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The Price of the Hippocratic Oath:

Determinants of Bribery in Russian Health Care

First draft

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Abstract

The paper uses the Russian Longitudinal Monitoring Survey to examine the incidence and determinants of informal payments in the health care industry.

Keywords: bribery, informal payments, health services, Russia

1. Introduction

Negative economic consequences of corruption have long been recognized and studied extensively empirically (Shleifer and Vishny, 1993). Some industries, such as health care, are especially prone to corruption. This is true in many developing countries and particularly in former centrally-planned economies, where bribery in the form of informal payments from patients to healthcare providers is common and widespread (Lewis, 2000).[1] Transitional Russia, which initiated a massive restructuring of its health care system in the early 1990s, presents a particularly interesting case. Anecdotal evidence suggests that informal payments for health care services, a common phenomenon during the Soviet period, did not disappear since the transition has begun but in fact have become more prevalent. Although the problem has recently attracted more media attention,[2] it remains largely unexplored due to primarily unavailability of reliable data. Using unique individual-level data from the nationally representative *Russian Longitudinal Monitoring Survey*, this study explores the underlying mechanisms which explain the determinants of bribery in Russian health care sector.

There is no consensus on the prevalence and scope of informal out-of-pocket payments for health services in Russia. Little evidence that does exist suggests that the shadow portion of the health care sector is quite large. According to the joint study undertaken by the World Bank and the Russian think-tank IDNEM, the annual bill for bribery in Russia amounts to $36 billion. An estimated $2.5 billion is attributed to unofficial payments for services which, by law, require a free provision. Of this amount, the health care sector claims the largest share, equaling to $600

[1] The side payments both in money or in-kind to government employees are illegal and considered as bribery. Since 96% of Russian health care is publicly-owned, most informal payments fall into the category of bribery.
[2] See Los Angeles Times, "Russia's Outdated Healthcare Mired in Corruption," May 16, 2008: http://articles.latimes.com/2008/mar/16/world/fg-russia16plr.

million[3] (Satarov, 2002). Unofficial payments are a barrier to equal access to health care, and these indirect welfare and equity effects of corruption are even more difficult to measure. According to some estimates, at least 12 million Russians choose not to seek medical help they need because they cannot afford to pay the bribes (Tragakes and Lesoff, 2003). There is substantial evidence that the burden of unofficial payments is borne disproportionately by poor, distorting allocation of health care services, increasing inequality and undermining rule of law (Transparency International, Corruption and Health, 2006). Viewed as a user fee, unofficial payments increase the price of public services beyond the tax price taxpayers pay for the provision of medical services (Martinez-Vazquez *et al*, 2008). Furthermore, "under-the-table" payments erode official payment channels and, therefore, reduce the revenues of medical facilities, lower government tax revenues and prevent new investment in capital and medical equipment. Moreover, bribery creates perverse incentives for the health care providers to engage in rent-seeking behavior and may reinforce the norm of corruption creating spillovers in other sectors of the economy. A better understanding of the causes of corruption can help policymakers to devise better-targeted strategies to enhance their anti-corruption efforts, not only in health care but in other parts of the economy.

Empirical studies on corruption in the heath care sector are scarce, although there has been a growing interest in this subject, particularly for developing countries where this problem is more acute. Majority of existing studies that investigate informal payments in health care perform descriptive analysis, focusing on documenting the extent of illegal payments (Gall *et al*,

[3] According to the report, in terms of the order in which informal payments are usually made, getting referred to a hospital to obtain adequate treatment and adequate outpatient treatment and undergoing complex surgical operation ranked 7th and 9th in the list, respectively, after resolving problems with traffic police (rank 1); getting admitted to a university (rank 2); evading military service (rank 3); renovating apartment (at the government's expense) (rank 4); obtaining a state-owned apartment (rank 5); getting assistance from police (rank 6). However, in terms of amounts paid, payments made for outpatient and inpatient services rank second and third in the overall volume structure of bribes, the largest sums being paid to bribe university officials (Satarov, 2002).

2006; Belli *et al*, 2004; Falkinghman, 2004; Thompson *et al*, 2003; Chawla et al, 1998). In our study we take a more comprehensive approach. First, we employ household-level data on informal payments which is a significant improvement over commonly used country-level *corruption perception indices*, thus avoiding the problem of subjectivity of these perception-based measures. More importantly, we supplement individual-level data with a rich set of regional economic characteristics, allowing us to test several hypotheses about the determinants of bribery in the Russian health care sector.

