

Health Spending Growth: The Effects of the Great Recession

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One of the most noted economic phenomena of the past few years has been the slowdown in health spending. Washington Post columnist Robert Samuelson called the 5-year stabilization in health spending's share of GDP one of the "15 most interesting stats" of 2014. These past five years also followed the most severe recession experience since the Great Depression, as well as the enactment of the Affordable Care Act (ACA), a major health reform that had a slowdown in health spending as one of its goals. Thus, a natural question is whether the recent pattern of health spending growth represents a major turning point, or whether it is a temporary phenomenon associated with the economic slowdown or other factors.¹

The trajectory of health spending growth has important implications for our economy. It is one of the most important variables determining the long-run sustainability of both federal and state budgets. If health care spending remains subdued, then projected future deficits appear relatively manageable. But, if health spending accelerates, then we will need to take much larger measures in the future to either tame it or to raise taxes or cut other spending.

Of course, health spending has benefits, and a slowdown does not necessarily imply an increase in welfare. To the extent the slowdown is due to the after-effects of the recession, perhaps we should not view it any differently than a slowdown in purchases of cars or other consumption items. A full accounting of the recent experience would obviously require a measure of outcomes as well as costs. Nonetheless, regardless of the benefits of health spending, it seems clear that, over the long run, our society will not be able to finance health spending growth at its historical level, and a slowdown in spending growth would clearly have significant benefits, although perhaps costs as well.²

For these reasons, the question of what drives health spending growth is a subject that has received much attention from researchers and policymakers, although much remains to be learned. In this paper, I build upon previous research examining the relationship between GDP changes and health spending. In particular, I use several sources of health spending by state to examine the degree to which and the channels through which near-term changes in GDP affect health expenditures. I also examine the relationship between the slowdown in non-Medicare spending and Medicare spending at the state level, both over long periods of time and over this recession in particular.

¹For other views on this question, see, Cutler and Sahni (2013), Chandra, Holmes, and Skinner (2013), Holahan and McMorro (2013), Roehrig (2013), and Ryu, Gibson, McKellar and Chernew (2013).

²Most analysts believe that the growth of spending over time largely reflects improvements in medical technology that increase the value of health spending. Although there is no question that a slowdown in health spending that reflected improvements in the efficiency of health spending would be a net good for the economy, it is also possible that a slowdown owing to a less-rapid pace of even useful medical technology growth could be a good thing for the economy.

How Much Has Health Care Spending Slowed?

One of the most dramatic representations of the recent slowdown in health spending is shown in Figure 1, which plots the share of national health expenditures in GDP over time. As noted by Samuelson, health spending has remained at a constant 17.4 percent of GDP since 2009, a phenomenon not seen since the mid-1990s during the era of managed care. But, of course, health spending as a share of GDP reflects not just the growth rate of health spending, but also that of GDP, and what are also evident in Figure 1 are the large jumps in the health spending share of GDP between 2006 and 2009, when GDP fell sharply but health spending did not. Over those three years, the health spending share of GDP increased almost 2 percentage points: from 15.6 percent of GDP to 17.4 percent of GDP. When plotted against *potential* GDP (CBO's estimate of what the GDP would be at full employment)—the blue line in the figure—one can see a gradual, albeit still muted increase over time.

A better gauge of the recent pattern of health spending is the real growth rate of health spending per capita, shown in Figure 2. As shown in the figure, real per capita health spending has been tumbling since 2002, and has been growing at historically low rates since about 2008. Some analysts have pointed out that, since the slowdown in spending started in 2002, well before the Great Recession, it is unlikely to have been caused by it. But, this reasoning omits two important facts: one, there was also a recession in 2001, which could have pushed health spending down early in the decade, and two, health spending growth appears to move in cycles. Thus, it seems quite plausible, that absent the recession, spending growth might have turned up against in the late 2000s rather than continuing to tumble.

Prior to some recent research, discussed below, most analysts would have assumed that health spending does not respond very much to changes in GDP related to business cycles. After all, the demand for health care in cross-sectional regressions appears to be quite income inelastic (Newhouse, 1992, 1993.) Indeed, as noted above, excess cost growth tends to jump sharply during recessions, because health spending falls much less than GDP in recession years. But the recent slowdown in health spending growth has led to more thinking about the potential for near-term changes in GDP to affect national health spending growth.

Why Would Health Spending Respond to GDP in the Short Run?

There are a number of different channels through which GDP may affect spending. One can group them loosely as demand channels and supply channels.

Demand Channels

The depth of the Great Recession resulted in a number of economic changes that likely would affect the demand for health care goods and services. First, along with the surge in unemployment came a large decline in the percent of Americans with private health insurance, as

shown in the top panel of Figure 3. While some of that decline was offset by an increase in Medicaid coverage, shown in the middle panel, there was also a large increase in the share of Americans that were uninsured, as shown in the bottom panel. For those who lost insurance (and lost a job), it is likely that any discretionary spending on health care would be delayed.

In addition, even for those who were able to maintain health insurance, the financial difficulties that beset many households during the recession—associated with unemployment, housing foreclosures, and lost access to credit—likely led to a contraction in demand for health goods and services as well. This contraction in demand could have led directly to lower spending on discretionary health services, but it also likely led to changes in the types of insurance that firms offered and that employees chose. For example, there has been a significant increase in health insurance plans with high deductibles, as shown in Figure 4. The share of workers with employer-sponsored health insurance with a deductible of \$2,000 or more increased from 3 percent in 2006 to 18 percent in 2014, according to the Kaiser/HRET Survey of health plans.

Finally, state and local governments, which typically have balanced budget requirements, also face tighter budget constraints during recessions. This past recession was particularly challenging for them as the sharp drop in home prices translated into lower property tax revenues, which is a significant source of revenues for these governments. In response, states may have cut Medicaid reimbursements, tightened eligibility, cut back on outreach efforts, and reduced staff for Medicaid and public health activities in general.

Supply Channels

Changes in some parts of the economy likely have spillover effects in the health sector. For example, job losses in more cyclically-sensitive industries lead to an increase in the supply of labor of workers whose skills are not specific to the health industry. In addition, the labor supply of highly specialized workers may also increase during recessions, in response, for example, to a spouse losing employment or a household generally facing financial difficulty. Indeed, Staiger, Auerbach, and Buerhaus show that the labor supply of RNs increased sharply during the recession, and they argue that this is a temporary phenomenon that will abate as the economy recovers. The increase in labor supply to the health industry may result in a slowdown in wage growth.

Figure 5 shows both these phenomena. The top panel charts the growth rate of the ratio of health workers to population. Health employment to population accelerated in 2007 and 2008, and has remained at close to 1 percent per year since then. In contrast, as shown in the bottom panel, real wage growth in the health industry decelerated sharply between 2007 and 2010, and has remained relatively low since then.

In addition to the supply of labor, the supply of new technologies might also be affected by recessions. This recession, in particular, was marked by extremely tight credit markets for all

types of borrowers. If the health industry invested less in research and new technologies, then health spending would naturally slow.

Finally, insurers may have responded to the recession by cutting into their markups. Dafny (2010) demonstrates that, in concentrated insurance markets, insurers charge higher premiums to more profitable firms. Thus, as firm profitability fell during the recession, insurers were likely to have exercised their market power and lowered premiums.

Finally, the health industry is extremely fragmented and shifts across sectors can affect aggregate spending. For example, Medicaid payment rates tend to be significantly lower than those paid by private insurers. A shift from private insurance to Medicaid would, all else equal, result in a lower average price for health services and lower nominal health spending.

Examining the Components of the Slowdown for Clues

Table 1 analyzes the growth rates of different components of spending and compares them to earlier periods. As shown in the top line of the table, real national health expenditures (NHE) rose at an average rate of 1.7 percent per year during the 2008 to 2013 period, 2 percentage points below the average rate from 1993 to 2007, and 2.5 percentage points below the average from 2000 to 2007.³ Regardless of the comparison period, this looks like a very significant slowdown.

The middle portion of the table shows the growth rates of various components on NHE, with those exhibiting the greatest slowdown relative to the 1993 to 2007 period shown first. The ordering is quite suggestive. Spending on prescription drugs, which increased 8 percent per year between 1993 and 2007, has been completely flat since 2008. Much of this slowdown reflects the “patent cliff” in which the patents of many commonly used drugs have expired and the use of lower-priced generics has surged. The other components of spending that have slowed sharply include the net cost of health insurance and private and public spending on insurance administration, health research, public health activities, and investment in structures and equipment. These slowdowns likely reflect the combination of tight government budgets, which have lowered public spending on administration and public health, difficult financing conditions during the recession, which likely constrained investment in the health sector, and strategic behavior on the part of insurers with market power.⁴

Of the components of personal health consumption (goods and services that are consumed by people), drugs, dental services, and purchases of durable and nondurable goods other than prescription drugs, have slowed the most. These are goods and services for which out-of-pocket payments represent a relatively large share of expenditures, suggesting that the poor economy

³I use the top-line GDP deflator, rather than the GDP deflator for health services, so this measure adjusts for overall inflation, but not changes in the relative price of medical goods and services.

⁴ State budgets have been tight since the beginning of the recession, while federal budgets have been very tight over the past few years.

has played a role in the decline.⁵ The slowdown has been smallest in physician, other professional, and hospital services. Indeed, the growth rate of hospital services from 2008 to 2013 was actually somewhat above the rate observed over the 1993-2007 period. The growth rate of hospital, physician, and other professional services together rose only ½ percentage point less from 2008 to 2013 than over the 1993-2007 period, but the slowdown was 1¼ percent relative to 2000-2007.

Table 2 reports recent trends in private health insurance premia, using a number of different sources. The first column reports on trends in the health insurance premiums reported in the Medical Expenditure Panel Survey (MEPS) for single-coverage and family-coverage. The second column reports premiums from the Kaiser/HRET Survey of Employer and the final column reports health spending expenditures from the Employer Cost Index. All three measures show a significant slowdown in health insurance premiums in recent years, although there is a fairly wide variation in the reported growth rates in both periods, and the degree of slowdown ranges from 3 percentage points (MEPS, single coverage) to 4.3 percentage points (Kaiser/HRet).

