumes a variable average cost model. Both show that that profit maximizing providers would not cost shift. However, providers that maximize utility that depends on profit and volume may or may not cost shift, depending on details of the utility function and the marginal profitability of privately insured patients. Hence, measures of patient volume ought to be considered as independent variables in the specification of an empirical model of hospital prices.

Rosenman, Li, and Friesner (2000) hypothesize that non-profit hospitals seek to maximize prestige. They suggest this is done by maximizing revenue subject to the constraint that it covers costs. The authors show that such an objective function can lead to either cost shifting (high private prices and lower private volume) or the opposite (lower private prices and higher private volume) in response to lower public payments. Which will occur depends in part on the provider's ability to cut costs. The theory also predicts that payer mix is important. More public pay patients relative to private pay patients can increase the degree of cost shifting. Their theoretical model also includes the role of government grants. Grants decrease the likelihood of cost shifting and prevent it if the change in grant monies is large for changes in quantity of public patients served or public revenue collected. Friesner and Rosenman (2002) provide a similar a model of hospital prestige maximization (maximizing revenue subject to the constraint that it at least meets costs). They predict that cost shifting and lower service intensity are substitute responses and should occur under similar circumstances.

Cutler (1998) provides an intuitive, graphical depiction of a theory of non-profit hospital price setting under utility maximization. He shows that cost shifting and cost cutting are both expected when public payments to hospitals are reduced. The extent to which each is employed depends on the degree to which insurers have power to exclude hospitals, i.e. the elasticity of insurer demand for hospital services. Cost shifting requires a private sector with relatively inelastic demand. As demand becomes more elastic, hospitals respond more with cost cutting than cost shifting. This work highlights the role of costs and cost cutting. In principle, costs vary by payer because public programs and private insurers cover different populations with different needs (Morrisey 1993, 1996). Costs

can also vary by different rates over time for different payers. Hence, cost shifting analysis based on margin (revenue divided by cost) has the potential to confound changes in price with changes in cost.

In summary, the literature on cost shifting assuming utility (not merely profit) maximizing behavior by providers suggests that cost shifting is possible. The degree to which it occurs is expected to be related to public/private patient mix, changes in costs, other financial resources (e.g. grants), and service intensity.

3.0 Review of the Empirical Literature

The literature identifies many possible provider responses to decreases in public payments. They include (1) reduction in staff or wages, (2) reduction in (underutilized) capacity, (3) changes in quality, (4) reduction in services (trauma center, emergency rooms), (5) reduced diffusion rate of technology, (6) closure, (7) upcoding, (8) volume shifting, and (9) cost shifting (Cutler 1998, Dranove and White 1998, Tai-Seale, Rice, and Stearns 1998, Dafny 2005). Given all these possible responses and in light of the relatively narrow range of circumstances in which cost shifting can theoretically occur (as reviewed in Section 2), it is not surprising that the empirical literature generally finds little evidence of substantial, sustained cost shifting. I review that literature in this section. But first, I begin in Section 3.1 with a description of a general empirical framework that accommodates most cost shifting studies reviewed. In the subsequent subsections, I review studies that have attempted to measure (rather than assume) the level of cost shifting by physicians, nursing homes, and hospitals.

3.1 Empirical Framework

In my review of the theoretical literature in Section 2 I identified factors likely related to cost shifting: profit and ownership status, provider market power, degree of selective contracting presence in the market (managed care market penetration or insurer market power), demand for care, costs or cost drivers (like case mix, wage levels, capacity), quality, public/private payer mix, and other financial resources (like government grants). Let the vector x_{it} represent a set of control variables for provider i in year t that includes measures of all such factors. As rich a set of controls as these are, they likely do not capture all relevant provider effects or secular trends. Therefore, it is sound empirical strategy to include provider and time fixed effects. An empirical model of private prices, p_{it} is therefore given by

$$p_{it} = \alpha m_{it} + \beta x_{it} + \gamma_t + \delta_i + \varepsilon_{it} \tag{1}$$

where m_{it} is the public payer price (Medicare or Medicaid or a vector of both), γ_t and δ_i are year and provider fixed effects, respectively, and ε_{it} is the idiosyncratic error term. A slightly more general version of Equation (1) would include interactions between m_{it} and other terms and/or other interactions. That the coefficient vector β_t is potentially time varying is important, as discussed below

It is essential to be precise about what I mean by “price,” either private or public. I do not mean the provider’s list price or charges as those are not representative of what the provider is actually paid (Rosenman, Li, and Friesner 2000). Instead, I mean the actual transaction price. It is common in empirical work to use annual per patient revenue as an average annualized transaction price. Note also that Equation (1) is a model of price, not of price-to-cost ratio (or margin) or price less cost (profit). Since a possible response to changes in public price is a change in cost, a model of margin or profit does not permit an unambiguous assessment of cost shifting.