Implementation of the market-oriented reforms during the process of restructuring and subsequent economic recovery in the early 2000s has failed to rid the health care system of corruption, which raises several important questions. Specifically, if bribery is ultimately a problem of resource availability, is it possible to identify the most important factor? A commonly cited view is that bribery is a relic of the centrally-planned economy, which planted much inefficiency into the system. According to Tragakes and Lesoff (2003), the many weaknesses of the financing schemes in the Soviet system contributed directly to the excess capacity, overutilization of medical services by the public and, at the same time, deteriorating quality. A major source of budgeting in health care facilities was based on the total number of bed-days which a hospital reported at the end of the fiscal year; the funding for next year was then allocated from the center in accordance with the previous year bed-days. Thus, the incentive was to offer healthier patients longer in-patient services. In the out-patient facilities, remuneration of staff was based in part on the number of patients received, not the number of treated patients, which created an incentive to receive many patients but refer them to a hospital for a secondary treatment. In addition, the pay for health care workers was not performance-based, leaving little room for quality control and proper incentives. As a result, Russia inherited

a highly inefficient system where informal payments could be used to purchase a better quality services among the excessive number of non-competing facilities.

Ensor (2004), among others, points out that bribery in health care in many developing countries is ultimately a problem of the chronic under-financing. During the Soviet period, health care (and other sectors such as education) was financed in accordance to so-called "residual principle" where the sector received the residuals from the budget after other sectors of the economy considered of primary importance received their share (Tragakes and Lesoff, 2003). The economic downturn during the early transition period led to rapid declines in real public health care spending, pauperizing the health care system. According to Shishkin (2000, p. 2), public spending on health care decreased by 33% in real terms in the early 1990s. During this period of low economic growth and sky rocketing inflation, volatile financing, both at the federal and local levels, and the system's failure to introduce alternative sources of financing may have increased the importance of undocumented payments, shifting the burden of financing to the general public. Our study finds that bribery in Russian health care does not respond to short-run budgetary fluctuations.

Insufficient budget resources can also manifest themselves in delayed wage payments to medical workers in the public sector or put a downward pressure on their salaries. In fact, we find that in the Fall of 1998 (following the financial crisis) 80% of nurses and 63% of doctors reported wage arrears, amounting to almost 3 months of unpaid wages, on average. Anecdotal evidence also suggests that doctors in Russia have been systematically underpaid relative to other professional and rely heavily on under-the-table payments to supplement their income (Shishkin *et al*, 2003). Interestingly, the results from several empirical studies, which investigate the relationship between wages and corruption are ambiguous. While van Rijckegham and

Weder (2001) uncover a significant negative relationship between the relative civil-service pay and corruption indices in a sample of 31 countries, Rauch and Evans (2000) and Treisman (2000) find no evidence that higher officials' wages are associated with lower corruption levels. Our study shows that once the endogeneity of medical wages is accounted for, the positive association between the bribery and wages of medial workers disappears and the relationship is no longer significant.

Finally, market failure and the lack of competition in the market for health care services may facilitate corruption. If costs of medical services in public facilities are artificially set below the actual market costs, then informal payments may be an equalizing factor, raising the prices of services to their "true" market levels, making the system at least partially *de facto* privatized. Contrary to our expectations, our study finds that bribery in Russia is more prevalent in the private than in public sector, perhaps due to greater tax evasion incentives.

The rest of the paper is organized as follows. Section 2 provides a brief overview of the institutional background. Section 3 describes data and variables employed in the empirical analysis. Evidence of bribery from our dataset and from related studies is discussed in Section 4. Section 5 presents the econometric model of bribery in the supply and demand framework and outlines the main hypotheses to be tested. Section 6 presents estimation results and Section 7 concludes.

