GOVERNMENT INTERVENTION IN HEALTH CARE MARKETS AND HEALTH CARE OUTCOMES: SOME INTERNATIONAL EVIDENCE

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Introduction

Continual and significant price inflation has characterized the health care sector of the United States since the 1960s. In turn, the rising medical prices have contributed to increased health care costs. In fact, aggregate health care expenditures in the United States increased from 5.2 to 10.6 percent of gross domestic product (GDP) from 1960 to 1985 (OECD 1990). For the most part, policymakers have responded by advocating more competition in health care markets or increased regulations (e.g., the diagnosis related groups system for hospitals and relative value scales for physicians)[1] as a way of mitigating the spiraling medical care expenditures.

At the same time, policymakers have become increasingly concerned that growing competition between health care providers and various regulations might lead to unwanted reductions in the quality of medical care, as health care providers respond to the market and regulatory incentives to contain costs (Shortell and Hughes 1988). The double-edged sword of higher medical prices and lower quality of care has alarmed and dismayed many influential groups in the United States. Attempting to shield themselves, many industry groups have called on government to shoulder more responsibility for health care financing whereas government, on the other hand,

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[1]See Hsiao et al. (1988).

has considered mandating that employers share much of the financial burden (Stevens 1989, Wilensky 1989).

In response to the attempt to pass the health care buck, a number of physicians in the United States have endorsed a national health care program along the lines of the Canadian national health insurance program or the national health care system of Great Britain (Himmelstein and Woolhandler 1989). Many argue that a national health care program can simultaneously contain medical prices and ensure an acceptable quality of care. For example, Himmelstein and Woolhandler point out that health care expenditures, as a fraction of GNP, are much lower in Canada (8 percent) and Great Britain (6 percent) than in the United States (nearly 11 percent). Despite those relatively lower health expenditures, however, Himmelstein and Woolhandler (1986, p. 444) note that "within a decade of the introduction of free access, a sharp decline in mortality occurred, so that the current levels in both Canada and Great Britain are slightly lower than those in the United States."

This paper examines government involvement in health care from both a theoretical and empirical standpoint. From a theoretical perspective, government involvement in health care matters may have an adverse impact on the quality of care. Numerous analyses of other sectors of the economy have found that both the quantity and quality of output suffers from public intervention and regulations. In particular, analysts use the postal system, local schools, rent control laws, and the pre-deregulated transportation sector as prime examples of areas in which government enterprise and regulations have inhibited efficiency (Baumol 1989). Moreover, Canadian policymakers have recently begun to question the desirability of their own health care delivery system (Brown 1989, Doherty 1989).

From an empirical standpoint, the Himmelstein and Woolhandler view may be flawed because they draw their policy conclusions from a few limited and, perhaps, unrepresentative observations (i.e., the Canadian and British national health care programs relative to the health care system of the United States). Clearly, more than a few observations are required to draw a meaningful conclusion about the relationship between government involvement in health care and the performance of the health care sector. Also, other determinants of health care outcomes, such as real GDP must be held constant before any proper conclusion can be drawn about the isolated pairwise correlation between government intervention and health care outcomes. Given the theoretical and empirical concerns, this paper systematically examines how government involvement in health care has affected infant mortality and health care costs.

Government Intervention and Infant Mortality

To determine the effect of government on the performance of the health care sector, we examine differences in infant mortality in 20 countries that belong to the Organization for Economic Cooperation and Development (OECD) during the six adjacent half decades from 1960 to 1985. (We will provide an appendix containing the sources of all our data upon request.) Those countries are relatively homogeneous in terms of their stage of economic development and real per capita income, which allows for a systematic comparison. Government intervention in the health care sector is measured by the fraction of health care expenditures that is financed by the public sector at all levels of government. While it would be ideal if the countries could be classified under various categories or arranged into a continuum based on the degree to which their health care systems are nationalized or regulated, that is a very difficult and subjective task. In any case, ample precedent supports an expenditure ratio of the kind used here as a measure of government involvement (Borcherding 1985, Mueller and Murrell 1986).

We focus on differences in infant mortality rates as a relative measure of health care sector performance for four reasons. First, data are readily available. A more encompassing measure of health care outcomes, such as morbidity, is unavailable. Second, compared with adult mortality, infant mortality possesses a greater economic significance in terms of forgone production. Third, infant mortality is influenced much less by behavioral decisions, unlike teenage or adult mortality. Fourth, government health care policies would seem to have a greater impact on mortality during infancy, especially during the neonatal period. For example, establishing more intensive care units in selected hospitals that service high-risk infants could be accomplished relatively easily.