There are three general categories of empirical cost shifting studies based on the model of Equation (1). The first are cross-sectional studies that rely on variation across providers but not time. Models estimated in such studies do not include year or provider effects and the subscript t is not meaningful. Cross-sectional studies only reveal evidence of cost shifting under an assumption that geographical variation (or variation across providers) is a good proxy for temporal variation. In general, cross-sectional studies identify an effect by exploiting variation in price discrimination, which is a static phenomenon, not cost shifting, which is a dynamic one. A stronger class of studies rely on a fixed effects specification at least for providers (i.e. they include δ_i) and are based on a panel of providers for which multiple years of data are available. Such a model measures how private prices change due to changes in public prices relative to their provider-specific means.

A difference model removes all time-invariant factors, so is similar to a fixed effects specification (Wooldridge 2002). Such a model is found by taking the difference of Equation (1) at time t with itself at time $t-1$ so that

$$\Delta p_i = \alpha \Delta m_i + \beta_t \Delta x_i + \Delta \beta x_{it-1} + \Delta \gamma + \Delta \varepsilon_i \quad (2)$$

where Δ is the first temporal difference operator. All time-invariant effects difference out, but because the coefficients β_t are potentially time varying, a term linear in levels (as opposed to changes) in x remains. This is important since time-invariant levels of provider or market factors may be correlated with changes in private prices. Most studies assume either that β or x is time invariant (Wu (2009) is a notable exception).

The final element of an empirical framework for cost shifting is consideration of endogeneity of independent variables. As described in Section 2, there are theoretical reasons to believe that public prices can respond to private ones and vice versa. Therefore, to obtain an estimate of the causal effect of public prices on private ones using Equations (1) or (2) requires a source of exogenous variation in public prices. This is typically achieved with an instrumental variables (IV) approach in stronger studies, though many ignore this endogeneity potential. Hospital and insurer market structure variables may also be endogenous, a possibility considered in a few studies. Zwanziger, Melnick, and Bamezai (2000) note that costs too can be endogenous since unobserved quality is likely to be correlated with both costs and prices. No study addresses all these possible endogeneity issues simultaneously.

3.2 Physician Cost Shifting

Since 1996, there have been three studies of cost shifting by physicians. None found any evidence of it (Rice et al. 1996; Showalter 1997; Rosenman, Li, and Friesner 2000). Rosenman, Li, and Friesner (2000) analyze 1995 California primary care clinic data with relatively sophisticated methodologically that considers the potential endogeneity of Medicare prices and the role of government grants in a seemingly unrelated regression (SUR) framework. However, because the data are from a single year, it is a cross-sectional analysis. Though they claim to find evidence of cost shifting—and that it is mitigated by government grants—it is most informative of price discrimination and is only interpretable as cost shifting under an assumption that relationships revealed by variations over providers are identical to those that would be revealed by temporal variations. Given that health care markets are local and likely idiosyncratic in unobservable ways, such an assumption is not justified.

Likewise, Showalter (1997) investigates price discrimination in a study based on 1983-1985 cross-sectional Physicians' Practice Cost and Income Survey data. With physician level ordinary least squares (OLS) models of physician fees and Medicaid volume with Medicaid reimbursements as the key independent variable, he finds evidence consistent with profit maximizing behavior by physicians, which makes cost shifting an impossibility. Public and private payments are positively correlated and lower public payment is associated with lower public volume.