2. Institutional Background

In the last twenty years, the healthcare system in Russia underwent significant transformations. The process of transition in the early 1990s initiated the profound reorganization of health care from the state-funded administrative system to an insurance-based

system. The goal of the reform was to establish decentralized financing and promote efficiency, while at the same time preserve a free universal access to health care services for all citizens.[4]

The reform of the healthcare system began in 1991 with the creation of a Federal Fund for Mandatory Medical Insurance (OMS, thereafter) and its subsidiaries across all regions (Tompson, 2006). In addition, voluntary health insurance (offered by private insurers) was introduced for the first time but has proven unpopular with the general public and has remained on the periphery of health care debate.[5] The new system of mandatory health insurance was intended to promote individual choice among the competing medical insurance companies, both public and private. Insurance companies would negotiate directly with various health care providers, thus promoting competition and leading to lower overall costs for the patients and better quality services (Tragakes and Lesoff, 2003). An additional important goal was to increase total health care funds by creating a new source of revenue such as payroll contributions amounting to 3.4% of the total wage bill paid by the employer to a regional OMS fund; 0.2% of wage bill had to be transferred to the federal OMS fund which would ensure the equalization of financing among regions (Treisman, 2006). The new revenue source was intended to promote more financial stability since the revenues would not depend entirely on the fluctuations of budget.

The reform, however, was never fully implemented. It did not achieve its original goals mainly due the overly-complex financing mechanism, insufficient competition and the lack of proper incentives (Tompson, 2006). The semi-reformed state of health care system generated

[4] Article 41 of the Constitution of the Russian Federation (1993) guarantees that "the provision of health care at state and municipal health institutions shall be free of charge."

[5] According to the WHO (2003, p.106) report, the contribution of voluntary insurance constituted only 3.5% of total health care financing in 1999. The report also cites the results of the survey administered by the Institute of Social Research in 1999, which finds that only 5% of households purchased voluntary insurance, mainly for their children.

large regional disparities in health care funds, and the gap between the actual revenues and the necessary revenues to cover the state generous guarantees of free health care continue to grow.[6]

An attempt to reconcile the state guarantees with the realities of massive under-financing came in 1996 when the government passed a resolution which introduced "chargeable health services"—specified services for which patients were required to make payments through cash registers at the medical facilities.[7] In 1998, there was another attempt to revise the range of free services, guaranteed constitutionally, and to balance the state commitments with the regional resources. The so-called Guaranteed Package Program established the minimum package of free medical services for the regions and gave regional authorities flexibility to set additional free services (Tragakes and Lesoff, 2003). However, the original benefits structure remained almost intact because any legal attempts to reduce the state guarantees proved very unpopular with the general pubic and were too costly politically. During the 2001 state-of-the-nation address, former President Putin articulated the underlying problem in the health care system and identified bribery as the main culprit for any progressive changes and reforms:

> Every year the government approves the Guaranteed Package Program of state guaranteed free medical care, but in the absolute majority of regions the cost of this program is not covered with the state funds. The total deficit for this program--30 to 40 percent of what is needed—is covered—and let's speak about it directly and frankly—by patients being forced to pay for medicine and medical care […] In reality, on the basis of a network of public medical facilities, a hidden, but almost legitimized, system of non-

[6] According to Tompson (2006), with the introduction of the unified social tax in 2001, the OMS system received revenues equal to 3.6% of payroll tax, of which 3.4% was allocated to regional OMS funds and 0.2% to the federal OMS. When in 2005 the unified social tax was lowered, the OMS income fell to 2.8% of payroll tax rate. The equalization of inter-regional inequalities in the OMS regional funds was difficult since transfers went to regional budgets, not regional OMS funds, and since most of the transfers were not earmarked for healthcare, often the funds did not reach the intended destination.

[7] Chargeable services include: 1) medical examinations and tests that a patient needs to undergo in order to receive a formal certificate; 2) hotel/auxiliary services at hospitals (a single room with a TV set, refrigerator, etc.); 3) medical interventions involving the use of advanced technologies (e.g. endoscopy); 4) consultations by physician specialists; 5) diagnostic procedures, including those "bypassing the list"; 6) additional treatments, such as massage; 7) high-quality prosthesis; 8) personal nursing station; 9) cosmetic or plastic surgery (Shishkin *et al*, 2003). Price-setting for chargeable services is performed by the public health institutions and by health authorities, in accordance with two federal regulations.

> free health care has formed, where lawlessness reigns and there is no room for social justice (Putin, April 3, 2001)[8].