National Regressions

Recent work by the Altarum Institute in conjunction with the Kaiser Family Foundation (Roehrig 2013), as well as subsequent research by Chandra and Skinner (2013), Sheiner (2014), and others, has shown that changes in annual GDP growth are predictors of health spending growth.

Table 3 presents the results of regressions that use data on national health spending and GDP from 1975 to 2007 to test whether near term changes in health GDP affect health spending. (The regression uses years **prior** to the current recession to test whether the recent slowdown can be explained. Given that we know that both health spending and GDP have declined in recent years, including the recession years would bias the test toward finding a relationship.)

The first column of the table simply regression real national health spending per capita on current and lagged real GDP growth per capita. The second column adds in a measure of relative health prices, using the BEA health price index, the third column adds a time trend, and the fourth column adds a dummy variable for the post-1991 period. Although not measured with precision, the regressions show that near-term changes in GDP growth do affect health spending, but that these effects occur slowly over time. The sum of the coefficients on GDP are between .7 and .8. Sheiner (2014) demonstrates that Medicare expenditures are not well explained by GDP growth, and, if anything, the relationship appears to be the opposite of that for overall health spending and for non-Medicare spending.

⁵ As part of the ACA, the federal government also instituted new measures aimed at preventing fraud, particularly for the purchases of DME and home health. Although the new DME rules did not go into effect until July 1, 2013, Medicare spending on DME has slowed much more than non-Medicare DME spending over the 2008-2013 period.

The national regressions suggest a reasonably strong relationship between health spending and near-term GDP growth, but there is not that much variation to exploit. Furthermore, the national regressions do not control for changes in Medicare policies or variations over time in the availability of new medical technologies like new procedures or new drugs that might affect health spending.

An examination of state-level regressions can help address some of these issues and also provide a different source of variation to exploit in order to test the relationship between gdp growth and health spending. However, one might expect the responsiveness of health spending to be smaller at the state level than at the national level, for a number of reasons. First, many large firms operate in multiple states, and they may be less likely to change insurance offerings in response to economic shocks that affect only some of their states. Second, there is more labor mobility across states, so that a shock to one industry in one state is less likely to have spillover effects on health worker wages. Finally, because technology availability crosses state borders, it is less likely that an economic contraction in one state will have an effect on spending through a slowdown in technological progress.

State Regressions

Data:

- The Center for Medicare and Medicaid Services (CMS) publishes estimates of personal health care expenditures by state. (These exclude items like public health, health administration, and investment, another reason why the state-level relationships might differ from the national ones using national health expenditures.) However, these data are currently only available through 2009.
- The Bureau of Economic Analysis (BEA) has recently published experimental estimates of personal consumption expenditures by states for the years 1998 to 2012. These estimates include a line item for health service expenditures (so, exclude drugs and other health goods).
- The BEA also publishes estimates of the health industry workforce and its compensation by state, allowing me to compute a health industry wage.
- Finally, the MEPS includes estimates of health insurance premiums by state for all states from 2003 to 2006, and 2008 to 2013. (Earlier years exclude a number of states.)

Table 4 shows the results using the state personal health expenditures by state of residence published by CMS. The first column reports the results of a regression of the growth in real state

health spending on the growth rates of current and lagged real personal income growth by state.⁶ Without any controls for year or state fixed effects, this regression exploits both cross-state and cross-time variation in income and finds large and positive effects of income growth on health spending, with the coefficient equal to .8, about the same result as in the national regressions. Adding state fixed effects, column (2), does little to the results, but adding year effects, which controls for all national variation in income growth, changes the results substantially. Column 4 controls for both state and year fixed effects. This regression shows a smaller but still reasonably large relationship between changes in state personal income growth and state health spending. The lag structure is slower than in the national regressions, with income changes affect health spending with a lag of up to six years. The sum of the coefficients on this regression is .4, much smaller than in the national regressions, but still substantial.

Table 5 decomposes health spending into its components. Looking across the top of the table, one can see that spending on dental services is the most responsive to changes in personal income, with the effect occurring gradually over 4 years. Hospital spending is also quite responsive, although that effect takes place with long lags. Prescription drug spending responds strongly to current income growth, but not so much to its lags. Finally, spending on the services of physicians and other professionals appears the least responsive to local income shocks.

Table 6 decomposes spending into Medicare and non-Medicare spending. I restrict this table to spending on hospitals, physicians, and other professional services, because these services are largely paid by Medicare for Medicare beneficiaries.⁷ Non-Medicare health expenditures are significantly more responsive to changes in personal income than are aggregate health expenditures by state. Column (1) shows the effect of income on total spending for this category of services, and column (2) shows the effect on non-Medicare beneficiaries. The sum of the coefficients is much larger in column (2). However, as in the regressions in Table 1, hospital spending remains more responsive to income than spending on physicians.

Table 7 compares uses BEA's experimental data on health service spending by state. As shown in the first column, without year or state fixed effects, the effects on personal income in these data are large, significant, and similar to those found in the other data sources. However, controlling for year fixed effects shows smaller and shorter-lived effects on health spending. Whether this reflects the difference in the time periods or something else is not clear. It is true that during this time period there were two national recessions that were fairly widespread, and so controlling for year effects might not leave that much cross-state variation to exploit.

⁶ These results differ somewhat from those in Sheiner (2014) because of BEA's sizable revisions to per capita personal income by state. The numbers used in this paper were published by BEA in August 2014.

⁷ To calculate non-Medicare spending, I subtract total Medicare spending on hospitals, physicians, and other professionals plus the total out of pocket payments for these services, and then divide by the non-Medicare population.

Table 8 addresses the supply side by examining employment, wages, and compensation in the health industry across the states, spanning the years 1970 through 2012. The first column of the table examines the relationship between income growth and wages in the health industry. Health industry wages respond strongly to local shocks, with a 1 percentage point increase in income growth translating, over time, into a .67 percentage point increase in wages. The second column examines employment effects. These, conversely, are negatively related to shocks to state income. Health industry employment relative to state population falls in good times, but rises in bad times. However, the effect is much smaller, so that, as shown in column 3, total real compensation for health industry workers per capita—which can be viewed as a rough measure of health spending—is positively related to income. In particular, a 1 percentage point increase in state income leads to about ½ percentage point increase in compensation, with the effect taking places over about five years.

Thus, in recessions, health worker wages fall while health employment rises. While further work is needed to detangle demand from supply side effects, this is, on its face, more consistent with a labor supply story than a labor demand story. If the demand for health services fell, and hence the demand for health labor fell, one would expect to see both a reduction in wages and a reduction in employment. But, if shocks to other industries spilled over into increased labor supply in the health industry, one would expect to see lower wages but higher employment.⁸

Table 9 addresses the question of the relationship between Medicare and non-Medicare expenditures at the state level, again limiting the analysis to expenditures on hospital, physician, and other professional services. Because year fixed effects are included, any variation in national Medicare policy that affects spending across the states uniformly is excluded here. Furthermore, because state fixed effects are included, any systematic variation in growth rates between Medicare and non-Medicare health spending are also excluded. The regressions show a strong and negative relationship between Medicare and non-Medicare spending at the state level, with a 1 percentage point increase in Medicare growth associated with a ¼ percentage point decrease in non-Medicare growth. The relationship is unaffected by the inclusion of income or health industry wages, and is strong and significant in both the early years and the later years of my sample. As shown in the final two columns of the table, however, the negative relationship appears only at the hospital level; Medicare and non-Medicare expenditures on physician services are uncorrelated. This negative finding is surprising in light of recent evidence suggesting that there are positive spillovers from non-Medicare to Medicare. However, Sheiner (2015, BPEA) finds that, the **levels** of Medicare and non-Medicare spending appear to be negatively correlated, and hypothesizes that providers use Medicare to help finance fixed costs in places where non-Medicare resources are limited. Whether a similar phenomenon could be occurring with changes in income over time is unclear and worthy of further research.

⁸ Note that this story is also consistent with that told by Stevens, Miller, Page, and Filipksi, who find that mortality of the elderly declines in recessions because, given lower wages, nursing homes hire more staff.

In summary, the state level regressions provide further evidence of a large effect of income growth on health expenditures. The effect appears to occur relatively quickly for prescription drug and dental spending, but more slowly for hospital and physician services. The state regressions also confirm findings from the national regressions and other researchers (e.g., Levine and Buntin, 2013) that Medicare spending appears invariant to current economic conditions. An open question is whether the reduction in spending on hospital and physician services reflect changes in demand for those services—perhaps mediated by changes in insurance policies that affect access to those services---or whether they are simply a reflection of spillover effects that affect the labor supply to the health industry. Regardless of the answer to this important and interesting question, these effects are likely to be temporary.

What Can we Learn From these data about THIS Recession?

The past 6 years have been unusual in many ways. The recession was extremely deep and widespread—affecting employment, the stock market, housing values, and credit markets--and the recovery has been particularly slow. In addition, unlike in previous recoveries, the stance of fiscal policy during the recovery has been quite tight; from 2011 through much of 2014, fiscal policy was a net negative for the economy.⁹ Inflation has been extremely low as well, making it more difficult for firms to lower real wages without lowering nominal wages, and possibly making them more likely to cut back on employee benefits like health insurance. Finally, a major health reform was enacted. The ACA likely had far-reaching effects on the health industry, combining an expansion of Medicaid and private insurance coverage with provider payments cuts and performance incentives under Medicare.

Thus, it is worthwhile examining the state data that are available for the years during and following the recession to see whether the patterns evident in the historical data hold true for the recent recession and recovery as well.

I exploit three sources of data: the changes in the MEPS insurance premium by state, the changes in health industry wages and compensation from the BEA, and the changes in BEA's measure of personal consumption expenditures on health services. BEA has not released much detail about the methodology used to construct the state level consumption measure, but they do say that they use data on compensation for years for which they do not have source data, so there is probably some overlap between these sources.

