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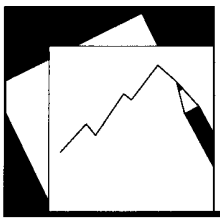

IMF Working Paper

Economic Transition and Health Care Reform: The Experience of Europe and Central Asia

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Economic Transition and Health Care Reform: The Experience of Europe and Central Asia

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Abstract

This paper exploits the staggered adoption of major concurrent health reforms in countries in Europe and Central Asia after 1990 to estimate their impact on public health expenditure, utilization, and avoidable deaths. While the health systems all derived from the same paradigm under central planning, they have since introduced changes to policies regarding cost-sharing, provider payment, financing, and the rationalization of hospital infrastructure. Provider payment reforms produce the largest impact on spending, with fee-for-service increasing spending and patient-based payment reducing it. The impact on avoidable deaths is generally negligible, but there is some evidence of improvements due to fee-for-service.

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I. INTRODUCTION

The fiscal implications of financing health care are substantial. Among OECD countries, public spending on health has grown more than 1½ percentage points faster than income annually since 1970, on average.[2] As a share of GDP, public health spending in these countries has nearly doubled from 3.5 percent to 6.8 percent during this time. Many middle-income countries are beginning to face similar pressures. The increase in expenditure has brought attention to policies designed to improve efficiency in the delivery of health care services. Such policies often aim to control both the supply side (e.g., provider payment) and the demand side (e.g., patient coinsurance).

Despite the large number of studies analyzing the impact of health policies within a particular country, there has been relatively less cross-country work on the impact of health reforms. The objective of this paper is to provide some insight into this issue on a consistent basis by examining a "natural experiment" in health reform: the evolution of health policies in Europe and Central Asia after central planning.

While the health systems of these countries all derived from a common paradigm, they have since implemented health reforms that introduce market mechanisms in the health sector to various degrees. In 1990, each country financed their health system from general revenues, paid hospitals via line-item budgets, reimbursed physicians based on salary, and were characterized by a bloated hospital infrastructure under central planning. Since then, most countries have done some combination of the following: adopted social health insurance; switched to fee-for-service or diagnosis-related groups (DRGs) for hospital payment; reimbursed primary care doctors by capitation, fee-for-service, or some combination of the two; introduced demand-side cost sharing; and consolidated hospital beds and facilities.

Wagstaff and Moreno-Serra (2009) analyze the effects of switching from general revenue financing to social health insurance on a host of health sector outcomes in this region during this period. I extend their approach by assessing the impact of an expanded set of policy measures and complementarities between them on public health expenditure, utilization, and avoidable deaths in 21 countries in Europe and Central Asia.[3] I construct a unique dataset of the timing of concurrent health policy reforms in these countries from 1991 through 2005. Accounting for a comprehensive set of health policies, these reforms include formal copayments, provider payment reforms for primary care physicians and for hospitals, changes in financing

[2] This calculation is based on data from the OECD Health Data (2009) and excludes Czech Republic, Hungary, Mexico, Poland, Slovak Republic, and Turkey.

[3] The analysis includes the following 11 CIS countries: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Ukraine, and Uzbekistan. Other countries included are Albania, Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Macedonia, Poland, Romania, Slovak Republic, and Slovenia.

arrangements from general revenues to social health insurance, and the rationalization of hospital facilities and hospital beds.

In order to estimate the effect of the reforms, I first verify that "treatment" and "control" countries were similar before any policies were implemented. Indeed, the trends in outcomes between countries eventually implementing reforms and those not doing so are generally not significantly different during the baseline period. Regression analysis is used to estimate the impact of these reforms by exploiting their staggered adoption (and abolition) within and across countries. The specification controls for socioeconomic and demographic factors possibly correlated with the reforms, country and time fixed-effects, and time trends that may vary by country.

The results indicate that the effect of provider payment reform on health spending, utilization, and avoidable deaths is complex. For example, paying fee-for-service to hospitals increases spending relative to fixed budgets, but the magnitude depends on how primary care is paid. Social health insurance also increases spending relative to financing health care through general revenues. The impact on spending of the provider payment reforms may be operating through changes in inpatient utilization. The impact of the reforms on quality, as measured by two indicators of avoidable deaths, is generally negligible.

The results suggest that the transformation of the health care system led to higher spending but also improved outcomes. If countries had implemented an optimal policy mix—defined as capitation and fee-for-service for primary care physicians, DRGs for hospitals, and formal copayments, predicted spending in 2004 would have been slightly lower than observed, and both average length of stay and avoidable deaths would have been lower. This suggests such a policy mix may reduce spending while improving efficiency and quality.

The paper proceeds as follows. Section II describes the health policies analyzed and their history in the region. Section III outlines the methods and Section IV describes the dataset. The results are presented in Section V. Section VI discusses the findings and contains the paper's conclusions.

II. Historical Background and Economics of Health Reforms in Europe and Central Asia

The following policies cover the major health care reforms adopted after abandoning central planning:

- Official demand-side cost sharing for outpatient and inpatient care;[4]

[4] Demand-side cost sharing efforts should be interpreted in light of the high prevalence of informal payments and may correspond to the impact from formalizing such under-the-table payments.

- Primary care payment method (salary, capitation, fee-for-service, or a capitation/fee-for-service mix);
- Hospital payment method (budget, fee-for-service, or patient-based);
- Type of financing system (general revenue or social health insurance);[5] and
- Hospital infrastructure rationalization (hospitals and hospital beds per 100,000).

Most of these policies affect the incentives that different agents in the health sector face to consume or provide services. As a result, they directly impact the level of health spending and utilization, which may subsequently influence health outcomes. The economic theory underpinning these effects has been well studied and there exists a large body of empirical evidence on the subject.[6] Since the fall of central planning, much research has also described the Soviet or "Semashko" health system, characterized by shortages and inefficiency, and the progress of countries in adopting more market-oriented policies.[7] The following paragraphs closely draw on these areas of research to briefly summarize how these policies may affect health expenditure, utilization of health services, and the region's experience in implementing them.

A. Demand-side Cost Sharing

On the demand-side, payments made by patients at the point of service are designed to reduce excessive utilization stemming from moral hazard. Demand-side cost sharing may take many forms: copayments require the patient pay a flat amount for a particular service; coinsurance stipulates that the patient pay a certain percentage of the cost; and deductibles specify an amount the patient must first pay before services will be reimbursed by an insurance agent or another purchaser. For publicly provided services, out-of-pocket payments are often referred to as user charges. In these countries, user charges, copayments, and coinsurance are the most common demand-side cost sharing arrangements. Due to the difficulty in ascertaining the various arrangements and rates across countries and over time, this paper will not distinguish between these different forms and will simply classify all formal demand-side cost sharing arrangements as copayments.

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[5] I follow the classification of social health insurance by Wagstaff and Moreno-Serra (2009). Social health insurance is distinguished from general revenue financing by earmarking payroll tax contributions for health care with liability possibly split between the employee and employer.

[6] See Pauly (1968); Feldstein (1973); Manning and others (1987); Dranove (1987); Carter, Newhouse, and Relles (1990); Ellis and McGuire (1993); McGuire (2000); Scott (2000); Iverson and Luras (2000); Zweifel and Manning (2000); Glied (2000); Giuffrida and Gravelle (2001); and Iverson and Luras (2006).

[7] See Kornai and Eggleston (2001); Kornai and McHale (2000); Lewis (2002); Figueras and others (2004a); Ensor (2004); Szende and Mogyorosy (2004); Ruseski (2006); Gaal and others (2006); and Chawla (2007).

Under central planning, health care was officially free to the population although a black market existed where providers charged informal payments to patients. After independence in many countries, government health expenditures declined, with reductions in outlays for medicines and supplies, and lower real salaries for health care providers. As a result, the practice of charging informal payments became more pervasive (Lewis, 2002). Such payments, in cash or in kind, are used to obtain health services or possibly jump the queue. Informal payments are collected directly by individual physicians or other health personnel and do not accrue to the facility or the health system as a whole.

However, since the end of central planning, many countries have formalized copayments for at least certain publicly provided health care services—generally outpatient and inpatient care. This has frequently been coincident with the introduction of a basic benefits package, which legally (but often not in practice) comprises the specific services that are provided free to the population through payroll tax contributions or general revenue financing. On the other hand, patients tend to finance the entire cost of outpatient drugs in many of these countries. Even where some payments have been formalized, the practice of charging informal payments remains and the services covered in the benefits package are often unclear.

B. Provider Payment and Delivery

Turning to the supply-side, the three major payment schemes for primary care physicians—salaries, fee-for-service, and capitation—offer different financial incentives to induce costly effort and adjust referral patterns (Scott, 2000). Salaries give incentives to provide care that does not require costly effort and encourages referrals because income is fixed. For this reason, physicians may be less willing to treat patients who are sicker and more difficult to treat. On the other hand, fee-for-service (FFS) reimbursement encourages providers to deliver more services as long as the service is priced above the incremental cost the provider incurs in supplying it. Capitation, the third major reimbursement method, pays physicians a set amount *ex ante* for each patient for a given time period so income is proportional to the number of registered patients. This encourages low-cost care and referrals, but also competition for patients.

In this paper, I consider two levels of service delivery: primary care and hospitals. At the level of the hospital, reimbursement may follow predetermined budgets, fee-for-service, or payment based on certain characteristics of the patient (Ellis and Miller, 2008). The most widely used form of patient-based payment is diagnosis-related groups (DRGs). DRGs reimburse the hospital a fixed amount to provide care based on the patient's diagnosis. This offers the incentive for low-cost treatment and a faster discharge from the hospital. It also encourages providers to assign patients to a group with a higher reimbursement rate, a process known as up-coding or "DRG creep."