What are the key characteristics of the Russian health care system? Figure A1 presents several key health indicators from 1990 to 2006, with the U.S. data chosen for comparison. In Russia, both genders have expereinced a *decrease* in life expectancy since 1990. In contrast, in the U.S. life expectancy for both genders has improved. U.S.women have the highest life expectancy (reaching a little over 80 years in 2006), while life expectancy of Russian women (about 70 years) is slighly below that of the U. S. males. It is striking that Russian male is not expected to live beyond his late 50s. In terms of availability of health care resources, Russia, relative to the U.S., has approximately 3 times more hospital beds per 10,000 population. Although both countries have seen a decrease in the hospital beds over the years, the large difference has abided. Number of doctors per 10,000 population has increased in both countries at about the same rate; however, Russia claims significantly more doctors per capita (about 50 per 10,000 population in 2006). Salaries of Russian medical workers are significanlty lower than salaries of workers from other industries while in the U.S. medical workers earnings are comparable to the average compensation of non-farm workers and in fact exceeded that average in the early 2000s. Finally, the share of budget expenditures on health care has grown steadily in the U.S., from approximately 15 percent in 1990 to 24 percent in 2006. In Russia, the share has fallen between 1995 and 2001 and then risen again to 17 percent, barely surpassing the 1990 level. Overall, the Russian health care system is characterized by the general abundance of resources, both in terms of capacity of facilities and human capital. Russian medical workers, however, are underpaid relative to workers from other industries, and the share of budget

[8] The complete speech in Russian is available at:
http://www.kremlin.ru/appears/2001/04/03/0000_type63372type63374type82634_28514.shtml

expenditures on health care has remained relative low, barely reaching its early 1990s level recently.

3. Data and Variables

The primary data for this study are drawn from the second wave of the *Russian Longitudinal Monitoring Survey* (RLMS, 1994-1996, 1998, 2000-2005), a household panel survey based on the first national probability sample. We use the second wave of RLMS started in 1994; it selected 4781 dwelling units by a three-stage stratified clustering sampling method and 3971 household units responded. In the subsequent years of survey, the new households moved to the initially sampled dwellings were added and the old households that moved from the original sample to new addresses were included, whenever possible. The number of individuals surveyed was about 10,000-12,000 per year.

All the variables used in this study and their definitions are presented in Table 1. The survey provides detailed information on individual characteristics, such as age, gender, actual and adjusted years of schooling, and various characteristics of labor market activity, including work experience, job tenure, usual monthly work hours, and contractual monthly wages. In addition, an extensive series of questions document respondents' recent experience when utilizing medical services. Beginning with the round 9 (survey year 2000), questions detailing the type of payment made for the medical services were added to the survey. Specifically, the respondent was asked whether the payment was made "officially in the medical enterprise's cashier's office" or unofficially "with money or gifts directly to the medical personnel".

We have information on three types of medical services: "treatment visit" in the last 30 days; hospital stay in the last 3 months; and preventative check-up visit in the last 3 months. The treatment visit, in turn, is divided into two subcategories: "outpatient" visit to a medical facility

(including any additional procedures performed during that visit) and a visit by a medical worker at home. There is significantly more consistent data for treatment visits than for a hospital stay or a check-up visit[9]. For a treatment visit we have complete information on the type of medical facility visited for each survey round (hospital, clinic, or home visit) as well as the ownership type of the facility (public or private, which also includes private practitioners). For hospital stay and preventative check-ups these variables are missing for the later rounds and, therefore, cannot be used in the analysis. Thus, we identify two subsamples of individuals: those who had a treatment visit in the last 30 days and all medical visits, including hospital stay and check-up visits. Summary statistics for the estimation sample is presented in Table 1A.

The overall trends of health care service utilization do not show significant changes between 1994 to 2005. Figure 2 shows that approximately 40 percent of the respondents report having some health issues in the last 30 days; the trend is rather steady between 1994 and 2005. The share of respondents who had an "outpatient" visit in the last 30 days has also remained steady over the years, at approximately 18 percent, and a little under 5 percent report having a medical worker visit them at home. The share of respondents who stayed at the hospital in the last 3 months is also stable over the years. However, the share of individuals who had a preventative check-up is more volatile and closely follows the business cycle, with the decline in the 1990s and rise in the 2000s. Interestingly, the share of private sector visits has grown but is still rather small below 6 percent. This suggests that private ownership constitutes a relatively small share of the market for health care services in Russia.