Figure 6 plots the national trends in insurance premiums from the MEPS. Insurance premiums rose sharply in the late 1990s and early 2000s, but have been relatively muted since. It is interesting to note that it is 2012 and 2013 that have shown the slowest growth rates over the past decade (the Kaiser/HRET premiums show a similar pattern). This is consistent with the findings

⁹ See the Hutchin's Fiscal Barometer for an analysis of the stance of fiscal policy at <http://www.brookings.edu/research/interactives/2014/fiscal-barometer>.

from Sheiner (2014) that shocks to GDP affect private health insurance premiums with a long lag.

Figure 7 plots the percent change in real MEPS premiums by state from 2009 to 2012 against the percent change in real personal per capita income by state from 2007 to 2011.¹⁰ One thing that is clear in all these regressions is how weak these tests are. First, the insurance premiums by state vary widely by year and across data sources so are likely measured with a fair bit of error.¹¹ Second, the recession was quite widespread and most states experienced similar levels of economic distress; thus, much of the identification comes from the outlier states: North Dakota and South Dakota, which enjoyed a huge boom owing to fracking, and Nevada, whose housing market collapsed.

Keeping these caveats in mind, there does appear to be some relationship between the depth of the recession and the subsequent growth rate of health expenditures, with the positive outlier states experience the greatest gains in premiums and the negative outlier state experiencing the smaller. Figure 8 examines the relationship between health industry wages and changes in per capita income. These data show a somewhat more robust positive relationship with income growth, perhaps because the data are measured with less error. Finally, Figure 9 shows the relationship between MEPS premium changes and health industry wage changes. This relationship is quite strong and robust.

Table 10 presents the regressions results associated with these graphs. The regressions show a strong and robust relationship between wages and income, and between insurance premiums and income. But, once the changes in health wages are included in the regressions, there is no longer any relationship between changes in personal income and health insurance premiums, suggesting, again, that much of the relationship between health spending and near-term economic conditions stems from the supply side.

The middle portion of the table conducts the same set of regressions using BEA's personal consumption of health services measure (with the graphs shown in Figures 10 and 11). The regressions in Table 10 show that health service spending growth between 2008 and 2012 was also correlated with income, with every 1 percentage point change income associated with a .6 percentage point increase in the growth rate of health service spending. The relationship persists even when the growth rate of health worker wages is included in the regression.

Finally, the bottom of Table 10 examines the relationship between Medicare fee-for-service (FFS) spending and personal income growth by state, using CMS's data on FFS Medicare

¹⁰ I also tried a number of other years – the changes from 2009 to 2013 show a similar pattern, but the fit is not as good.

¹¹ I compare three measures of insurance premiums: the MEPS, the Kaiser/HRET survey, and the health insurance costs from the Employer Cost Index. All three show a slowdown between 2000-2006 and 2007-2012, but the extent of the slowdown varies across measures (even for family vs single policies) and the annual patterns are also different.

expenditures for the over-65 population by state from 2008 to 2012. Surprisingly, there does seem to be a relationship between income growth and Medicare spending. As is clear from Figure 12, this relationship is once again dominated by the outliers like North Dakota and South Dakota. But, this relationship appears to be due the relationship between Medicare's geographic price adjustment and wages. Once this is taken into account, by using the growth of price-and-risk adjusted spending instead of nominal spending, there is no longer any relationship between income growth and medicare spending growth.

Table 11 attempts to find evidence of spillovers from Medicare to non-Medicare expenditures, perhaps stemming from the effects of the ACA. The ACA cut the annual updates to payments to hospitals and other non-physician providers, and also cut payments to Medicare Advantage plans. It is possible that some of the reason for the slowdown in investment in the health care industry was in response to these provider cuts, rather than in response to the recession. Further, to the extent that tight budget conditions lead to improvements in efficiency (see White, Medpac and.., and for some evidence of this), the budget cuts under the ACA might have improved efficiency in a way that affected the treatment of both Medicare and non-Medicare beneficiaries. In addition, the ACA included a number of incentives to improve the quality and efficiency of care. The penalty for readmissions has been viewed as particularly effective in cutting Medicare hospital readmissions. This penalty may have changed practice styles in a way that also improved the care of and lowered spending for non-Medicare beneficiaries.

The top panel of Table 11 uses the change in the real MEPS premium between 2009 and 2012 to test these hypotheses. The regressions all include the change in real personal income growth, and also include various measures related to Medicare. The Medicare variables I examine are: the real growth rate in per-beneficiary FFS Spending from 2008 to 2012, the real growth rate of price-and-risk adjusted per beneficiary FFS Spending from 2008 to 2012, the ratio of Medicare to total health expenditures in the state in 2006, the change in Medicare readmission rates between 2008 and 2012, the change from 2008 to 2012 in the percentage of Medicare beneficiaries who had an inpatient admission (labeled the Medicare Admission rate) and the change in the number of Medicare outpatient visits per beneficiary.

The table is laid out so that each row represents a different regressions. For example, the first row of the table shows the results of a regression of the MEPS premium on income and the growth rate of Medicare spending, the second row shows the results from a regression of the MEPS premium on income and the growth in price-and-risk-adjusted Medicare spending, etc.

Examining the top panel of the table, one can see no relationship between changes in the MEPS premium and any of the Medicare measures—states where readmissions fell the most are not the states where insurance premiums rose the least, etc.. Similarly, states in which the Medicare share of spending is high did not see different premium growth from states in which the Medicare of spending is low.

The bottom panel of the data uses the BEA’s measure of health service consumption by state. This measure should capture the health service consumption of Medicare beneficiaries, so one would expect the Medicare variables to have some explanatory power. And, indeed, they do. The change in Medicare readmissions, for example, does affect health spending—with every 1 percentage point reduction in readmission lowering total health service spending .2 percentage point. This seems roughly in line with the elderly share of hospital admissions, so it is not clear if there are any spillover effects.¹² There is no evidence of a greater spending slowdown in states in which the Medicare share of spending is high, suggesting that the prospect of future provider cuts may not be responsible for the recent slowdown.

Implications for Our Understanding of the Slowdown

All of these regressions have attempted to measure the degree to which health spending responds to near-term changes in GDP. If health spending is written as:

$$\text{Health Spending per capita} = \alpha + \beta * (\text{Lags of GDP per capita})$$

then the regressions should be viewed as an attempt to obtain estimates of β .

It seems clear from all the regressions with all the different data sets that health spending does respond to near-term changes in income. The estimates of β range from a low of about .3 to a high of about .7. The responsiveness is significantly larger when the data are limited to the non-Medicare population.

Table 12 explores the implications of these different estimates for the interpretation of the recent slowdown in health spending. It takes the growth rates of health spending presented in Table 1 and subtracts the parts “explainable” by changes in GDP growth, using three different β ’s – that is, three different coefficients on GDP growth: 0.8, 0.6, and 0.3. Specifically, the table reports the difference between the growth rates of spending and β times the growth rate of per capita real GDP over the same time period—that is, it shows estimates of α over the different time periods.

Using a coefficient of 0.8, for example, we see that the slowdown in NHE relative to the entire 1993-2007 period is very small—that is, the α for NHE was about ¼ percentage point lower in 2008 to 2013 than in the entire 1993 – 2007 period, but about 1¼ percentage points lower than in the 2000 to 2007 period. However, as shown in the bottom row of the table, the slowdown is eliminated if we focus only on personal health expenditures less prescription drug spending. That is, if the correct coefficient on GDP is 0.8, then there appears to be no slowdown in

¹² The Medicare share of hospital spending in 2006 average 28%, ranging from a low 13 percent in Alaska to a high of 36 percent in Arkansas.

personal health spending less prescription drugs relative to either the 1993-2007 period or the 2000 to 2007 period.

Moving over the the bottom-right corner of the table, we see that, even if the coefficient on GDP is only 0.4—then the unexplained portion of health spending growth ex drugs slowed in 2008-2013 relative to 2000-2007, but not relative to the entire 1993 to 2007 period.

Of course, this table does not distinguish between Medicare and non-medicare consumption, and much of the evidence suggests that Medicare spending is unresponsive to changes in income. The fact that Medicare has slowed so much remains a puzzle to be explained. The evidence does suggest a fair degree of wage spillover during the recent recession and recovery, and this appears to have led to a larger slowdown in Medicare spending in states with slow wage growth. But part of this slowdown in wage growth was offset, nationally, by a smaller productivity adjustment, so the slowdown in wage growth is likely to be a more important factor explaining cross-state variation in Medicare spending growth than in explaining national Medicare spending growth.¹³

Conclusion

This paper examines the question of the responsiveness of health spending to income growth. First, I examine the components of the recent slowdown and find that the components that slowed the most were drug spending, investment, research, public health and administration, and dental. Spending on physician and hospital services slowed the least. It seems clear that there is a large income responsiveness for spending components that are more discretionary; further, the patent cliff appears to have had a significant effect on the spending slowdown.

I then use cross-state variation in health income and health spending to examine the responsiveness of personal health consumption to income. I find that spending is quite responsive to income, but the effect occurs fairly gradually. I find that health employment rises but health wages fall in response to negative income shocks, so part of the relationship between health spending and income may be due to the wage effect, rather than to direct effects on demand. I find that in the historical data, Medicare appears unresponsive to income growth and negatively correlated with non-Medicare spending. In the most recent period, Medicare spending growth appears to slowed more where income growth, and hence wage growth, was weaker. Finally, I examine the implications of these findings for the interpretation of the recent slowdown. Relative to the entire 1993-2007 period, there appears to be no slowdown in personal health spending excluding prescription drugs, even when using a very small value for the effect of real GDP changes on spending.

¹³ The ACA instituted annual productivity adjustments that subtract the 10-year average of multifactor productivity from the provider updates. The slowdown in productivity associated with the recession and slow recovery reduced this adjustments, thereby raising payments and offsetting, to some extent, the lower wages that are also a component of the Medicare update.