Under central planning, physicians at all levels were paid salaries and were employees of the state. Most countries have since introduced capitation among primary care doctors and some have also pursued partial or full reimbursement via fee-for-service for preventive care or minor

surgery. Capitation follows broadly similar policies in these countries; each year primary care receives some funding allocation from the insurance plan or government, which is then divided by the number of insured people to arrive at the per capita amount. The primary care provider receives this amount for each registered patient on his list so that a larger list size implies higher income. However, reimbursement may be capped at some threshold of registered patients so that a physician's list can only be so large (Kornai and Eggleston, 2001). In some cases, the capitation payment may be adjusted for different ages or rural/urban location (e.g., Bulgaria, Latvia, Romania), but risk adjustment beyond this is uncommon.

While primary care was previously neglected, hospital care was the chief component of the Soviet delivery system, and payments were based on block grants or line-item budgets. Since the end of central planning, though, many countries have begun to introduce more market-oriented payment methods in the hospital sector, like DRGs, while a few have experimented with fee-for-service.

Privatization of delivery is generally limited in these countries, with some exceptions. In the Czech Republic and Slovak Republic, for example, many primary care physicians have become self-employed and are under contract from the insurer and local government that provides the facilities (Kornai and Eggleston, 2001). Ambulatory facilities and some hospitals are also increasingly privately controlled, though the majority are still publicly owned. On the other hand, pharmacies and dentists have been largely privatized in many countries (Kornai and Eggleston, 2001). However, since the large majority of health care is still publicly delivered and detailed measurements of relative shares of private vs. public providers is lacking, this paper does not distinguish between the two.

C. Financing

In addition to out-of-pocket payments by households, the two other major financing sources in these countries are general revenues and social health "insurance"—payroll taxes earmarked for health care.[8] Since 1991, many of these countries have replaced or combined their general revenue-financed health systems with social health insurance. Contribution rates for the latter range from lows of 2 percent in Kyrgyzstan and 4 percent in Georgia to over 13 percent in Estonia, Czech Republic, Romania, Slovak Republic and Slovenia (Dixon and others, 2004, pp. 59). Social health insurance agencies administering the scheme are often separate from the Ministry of Health and purchase services from providers through contracting. Yet in many countries, a lack of sufficient transfers to the insurance funds has led to large deficits, which are typically bailed out by government from the state budget (Chawla, 2007). Most, but not all of social health insurance schemes in these countries have a ceiling on contributions (Normand and Busse, 2002).

[8] There is no clear definition of social health insurance (Gottret and Schieber, 2006). However, the term insurance is a bit misleading, as the benefits bear no link to the contributions within countries and there is sometimes not a ceiling on contributions. As a result, these schemes more closely resemble a tax than insurance per se.

Among these countries, social health insurance benefits usually do not provide capped first-dollar coverage, whereby a patient's expenses are reimbursed up to a certain threshold before the patient is responsible for the remainder. Instead, official copayments are often charged for outpatient and inpatient care. However, given the extent of informal payments and the limited number of services in the benefits package in some cases, social health insurance benefits may, in effect, resemble a low-cap, first-dollar coverage policy. This type of policy, though popular in many other developing countries, undermines insurance principles through limited risk sharing (Gertler and Solon, 2002).

A priori, the effects of social health insurance on government expenditures and utilization is ambiguous (Wagstaff and Moreno-Serra, 2009). People may be less reluctant to pay social health insurance contributions than other taxes because they grant a claim to services, and earmarking a set amount for the health sector may increase expenditure by removing the sector's allocation from budgetary negotiation. Although one of the goals of implementing social health insurance in these countries was to protect revenues to the health sector during a time of tight fiscal constraints, revenues to the sector actually decreased due to weak collection efforts (Wagstaff, 2007). Moreover, general revenues, in some circumstances, can grow faster than social health insurance contributions, depending on how the rates are set (most have ceilings). The prospect of evasion is also an important consideration. Wagstaff and Moreno-Serra (2009) find that social health insurance increases government health spending in Europe and Central Asia through increasing salaries, and possibly both administrative costs and service intensity, with limited impacts on health outcomes.

D. Rationalization of Hospital System Infrastructure

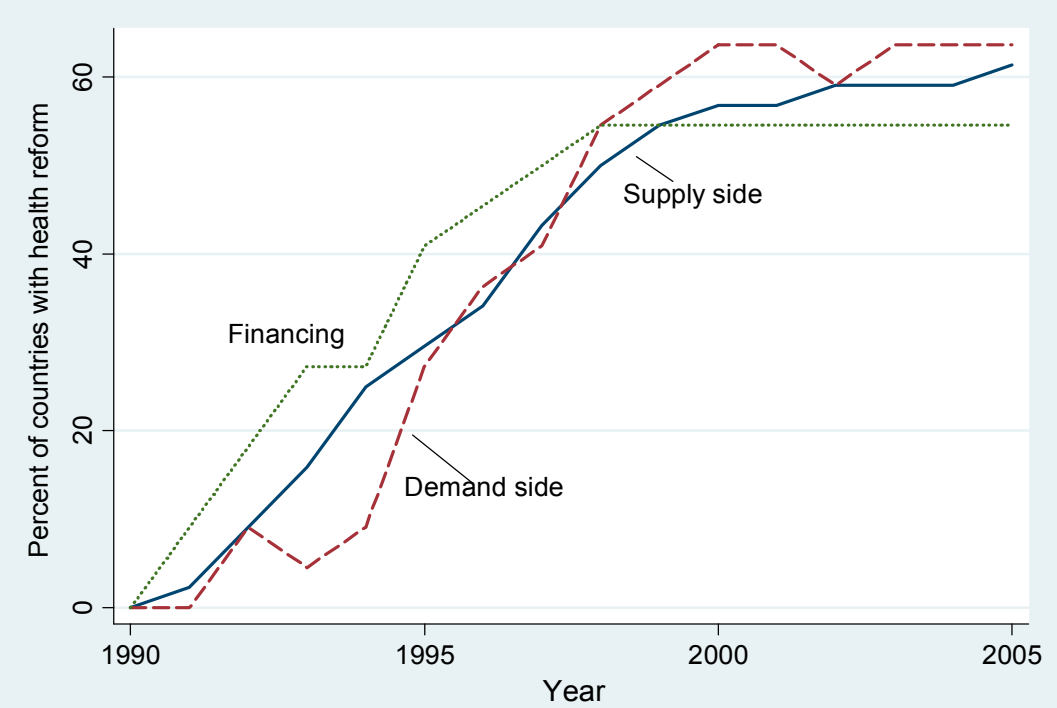
Finally, one health reform that is unique to this context is the rationalization of hospital infrastructure. Central planning led to an excessive number of hospital facilities and hospital beds. This is partly because these facilities received budgets that were allocated contingent on meeting certain standards or 'norms' based on the number of beds. More beds translated into more staff, resources, and funding. Additionally, some facilities were also built for reasons of national defense. In any case, the rationalization of the inflated hospital infrastructure has been a key aspect of health system reform in many countries, especially those in Central Asia.

E. Timing of Reforms

Given the multitude of health reforms in the region since 1991, a notable aspect of their experience is how quickly policies were implemented. OECD countries have pursued similar reforms, but the changes generally occurred decades ago. Additionally, while OECD countries do continually implement new policies in the health sector, these are usually not major changes of regime.

Identification of the impact of the reforms rests on adoption occurring on a staggered basis over time. In fact, some countries took the lead in implementing many reforms (e.g., Baltic countries) while the health systems of others have changed little since 1991 (e.g., Belarus, Ukraine). The rest have adopted select reforms, although the timing and choice of which one varies. Figure 1 displays an aggregate picture of the introduction of health reforms in the 21 countries. The reforms are classified according to whether the policy influences the demand side (copayments), supply side (primary care payment and hospital payment), or financing (social health insurance). The vertical axis plots the proportion of countries that had implemented the type of reform at a given time. Financing reforms were initially the most popular, but since the late 1990s countries have implemented more demand and supply side reforms (mostly copayments and capitation for primary care). Details on the specific timing of policy reforms by country are provided in Appendix Table 1.

Figure 1. Dynamics of Health Reforms, 1990–2005



Source: See Appendix 1.

III. METHODS

The basic approach is to compare the levels of public health spending, utilization, and avoidable deaths in countries that did not reform with those of countries that did. The identifying assumption is that without these reforms, trends in pre-reform differences would have continued. In order to empirically measure the impact of the reforms, I estimate a fixed-effects specification similar to the random trend model of Wagstaff and Moreno-Serra (2009). The basic regression takes the following form:

$$y_{it} = \alpha_i + \theta_t + c_i\left(trend \times country_i\right) + X_{it}\gamma + \beta_1 COPAY_{it} + \beta_2 PCAP_{it} + \beta_3 PFFS_{it} \quad (1.1)$$
$$+ \beta_4\left(PCAP_{it} \times PFFS_{it}\right) + \beta_5 HPBP_{it} + \beta_6 HFFS_{it} + \beta_7 SHI_{it} + \beta_8 HOSP_{it} + \beta_9 BED_{it} + \beta_{10} DOC_{it} + u_{it}$$

where *i* indexes countries, *t* indexes time, y_{it} is the log of public health expenditure per capita in constant 2005 $US adjusted for purchasing power parity, inpatient or outpatient utilization, or avoidable deaths, α_i is a country-specific effect, θ_t is a time-specific intercept, $country_i$ is a country-specific dummy and *trend* is a time trend.