We control for the health status of a respondent in several ways. First, we use a respondent's un-coded description of health problems in the last 30 days to construct 7 categories

[9] Questions on the time spent on travel to and from the medical facility, total travel expense, and total wait time were discontinued in rounds 12-14. We will try to find a way to use these questions in the future drafts.

of illness. The categories include respiratory system disease, heart disease, traumatic injury, digestive system disease, other systemic diseases, other symptoms and unclassifiable health conditions. The classification is based on the Occupational Injury and Illness Classification (OIIC) available from the Bureau of Labor Statistics. Details of the classification are presented in the Table 1. We did not finish coding for about 6 percent of cases. Those are combined into the category "unclassified" will be classified later. In addition, we have data on self-evaluated health conditions and general well-being, including self-assessed health and an indicator for any chronic illness.

We use three types of dependent variables in our analysis. First, we use several binary indicators: (1) a binary variable equal to 1 if the respondent paid informally for medical services (and equal to 0 if the respondent didn't pay or paid officially); (2) a similar indicator variable for official payments; and (3) a binary variable for any payments. The second dependent variable is categorical, where we define three categories for the type of payment a respondent can make: no payment, official payment only, and any informal payment. Our third dependent variable is the log of total expenses during treatment visit and all visits, differentiating between informal, official, and total payments.

Individual level data are supplemented by a large set of regional variables to control for the trends in health care industry and to account for the effect of local fiscal shocks. Annual regional variables were assembled from several sources for the years 1995-2005 (most regional variables are not available for 1994). Table 2 presents the definitions of all the regional-level variables, units of measurement, and their sources. Data on health care sector resources including the number of hospital beds, total and population-adjusted number of doctors and associate medical personnel come from *Regions of Russia, 2004* and *2007*, available from the

Federal State Statistics Service of the Russian Federation (Goskomsat). Additional information on health care resources including total number of hospitals and clinics, employment in health care service industry and average monthly accrued wage in health care industry come from *Health Care in Russia, 2001*, *2005* and *2007*, also available from Goskomstat.

Regional budgetary data such as consolidated budgetary expenditures and consolidated budgetary revenues are gathered from *Regions of Russia, 2004* and *2007*. Budgetary expenditures on health care and physical culture are extracted from the Treasury Budget Data (Roskazna), *Health Care, 2005* and *Regions of Russia, 2007*. Population and gross regional product data are gathered from *Regions of Russia, 2004* and *2008*. Measures of air and water pollution come from *Environment, 2001* and *Environment, 2008*, available from Goskomstat.

In addition, we incorporate two distinctive characteristics of the Russian labor markets and institutional settings: wage arrears and regional wage coefficients. Information on regional wage arrears in health care industry from 1995 to 2005 include total wage arrears in the health care industry, share of wage arrears due to budgetary problems; number of health organizations with wage arrears; number of health care workers with wage arrears, and wage arrears expressed as a percent of total monthly wage bill for the affected organizations. These data come from *Wage Arrears*, available from Goskomstat.

We have also gathered data on the regional wage coefficients that will be used as instruments in our estimation. Regional wage coefficients are multiples of the base salary and are designed to compensate workers in the public sector for residing in locations with harsh climate and extreme weather conditions. Regional wage coefficients are applied in 37 regions and 12 autonomous regions, with higher compensation available in northeastern part of the country. Data for the 2001-2005 regional wage coefficients can be accessed from the archived

documents of Inter-budgetary relations, Ministry of Finance of the Russian Federation.[10] For this period, we have data on the base regional wage coefficients, weighted wage markups for Northern locations and other wage markups in Eastern Siberia and Far East, zone coefficients for compensation of transportation costs, plus a conditional wage markup for transportation expenditures in Northern locations. Total regional wage coefficient is a sum of all the markups and transportation compensations. It varies from 1 (no extra compensation) in central parts of Russia to 5. 0 (base wage multiplied by 5) in Chukotka. We have also assembled a timetable of any legal changes of the area covered by regional wage grid.