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Figure 1

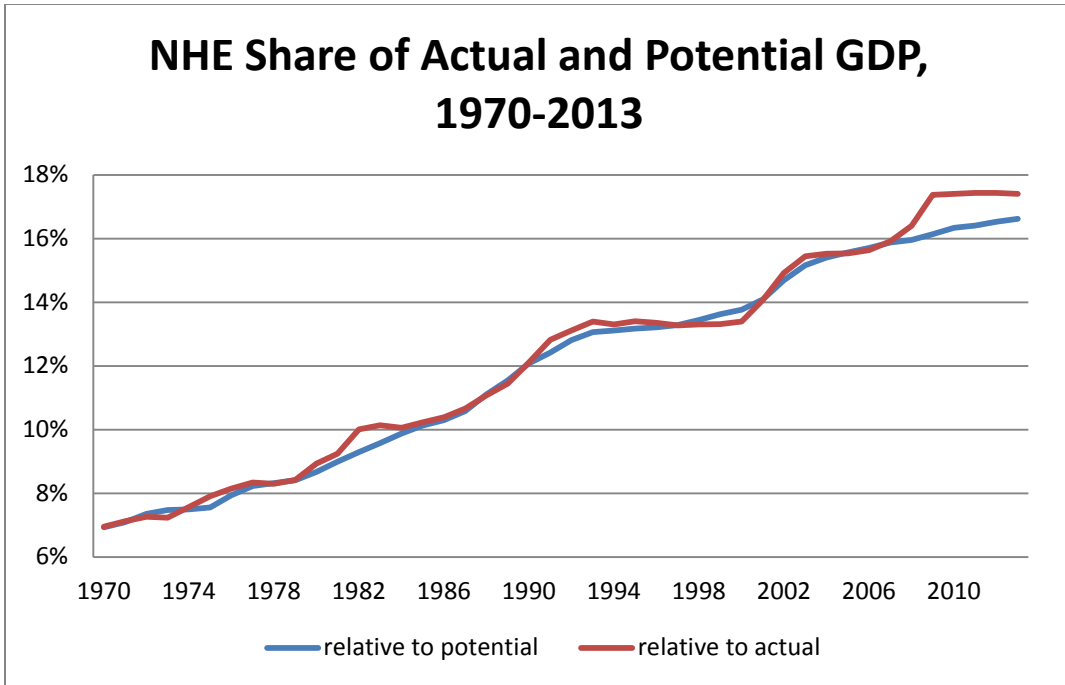


Figure 2

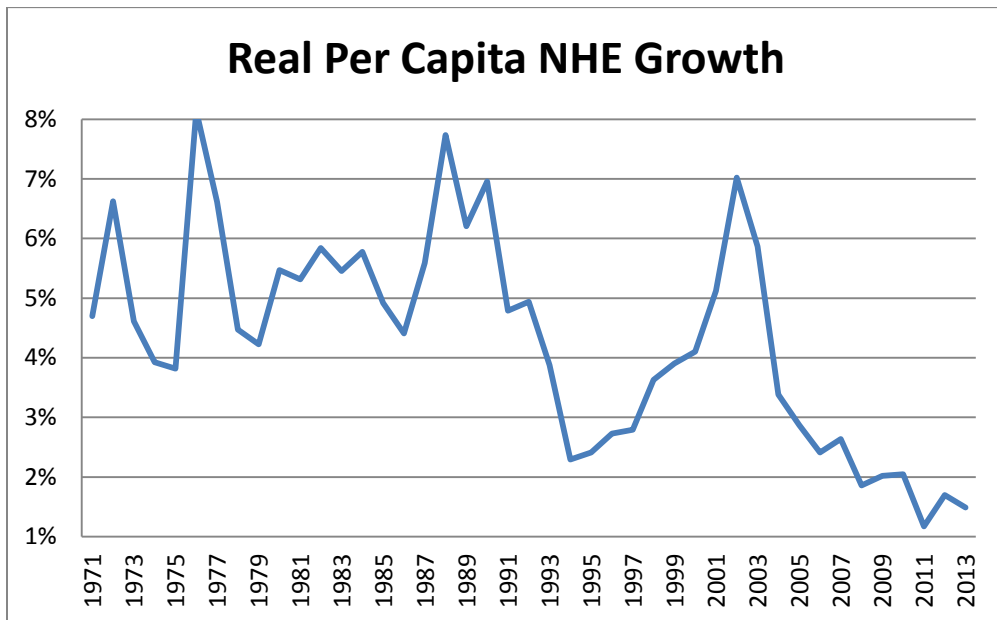


Figure 3

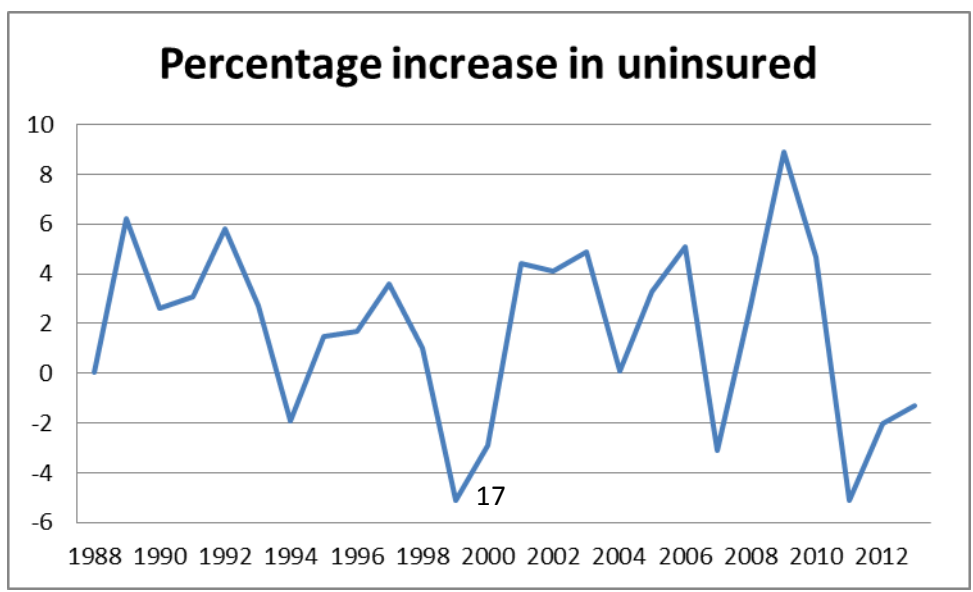
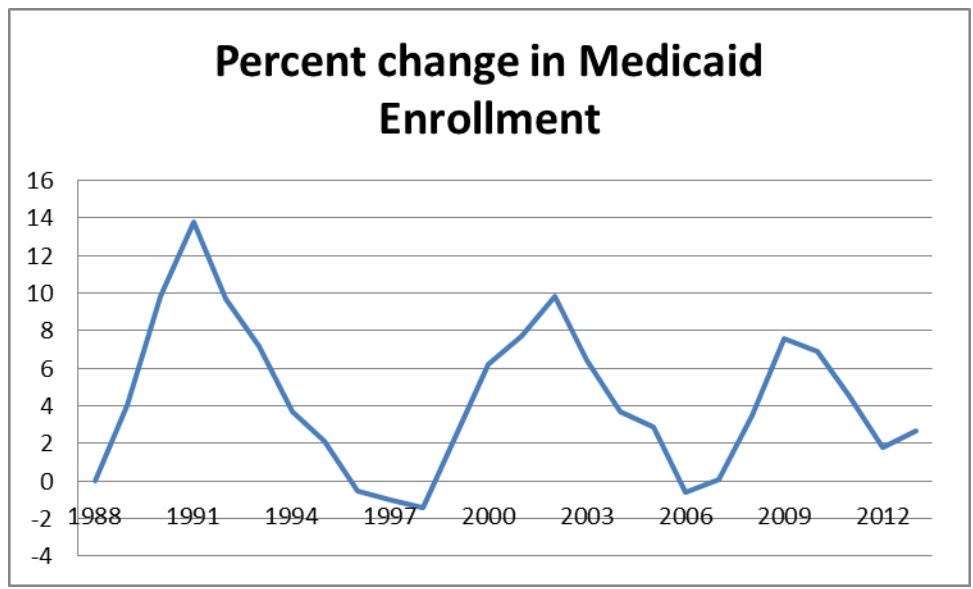
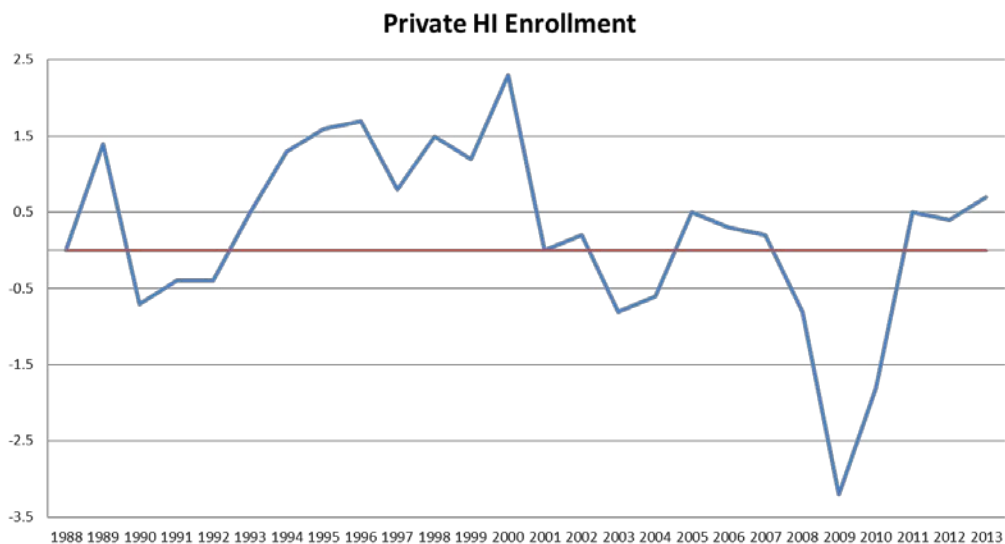