Policies appear as dummy variables corresponding to whether the policy was in place at time *t*. *COPAY* refers to official copayments for outpatient and inpatient care. Primary care payment variables included are *PCAP* (primary care capitation) and *PFFS* (primary care fee-for-service) with payment via salaries as the reference category. The coefficient on the interaction of capitation and fee-for-service (β_4) estimates the combined effect of reimbursement via capitation and fee-for-service (relative to salaries). This allows for identification of the separate and joint effects of capitation and fee-for-service. The hospital payment variables included are *HPBP* (hospital patient-based payment) and *HFFS* (hospital fee-for-service) with reimbursement via budgets as the reference category. The dummy *SHI* captures the effect of social health insurance compared to general revenue financing.

Indicators of hospital capacity and human capital are represented by the variables *HOSP,* the number of hospitals per 100,000, *BED*, the number of hospital beds per 100,000, and *DOC*, the number of physicians per 100,000.

Control variables that may be correlated with the policies and also determine the outcomes are included in the X_{it} vector. These are GDP per capita; the share of the population over the age of 65; and the urban population share. The majority of macroeconometric studies of health expenditure have focused on the importance of income and ageing.[9] One would also expect GDP per capita to be positively correlated with inpatient and outpatient visits, and negatively correlated with average length of stay (taken as a crude measure of efficiency) and avoidable deaths. Higher shares of urban populations may increase health expenditure and utilization because of reduced time and travel costs (Leu, 1986). Urbanization may affect health policy through the organization and supply of medical providers. There are likely other variables that are determinants of health expenditure (McGuire and others, 1993; Culyer, 1988; and Roberts, 1999), but the goal here is to include only those that, if omitted, would bias the estimates of the reforms.

A log-linear specification is used to estimate public health expenditure. Economic theory does not provide clear justification for one choice of functional form over another and empirical

[9] See Newhouse (1977) and Gerdtham and Jonsson (2000).

research has used both linear and log-linear specifications (Parkin and others, 1987; Gerdtham and Jonsson, 2000). However, since there is wide variation in health spending between countries, it seems more sensible to estimate a proportionate change in health expenditure rather than a change by some absolute dollar amount. In all regressions, standard errors are adjusted for the possibility of intra-country correlation over time as well as heteroskedasticity (Bertrand and ohters, 2004).

The rationale for the inclusion of country-specific trends is to allow for unobservables that may (1) change over time, but differently across countries and (2) be correlated with the dependent variables and the health policy reforms. Estimation by fixed effects allows for time-invariant unobservables. If some unobservables vary within countries over time and also vary uniformly across countries, then these will be picked up by the year dummy variables. However, if these time-variant unobservables do not vary uniformly across countries and are correlated with the policy reforms, then the estimates of the policies will be biased. Including country-specific trends permits contemporaneous unobservables that affect the dependent variables differently to grow with a constant percentage effect. Country-specific trends may serve to pick up unobserved propensities to adopt health reforms that are related, for example, to technology adoption.

However, there may be complementarities between the provider payment policies at different levels, since some patients visit a primary care physician before going to a hospital and physicians can refer patients to other providers. It is reasonable to assume that primary care capitation, coupled with patient-based payment for hospitals, would increase spending over and above the individual effects of each payment method. This could occur since primary care physicians have an incentive to refer more patients than they would under salary, and hospitals have an incentive to admit more patients than they would under budgets. The same holds for the combination of primary care capitation and hospital fee-for-service. One might also hypothesize that if both primary care physicians and hospitals are reimbursed via fee-for-service, spending would increase, but less than the sum of the individual effects if there is competition between providers at different levels. A second regression equation incorporating such interactions takes the following form:

$$\begin{aligned} y_{it} = {} & \alpha_i + \theta_t + c_i\left(trend \times country_i\right) + X_{it}\gamma + \beta_1 COPAY_{it} + \beta_2 PCAP_{it} + \beta_3 PFFS_{it} \\ & + \beta_4\left(PCAP_{it} \times PFFS_{it}\right) + \beta_5 HPBP_{it} + \beta_6 HFFS_{it} + \beta_7 SHI_{it} + \beta_8 HOSP_{it} + \beta_9 BED_{it} + \beta_{10} DOC_{it} \\ & + \beta_{11}\left(PCAP_{it} \times HPBP_{it}\right) + \beta_{12}\left(PFFS_{it} \times HPBP_{it}\right) + \beta_{13}\left(PCAP_{it} \times HFFS_{it}\right) + \beta_{14}\left(PFFS_{it} \times HFFS_{it}\right) + \varepsilon_{it} \end{aligned} \tag{1.2}$$

Now the coefficient on *PCAP* measures the impact of switching from salaries to capitation when hospitals are paid budgets. Similarly, the coefficient on *HFFS* measures the impact of paying hospitals via fee-for-service compared to budgets when primary care is paid salaries.

Both specifications also include time-specific effects for the first five years for countries previously part of the Soviet Union. The rationale is two-fold: (1) the collapse of the Soviet Union may have produced more severe impacts on countries dependent on its revenues than

other countries that were not, which in turn affect the level of health spending; and (2) this serves to pick up differences in data measurement between former Soviet countries and others before and after the end of central planning. The results presented in Section V are not sensitive to how many years in the 1990s are included.

Finally, there may be concern that policies are endogenous. Reforms may have been implemented precisely because the government was concerned with the level of health spending or to increase or decrease utilization. In order to examine this, lead dummy variables for each reform are included that take a value of one if the reform is implemented the next year and zero otherwise. This strategy follows Gruber and Hanratty (1995) and is also employed by Wagstaff and Moreno-Serra (2009). If the coefficient on the lead dummy variable is significantly different than zero, this suggests reverse causality or the existence of a spurious correlation between the outcome and the propensity for countries to introduce the policy.

IV. DATA

The analysis uses annual data between 1990 and 2005. The countries comprise all those in Europe and Central Asia with (1) a previous history of central planning, and (2) none of the studied health reforms in place before 1991. This excludes Bosnia and Herzegovina, Croatia, Hungary, Serbia and Montenegro, and Turkey.

The data comes from several different sources. Income, measured as GDP per capita in constant 2005 $US adjusted for purchasing power parity, is taken from the World Bank's *World Development Indicators* (WDI). I use the same data on public health expenditure as Wagstaff and Moreno-Serra (2009), which is also taken from WDI, and updated for 2005. I do not examine private or total spending because the prevalence of informal payments in many of these countries makes private spending highly uncertain. The urban population share and the share of the population over age 65 are both collected from WDI.

Indicators of utilization include inpatient care admissions per 100, average length of stay in hospitals, and outpatient contacts per person. This data is extracted from the World Health Organization Regional Office for Europe's *Health for All Database* (HFA-DB). Using the number of outpatient and inpatient visits, a variable measuring the outpatient share of total visits is constructed.

Two criteria are used to decide which indicators should be included to proxy quality of care. First, the data should be both available and comparable across countries and over time. Second, the indicator should primarily reflect the performance of the health system itself. While there are many indicators that satisfy the first condition, many of these, including life expectancy at birth and infant mortality, are determined mostly by factors outside the health system.

Accordingly, the analysis considers two measures of avoidable deaths as health outcomes that might plausibly be impacted by the reforms: standardized death rates (SDRs) for appendicitis per

100,000 (ages 0–64) and standardized death rates for hernia and intestinal obstruction per 100,000 (ages 0–64).[10] These two outcomes have been used in studies measuring avoidable deaths across and within countries (Velkova and others, 1997; Andreev and others, 2003; and Nolte and McKee, 2008). The assumption is that better functioning health systems should have fewer people die from these causes. Both are easily treatable with early diagnosis often followed by minor surgery, usually performed at a hospital. I sum deaths from these two causes to construct a measure of avoidable deaths. Although there is no way to know if those who died were ever treated, deaths theoretically correspond to problems in accessing care and/or poor quality care. The rationale for not examining these deaths for the entire population is that, at older ages, the amenability of health care to deaths and the reliability of cause-of-death certification is more uncertain (Velkova and others, 1997).

Information to establish the date of implementation of policy reforms was extracted from a number of sources. The timing of primary care capitation, primary care fee-for-service, and copayments are mostly taken from the Health Systems in Transition country profiles (HiTs) of the European Observatory on Health Systems and Policies, which is affiliated with the World Health Organization Regional Office for Europe. Various journal articles and World Bank documents—Public Expenditure Reviews (PERs), Health Policy Notes, and Poverty Assessments—also provided evidence of the timing of policy implementation. A comprehensive list of sources by policy and country is presented in Appendix I. The accuracy of the information in several countries was verified with knowledgeable World Bank staff.[11] The timing of social health insurance and hospital payment reforms are taken directly from Wagstaff and Moreno-Serra (2009).[12] Data on physicians, hospital beds, and hospitals per 100,000 are taken from the HFA-DB.

Determining the precise timing of certain reforms requires some degree of judgment, due to incomplete adoption within countries. In some cases, provider payment reforms occurred for public sector providers—but not private sector ones—or only in certain regions. The paper bases the classification of a reform on whether it is in place for more than half the providers or for half of the regions. Both social health insurance and copayments were often individually introduced at the same time throughout the country, so this issue is less relevant with these reforms. Finally, without information on the month of implementation for all reforms, which would allow for

[10] The HFA-DB also contains data on surgical infection rates and adverse deaths from therapeutic agents, which may similarly represent the quality of the health system. Data for these variables, however, are unavailable for over half of observations in the dataset.