Finally, we supplement the data with a rich set of weather indicators in order to control for the sample selection bias. Several daily weather indicators, such as mean, maximum and minimum daily temperature, mean dew point, mean sea level pressure, precipitation amount, plus an indicator of the occurrence of snow, fog, rain or drizzle, hail, thunder and tornado, are available from the U.S. Department of Commerce, National Climatic Data Center, Global Summary of the Day. The indicators are collected from approximately 9000 meteorological stations worldwide and are exchanged under the World Meteorological Organization (WMO) World Weather Watch Program. Using latitude-longitude distance calculator, we have identified a meteorological station which has the shortest distance to the administrative center in each of RLMS locations. The majority of the stations are located within a 100 kilometer radius from the administrative center. However, in a few cases the records from the closest station were incomplete or data were missing for unspecified reasons; we chose the next closest station with more complete records although the distance slightly exceeded 100 kilometers radius. Daily weather data were collected from January 1, 1975 through the end of 2006, which allowed creating monthly weather deviations from a 30-year trend for each month. Using deviations

[10] Since the budget is developed in the middle of the year, one-year forward values are used for any given year.

from the monthly norm rather than simple means captures sudden, unexpected fluctuations in weather that may have an exogenous effect on treatment visits, but not have a direct effect on bribery.[11] Detailed account of the specific weather variables used is presented in the Appendix (to be created).

4. Evidence of Bribery

Health care systems in many developing countries are not immune to bribery. Informal out-of-pocket payments to healthcare providers are widespread in Central and Eastern Europe (CEE), the Former Soviet Union (FSU) countries and in Central Asia (Gaal et al, 2006; Ensor, 2004; Lewis, 2000, 2007). Comparisons across countries in these regions are confounded by the absence of comparable and reliable data, fundamental differences in definitions and survey methods[12] used to measure informal payments, and differences in social norms[13] and attitudes towards corrupt behavior. Nevertheless, some generalizations can be made. There exists a considerable variation in terms of the frequency of bribery and their relative importance in healthcare financing. Lewis (2007, p. 987) compiles recent data from various sources on the proportion of users of healthcare services who report making informal payments. Among 15 FSU and ECE counties, the highest share of bribes for health care services is in Moldova (90 percent), a country tainted with corruption, followed by Kyrgyz Republic (70 percent), Armenia (50 percent) and Albania (40 percent). Available evidence also suggests that, in most cases,

[11] Simple climate means are not exogenous as people can sort themselves to locations based on the weather and thus unobserved individual characteristics may be correlated with the propensity to bribe. However, deviations from the norm are not predictable and exogenous by their nature.

[12] Some estimates are derived from the perception-based surveys while others rely on the exits polls or past experiences. In Albania alone, the estimates vary widely: informal payments increased drastically from 22 percent in 1996 to 60 percent in 2001, the latter result derived from a smaller, more nuanced survey (Lewis, 2007).

[13] For instance, the practice of gift giving is deeply rooted in culture of many countries, particularly in Central Asia and the caucus region of the Former Soviet Union (Ensor, 2004). The distinction between ex-post gift, which is an expression of gratitude, and in-kind informal payment, which is non-discretionary, is ambiguous.

informal payments for inpatient services (e.g., surgical procedures) are more frequent and of significantly larger amounts than for outpatient services (Lewis 2000).

Figure 3 presents some trends in payments for medical services from the RLMS. Across all three types of medical services—treatment visit, hospital stay (excluding payments for medicine) and preventative check-up visits,—the share of paid visits has grown steadily, reaching over 20 percent for the treatment visit in 2005. This share is considerable, taking into account that the state guarantees free health care. For a hospital stay, the share of paid visits is likely to be understated since we do not include payments for medicine and purchases of other materials, such as syringes, due to a large number of missing observations. Panel B shows that growth in informal payments can explain a large portion of growth in the share of paid treatment visits and hospital stays. In fact, share of informal payments for hospital stay has increased from 50 to approximately 70 percent, which is quite large. The share of informal payments for treatment visits has remained stable at approximately 60 percent. However, the share of informal payments for preventative check-ups has decreased, from 30 to 18 percent. Thus, growth in paid check-up visits may be attributed to the increasing importance of the official payments. Panel C shows that total payments for medical visits are about 2 percent of household non-durable consumer expenditures in 2000-2005.