Figure 4

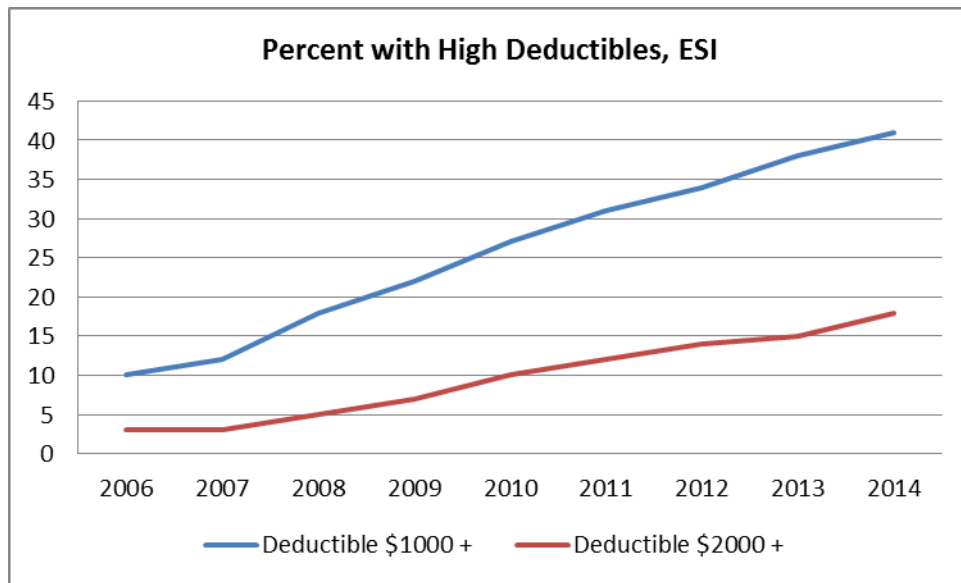


Figure 5

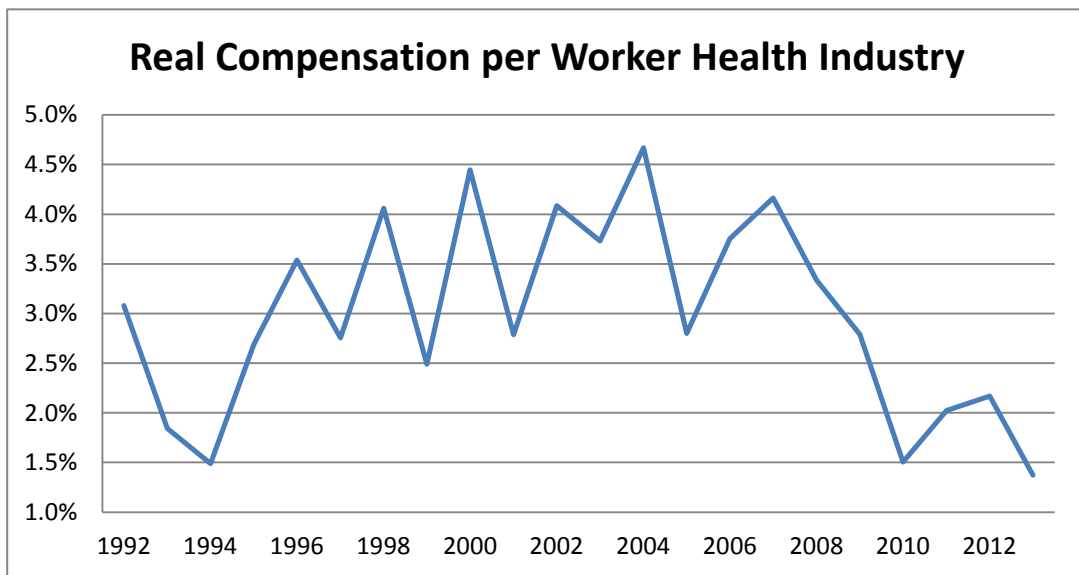
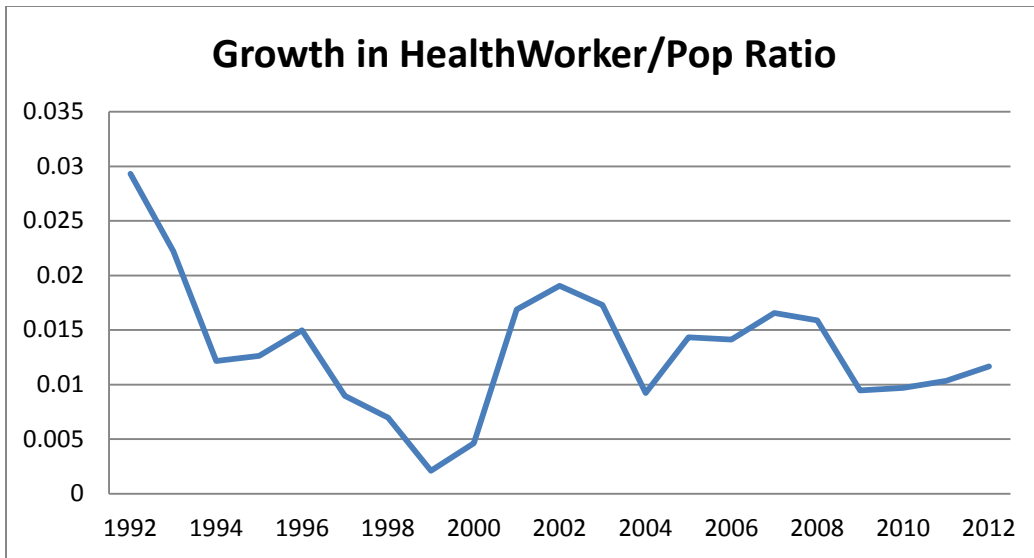