[11] I am thankful to Pia Schneider, Rekha Menon, Aizhan Imasheva, and Santiago Cornejo for help in verifying the dates of policy reforms.

[12] These are updated for the year 2005. The only change is the introduction of hospital patient-based payment in Romania.

weighting by the percentage of the year each policy was in force, the classification is based simply on the year of implementation.

The variation in health expenditure, income, and health policy is readily apparent from the descriptive statistics presented in Table 1.

Table 1. Descriptive Statistics of Dataset

Variable	Mean	s.d.	Min	Max
Public health expenditure per capita, PPP (constant 2005 intl $)	315.22	311.04	7.49	1394.44
Inpatient admissions per 100	16.68	5.92	4.57	30.02
Average length of stay (days)	12.97	2.97	6.40	18.10
Outpatient visits per 100	6.91	3.33	1.40	16.43
Standardized death rates, appendicitis (ages 0-64), per 100,000	0.18	0.14	0.00	0.91
Standardized death rates, hernias (ages 0-64), per 100,000	0.90	0.41	0.06	2.38
GDP per capita, PPP (constant 2005 intl $)	6894.73	4786.41	879.34	22506.44
Population over age of 65 (% of total population)	10.50	3.69	3.46	17.18
Urban population (% of total population)	57.27	12.89	24.70	75.20
Copayments	0.39	0.49	0.00	1.00
Primary care capitation	0.38	0.49	0.00	1.00
Primary care fee-for-service	0.21	0.41	0.00	1.00
Primary care capitation and fee-for-service	0.18	0.39	0.00	1.00
Hospital patient-based payment	0.24	0.43	0.00	1.00
Hospital fee-for-service	0.12	0.32	0.00	1.00
Social health insurance	0.41	0.49	0.00	1.00
Hospitals per 100,000	5.08	2.47	1.10	10.73
Hospital beds per 100,000	827.64	267.41	296.61	1407.54
Physicians per 100,000	314.56	86.76	118.28	519.17

Source: Fund staff estimates.

Notes: s.d. = standard deviation. Sample consists of annual data for 22 countries between 1990 and 2005 (*N*=352). The dataset is 99 percent non-missing for physicians and inpatient admissions, 97 percent non-missing for outpatient visits, 90 percent non-missing for SDRs from hernias and intestinal obstruction and public health spending, 89 percent non-missing for SDRs from appendicitis, and complete for the remaining variables.

Table 2 shows the variation at the beginning and end of the sample period. On average, public health spending as a percent of GDP was 3.6 in 2005, which is between the average for other low- and middle-income countries (Figure 2). Not surprisingly given the discrepancy in income between some of these countries, this share varied between less than 1 percent in Azerbaijan and over 6 percent in the Czech Republic. Public health spending as a percentage of general government expenditure displays similar patterns.

It is important to verify that the countries implementing the policies are comparable to those not doing so (Meyer, 1995; and Besley and Case, 2000). The degree of similarity between the "control" and "treatment" groups is checked in several ways. For each individual reform, the sample is divided into two groups: those that adopted the reform at some point during the 16 years and those that did not. The means of each dependent variable in 1990, 1991, and the change during this period for each of these groups are compared through *t*-tests, excluding two countries that began reforms in 1991 (Appendix Table 2).

Table 2. Descriptive Statistics, 1990 and 2005

	1990		2005	
Variable	Mean	s.d.	Mean	s.d.
Public health expenditure per capita, PPP (constant 2005 intl $)	324.78	261.16	381.06	16.91
Inpatient admissions per 100	18.97	4.79	16.73	6.47
Average length of stay (days)	15.19	1.88	10.18	2.43
Outpatient visits per 100	8.19	2.42	6.79	3.63
Standardized death rates, appendicitis (ages 0-64), per 100,000	0.29	0.14	0.12	0.11
Standardized death rates, hernias (ages 0-64), per 100,000	0.96	0.29	0.60	0.18
GDP per capita, PPP (constant 2005 intl $)	7798.92	4224.96	9175.22	6130.83
Population over age of 65 (% of total population)	8.79	3.06	12.09	4.07
Urban population (% of total population)	57.35	12.65	57.56	13.55
Copayments	0.00	0.00	0.64	0.49
Primary care capitation	0.00	0.00	0.68	0.48
Primary care fee-for-service	0.00	0.00	0.32	0.48
Primary care capitation and fee-for-service	0.00	0.00	0.32	0.48
Hospital patient-based payment	0.00	0.00	0.50	0.51
Hospital fee-for-service	0.00	0.00	0.05	0.21
Social health insurance	0.00	0.00	0.55	0.51
Hospitals per 100,000	5.76	2.84	4.34	2.00
Hospital beds per 100,000	1046.03	283.44	653.46	201.08
Physicians per 100,000	330.00	91.90	319.55	84.23

Source: Fund staff estimates.
Note: s.d. = standard deviation.

The differences in levels in 1990 or 1991 are not statistically significant roughly 85 percent of the time. More importantly, the differences in changes are not significant over 90 percent of the time. The changes in the remaining 10 percent of cases are also not statistically different after controlling for differences in GDP per capita, urban population share, and share of the population over age 65. For the purposes of the regression analysis, this indicates that the control and treatment groups follow "parallel trends." Figure 3 graphically illustrates the trends in public health expenditure per capita.

V. RESULTS

A. Effects on Public Health Expenditure

The results of estimating regression equations (1.1) and (1.2) for public health spending per capita are presented in Table 3. In the basic model without provider payment interactions (Column 1), changes in hospital capacity and the introduction of social health insurance are the only policy measures to have a statistically significant impact on spending (with both increasing it). However, controlling for the combination of payment methods in primary care and hospitals (Column 2) unearths the impact of the provider payment reforms. The interpretation of the provider payment coefficients is now different. Primary care fee-for-service increases expenditure by 29 percent relative to salaries when hospitals are paid budgets. Hospital fee-for-service increases spending by 37 percent if primary care providers are paid salaries.

However, if both levels are paid via fee-for-service, the increase is dampened, as indicated by the large and significantly negative coefficient on the interaction of both fee-for-service variables. Paying both levels fee-for-service still increases spending overall, though. On the other hand, hospital patient-based payment reduces spending by 16 percent compared to budgets when primary care providers are paid salaries.

The reason the hospital payment coefficients increase in magnitude (in absolute value) and become significant in Column 2 is that their effect depends on how primary care is paid. Hospital fee-for-service is not as expensive if primary care is also paid fee-for-service, perhaps because primary care physicians who are paid fee-for-service may refer fewer patients to hospitals than if they were paid salaries. On the other hand, hospital fee-for-service is more expensive if primary care physicians are paid via capitation, although the coefficient estimate of 0.31 on the interaction term, which is large in magnitude, is only significant at the 15 percent level. This is expected, as capitation induces more referrals to hospitals than salary and hospital fee-for-service induces greater activity than budgets. Similarly, hospital patient-based payment is more expensive if primary care is paid capitation, as expected. The incentive given by DRGs is to increase hospital activity by admitting more patients, and this is easier to do if referrals from primary care increase due to capitation.

The coefficient on social health insurance is robust to including provider payment interactions, which is expected since it should not depend on this factor. Introducing copayments for outpatient and inpatient care is predicted to decrease public spending by 17 percent although this estimate is only significant at the 15 percent level. The impacts of the number of hospitals, beds, or physicians per capita are generally not statistically significant.

Reverse causality does not appear to be a problem, as suggested by the statistically insignificant estimates of the leads of the policies (Column 3).

B. Effects on Utilization

Table 4 presents the results of the inpatient utilization regressions. In the basic specification (Column 1), the only policy to significantly impact inpatient admissions is hospital fee-for-service, which enters positively. This corresponds with the fact that under central planning, most services were delivered in the overdeveloped hospital sector.

Including provider payment interactions (Column 2) again shows the effects of hospital payment methods depend on how primary care physicians are reimbursed. The coefficient estimates on the interaction terms all have the expected signs and three of the four are statistically significant. The joint effect of capitation and hospital patient-based payment (or fee-for-service) is positive. Although it is not possible to determine if these increased admissions are due solely to more referrals, it seems reasonable that some portion likely is. On the other hand, the joint effect of primary care fee-for-service and hospital fee-for-service is negative, possibly due to reduced referrals.

Primary care fee-for-service payment is estimated to increase admissions by 15 percent when hospitals are paid budgets and the effect is highly significant. This helps to explain the corresponding spending increases in Table 3 although it is not clear why this leads to higher hospital admissions. One explanation might be that some clinics are located in outpatient facilities of hospitals and as a result, there are greater connections between primary care and hospitals. The coefficient estimates on hospital patient-based payment and hospital fee-for-service have the expected positive sign with p-values of 0.12 and 0.11, respectively. Contrary to expectations, capitation alone does not increase inpatient admissions.

Regarding average length of stay, formal copayments are predicted to produce reductions of 4 percent (Columns 4–6). While there is some indication that primary care FFS impacts average length of stay depending on how hospitals are paid, the lead dummy variable is significant in Column 6.

Table 5 presents the results for outpatient utilization. Introducing hospital fee-for-service is predicted to decrease outpatient visits by 20 percent when primary care physicians are reimbursed salaries (Column 2). As expected, copayments reduced outpatient utilization by about 8 percent, although the p-value is again 0.12. In the outpatient share regressions (Columns 4-6), there is some sign that either fee-for-service for hospitals or primary care reduces the share of outpatient visits (through increasing inpatient admissions). Social health insurance is predicted to increase this share, although the leads of both social health insurance and primary care fee-for-service suggest endogeneity may be an issue with the outpatient share regressions.