In Table 1, we have listed the government's share of total public and private health care expenditures, total health care expenditures as a fraction of GDP, and infant mortality for each OECD country in our sample during 1985. At the bottom of the table, we also show the average figures for those variables. The statistics for the United States are of particular interest. The U.S. government is responsible for a very low share of all health care spending (41.8 percent). That percentage is by far the lowest expenditure share of all OECD countries. Moreover, the infant mortality of 10.6 deaths per 1,000 live births in the United States is higher than the 9.4 average infant deaths for all OECD countries. That is despite the fact that health care spending as a percentage of GDP in the United States is well above the average for all OECD countries.

TABLE 1

GOVERNMENT SPENDING, HEALTH CARE EXPENDITURES, AND INFANT MORTALITY, 1985

Country	Government's Share as Percentage of Health Spending	Health Expenditures as Percentage of GDP	Infant Mortality Rate (per 1,000 Live Births)
Australia	71.9	7.0	9.9
Austria	66.7	8.1	11.2
Belgium	76.9	7.2	9.4
Canada	74.7	8.5	8.0
Denmark	84.5	6.2	7.8
Finland	78.7	7.2	6.3
France	76.9	8.5	8.1
Germany	78.0	8.2	8.9
Greece	81.0	4.9	14.1
Ireland	88.8	8.0	8.9
Italy	78.8	6.9	10.9
Japan	72.3	6.6	5.5
Netherlands	76.2	8.2	6.9
New Zealand	85.2	6.6	10.8
Norway	96.3	6.4	8.5
Portugal	56.8	7.0	17.8
Spain	71.5	6.0	9.1
Sweden	91.1	9.4	6.8
United Kingdom	86.7	6.0	9.4
United States	41.8	10.6	10.6
Average	76.7	7.4	9.4

SOURCE: OECD (1990).

To take into account the various factors influencing health care outcomes, we examine the relation between government intervention and infant mortality by using multiple regression analysis and relying on production theory to guide the selection of our specific variables. Health economists, including Auster, Leveson, and Sarachek (1969), typically specify a health production function and include various factors, such as income, lifestyle, environmental variables, and medical services that influence health outcomes. We modify and extend the typical production function by incorporating a measure that represents the government's involvement in health care markets.

As control variables, we specify a time trend over the six half decades, real GDP per capita, quantity of medical services, percent-

age of population that is urbanized, female labor force participation rate, and education level in each country. Taking on a one or zero value, dummy variables for each country are also specified in the multiple regression equation to control for other national differences (e.g., diet, medical technology, and climate) not captured by the other independent variables. No dummy variable is used for the United States so that the net effect of all country-specific differences is measured relative to the United States.

By using economic theory and the results of previous empirical studies, the expected signs of the multiple regression coefficients can be inferred for several of the explanatory variables. We have no a priori expectations concerning the expected sign of the coefficient on the government term. A strong argument could be made for either a beneficial (negative coefficient estimate) or adverse (positive coefficient estimate) impact. On the one hand, greater government involvement in or financing of health care may provide individuals who are unable to pay greater access to health care. Since those individuals would otherwise consume relatively small amounts of medical services because of financial barriers to access, medical services for low-income individuals should be able to generate good health. Hence, mortality rates would tend to decline with greater government financing of health care.

On the other hand, greater government involvement in health care may come at the cost of excessive regulations. Excessive regulations may adversely affect the total output (quantity and quality) of physicians and other health care providers. For example, if government uses its monopsony power to reduce prices of medical services and wages of health care employees, shortages of medical services might result. Those shortages would lead to higher mortality rates. Indeed, the theory of public choice (Brennan and Buchanan 1980), the theory of government enterprise (Ahlbrandt 1973), and the theory of economic regulation (Stigler 1971) all suggest that more government involvement is very likely to have an adverse, rather than a beneficial, impact on the performance of the health care sector.

The time trend variable is specified because panel data are used. Fuchs (1986) notes that mortality rates may decline over time with advances in knowledge and technology. Real GDP per capita controls for differences in nutrition and home environment, among other factors, and thus, theoretically, higher GDP per capita should lead to lower infant mortality.[2] Increased medical services should also

[2]Real GDP and real health expenditures in U.S. dollars are determined by dividing the nominal values by the GDP deflator and converting with the 1980 U.S. dollar exchange rate.

lead to lower mortality rates as long as the marginal productivity of medical services is greater than zero. Real health care expenditures per capita and physicians per capita act as proxy variables for medical services in two separate regression equations.