Rice et al. (1996) studied the effect of reductions in Medicare physician payment rates mandated by the Omnibus Budget Reconciliation Acts of 1989 and 1990 using a fixed effects specification with market-year as the

unit of analysis. OLS models of two different dependent variables—private billed charges and private billed charges less payment rates (called “excess charges”)—were estimated with Medicare payment rate as the key independent variable, controlling for nurse wage levels, provider density, HMO membership rate, and per capita income. The results are consistent with profit maximizing behavior on the part of physicians, not cost shifting. Private charges fell by 1.2% for each 10% reduction in Medicare payment rates. Because the models control for locality and year with fixed effects, they are capable of producing valid estimates of cost shifting.

3.3 Nursing Home Cost Shifting

My literature search identified a single study of nursing home price. Using 1994-1996 Florida Medicaid nursing home financial data and Online Survey Certification and Reporting (OSCAR) data, Troyer (2002) estimated an OLS model of the logarithm of per resident nursing home costs. Independent variables included resident-days by payer, wage and price indices, number of beds, case mix, percent elderly, profit and ownership status, measures of quality, and an MSA indicator. Using this estimated cost function, the author predicted the average incremental cost of providing services to a Medicaid patient for each facility and compared it to Medicaid payments. Payments are below costs for about one-quarter to one-third of Florida nursing homes. Troyer also finds that patients who convert to Medicaid during their stay have paid private rates above costs early in their residency. Thus, nursing home are compensating for the risk of residents’ Medicaid conversion by charging a premium to private payers. This finding is consistent with price discrimination and is not necessarily the signature of cost shifting.

3.3 Hospital Cost Shifting

The hospital cost shifting literature is more voluminous than that for physicians or nursing homes: I found ten such studies. A meaningful way to organize them is based on the typology explained in Section 3.1: according to cross-sectional, fixed-effects, and difference specifications. In my survey I found three, two, and four studies of these types, respectively, and one other that falls outside this typology. Among the studies with the strongest specification and methodological technique, the quantitative evidence of cost shifting is mixed. However, qualitatively, with one exception, all studies find no cost shifting or a level of it that is far below dollar-for-dollar. The exception is that Cutler (1998) found dollar-for-dollar cost shifting for the period 1985-1990. However, for the

period 1990-1995 he finds no evidence of cost shifting. The strongest study (Wu 2009) finds an average 21% cost shift rate for the 1996-2000 period.

One study (Gowrisankaran and Town 1997) estimates a structural model that is outside the typology of studies I follow below. Using Current Population Survey data, hospital cost report data from the Health Care Financing Administration (now the Centers for Medicare and Medicaid Services), and American Hospital Association data (all from 1991), the authors estimate by general method of moments (GMM) a fully dynamic structural model of the inpatient hospital market. The model captures dynamics of the a hospital industry in which for- and non-profits compete and maximize different objective functions, have different preferences for investment, and face different levels of taxation. For-profits maximize profits while non-profits maximize a mix of profits and quality, where quality is implemented as a reduced form abstraction but thought of as characterized by levels of physical and human capital, as well as unobservable components. The model includes the effects of hospital entry, exit, investment, and multi-payer pricing decisions, as well as patient preferences for hospitals. Observable input parameters included proportion of patients ill by payer, income threshold for free care, co-payment, Medicare deductible, Medicare reimbursement rate, corporate tax rates, and the discount rate.

Gowrisankaran and Town used their model to simulate the welfare effects of Medicare's 1984 switch from a retrospective to a prospective payment system for hospital services. They found that the new payment system resulted in a 10% reduction in quality and a 1% decline in private price due to more concentrated hospital markets. The authors characterize this as a cost shift in the sense that price per unit of quality increased. They also applied the model to simulations of a universal health care system and taxation of non-profits, descriptions of which are beyond the scope of this paper.

Cross-Sectional Studies

Stensland, Gaumer, and Miller (2010) published the most recent cost shift study. In it, the authors describe two hypotheses to explain descriptive evidence of the type that is frequently considered the signature of cost shifting. One hypothesis, promoted by the hospital and insurance industries or consulting firms on their behalf (PWC 2009, Fox and Pickering 2008; see also Dobson et al. 2009), is that costs are exogenous and lower Medicare payment-to-cost margins induce hospitals to seek higher payment from private sources. The alternative dynamic was described

in Section 2.1: hospitals with strong market power and a profitable payer mix have strong financial resources, high costs, and therefore low Medicare margins.