C. Effects on Avoidable Deaths

Some of the provider payment reforms appear to reduce avoidable deaths (Table 6). The joint effect of primary care capitation and fee-for-service significantly reduces avoidable deaths (Column 2). Hospital fee-for-service reduces deaths by 0.37 per 100,000 if primary care physicians are paid via salary. While arguably small in magnitude, this corresponds to a 34 percent reduction in the death rate, on average. This effect is dampened if primary care physicians are also paid fee-for-service, though. In light of the corresponding relative reduction in inpatient admissions and the incentives fee-for-service provides to deliver additional services, perhaps there is an overprovision of services in the primary care setting and an underutilization of more specialized hospital services.

Table 3. Log Public Health Expenditure per Capita (Fixed Effects Regressions)

	(1)	(2)	(3)
Copayments	-0.17	-0.17	-0.16
	(0.10)	(0.11)	(0.11)
Capitation	-0.06	-0.29	-0.30
	(0.11)	(0.20)	(0.22)
Primary care FFS	-0.11	0.29**	0.23
	(0.13)	(0.12)	(0.17)
Primary care capitation+FFS	0.16	0.12	0.12
	(0.14)	(0.12)	(0.12)
Hospital PBP	0.02	-0.16**	-0.17*
	(0.06)	(0.07)	(0.09)
Hospital FFS	0.12	0.37***	0.40***
	(0.08)	(0.13)	(0.12)
Social health insurance	0.26***	0.28***	0.25***
	(0.07)	(0.07)	(0.08)
Log hospitals per 100,000	0.19*	0.06	0.07
	(0.09)	(0.09)	(0.09)
Log hospital beds per 100,000	-0.15	0.09	0.07
	(0.19)	(0.21)	(0.25)
Log doctors per 100,000	-0.47	-0.52	-0.49
	(0.40)	(0.40)	(0.44)
Hospital PBP and primary care capitation		0.33*	0.30
		(0.19)	(0.20)
Hospital PBP and primary care FFS		-0.05	-0.04
		(0.22)	(0.24)
Hospital FFS and primary care capitation		0.31	0.29
		(0.19)	(0.22)
Hospital FFS and primary care FFS		-0.61***	-0.61***
		(0.16)	(0.18)
Copayment in 1 year			0.03
			(0.05)
Primary care capitation in 1 year			-0.03
			(0.06)
Primary care FFS in 1 year			-0.06
			(0.06)
Hospital PBP in 1 year			-0.04
			(0.04)
Hospital FFS in 1 year			0.11
			(0.11)
Social health insurance in 1 year			-0.10
			(0.07)
Log of GDP per capita	1.81***	1.89***	1.89***
	(0.25)	(0.24)	(0.24)
Population age 65+ (%)	0.18	0.13	0.16
	(0.12)	(0.11)	(0.11)
Urban population (%)	0.20***	0.21***	0.20***
	(0.06)	(0.06)	(0.06)
Observations	311	311	311
Adjusted R^2	0.79	0.81	0.81

Source: Fund staff estimates.
* p<0.1, ** p<0.05, *** p<0.01. Cluster-adjusted standard errors are in parentheses. Regressions also include country and time fixed effects, time dummies for former Soviet countries between 1990 and 1994, country-specific trends and a constant.

Table 4. Inpatient Utilization (Fixed Effects Regressions)

	Inpatient Admissions			Average Length of Stay		
	(1)	(2)	(3)	(4)	(5)	(6)
Copayments	-0.03	-0.02	-0.02	-0.04**	-0.04**	-0.04**
	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.02)
Primary care capitation	0.03	-0.02	-0.04	-0.02	0.02	0.03
	(0.03)	(0.04)	(0.06)	(0.03)	(0.05)	(0.07)
Primary care FFS	0.01	0.15***	0.19**	-0.03	-0.11**	-0.18**
	(0.04)	(0.05)	(0.09)	(0.02)	(0.04)	(0.08)
Primary care capitation+FFS	-0.02	-0.05	-0.08*	-0.02	0.00	0.03
	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.03)
Hospital PBP	-0.00	0.07	0.08*	0.01	0.01	0.01
	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.05)
Hospital FFS	0.06	0.06	0.06	-0.04	-0.05	-0.04
	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)
Social health insurance	-0.00	-0.02	-0.03	0.01	0.01	0.02
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)
Log hospitals per 100,000	0.30***	0.29***	0.30***	0.14	0.15	0.15
	(0.07)	(0.07)	(0.07)	(0.11)	(0.11)	(0.11)
Log hospital beds per 100,000	0.19	0.20	0.18	0.11	0.09	0.11
	(0.19)	(0.19)	(0.18)	(0.11)	(0.11)	(0.11)
Log doctors per 100,000	-0.04	-0.02	-0.00	-0.02	-0.02	-0.06
	(0.12)	(0.12)	(0.12)	(0.08)	(0.08)	(0.08)
Hospital PBP and primary care capitation		0.06	0.05		-0.05	-0.06
		(0.05)	(0.05)		(0.05)	(0.05)
Hospital PBP and primary care FFS		-0.20**	-0.21**		0.06	0.08
		(0.08)	(0.09)		(0.08)	(0.09)
Hospital FFS and primary care capitation		0.12**	0.16*		-0.08	-0.11
		(0.05)	(0.08)		(0.06)	(0.08)
Hospital FFS and primary care FFS		-0.15**	-0.18**		0.10*	0.14*
		(0.05)	(0.07)		(0.05)	(0.07)
Copayment in 1 year			-0.02			-0.01
			(0.02)			(0.01)
Primary care capitation in 1 year			-0.03			0.01
			(0.03)			(0.03)
Primary care FFS in 1 year			0.04			-0.07**
			(0.04)			(0.03)
Hospital PBP in 1 year			0.00			0.03
			(0.03)			(0.02)
Hospital FFS in 1 year			-0.02			0.05
			(0.03)			(0.03)
Social health insurance in 1 year			-0.03			0.01
			(0.03)			(0.02)
Log of GDP per capita	0.40***	0.41***	0.40***	-0.16***	-0.17***	-0.17***
	(0.08)	(0.08)	(0.08)	(0.06)	(0.06)	(0.05)
Population age 65+ (%)	-0.05	-0.06	-0.05	0.02	0.02	0.02
	(0.06)	(0.06)	(0.06)	(0.05)	(0.04)	(0.04)
Urban population (%)	0.13**	0.12**	0.12*	-0.02	-0.02	-0.01
	(0.06)	(0.06)	(0.06)	(0.03)	(0.03)	(0.03)
Observations	344	344	344	347	347	347
Adjusted R^2	0.89	0.90	0.90	0.93	0.93	0.93

Source: Fund staff estimates.
* p<0.1, ** p<0.05, *** p<0.01. Cluster-adjusted standard errors are in parentheses. Regressions include the same controls as in Table 3. See notes for Table 3.

Table 5. Outpatient Utilization (Fixed Effects Regressions)

	Log Outpatient Visits per Capita			Outpatient Share of Total Visits		
	(1)	(2)	(3)	(4)	(5)	(6)
Copayments	-0.10	-0.08	-0.08	-0.13	-0.13	-0.11
	(0.06)	(0.05)	(0.06)	(0.12)	(0.12)	(0.14)
Primary care capitation	-0.06	-0.11	-0.13	-0.18	-0.22	-0.20
	(0.07)	(0.14)	(0.19)	(0.15)	(0.27)	(0.35)
Primary care FFS	-0.14	-0.11	-0.12	-0.50	-0.68*	-0.92*
	(0.10)	(0.13)	(0.24)	(0.31)	(0.33)	(0.50)
Primary care capitation+FFS	0.01	-0.06	-0.10	0.16	0.02	0.05
	(0.14)	(0.12)	(0.12)	(0.33)	(0.33)	(0.35)
Hospital PBP	-0.08	-0.05	-0.08	-0.18	-0.31	-0.46**
	(0.07)	(0.06)	(0.06)	(0.19)	(0.20)	(0.22)
Hospital FFS	-0.03	-0.20**	-0.27***	-0.24	-0.73***	-0.88***
	(0.05)	(0.07)	(0.09)	(0.18)	(0.18)	(0.19)
Social health insurance	0.04	0.08	0.11*	0.12	0.26**	0.41**
	(0.05)	(0.05)	(0.06)	(0.14)	(0.12)	(0.15)
Log hospitals per 100,000	0.12	0.14	0.13	-0.73*	-0.71*	-0.81**
	(0.12)	(0.12)	(0.12)	(0.36)	(0.35)	(0.34)
Log hospital beds per 100,000	0.40	0.36	0.39	0.58	0.47	0.64
	(0.28)	(0.25)	(0.24)	(0.69)	(0.66)	(0.65)
Log doctors per 100,000	-0.16	-0.11	-0.15	0.18	0.25	0.07
	(0.30)	(0.29)	(0.28)	(0.79)	(0.75)	(0.69)
Hospital PBP and primary care capitation		0.08	0.11		0.12	0.19
		(0.14)	(0.15)		(0.30)	(0.32)
Hospital PBP and primary care FFS		-0.12	-0.16		0.17	0.15
		(0.21)	(0.27)		(0.50)	(0.56)
Hospital FFS and primary care capitation		0.17	0.20		0.26	0.15
		(0.14)	(0.22)		(0.32)	(0.42)
Hospital FFS and primary care FFS		0.09	0.09		0.53	0.69*
		(0.13)	(0.20)		(0.34)	(0.40)
Copayment in 1 year			0.00			0.06
			(0.04)			(0.09)
Primary care capitation in 1 year			-0.01			0.14
			(0.08)			(0.18)
Primary care FFS in 1 year			-0.13			-0.53**
			(0.10)			(0.22)
Hospital PBP in 1 year			-0.05			-0.09
			(0.04)			(0.13)
Hospital FFS in 1 year			-0.09			-0.17
			(0.08)			(0.17)
Social health insurance in 1 year			0.06			0.25*
			(0.04)			(0.12)
Log of GDP per capita	0.33**	0.33**	0.33**	-0.00	-0.02	0.01
	(0.12)	(0.12)	(0.12)	(0.30)	(0.29)	(0.29)
Population age 65+ (%)	-0.14	-0.14	-0.14	-0.36*	-0.35	-0.40*
	(0.09)	(0.09)	(0.09)	(0.21)	(0.21)	(0.20)
Urban population (%)	0.09	0.08	0.09	-0.02	-0.00	0.01
	(0.07)	(0.07)	(0.07)	(0.25)	(0.25)	(0.23)
Observations	340	340	340	337	337	337
Adjusted R^2	0.76	0.77	0.77	0.62	0.63	0.64

Source: Fund staff estimates.
* p<0.1, ** p<0.05, *** p<0.01. Cluster-adjusted standard errors are in parentheses. Regressions include the same controls as in Table 3. See notes for Table 3.