Several indicators of medical workers' earnings are shown in Figure 4. Our data show that medical workers' contractual monthly wages, adjusted for inflation, are substantially lower than wages of other workers. However, the variance of medical worker's wages is lower than variability of wages in other occupations, reflecting wage compression and rigidities in labor remuneration practices which exist in health care (Blam and Kovalev, 2003). The average number of unpaid monthly wages is slightly lower for the medical workers. The trend is

interesting, reaching a peak in 1998 during a financial crisis and then reaching low levels and flattening out in the early 2000s.

Empirical work on bribery in health care is scarce, and the majority of studies rely on the descriptive analysis (Lewis, 2000; Gall *et al*, 2006; Thompson *et al*, 2003; Belli *et al*, 2004; Falkinghman, 2004; Killingsworth *et al*, 1999; Chawla *et al*, 1998). A few studies that go beyond the descriptive approach examine various the socio-demographic characteristics of individuals as the primary determinants of bribery. Balabanova and McKee (2002) use multinomial logistic regression framework to identify patient characteristics associated with informal payments in Bulgarian health care[14]. Their results support findings from macro-level studies (Mocan 2008): those who are better able to pay—wealthier, younger, better educated individuals—are more likely to give bribes. Dabalen and Wane (2008) investigate whether gender of health workers in Tajikistan is a factor in determining a demand for bribes from the patients.[15] After controlling for a variety of community, household, and individual characteristics, as well as the position of female workers in the hierarchy of a health care facility— a proxy for her ability to extract bribes—authors find that women health care workers are equally likely as men to be paid informally.

We build on the previous literature that analyzes the determinants of informal payments using various socio-demographic characteristics. However, in addition to individual-level characteristics, we incorporate a number of other factors, such as regional shocks, into our analysis which significantly broadens the scope of earlier work. The model is discussed in the next section.

[14] Their data come from a representative national survey of 1,547 individuals over the age of 18, supplemented with qualitative data derived from several semi-structured interviews with 33 health care users and 25 providers.

[15] The authors convincingly argue that data on bribes collected directly from the health care providers is reliable because in Tajikistan, due to the widespread acceptance of corruption and absence of legal enforcement, penalty associated with accepting an informal payment is close to zero (p. 10).

5. The Econometric Model of Bribery in the Public Sector

In this section, we present the identification strategy for estimating the determinants of informal payments in the public health care sector. Since informal payments to the public sector employees are illegal (though may not be enforced), we will refer to them as bribes. The model is based on the equilibrium demand-supply identity for each location under the assumption of localized health care (no travel outside the region for medical services):[16]

$$B_{jt} = \sum_m b^d_{mjt} = \sum_i b^s_{ijt},$$

where B_{jt} is the total amount of bribes received/paid in location j and time t, b^d_{mjt} is the amount of bribes received by a medical worker m in time t (d stands for the demand side), and b^s_{ijt} is the amount of bribes paid by a patient i in time t (s stands for the supply side).

Therefore, the extent of bribery in location j can be expressed as total bribes per capita:

$$\bar{B}_{jt} = \frac{B_{jt}}{N_{jt}} = \left(\frac{M}{N}\right)_{jt} \frac{1}{M_{jt}} \sum_m b^d_{mjt} = \left(\frac{M}{N}\right)_{jt} \bar{b}^d_{jt}, \quad (1)$$

where $(M/N)_{jt}$ is the observed share of medical workers in total population in location j at time t and $\bar{b}^d_{jt} = \frac{1}{M_{jt}} \sum_m b^d_{mjt}$ is the average bribe per medical worker in location j.

We model the demand of medical workers for bribe as function of their official wages, w^d_{mjt}, other observable individual characteristics, X^d_{mjt}, observable and unobservable local demand-side shocks (Z^d_{jt} and $\tilde{\varepsilon}^d_{jt}$, respectively), and a worker-specific error term, ε^d_{mjt}:

$$b^d_{mjt} = \pi_0 + \pi_1 w^d_{mjt} + \pi_2 X^d_{mjt} + \pi_3 Z^d_{jt} + \tilde{\varepsilon}^d_{jt} + \varepsilon^d_{mjt}. \quad (2)$$

[16] The assumption of localized health care is largely supported by anecdotal evidence (Tragakes and Lesoff 2003). Our data show that in 93% of all treatment visits in 1994-2002, it took one hour or less for patients to travel one way (two hours or less in 98% cases).