Though these are dynamic cost shifting hypotheses, strictly speaking Stansland, Gaumer, and Miller only tests static versions of them, that is, they only examine price discrimination. Pooling across years the authors illustrate how margins correlate across payers and how they relate to costs and market power. Their descriptive findings are based on 2002-2006 Medicare hospital cost reports. Because they stratify their analysis by degree of Medicare margin it is (weakly) cross-sectional. This analysis is supplemented with two case studies of Chicago and Boston area hospitals based on 2005 IRS filings and newspaper accounts to characterize qualitative differences in market power across hospitals. They find that hospitals with lower non-Medicare margins had higher Medicare margins. In turn, hospitals with higher Medicare margins had lower costs. Finally, hospitals with higher market power had higher costs, lower Medicare margins, and higher private-pay margins. However, the descriptive analysis does not support causal inference. Thus, they do not find evidence of dynamic cost shifting, indeed, they never test for it (though, to be fair, nor do the industry-funded studies the authors aim to refute).

Dobson, DaVanzo, and Sen (2006) employ a cross-sectional analysis of static public and private margins that does not consider the role of market power. Thus, it is more appropriate for the study of price discrimination than dynamic cost shifting. Using American Hospital Association survey data, they exploit year 2000 state variation in payment-to-cost margins for private payers, relating them to variations in Medicare, Medicaid, and uncompensated care margins, controlling for HMO penetration rates. Though they find statistically significant evidence of price discrimination, their analysis doesn't control for costs. Since costs are in denominator of the dependent and independent margin variables, the results confound price with cost effects, another reason why they do not provide evidence of cost shifting.

Fixed Effects Specifications

Due to the rich set of hospital payment and discharge data available from the California Office of Statewide Planning and Development, many cost shifting studies focus on the California market, spanning different methodologies and time periods. I review them in succession, beginning with Zwanziger, Melnick, and Bamezai (2000), which considers the California market over the 1983-1991 period. Just prior to this study window (1982) California enacted legislation that permitted establishment of selective contracting insurance products. By the end

of the study period (1990), over 80% of the privately insured in California were enrolled in such a plan. Thus, the period of study represents one of increasing price competition for hospitals due to the growing collective market share of network-based plans. Additionally, during the 1980s Medicare and Medicaid reimbursements to California hospitals fell relative to costs (Dranove and White 1998).

Zwanziger, Melnick, and Bamezai (2000) estimated a hospital-year level OLS model of per patient private payment with hospital and year fixed effects. Independent variables include per patient Medicare and Medicaid revenue, measures of hospital competition, ownership status, average cost, and case mix. Costs are instrumented because unobservable quality is correlated with both costs and payment levels. A large number of interactions are used to allow for heterogeneity of public price variables by level of hospital competition, profit status, and time period (1983-1985, 1986-1988, 1989-1991). The study window was broken into three equal size periods to test the hypothesis that cost shifting would be less feasible as managed care plans captured more of the market in later years.

The results indicate that hospitals—both for- and non-profit—shifted costs in response to reductions in Medicare rates. Elasticities varied across time period and hospital market concentration from a low of 0.17 to a high of 0.59. Non-profit hospitals in less competitive markets tended to have larger elasticities than those in more competitive markets. Responses to Medicaid cuts were an order of magnitude smaller and generally statistically insignificant. The results are consistent over time, despite the increasingly competitive nature of the market. This result is puzzling—as is the for-profit cost shifting finding—and not consistent with the findings of other studies, reviewed below. One possible explanation for such odd findings is that their cost instruments (each hospital's cost relative to average hospital costs computed over the state and over the hospital's market) may not be exogenous.

Zwanziger and Bamezei (2006) is a follow-up study in which the authors implement a similar fixed-effects specification, focusing on the same dependent and key independent public payment variables and using from the same data source. The principal difference is that the study window is later than that considered in Zwanziger, Melnick, and Bamezai (2000): 1993-2001. Also, a slightly different set of controls are applied: average costs (instrumented, as described above), level of hospital competition (HHI), and HHI-year interactions. The justification for returning to the cost shifting question with a very similar model and the same data source but at a later time is twofold: (1) California hospital price competition increased over the 1990s; and (2) the Balanced

Budget Act (BBA) of 1997 reduced the growth rate of Medicare hospital reimbursements. That the study window straddles 1997 BBA enactment is a particular strength, especially if one believes that its Medicare payment change provisions are a source of exogenous variation in Medicare prices.