Table 6. Avoidable Deaths, Standardized Death Rates Ages 0–64 (Fixed Effects Regressions)

	(1)	(2)	(3)
Copayments	-0.11	-0.12	-0.07
	(0.08)	(0.09)	(0.09)
Primary care capitation	0.05	0.06	0.07
	(0.09)	(0.13)	(0.21)
Primary care FFS	0.18	0.09	0.22
	(0.11)	(0.11)	(0.31)
Primary care capitation+FFS	-0.13	-0.23**	-0.25
	(0.12)	(0.09)	(0.17)
Hospital PBP	0.03	-0.07	-0.11
	(0.08)	(0.12)	(0.16)
Hospital FFS	-0.13	-0.37***	-0.46***
	(0.11)	(0.11)	(0.14)
Social health insurance	-0.05	0.03	0.06
	(0.08)	(0.08)	(0.12)
Log hospitals per 100,000	-0.36	-0.34	-0.33
	(0.27)	(0.26)	(0.28)
Log hospital beds per 100,000	0.47	0.40	0.44
	(0.34)	(0.33)	(0.36)
Log doctors per 100,000	-0.27	-0.23	-0.24
	(0.38)	(0.38)	(0.41)
Hospital PBP and primary care capitation		0.01	0.07
		(0.13)	(0.12)
Hospital PBP and primary care FFS		0.17	0.10
		(0.15)	(0.18)
Hospital FFS and primary care capitation		0.13	0.18
		(0.10)	(0.25)
Hospital FFS and primary care FFS		0.26**	0.22
		(0.11)	(0.20)
Copayment in 1 year			0.09
			(0.08)
Primary care capitation in 1 year			0.07
			(0.20)
Primary care FFS in 1 year			0.06
			(0.23)
Hospital PBP in 1 year			-0.08
			(0.10)
Hospital FFS in 1 year			-0.25
			(0.17)
Social health insurance in 1 year			0.14
			(0.12)
Log of GDP per capita	-0.94**	-0.96**	-0.91***
	(0.34)	(0.35)	(0.30)
Population age 65+ (%)	0.15	0.15	0.08
	(0.17)	(0.17)	(0.15)
Urban population (%)	-0.17	-0.14	-0.14
	(0.11)	(0.10)	(0.09)
Observations	311	311	311
Adjusted R^2	0.53	0.53	0.53

Source: Fund staff estimates.

* p<0.1, ** p<0.05, *** p<0.01. Cluster-adjusted standard errors are in parentheses. Regressions include the same controls as in Table 3. See notes for Table 3.

VI. DISCUSSION

The health reforms enacted during the economic transition have had sizeable impacts on public health spending, utilization, and avoidable deaths. This paper does not attempt to estimate fully specified models of public health care spending, utilization, or avoidable deaths. Instead, by including country fixed effects, country-specific trends, socioeconomic and demographic controls, time effects (that may differ between former Soviet and other countries in the 1990s), and a comprehensive set of concurrent major policy reforms, it attempts to control for all variables that, if omitted, might bias the estimates of the reforms. This paper examines a small, but important, number of indicators in the health sector to shed light on some of the effects of reforms at the population level.

The regression results suggest that reform policies impacted public health spending through their effects on inpatient admissions. Where fee-for-service increased admissions, spending also increased. This is not surprising given that hospital care tends to be more expensive than care in other settings.

Supply-side measures tend to have a larger impact on public spending than demand-side measures or changes to the financing of health care. This accords with the fact that the majority of health care is delivered at the physician's discretion once the patient is in the system. The most expensive policy is hospital fee-for-service, which is predicted to increase public spending by 37 percent. This higher spending does yield benefits, as measured by fewer avoidable deaths. Similar to the findings of Wagstaff and Moreno-Serra (2009), social health insurance is also predicted to increase public spending; however, the magnitude of the estimate is smaller than those of most provider payment methods. The effects of reimbursement policies for primary care and hospitals critically depend on how the other level is paid.

For both hospitals and primary care, the increase in spending from fee-for-service may also owe to the replacement of informal payments with legal charging for services. Under the former system—and after its collapse—informal payments played an important role for providers to generate additional income and effectively represented a fee-for-service reimbursement on top of their salaries. The formal introduction of fee-for-service enabled providers to legally charge for payments that had been made earlier through informal channels. Even if the practice of informal payments was not as widespread in some of the countries adopting fee-for-service payment (e.g., Czech Republic and Slovenia), some of the estimated increase in spending due to fee-for-service may be a result of now observing some of this previously informal, private spending.

It is also important to point out that some of the provider payment interactions are identified by relatively few observations. The combination of fee-for-service at both levels is found for Czech Republic and Latvia for a period of four years each. Primary care fee-for-service and hospital budgets were present in the Slovak Republic in 1993, 1999, 2000, and 2001, and Romania between 1999 and 2004. The combination of hospital fee-for-service and salaried primary care is observed in Macedonia from 1991 to 2005 and Estonia between 1992 and 1997. However, the

fact that outcomes are observed before implementation and after abolition of the policies is useful.

A. Predicting Public Health Expenditure, Average Length of Stay, and Avoidable Deaths

An interesting question is what would have happened if no health reforms had been implemented, or if an optimal set had been. The literature suggests that an optimal policy mix, judged with respect to improving efficiency and quality, would involve capitation and fee-for-service for primary care, patient-based payment for hospitals, and copayments on the demand-side (Ellis and McGuire, 1990, 1993; Newhouse, 1996; Ma and McGuire, 1997; Pauly, 2000; Eggleston, 2000; Newhouse, 2002; and Eggleston, 2005).[13]

Table 7 below presents predictions of average public spending per capita, average length of stay, and avoidable deaths in 2004 under different policy scenarios. Given observed changes in physicians, hospitals and hospital beds, and social health insurance, if countries had not adopted any health reforms, average spending would have been $259 in 2004, much lower than what was actually observed ($370). Under the no-reform scenario, average length of stay and avoidable deaths would have been higher, though. Based on the negative correlation between avoidable deaths and health spending, countries would have had lower health spending compared to the no-reform scenario if the average level of avoidable deaths were equal to that in the no-reform scenario. In other words, for a given level of quality, the enacted reforms reduced spending. The third row of Table 7 shows that if countries had adopted an optimal policy mix and given the observed changes in hospital infrastructure and financing source, average predicted spending would have been slightly lower than what was observed and quality and efficiency would have improved.

Table 7. Average Predicted Outcomes Under Different Policy Scenarios, 2004

	Public Health Spending per Capita, PPP (Constant 2005 $)	Average Length of Stay (Days)	Standardized Death Rates, Avoidable Deaths (Per 100,000)
Observed	370	10.5	0.704
Counterfactual:			
No policy reforms	259	11.0	0.752
Optimal set of supply-side and demand-side reforms	366	9.9	0.680

Source: Fund staff estimates, based on results in Tables 3–6.

[13] Basing hospital reimbursement on a combination of fee-for-service and prospective payment might be optimal, but due to the difficulty in classifying mixed hospital payment methods, this is not considered.

B. Policy Implications

An important policy issue that countries pursuing health reform should consider is that complementarities in provider payment matter. Specifically, the key policy lessons are the following:

- When hospitals are paid on a fee-for-service basis, public expenditure on health tends to increase. The magnitude of the increase depends on how primary care is paid. The effect is lowest when primary care providers are paid on a fee-for-service basis; under this scenario, primary care providers have an incentive to provide treatment themselves to increase their compensation, rather than referring patients to hospitals. While hospital fee-for-service leads to higher expenditures and higher hospital admissions, it also reduces avoidable deaths;
- Introducing DRGs for hospitals decreases spending if primary care is reimbursed via salary, but not if primary care is reimbursed via capitation. This is likely explained by the fact that hospital care is generally more expensive than primary care and both capitation and DRGs provide incentives to increase hospital admissions. There do not appear to be adverse impacts on avoidable deaths due to DRGs;
- Social health insurance increases public health spending relative to general revenue financing; and
- The magnitudes of the estimated effects of provider payment reforms on spending are large—roughly between 15 and 35 percent—and greater than the impact of demand-side measures.