Figure 6

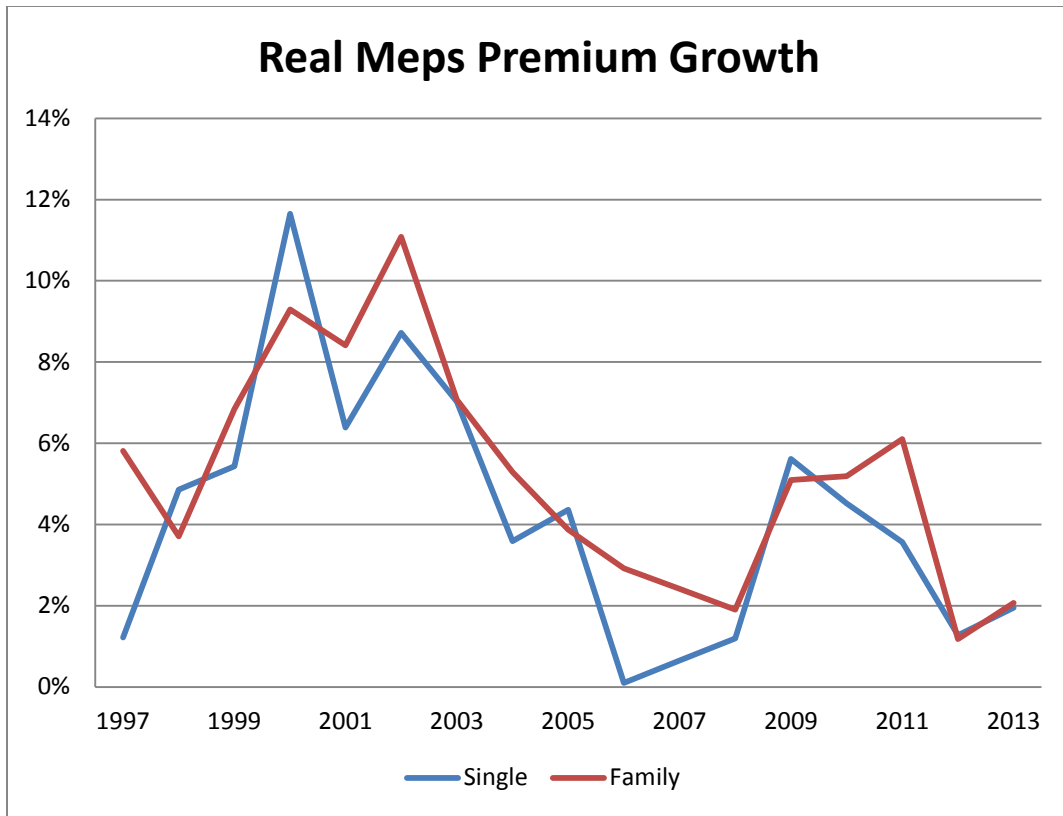


Figure 7

Relationship between Real Premium Growth and Real Income Growth

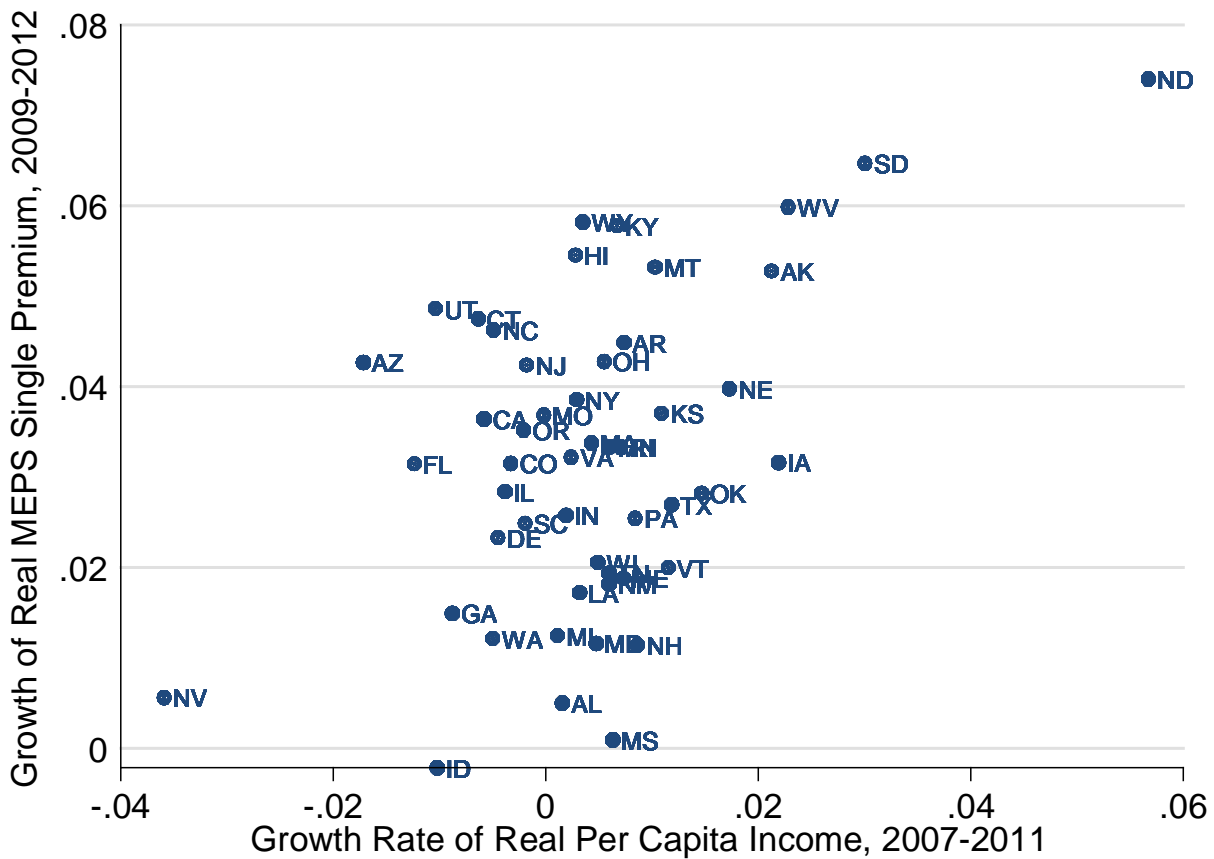


Figure 8

Relationship between Real Premium Growth and Real Health Worker Wage Growth

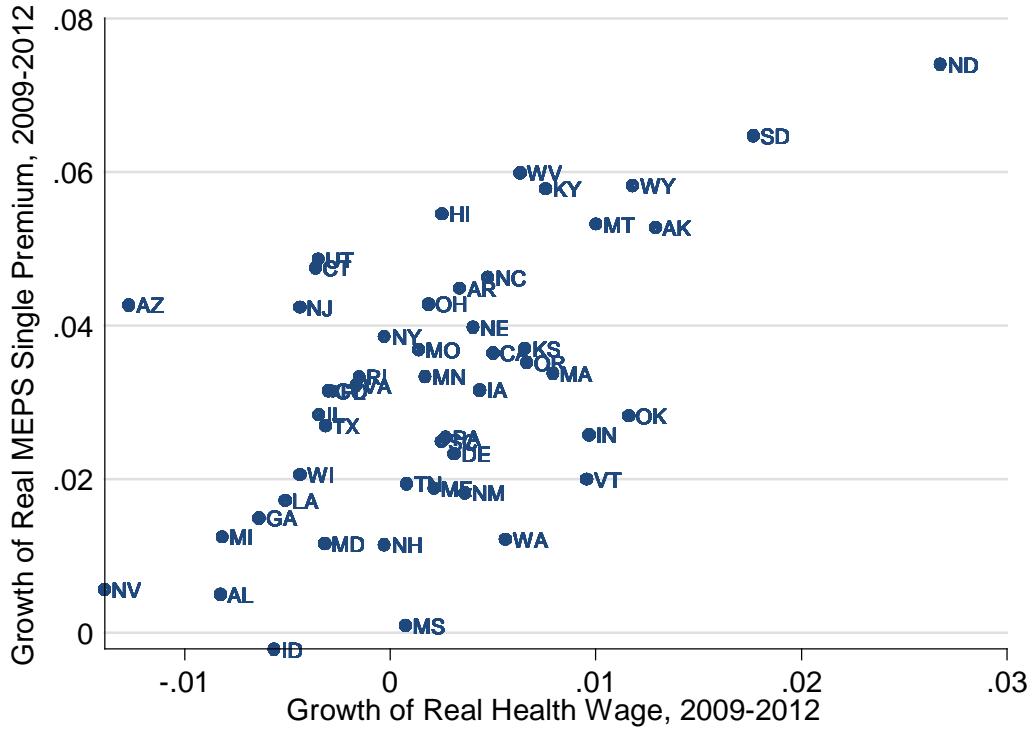


Figure 9

Relationship between Real Health Worker Wage Growth and Real Income Growth

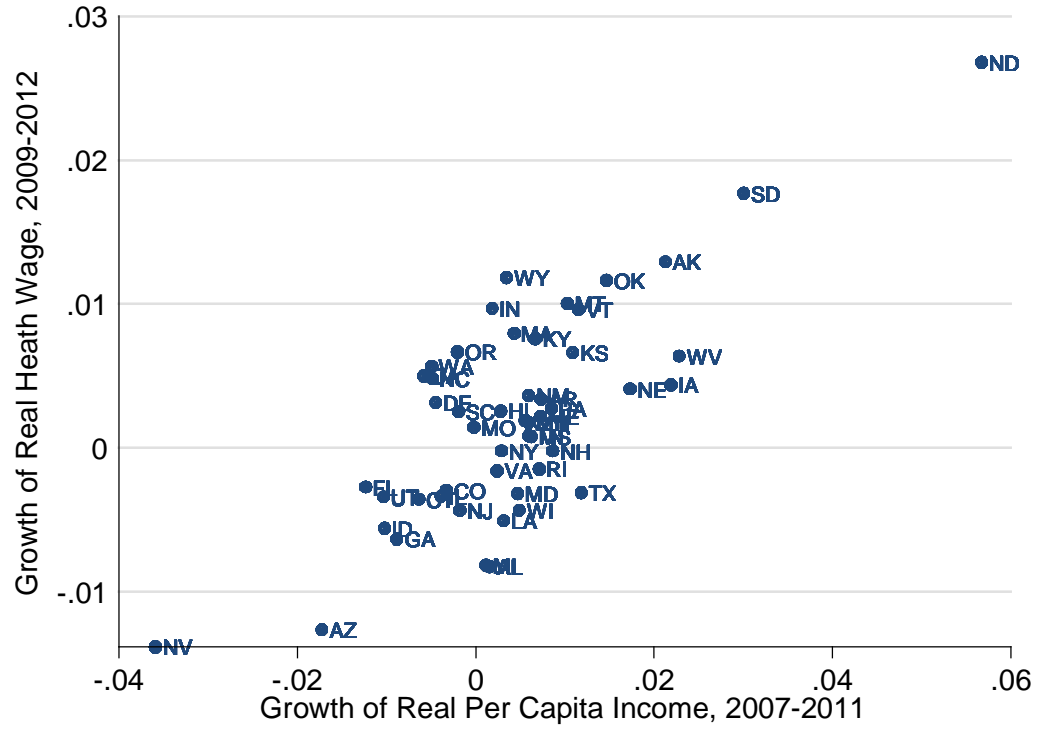


Figure 10

Relationship between PCE Health Services by State and Income

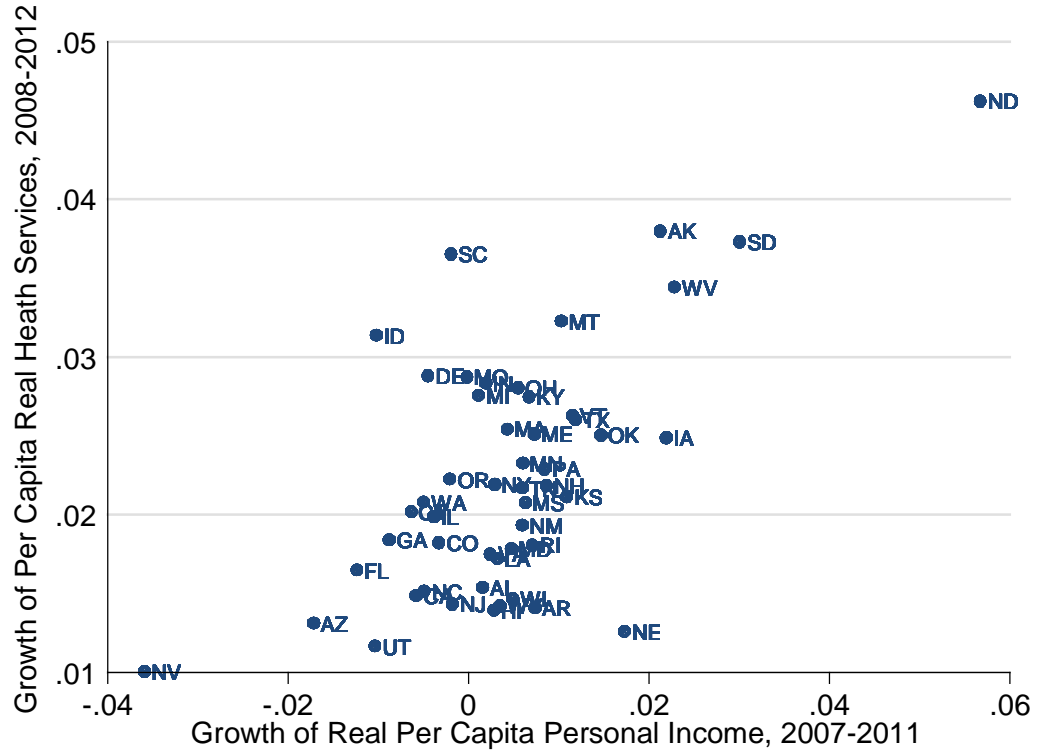


Figure 11

Relationship between PCE Health Services by State and Health Worker Wages



Figure 12

Relationship Between FFS Medicare Spending Growth and Income

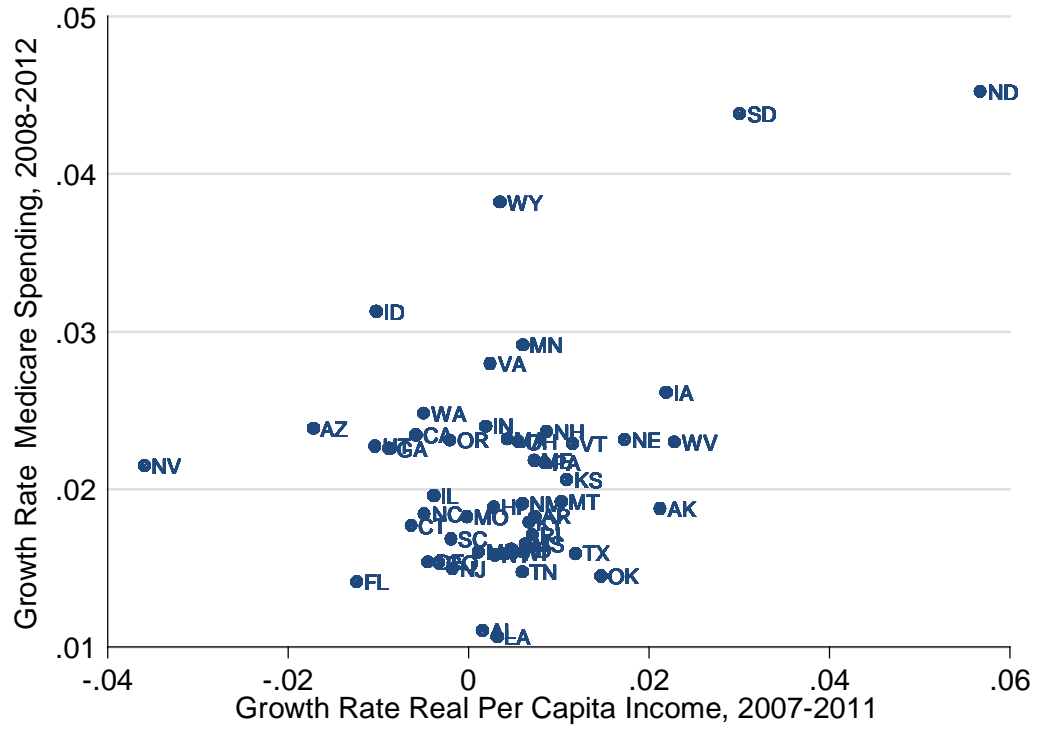
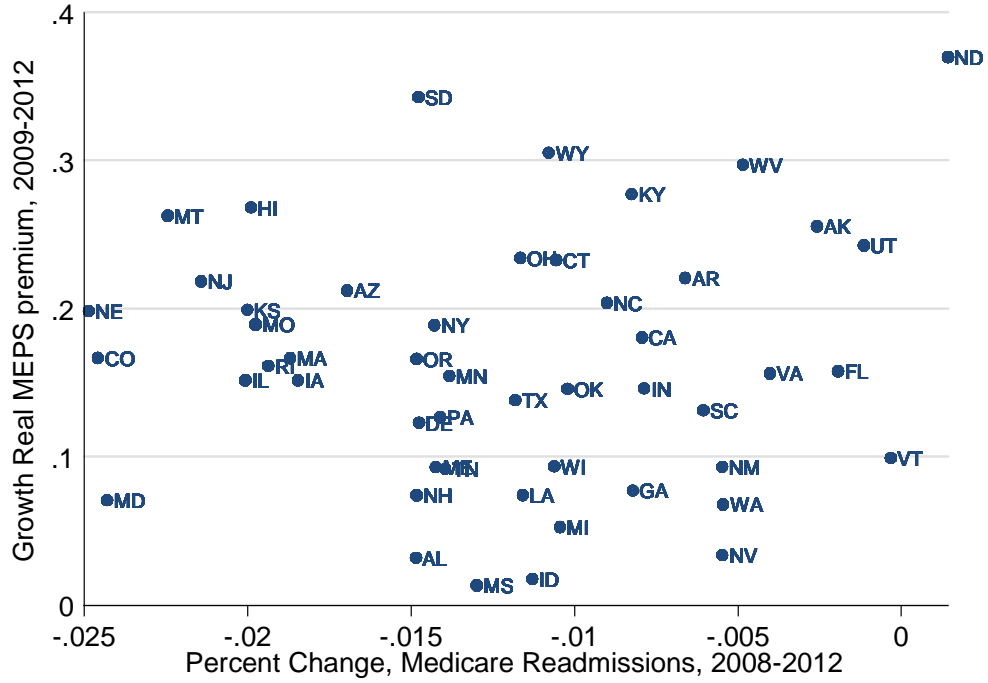


Figure 13

Relationship Between MEPS Premium Growth and Medicare Readmissions



Relationship Between Health Services Growth and Medicare Readmissions

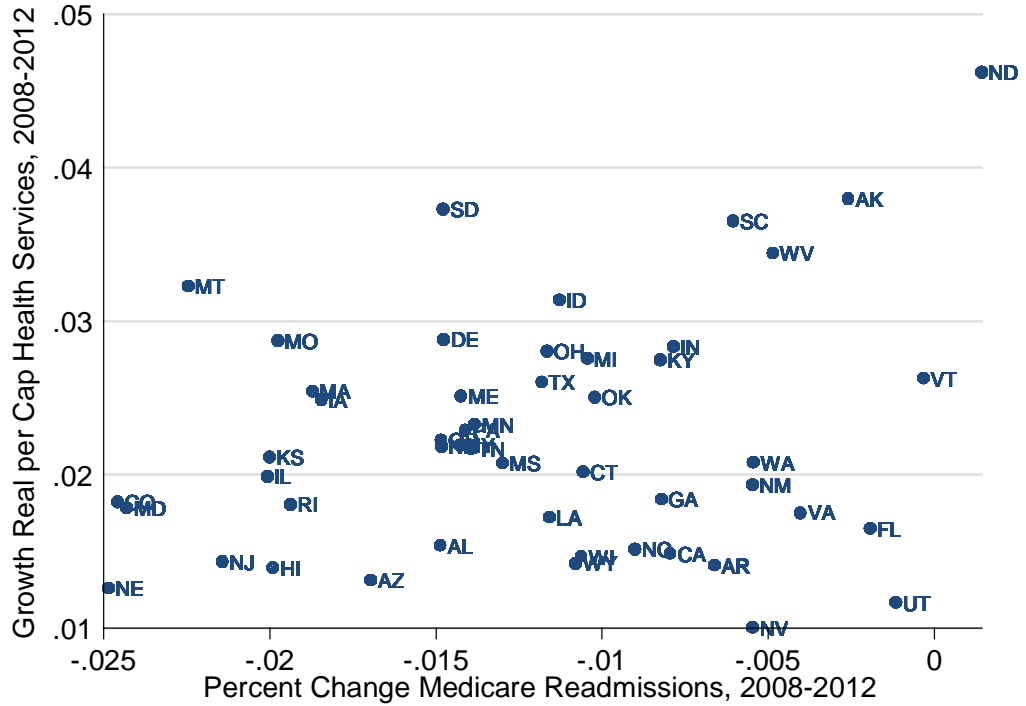


Table 1**Slowdown In Real per Capita Health Spending**
(Using GDP Deflator for all)

	Growth rate 1993-2007	Growth Rate 2008-2013	Slowdown relative to 1993-2007	Growth Rate 2000-2007	Slowdown relative to 2000-2007
National Health Expenditures	3.7%	1.7%	2.0%	4.2%	2.5%
Health Consumption	3.7%	1.8%	1.9%	4.2%	2.4%
Personal Health Consumption	3.5%	2.0%	1.5%	4.0%	2.0%
Drugs	8.3%	0.0%	8.2%	7.4%	7.3%
Net Cost of Insurance/Administration	6.7%	1.2%	5.5%	8.6%	7.4%
Health Research	4.1%	-0.6%	4.7%	4.4%	5.1%
Public Health Activities	3.7%	0.0%	3.7%	2.9%	2.8%