Greater urbanization might lead to lower infant mortality because the greater compactness and lower transportation costs in urbanized areas result in greater access to medical care. However, pollution and other environmental concerns might impose greater health hazards in urban environments. The female labor force participation rate also controls for two opposing effects. A higher female labor force participation rate may mean less home health care and a higher infant mortality rate, or it may mean increased income in two-wage-earner families and a lower infant mortality rate. While the female labor force participation rate of married women is preferred to test those hypotheses, data of that kind are unavailable.

Finally, the efficiency of home health care is captured by the education level in the country. Greater efficiency in home health care should lead to lower infant mortality. The number of teachers per pupil at the primary level serves as our proxy for educational differences across countries since it captures the resource commitment and priority given to education. Data for a more direct measure of educational attainment are unavailable. All variables are expressed as natural logarithms. The ordinary least squares technique is used to estimate the health care production function.

In Table 2, columns 2 and 3 report the regression results of estimating the production function with health care expenditures per capita (Regression 1) and physicians per capita (Regression 2) as alternative measures of medical services. The empirical results suggest that greater government involvement has no impact on infant mortality since the estimated coefficient on the government variable is not statistically different from zero at conventional levels of significance. The estimated coefficient is positive but only significant at the 20 to 25 percent level. Clearly, the results lend no support for the Himmelstein and Woolhandler point of view that greater government involvement reduces mortality, at least not among infants.

However, other factors do significantly influence infant mortality. Increases in real GDP are associated with a reduction in infant mortality. Since all variables are expressed in logarithms, the estimated coefficient on each variable can be interpreted as an elasticity. As a result, a 10 percent increase in real GDP per capita causes a 6.5 to 8.9 percent decrease in infant mortality. The empirical findings also imply that a greater quantity of medical services leads to a decrease in infant mortality. Specifically, a 10 percent increase in health care

TABLE 2

INFANT MORTALITY REGRESSIONS

Independent Variable	Parameter Estimate (Absolute Value of the *t*-Statistic)	
	Regression 1	*Regression 2*
Intercept	9.02[a] (5.71)	3.93[b] (2.60)
Government's Share of Health Care Spending	0.166 (1.40)	0.127 (1.30)
Time Trend	−0.569 (0.65)	−0.069 (1.11)
Real GDP	−0.650[a] (2.73)	−0.892[a] (6.83)
Medical Services Real Health Care Expenditures	−0.328[b] (2.09)	
Physicians per Capita		−0.539[a] (6.89)
Urbanized Population	0.433[b] (2.16)	0.707[a] (4.21)
Female Labor Force Participation Rate	−0.015[a] (4.45)	−0.004 (1.21)
Education	−0.042 (0.594)	−0.135[b] (2.34)
	+ 19 country dummy variables	+ 19 country dummy variables
Adjusted R^2	.931	.954
Number of Observations	110	110

[a]Significant at the 1 percent level or better.
[b]Significant at the 5 percent level.
NOTE: All continuous variables are expressed in natural logarithms.

expenditures per capita causes infant mortality to decline by 3.3 percent. Similarly, a 10 percent increase in the number of physicians per capita leads to a 5.4 percent decline in infant mortality.

In addition, urban environments are associated with greater infant mortality since the estimated coefficient on the urban variable is positive and statistically significant in both regressions. Increased education is associated with a lower infant mortality rate, as expected.

The estimated coefficient on the education variable is negative in both regressions. However, the coefficient on that same variable is not statistically different from zero in the first regression equation. The inverse relation between those two variables may confirm that better educated individuals are more efficient at producing home health care or that both types of human capital investments, education and health, are complementary.

Last, a higher female labor force participation rate is associated with lower infant mortality. The estimated coefficient is negative in both regressions and statistically significant in one of them. Apparently, the higher family income that results when females enter the labor force more than offsets the possible adverse effect of fewer home health care services and causes the infant mortality rate to decline.

Although not shown in Table 2, it is interesting to note that most of the country dummy variables possess negative and significant coefficient estimates. That means that other OECD countries have a significantly lower infant mortality rate than does the United States, after holding other influences on infant mortality constant. That finding indicates that country influences, specific to the United States, have an adverse impact on infant mortality. Those country-specific influences are factors other than government intervention, income, medical services, education, female labor force participation rate, and degree of urbanization.

Because country-specific influences are so important, an additional method of specifying their effects was followed. Rather than specifying country-specific factors by simply using the qualitative zero-one dummy variable (called the fixed-effect model), we allowed the country differences to vary randomly over the different time periods. Balestra and Nerlove (1966) and Maddala (1971) refer to that method as the random-effects or error-components model. That method should give more precise estimates of all the estimated coefficients if the assumptions of the random-effects model are satisfied (that the country-specific effects are independent, identically distributed random variables with mean zero and a common variance). Following Hausman's (1978) suggested technique, we tested and rejected those assumptions and, thus, conclude that it is more appropriate to use the fixed-effect model.