These policy lessons are directly applicable to countries within this region that have experienced a similar transition after central planning. Many have yet to implement major health reforms and this is especially true for those at lower income levels. Implementing an optimal policy mix would likely improve the performance of their health systems through increased efficiency and fewer avoidable deaths.

Appendix Table 1. Classification of Health Policy Reforms

	Demand-side		Supply-side				Financing
	Copayments[1/]		Hospital payment		Primary care payment		SHI adoption
Country	Yes/No	Years	Predominant method	Years	Predominant method	Years	Year
Albania	No	1990–1994	Budget	1990–2005	Salary	1990–1994	1995
	Yes	1995-2005			Capitation	1995-2005	
Armenia	No	1990-1996	Budget	1990-2005	Salary	1990-1997	Never
	Yes	1997-2005			Capitation	1998-2005	
Azerbaijan	No	1990-1997	Budget	1990-2005	Salary	1990-2005	Never
	Yes	1998-2005					
Belarus	No	1990-2005	Budget	1990-2005	Salary	1990-2005	Never
Bulgaria	No	1990-1999	Budget	1990-1998	Salary	1990-1999	1999
	Yes	2000-2005	PBP	1999-2005	Capitation	2000-2005	
Czech Republic	No	1990-2005	Budget	1990-1992	Salary	1990-1992	1993
			FFS	1993-1997	FFS	1993-1996	
			Budget	1998-2005	Capitation/FFS	1997-2005	
Estonia	No	1990-1994	Budget	1990-1990	Salary	1990-1997	1992
	Yes	1995-2005	FFS	1992-2003	Capitation/FFS	1998-2005	
			PBP	2004-2005			
Georgia	No	1990-1994	Budget	1990-1995	Salary	1990-1994	1995
	Yes	1995-2005	PBP	1996-2005	Capitation/FFS	1995-2005	
Kazakhstan	No	1990-1994	Budget	1990-1995	Salary	1990-1996	1996 (canceled 1998)
	Yes	1995-2005	PBP	1996-2005	Capitation	1997-2005	
Kyrgyz Republic	No	1990-1992	Budget	1990-1996	Salary	1990-1997	1997
	Yes	1993-2005	PBP	1997-2005	Capitation	1998-2005	
Latvia	No	1990-1995	Budget	1990-1993	Salary	1990-1993	Never
	Yes	1996-2005	FFS	1994-1997	FFS	1994-1998	
			PBP	1998-2005	Capitation/FFS	1999-2005	

Appendix Table 1. Classification of Health Policy Reforms (continued)

	Demand-side		Supply-side				Financing
	Copayments[1/]		Hospital payment		Primary care payment		SHI adoption
Country	Yes/No	Years	Predominant method	Years	Predominant method	Years	Year
Lithuania	No	1990-2005	Budget	1990-1993	Salary	1990-1996	1991
			PBP	1994-2005	Capitation	1997-2005	
Macedonia	No	1990-1991	FFS	1990-2005	Salary	1990-2005	1991
	Yes	1992					
	No	1993					
	Yes	1994-2005					
Moldova	No	1990-1998	Budget	1990-2005	Salary	1990-1996	Never
	Yes	1999-2005			Capitation	1997-2005	
Poland	No	1990-2005	Budget	1990-1997	Salary	1990-1998	Never
			PBP	1998-2005	Capitation	1999-2005	
Romania	No	1990-2005	Budget	1990-2004	Salary	1990-1998	1998
			PBP	2005	Capitation/FFS	1999-2005	
Russia	No	1990-2005	Budget	1990-2005	Salary	1990-2005	1993
Slovak Republic	No	1990-2002	Budget	1990-1993	Salary	1990-1992	1995
			FFS	1994-1998	FFS	1993	
	Yes	2003-2005	Budget	1999-2001	Capitation	1994-1997	
			PBP	2002-2005	Capitation/FFS	1998-2005	
Slovenia	No	1990-1991	Budget	1990	Salary	1990	1992
	Yes	1992	PBP	1992-2005	Capitation/FFS	1992-2005	
	No	1993-2005 [a]					
Ukraine	No	1990-1995	Budget	1990-2005	Salary	1990-2005	Never
	Yes	1996-2001					
	No	2002-2005					
Uzbekistan	No	1990-1997	Budget	1990-2005	Salary	1990-2005	Never
	Yes	1998-2005					

Sources: References in Appendix I.

1/. Outpatient and inpatient care FFS = Fee-for-service PBP= Patient-based payment following Ellis and Miller (2008). PBP refers to hospital payment that depends on characteristics of the patient and is most often represented by diagnosis related groups (DRGs).

a. Slovenia introduced voluntary health insurance to cover the cost of copayments in 1993. Since take-up of the policy was nearly universal, the paper classifies the country as not having copayments from 1993 onwards.

Appendix I. References of Policy Variables

Albania
Copayment: Nuri (2002) pp. 31–32. Vian and others (2006), p. 885.
Primary care payment: Taylor (2003) p. 4, Nuri and Healy (1999) p. 47.

Armenia
Copayment: Hakobyan and others (2006) p. 46.
Primary care payment: Hakobyan and others (2006) p. 67.

Azerbaijan
Copayment: Holley (2004) p. 21, World Bank (2005a) pp. 90–1
Primary care payment: Holley (2004) pp. 51–2, World Bank (2005a) p. 98.

Belarus
Copayment: Robinson (2002) p. 171, World Bank (2004), p. 56.
Primary care payment: World Bank (2002) pp. 67–8, 78, 86.
Hospital payment: World Bank (2002) pp. 67–8.

Bulgaria
Copayment: Georgieva and others (2007) p. 56.
Primary care payment: Georgieva and others (2007) p. 65, Koulaksazov and others (2003), pp. 71–2.

Czech Republic
Copayment: Rokosová and others (2005) p. 35
Primary care payment: Rokosová and others (2005) pp. 13, 75–6, Figueras et al. (1996b) pp. 14, 31.

Estonia
Copayment: Jesse and others (2004) p. 36.
Primary care payment: Koppel and others (2008) pp.87–8, Jesse et al. (2004) pp.114–5.

Georgia
Copayment: Belli and others (2004) p. 111.
Primary care payment: Gamkrelidze and others (2002) p. 59, Collins (2006) p. 303.

Kazakhstan
Copayment: Kulzhanov and Rechel (2007) p. 43.
Primary care payment: Kulzhanov and Rechel (2007) pp .50–53, Kulzhanov and Healy (1999) pp. 52, 54.
Social health insurance: Kulzhanov and Rechel (2007) p. 42.

Kyrgyz Republic
Copayment: Meimanaliev and others (2005) p. 32.
Primary care payment: World Bank (2001) p. 4, Sargaldakova and others (2000) pp. 62–3.

Latvia
Copayment: Tragakes and others (2008) p. 84.
Primary care payment: Tragakes et al. (2008) pp. 95–6, 214–5, Karaskevica and Travakes (2001) pp.79–81.

Lithuania
Copayment: Gediminas and Murauskiene (2000) p. 19, Dobrevolskas and Buividas (2003) p. 119, Jakusovaite and others (2005).
Primary care payment: Gediminas and Murauskiene (2000) pp. 62–64, 68, Dobrevolskas and Buividas (2003) p. 124, Starkiene and others (2005).

Macedonia
Copayment: Gjorgjev and others (2006) pp. 33–4, Hajioff (2000) p. 16.
Primary care payment: Gjorgjev and others (2006) pp. 74–6, 48.

Moldova:
Copayment: MacLehose (2002) pp. 23–5.
Primary care payment: World Bank (2005b) pp. 23, 32, 79.

Poland
Copayment: Kuszewski and Gericke (2005) p. 31, Kozierkiewiz et al. (2005) S62.
Primary care payment: Kuszewski and Gericke (2005) p. 91, Jerzy and others (1999) p. 47, World Bank (2003) p. 57.

Romania
Copayment: Ionescu (2006) p. 1307, Vladescu et al. (2008) p. 58.
Primary care payment: Vladescu and others (2000) p. 63, World Bank (2006) p. 49.
Hospital payment: World Bank (2006) p. 41, Vladescu and others (2008) p.70.

Russia
Copayment: Tragakes and Lessof (2003) p101, World Bank (2005c) p. 190.
Primary care payment: Tragakes and Lessof (2003) pp.167-8, Rese and others. (2005) pp.204–5.