The results of Zwanziger and Bamezei (2006) are, in many ways, qualitatively similar to those of their earlier study. They found no statistically significant difference in cost shifting relationships between for- and non-profit hospitals, no difference before and after the BBA, and no evidence of an influence of hospital competition intensity. Their main finding is that a 1% decrease in Medicare (Medicaid) prices caused a 0.17% (0.04%) private price increase. Put another way, over the 1997-2001 period, 12.3% of the total increase in private prices was caused by public payment decreases. Once again, the validity of these findings depend on the degree to which their cost instruments are exogenous.

The authors also estimated an OLS, California-wide, log-log model of private revenue-cost ratio as a function of Medicare and Medicaid revenue-cost ratios, controlling for costs. The results imply cost shifting elasticities of -0.68 for Medicare and -0.82 for Medicaid, magnitudes well above those found in the hospital-year level fixed effects specification described above. This illustrates the large degree of bias inherent in a simple model of margin aggregates.

Difference Models

Clement (1997/1998) examined the relationship between private revenue-cost margins and Medicare and Medicaid margins during three California fiscal years (1985-1986, 1988-1989, 1991-1992) relative to a baseline year (1982-1983). Using California Office of Statewide Health Planning and Development hospital discharge data, she estimates a hospital-level OLS with dependent variable change in log of private revenue-to-cost margin. Changes in Medicare and Medicaid margins are entered linearly and squared (not logarithmically), interacted with year dummies. Control variables include the hospital's total margin, a measure of other revenue, an historical average of asset value, hospital competition, HMO market strength, private occupancy rate, service mix, profit and ownership status, and other measures of case mix and hospital characteristics.

Clement found negative correlations between public and private margins, potentially evidence of cost shifting. However, because the model is of margins and not payment, one cannot separately identify effects on payment and

costs. Additionally, the inclusion of separate margins for Medicare and Medicaid across multiple years complicates calculation of a cost shift rate.

Dranove and White (1998) also examine changes in private price-cost margins, as well as in service levels and hospital closings, in the California hospital market during the 1980s and early 1990s. In contrast to Clement (1997/1998), however, they do not model changes in private margins as a function of those in public margins. Instead, they take a different approach based on the notion that if hospitals can shift costs, they will do so at a greater rate if their public pay case load is larger. In addition, hospitals with larger public case loads may reduce quality to a greater extent than those with smaller public case loads as public reimbursements decline. Dranove and White proxy quality with service intensity (number of services per day, controlling for DRG).

Using 1983 and 1992 California Office of Statewide Health Planning and Development hospital discharge data, Dranove and White estimate hospital-level OLS, SUR, and logit (for closings) models of the effect of Medicare and Medicaid case loads (proportions of billed charges) on changes in private margins, service levels to Medicare, Medicaid, or private patients (three different equations), and hospital closings, controlling for hospital competition, hospital size, a high-tech hospital indicator,¹ profit status, and drivers of demand. They tested different specifications with the independent variables entered as levels, changes, or both.

The authors found no evidence of cost shifting. Hospitals with larger Medicare or Medicaid caseloads reduced their private margins. However, because margin, not price, is the dependent variable, one cannot say whether prices fell or costs increased. Service levels for all payer types are negatively associated with Medicare and Medicaid case load sizes, though the results are not statistically significant for private payers. Dranove and White interpret this negative service level-caseload cross-payer correlation as support for the hypothesis that quality (as proxied by service level) is a public good. Finally, they find evidence that Medicaid-dependent hospitals are more likely to go out of business. Taken together, the results indicate that the burden of public payer reductions is borne by public patients. Hospitals with higher public payer case loads did not shift costs. Instead they reduced quality and were more likely to close.

¹ About the high-tech indicator the authors write that it “equals 1 if the hospital is in roughly the top one-quarter to one-third of all hospitals in the state in the breadth of high-tech service offerings, including neonatology, open heart surgery, cardiac catheterization, trauma center, magnetic resonance imaging, and radiation therapy.