Dental	3.5%	-0.1%	3.6%	3.4%	3.5%
Investment in Structures and Equipment	3.1%	0.2%	2.9%	3.1%	2.9%
Durable and other non-durable goods ex drugs	2.4%	0.8%	1.5%	2.1%	1.3%
Nursing Home and Home Health	3.4%	1.9%	1.5%	2.8%	1.0%
Physician and Other Professional	3.0%	1.9%	1.1%	3.5%	1.6%
Hospital Services	2.6%	2.9%	-0.2%	3.9%	1.1%
NOTE:					
Hospital + Physician + Other Professional	2.8%	2.4%	0.4%	3.7%	1.3%
Personal Health Consumption Less RX	3.0%	2.2%	0.8%	3.6%	1.3%
Real GDP per cap Actual	2.3%	0.2%	2.1%	1.8%	1.6%
Real GDP per cap Potential	2.1%	0.9%	1.2%	2.1%	1.2%

Table 2

Slowdown in Private Employer-Sponsored Health Insurance Premiums

	MEPS		Kaiser/HRET		ECI
	Single	Family	Single	Family	
2000-2006	6.0%	6.9%	7.5%	7.5%	5.9%
2008-2013	3.0%	3.6%	3.1%	3.1%	2.1%
Slowdown	3.0%	3.3%	4.3%	4.3%	3.8%

Table 3
Regressions of Real Per Capita National Health Spending Growth, 1975-2007

Sum of Coefficients on GDP	0.71	0.83	0.8	0.72
GDP Growth	0.15 (.10)	0.17* (.10)	0.15 (.09)	0.16* (.09)
GDP Growth _{t-1}	0.02 (.02)	0.12 (.09)	0.11 (.09)	0.07 (.08)
GDP Growth _{t-2}	0.04 (0.12)	0.11 (.09)	0.1 (.09)	0.06 (.08)
GDP Growth _{t-3}	0.18 (0.12)	0.17* (.09)	0.17** (.08)	0.16** (.08)
GDP Growth _{t-4}	.32** (0.12)	.26** (.09)	.27** (.09)	.27** (.08)
Relative Medical Price Inflation		.006** (.001)	.005** (.001)	.003** (.001)
Year			-.0004* (.0002)	
Post-1991				-.011** (0.00)
Constant	.03** (0.01)	.01** (0.01)	.75** (.37)	.03** (0.01)
Rsqr adj	0.14	0.58	0.63	0.67

Table 4

State-level Regressions of Per Capita Health Spending on Personal Income, 1991-2009