Government Intervention and the Containment of Health Care Costs

Another possible benefit of government intervention in health care markets is cost containment. We use regression analysis to analyze

this issue. Specifically, we regress the logarithm of total health care spending per capita on the logarithm of the following variables: government health care expenditure share, a time trend, real GDP per capita, percentage of urban population, female labor force participation rate, level of education and population, and country dummy variables.

According to Himmelstein and Woolhandler (1986), government financing eliminates most of the administrative overhead and waste associated with private health insurance. In addition, government can use its monopsony power to contain the prices of medical services when it controls a greater share of health care spending. Given these two considerations, the basic hypothesis is that greater government financing of health care spending leads to lower total health care costs. An alternative hypothesis is that government lacks a profit incentive to minimize health care costs (Ahlbrandt 1973). It follows that health expenditures will be higher when government controls a greater share of health care spending, other things being constant. For the sake of brevity, the expected relation between the other control variables and health care spending is not discussed. The regression results are shown in Table 3.

The results fail to support the basic hypothesis that greater government financing leads to a lower level of health care spending. In fact, the coefficient estimate on the government variable is positive rather than negative, although not statistically different from zero. The findings suggest that government is unable to contain health care costs, even with increased control over the health care purse strings. The results also lend no support for the alternative hypothesis that greater government financing leads to excess health care spending. Evidently, government has no net impact on overall health care costs, at least for this particular sample of OECD countries.

The results indicate, however, that per capita health care spending increases with real GDP. In particular, a 10 percent increase in real per capita GDP causes an 11 percent increase in health care per capita spending. Apparently, aggregate health care spending is highly responsive to changes in national income. Furthermore, the findings imply that health care spending has increased over time, perhaps reflecting the growth of cost-enhancing technologies in this sample of developed countries. Health spending is also found to be positively related to the level of education. Not surprisingly, those two forms of human capital investment, education and health, are positively correlated.

Conclusion

Our results raise serious doubt about the desirability of a national health care program in the United States. Evidently, government

TABLE 3

HEALTH CARE EXPENDITURE REGRESSION

Independent Variable	Estimated Coefficient (Absolute Value of the *t*-Statistic)
Intercept	−4.06[a] (3.79)
Government Share of Health Care Spending	0.008 (0.096)
Time Trend	0.287[a] (5.61)
Real GDP	1.11[a] (10.1)
Urbanized Population	−0.003 (0.019)
Female Labor Force Participation Rate	−0.004 (1.87)
Education	0.095[b] (1.98)
Population	0.000003 (1.57)
	+ 19 country dummy variables
Adjusted R^2	.985
Number of Observations	110

[a]Significant at the 1 percent level or better.
[b]Significant at the 5 percent level.
NOTE: All continuous variables are expressed in natural logarithms.

is unable to influence infant mortality or control total health care spending. But what about other roles for government in the health care sector?

Perhaps government can indirectly improve the performance of the health care sector by creating an environment that allows the macroeconomy to function properly. Our results indicate that infant mortality is greatly influenced by higher levels of real GDP. The more favorable socioeconomic conditions associated with higher levels of income apparently lead to better health care outcomes. If so,

ensuring macroeconomic growth is a good strategy for lowering infant mortality.

Alternatively, from a microeconomic perspective, the government might encourage the allocation of inputs to the medical services industry. Our empirical study also finds that more abundant medical services cause infant mortality to decline by a substantial percentage. Certainly, the government should not adopt regulations that negatively affect the quantity and quality of medical inputs. Some health economists view the diagnosis related groups system and relative value scale scheme as regulations of that kind.

From a slightly different microeconomic perspective, the government can help foster better health through education. The results suggest that better educated populations are associated with lower infant mortality rates. Indeed, the recent campaign to wipe out illiteracy in the United States could, if successful, have a tremendous impact on infant mortality. Furthermore, local schools might devote more resources to health education.

Of course, more studies are needed before any empirical generalizations can be made and policy implications can be safely drawn. Our suggestions for an appropriate government role are cautiously prescribed, and we eagerly await other opinions. Future studies should attempt to untangle the effects of government financing and production on the performance of the health care sector. Providing free access to private medical care, as does the Canadian health care system, may have an impact different from that of the national health care system of Great Britain, where production is nationalized. In our study, we were unable to separate and measure the differential impacts of these two kinds of health care programs. It is hoped that other researchers will pursue that fruitful line of inquiry.

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