Friesner and Rosenman (2002) is the final study based on California Office of Statewide Health Planning and Development hospital discharge data (from 1995 and 1998). The authors make a distinction between charges and payments. The former is what is billed and the latter is what the hospital actually receives. Their models include measures of charges and the proportion of them that are unpaid (i.e. 1-payments/charges). With hospital-level OLS models, the authors estimate the effects of changes in Medicare or Medicaid charges and the proportion unpaid on changes in private prices and public and private service intensity (length of stay), controlling for changes in number of beds, race, ethnicity, outpatient prices, and income. They estimate three models separately by profit status, on private price changes, and on public and private service intensity changes.

For the private price model, Friesner and Rosenman find a statistically significant and positive coefficient on the change in proportion of unpaid public charges for non-profit hospitals but no statistically significant coefficient for for-profit hospitals. They interpret this result as evidence that the former cost shift and the latter do not. However, they also find that the change in public charges is positively correlated with changes in private charges, which is not what hospitals actually receive in payment. For these reasons, their conclusion of non-profit cost shifting is not supported by their model. That a decrease in the proportion of public charges unpaid is associated with an increase in private charges (not all of which is received in payment) is not evidence that lower public payment leads to higher private payment.

The authors also find that reduced service intensity is associated with an increase in the proportion of public charges that are unpaid. They interpret this as evidence that hospitals reduce service intensity in response to lower reimbursement from public payers. But, again, changes in service intensity are also positively correlated with increases in public charges. The charge effect dominates the proportion unpaid effect. Thus, their interpretation is not actually supported by their results.

Cutler (1998) asks, to what extent do lower Medicare payments lead to lower costs (reduced services and lower quality) and to what extent is the cost level maintained and the burden of covering them shifted to the private sector? His answer depends in part on the nature of the private market, which varied considerably over the two time periods he examined—1985-1990 and 1990-1995. The time periods of study overlap a series of Medicare hospital payment reductions, including those established by the Consolidated Omnibus Budget Reconciliation Act of 1985, Omnibus Budget Reconciliation Acts of 1987, 1989, 1990 and 1993, and the Balanced Budget act of 1997.

For the key independent variable, Cutler constructs an arguably exogenous measure of Medicare payment reduction, which he calls the “Medicare bite.”² He notes that Medicare’s hospital prospective payment system had been designed to increase with the costs of medical inputs. However, reductions of the update factors drove a wedge between the originally designed increases and actual ones. The Medicare bite is the difference between the growth of the hospital market basket and the actual growth of Medicare payments multiplied by the number of Medicare patients served by the hospital.

Using data from Medicare cost reports and Interstudy, Cutler estimates by OLS the effect of the Medicare bite on hospital’s changes in per patient non-Medicare private revenue, hospital closures, number of hospital beds, changes in nurse staffing levels, and diffusion of technology, controlling for changes in cost, managed care enrollment, profit and ownership status, number of beds, and MSA size, but, notably, not hospital market structure. He found that over the 1980-1985 period hospitals shifted costs dollar-for-dollar, a much greater cost shift rate than found by Clement (1997/1998) and Zwanziger, Melnick, and Bamezai (2000) who studied the same time period (though those two studies focus on California only, as described above.) Over 1990-1995 Cutler found no evidence of cost shifting. Also, in the earlier period there was no evidence of an effect of reduced Medicare payment on hospital closure while in the later period a small effect indicating increased closures was detected. In both periods, nursing input was reduced as Medicare payments declined. There was little evidence that payment changes affected hospital size or diffusion of technology. Cutler’s interpretation is unambiguous. In the late 1980s, Medicare payment cuts were financed by shifting costs to the private sector. With the rise of managed care in the early 1990s, cost shifting was no longer feasible and cost cutting was the dominant response to lower Medicare payments. In particular, nursing staff levels were reduced.

Wu (2009) has provided what is, perhaps, the most careful study of the cost shifting hypothesis. With a long difference model using 1996 and 2000 Medicare hospital cost report data, she examines the effect on private prices of reductions in Medicare payments to hospitals as a result of the Balanced Budget Act of 1997. Moreover, she considers the heterogeneity of that effect across private-public payer mix (a test of the “market” vs. “strategy” hypotheses, discussed in Section 4.1), levels of hospital competition and share of hospitals in the market with for-

² Medicare bite is free of any endogeneity due to changes in hospital case mix because that is held constant in its construction. However, endogeneity could remain because most of the variation in Medicare bite is due to differences in Medicare revenue across hospitals which may not be random. Also, the endogeneity of the type raised by Glazer and McGuire (2002) could remain if Medicare changes payments in response to the private margins.

profit status. Of all studies reviewed, Wu's provides the strongest mitigation against and test of the potential endogeneity of Medicare payment, thereby providing the most plausible estimate of its causal effect.