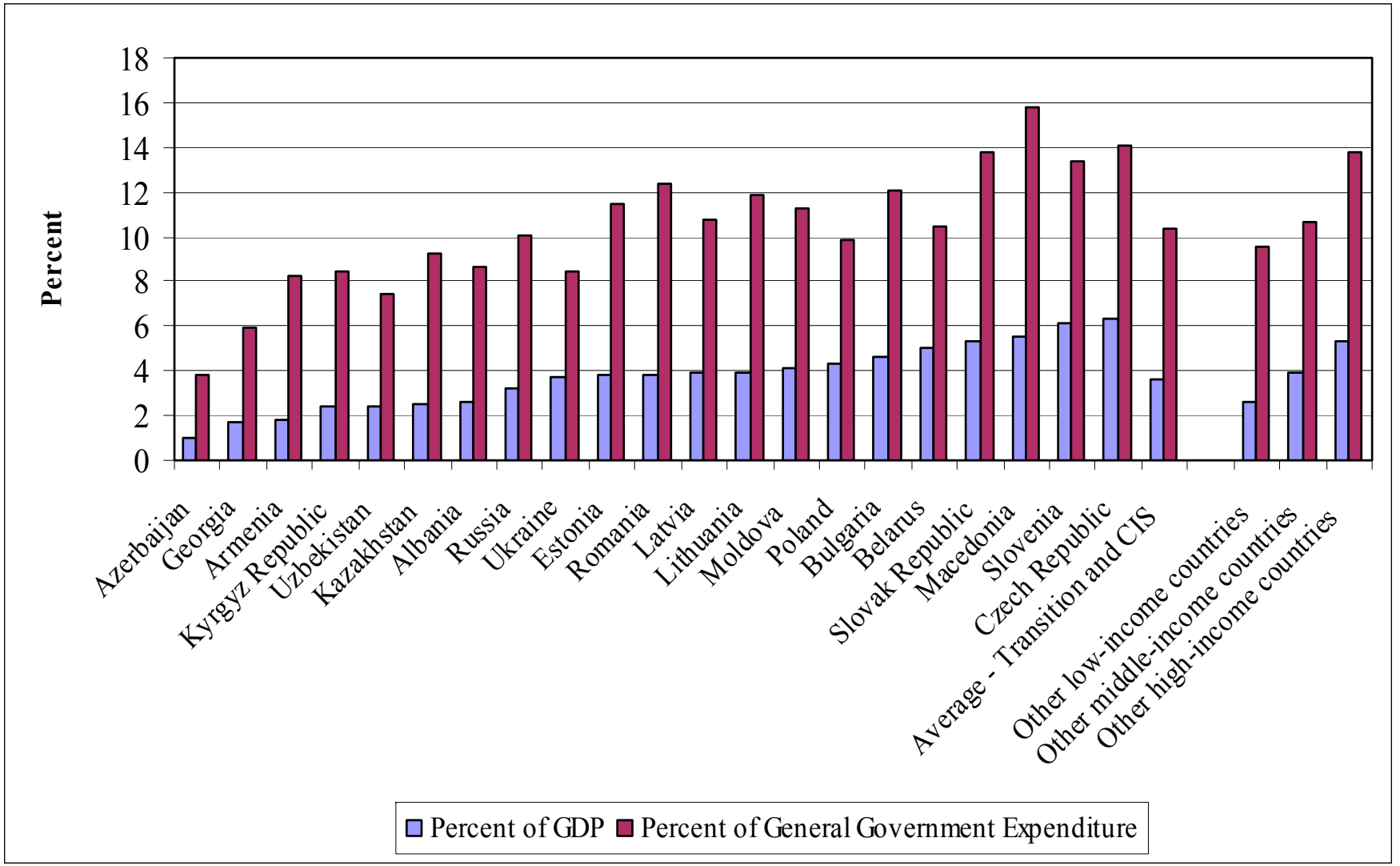
Slovak Republic
Copayment: Hlavačka and others (2004) pp. 44–6, Laursen (2005) p. 180.
Primary care payment: Hlavačka and others (2004) pp. 89–90, Langenbrunner et al. (2004) p. 246.

Slovenia
Copayment: Albreht and others (2002) p. 27, 29, Laursen (2005) p. 201.
Primary care payment: Albreht and others (2002) pp64–72, Figueras and others (1996a) p. 38.

Ukraine:
Copayment: Lekhan and others (2004) pp. 36–41, 109.
Primary care payment: Lekhan and others (2004) p. 101.

Uzbekistan:
Copayment: Ahmedov and others (2007a) pp. 53−5, World Bank (2005d) p. 21.
Primary care payment: Ahmedov and others (2007b) p. 310, Ahmedov and others (2007a) pp.63–6.

Figure 2. Public Health Expenditure, 2005
(Percent of GDP and Percent of General Government Expenditure)



Source: World Health Organization *National Health Accounts.*

Appendix Table 2. Baseline Differences in Dependent Variables Between Control and Treatment Groups

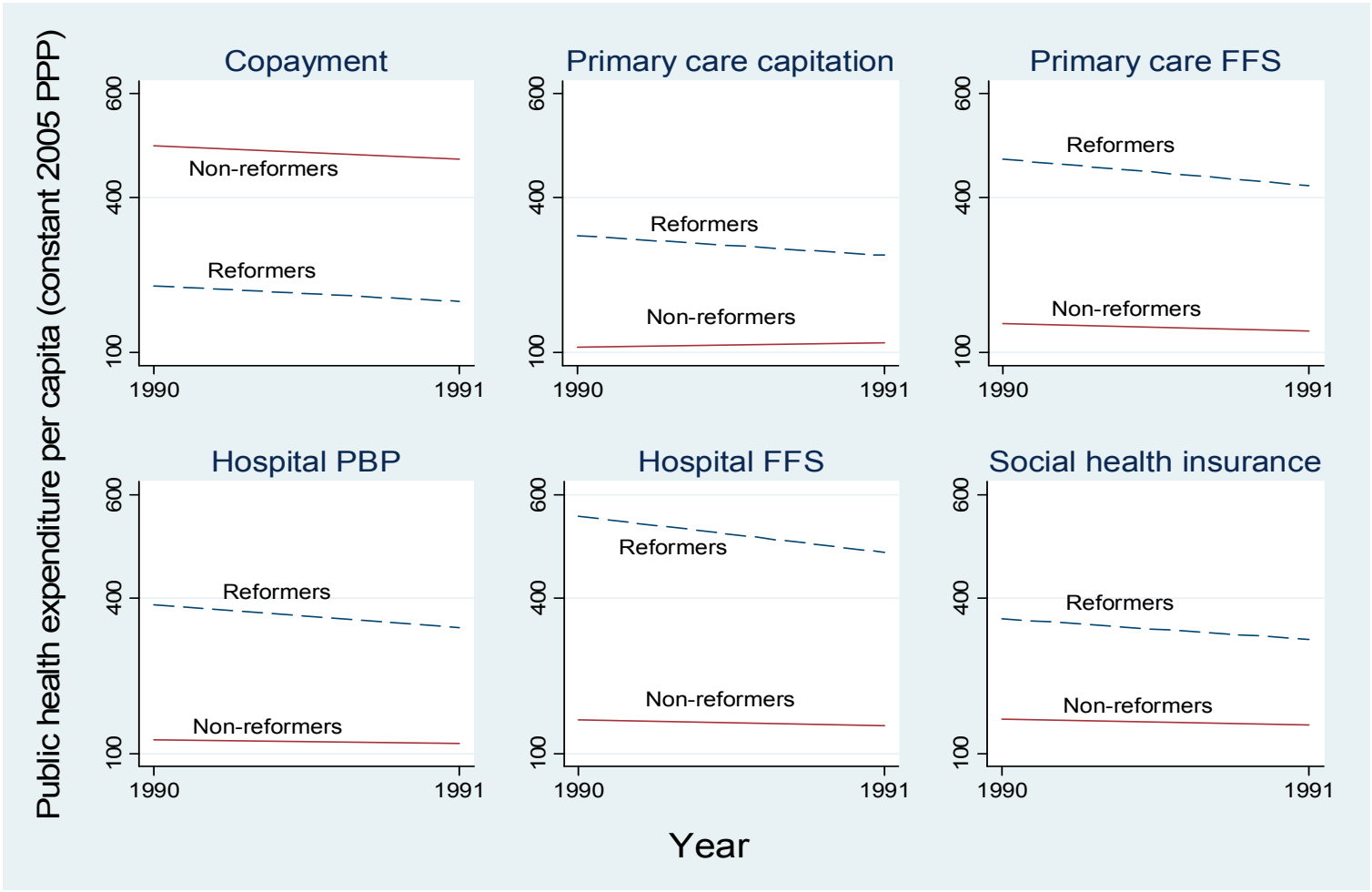
(P-values from *t*-tests of differences in mean levels and mean changes, 1990–1991)

		Public health spending	Outpatient visits	Inpatient admissions	Average length of stay	Outpatient share	SDRs: Appendicitis	SDRs: Hernias
Copayment	1990	0.152	0.187	0.954	0.357	0.353	0.664	0.322
	1991	**0.062**	0.155	0.911	0.367	0.308	0.750	0.554
	Δ	0.906	0.246	0.648	0.828	0.527	0.843	0.780
Primary care capitation	1990	0.268	0.462	0.103	0.187	0.600	0.207	0.889
	1991	0.407	0.403	**0.087**	0.146	0.615	0.550	0.376
	Δ	0.171	0.330	0.425	0.427	0.953	0.359	0.201
Primary care FFS	1990	**0.024**	0.107	0.143	0.575	**0.044**	**0.058**	0.613
	1991	**0.077**	0.197	0.148	0.431	**0.080**	**0.090**	0.126
	Δ	0.184	0.111	0.964	**0.099**	0.285	0.620	0.171
Hospital PBP	1990	**0.082**	0.680	0.174	0.202	0.611	**0.060**	0.467
	1991	0.111	0.764	0.200	0.130	0.779	0.113	0.311
	Δ	0.193	0.517	0.674	0.118	0.202	0.557	0.615
Hospital FFS	1990	**0.004**	**0.012**	0.773	0.120	0.116	0.883	0.735
	1991	**0.044**	**0.024**	0.863	0.186	0.163	0.817	0.303
	Δ	**0.033**	0.540	0.358	**0.077**	0.472	0.946	0.349
Social health insurance	1990	0.218	0.829	0.573	0.220	0.577	0.175	0.721
	1991	0.346	0.984	0.584	0.207	0.717	0.352	0.850
	Δ	0.334	**0.095**	0.948	0.893	0.286	0.506	0.893

Δ = 1991–1990. p<0.1 denoted in bold.

Source: Author's estimates.

Figure 3. Baseline Trends in Public Health Expenditure Between Control and Treatment Groups



Source: Author's estimates.

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