	(1)	(2)	(3)	(4)
Sum of coefficients on income growth	.84	.92	.41	.43
Income Growth	.03 (.02)	.03 (.02)	.11** (.03)	.10** (.03)
Income Growth _{t-1}	-.02 (.03)	-.01 (.03)	.02 (.03)	.01 (.03)
Income Growth _{t-2}	.14** (.03)	.16** (.03)	.05 (.04)	.07** (.04)
Income Growth _{t-3}	.27** (.03)	.28** (.03)	.05 (.04)	.06* (.04)
Income Growth _{t-4}	.18** (.03)	.19** (.03)	.05 (.03)	.05 (.03)
Income Growth _{t-5}	.13** (.03)	.14** (.03)	.04 (.03)	.05 (.03)
Income Growth _{t-6}	.11** (.03)	.13** (.03)	.09** (.03)	.09** (.03)
Constant	.02** (.001)	.04** (.003)	.03** (.003)	.05** (.004)
State Dummies	No	Yes	No	Yes
Year Dummies	No	No	Yes	Yes

Table 5**State-level Regressions of Per Capita Health Spending by Component on Personal Income, 1991-2009**

	Hospital	Physician	RX	Dental
Sum of coefficients on income growth	.56	.37	.3	.91
Income Growth	0 (.05)	.07 (.07)	.30** (.07)	.24** (.07)
Income Growth _{t-1}	.01 (.05)	-.02 (.07)	-.08 (.07)	.20** (.07)
Income Growth _{t-2}	.10* (.06)	.07 (.08)	-.01 (.07)	.21** (.08)
Income Growth _{t-3}	.06 (.06)	.08 (.08)	.11 (.08)	.20** (.08)
Income Growth _{t-4}	.08 (.05)	.05 (.07)	-.06 (.07)	.09 (.07)
Income Growth _{t-5}	.16** (.05)	0 (.07)	.07 (.07)	-.03 (.07)
Income Growth _{t-6}	.15** (.05)	.12* (.07)	-.03 (.07)	0 (.07)
Constant	.06** (.01)	.06** (.01)	- (.01)	.07** (.01)
State Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes

Table 6
State-level Regressions of Non-Medicare Per Capita Health Spending on Personal Income, 1991-2009

	Non-Medicare			
	All Hospital and Physician and Other Professional	Hospital and Physician and Other Professional	Non-Medicare Hospital	Non-Medicare Physician and Other Professional
Sum of coefficients on income growth	.47	.71	.76	.33
Income Growth	.03 (.04)	.03 (.06)	-.04 (.08)	.07 (.07)
Income Growth _{t-1}	0 (.04)	.04 (.06)	.04 (.08)	-.03 (.07)
Income Growth _{t-2}	.09* (.05)	.12* (.07)	.13 (.08)	.06 (.08)
Income Growth _{t-3}	.06 (.05)	.07 (.07)	.05 (.09)	.07 (.08)
Income Growth _{t-4}	.07 (.04)	.12* (.06)	.15* (.08)	.04 (.07)
Income Growth _{t-5}	.1** (.04)	.15* (.06)	.27** (.08)	0 (.07)
Income Growth _{t-6}	.12** (.04)	.18** (.06)	.16** (.08)	.12* (.07)
Constant	.06** (.006)	.05** (.01)	.04** (.01)	.06** (.01)
State Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Rsquared adj	.36	.34	.29	.18
Observations	900	900	900	900

** significant at 5% level; * significant at 10% level

Table 7

State-level Regressions of BEA Per Capita Spending for Health Services, 1998-2012

	(1)	(2)
Sum of coefficients on income growth	.75	.25
Income Growth	-.05** (.03)	.12** (.04)
Income Growth _{t-1}	.10** (.03)	.05 (.04)
Income Growth _{t-2}	.11** (.03)	.06 (.04)
Income Growth _{t-3}	.16** (.03)	.08** (.04)
Income Growth _{t-4}	.24** (.04)	.01 (.04)
Income Growth _{t-5}	.11** (.04)	-.06 (.04)
Income Growth _{t-6}	.08** (.04)	0 (.04)
Constant	.02** (.002)	.02** (.005)
State Dummies	No	Yes
Year Dummies	No	Yes
Rsq adj	.18	.5
Observations	750	750

** significant at 5% level; * significant at 10% level

Table 8

**State-level Regressions of Health Worker Wages and Health
Employment on Personal Income, 1991-2009**

	Health Worker Wages	Health Employment per Cap	Health Compensation per Cap
Sum of coefficients on income growth	.66	-.14	.54
Income Growth	.15** (.02)	.01 (.02)	.17** (.02)
Income Growth _{t-1}	.12** (.02)	-.04** (.02)	.09** (.02)
Income Growth _{t-2}	.14** (.02)	-.02 (.02)	.12** (.02)
Income Growth _{t-3}	.09** (.02)	-.03* (.02)	.06** (.02)
Income Growth _{t-4}	.09** (.01)	-.03* (.02)	.06** (.02)
Income Growth _{t-5}	.03* (.01)	-.02 (.02)	.01 (.02)
Income Growth _{t-6}	.04** (.02)	-.01 (.02)	.03 (.02)
Constant	-.01** (.003)	.02** (.003)	.01 (.02)
State Dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
Rsqr adj	.54	.49	.63
Observations	1850	1850	1850

** significant at 5% level; * significant at 10% level

Table 9

Relationship between Medicare and non-Medicare spending growth in state-level regressions, 1991-2009

	Non-Medicare	Non-Medicare	Non-Medicare 1991-2000	Non-Medicare 2000-2009	Non-Medicare Hospital	Non-Medicare Physician
Medicare Growth	-.23** (.08)	-.23** (.04)	-.20** (.06)	-.30** (.07)		
Medicare Hospital					-.27** (.04)	
Medicare Physician						.03 (.04)
Income Growth and 6 Lags	No	Yes	Yes	Yes	Yes	Yes
State Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Health worker wage growth 6 lags	No	Yes	No	No	No	No
Observations	900	900	450	450	900	900

** significant at 5% level; * significant at 10% level

Table 10**Relationship between Health Spending Growth and Income During Recession and Recovery**

	Change in Personal Income 2007-2011	Change in Health Worker Wage	Rsquared adj
Change in Health Worker Wage, 2009-2012	.43**		0.57
Change in MEPS Health Insurance Premium, 2009-2012	.60**		0.2
Change in MEPS Health Insurance Premium, 2009-2012	0.06	1.27**	0.31
BEA Health Service Spending, 2008-2012	.37**		.38
BEA Health Service Spending, 2008-2012	.23**	0.37	.4
Medicare FFS Spending, 2008-2012	.22**		0.15
Medicare FFS Spending, 2008-2012	0.05	.45*	0.19
Price and Risk Adjusted Medicare FFS, 2008-2012	-0.16	0.35	0

** significant at 5% level; * significant at 10% level

Table 11

Relationship Between Medicare and non-Medicare Spending

	Change in Personal Income 2007-2011	Change in Medicare Variable	Rsq adj
Dependent Variable is Change In Real MEPS Premium, 2009-2012			
Medicare Variable:			
Growth in Medicare FFS Spending, 2008-2012	0.46**	.65*	.24
Growth in Price-and Risk-Adjusted FFS Medicare Spending, 2008-2012	.61**	0.31	0.2
Medicare Share of Total Health Spending, 2006	.56**	-0.08	0.2
Change in Medicare Readmissions. 2008-2012	.60**	0.12	0.18
Change in Medicare Admission Rate, 2008-2012	.61**	0.21	0.19
Change in Medicare Outpatient Visits, 2008-2012	.62*	-.05	0.18
Dependent Variable is Change In Real Per Capita Spending on Health Services, 2008-2012			
Medicare Variable:			
Growth in Medicare FFS Spending, 2008-2012	.33**	.15	0.38
Growth in Price-and Risk-Adjusted FFS Medicare Spending, 2008-2012	.37**	0.08	0.37
Medicare Share of Total Health Spending, 2006	.36**	-0.01	0.37
Change in Medicare Readmissions. 2008-2012	.36**	.22*	0.4
Change in Medicare Admission Rate, 2008-2012	.38*	0.16	0.4
Change in Medicare Outpatient Visits, 2008-2012	.30**	.13**	0.45

** significant at 5% level; * significant at 10% level

Table 12

Slowdown Accounting for Real GDP Growth

	GDP Coefficient = .8		GDP Coefficient = .6		GDP Coefficient = .4	
	Slowdown relative to		Slowdown relative to		Slowdown relative to	
	1993- 2007	2000- 2007	1993- 2007	2000- 2007	1993- 2007	2000- 2007
National Health Expenditures	0.3%	1.2%	0.7%	1.5%	1.1%	1.8%
Health Consumption	0.2%	1.1%	0.6%	1.4%	1.0%	1.7%
Personal Health Consumption	-0.2%	0.7%	0.3%	1.0%	0.7%	1.4%
Drugs	6.6%	6.0%	7.0%	6.4%	7.4%	6.7%
Net Cost of Insurance/Administration	3.9%	6.1%	4.3%	6.4%	4.7%	6.7%
Health Research	3.0%	3.8%	3.5%	4.1%	3.9%	4.4%
Public Health Activities	2.0%	1.6%	2.5%	1.9%	2.9%	2.2%
Dental	1.9%	2.2%	2.3%	2.6%	2.7%	2.9%
Investment in Structures and Equipment	1.2%	1.6%	1.6%	2.0%	2.0%	2.3%
Durable and other non-durable goods ex drugs	-0.2%	0.0%	0.3%	0.3%	0.7%	0.7%
Nursing Home and Home Health	-0.2%	-0.3%	0.2%	0.0%	0.7%	0.3%
Physician and Other Professional	-0.5%	0.3%	-0.1%	0.6%	0.3%	0.9%
Hospital Services	-1.9%	-0.2%	-2.0%	0.1%	-1.1%	0.4%
Note:						
Hospital + Physician + Other Professional	-1.3%	0.0%	-0.9%	0.3%	-0.5%	0.6%
Personal Health Consumption Less RX	-0.9%	0.0%	-0.5%	0.4%	0.0%	0.7%