Wu constructs two instruments for changes in Medicare revenue: a "BBA bite" (similar to Culter's (1998) "Medicare bite") and 1996 ratio of Medicare to non-Medicare discharges. The first of these, but not the second, is also used as an instrument for change in Medicare price.³ The dependent variable is the change in per patient non-Medicare price, again similar to that of Culter (1998). Two types of models are estimated, one with instrumented Medicare price changes as the key independent variable and another with instrumented Medicare revenue changes as the key independent variable. Independent variables include instrumented Medicare price and revenue changes, a bargaining power measure (the share of discharges that are private pay less that for Medicare patients),⁴ hospital ownership type, level and change in HMO market penetration (also instrumented), change in case mix, hospital occupancy rate, level and change in Medicaid-to-Medicare physician fee ratio, share of for profit hospitals, and hospital market concentration.

Wu estimated a variety of OLS models with hospital fixed effects. In some models, the key independent Medicare price or revenue change variables are interacted with the bargaining power variable (to test the market power versus strategy hypotheses). In other models, the Medicare revenue change is further interacted with hospital characteristics (profit status, teaching hospital indicator, public hospital indicator, HMO market penetration level and change, level and change in proportion of discharges in the market represented by for profit hospitals). She found that, on average hospitals shifted 21 cents of each Medicare dollar lost to private payers. The degree of cost shifting varies by hospital bargaining power: a one standard deviation increase in such power increases the cost shifting rate to 33 cents on the dollar. There is no statistically significant evidence of heterogeneity in cost shifting by for-profit, teaching, or public hospital status. Nor does it vary by HMO market penetration or change of it. A smaller degree of cost shifting occurs in markets with a higher share of discharges from for-profit hospitals.

³ In analysis not provided in the paper, Wu obtained very different results using un-instrumented changes in Medicare revenue and price, thereby justifying the need for instruments (Wu 2010).

⁴ This variable is closely related to one of the instruments used for Medicare revenue so one might think it ought to be excluded as an independent variable in the second stage model. However, Wu conducts a falsification test, finding that the instrumented variables are not statistically significant in the same second stage models using data from a prior period (1992 to 1996).

4.0 Discussion

From the analysis of all cost-shifting literature since 1996 provided in the foregoing sections, a number of important conclusions can be drawn. The studies of hospital cost shifting I reviewed have focused on three time periods, the 1980s through early 1990s (five studies), the mid-1990s through early 2000s (four studies), and one study covering early- to mid-2000s. Of these ten studies, four found some evidence of cost shifting, but at levels generally well below dollar-for-dollar. Two studies report mixed results for which cost shifting occurs during some time periods or for some markets or provider types but not others. The remaining four studies do not reveal evidence of cost shifting. There is no clear temporal pattern to the findings. Likely, findings depend on methodology and geographic focus.

Taken together, these results strongly suggest that factors other than cost shifting are largely responsible for private price changes and that other responses to public price changes dominate that of private price adjustments. This conclusion is made more plausible by the theoretical literature on the subject, which shows that cost shifting can only occur if providers both possess market power and have not fully exploited it. This both limits the conditions under which cost shifting is possible and its extent. Once market power is fully exploited, as it would be by a profit-maximizing firm, there is not further scope for cost shifting. The theoretical literature also revealed the potential endogeneity of public prices in models of private ones, and the role of costs and provider and insurer market power.

The main implications of these findings for practitioners were described in Section 3.1, which developed an empirical specification for statistical analysis of cost shifting. Plausible causal inferences of the rate of cost shifting can be estimated from data, but not without careful attention to the form of dependent variables, the inclusion of relevant observable factors, the attention to potential endogeneity of others, and the use of a fixed-effects or difference model approach.

Additional conclusions and their policy relevance are provided in Frakt (2011).

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