Individual and local characteristics are included to capture both the cost of bribery and individual preferences towards accepting bribes.

Since b_{mjt}^{d} is not directly observed at the individual level, we aggregate equation (2) at the location level without the loss of generality:

$$\bar{b}_{jt}^{d} = \pi_0 + \pi_1 \bar{w}_{jt}^{d} + \pi_2 \bar{X}_{jt}^{d} + \pi_3 Z_{jt}^{d} + \mu_{jt}^{d}, \tag{3}$$

where $\bar{w}_{jt}^{d}$ is average wage of medical workers in location j, $\bar{X}_{jt}^{d}$ is a vector of average characteristics of medical workers in location j (e. g. , average schooling and experience), Z_{it}^{d} is a vector of observable local characteristics, and $\mu_{jt}^{d} = \tilde{\varepsilon}_{jt}^{d} + \bar{\varepsilon}_{jt}^{d}$ is unobserved common local shocks.

The relationship between bribes and official wages is theoretically ambiguous. It could be negative if bribes and wages are substitutes. Suppose that the opportunity to extract bribes is a job amenity that lowers the wage offer. If this is the case, then the hedonic model of compensating differentials will imply a negative correlation between bribes and wages on the demand side, $\pi_1<0$. On the other hand, bribes and wages could be complements. Suppose wages in the public sector are compressed and only partially capture the level of skills and individual productivity. If bribes are payments for better services and are increasing with skills of medical personnel, then the correlation between bribes and wages is likely to be positive, $\pi_1>0$. Both the hedonic trade-off and complementarity arguments imply that wages are clearly endogenous in both (2) and (3), that is $Cov\left(w_{mjt}^{d}, \varepsilon_{mjt}^{d}\right) \neq 0$.

Besides wages and measurable skill composition of medical workers, specification (3) also allows us to examine other potential demand shifters of bribery. For example, one can argue that it is not only the low level of wages but the volatility and delays in wage payments in the

Russian health care sector may induce medical workers to accept bribes. Thus, the Z_{it}^{d} vector may include the extent of wage arrears in the health care industry as well as other short-term budgetary fluctuations such as budget deficit. It is also to important to control for time-varying measures of regional economic development and changes in the endowment resources of health care industry, including health care budget resources and medical facilities. Including these factors will allow us to test whether the extent of bribery is affected by the lack of long-term health care resources and low level of economic development vs. temporary budgetary shocks and wage arrears.

Now we turn to the supply side and model the patient's choice. Conditional on medical visit, patients face three choices: do not pay for visit, pay officially for special medical procedures and chargeable health care services, or pay unofficially. For now, we will ignore official pay and model a binary choice for paying unofficially as a function of health status, ability to pay, preferences for health captured via demographics, type of services, and the extent of bribery in location.

$$b_{ijt}^{s} = \tilde{\gamma}_0 + \gamma_1 X_{ijt}^{s} + \tilde{\gamma}_2 \overline{B}_{jt} + \tilde{\mu}_{jt}^{s} + \varepsilon_{ijt}^{s}, \qquad (4)$$

where b_{ijt}^{s} is the amount of bribes paid by a patient *i* in location *j* at time *t* (*s* stands for the supply side); X_{it}^{s} is a vector of observable individual characteristics that include health conditions, household disposable income, demographic characteristics, schooling, employment status, and the type of medical services; $\overline{B}_{jt}$ is the extent of bribery in location *j*; and $\tilde{\mu}_{jt}^{s}$ are unobserved supply-side local shocks for bribery. We assume that the X_{it}^{s} vector is exogenous (e. g. , no contemporaneous feedback from bribery to health status). Better health conditions are expected to lower the demand for medical services and thus lower the willingness to pay unofficially. We

also expect that household income, schooling, and the employment status of the patient proxy for both the ability to pay and the monetary value of life. Therefore, employed and more educated patients from high-income households are likely to have a higher propensity to pay. We do not have prior expectations with respect to gender differences in bribing.

The extent of bribery in location j, $\overline{B}_{jt}$, is modeled in (1) and (3). By substituting equations (1) and (3) into (4), we obtain the following reduced-form specification for bribery:

$$b_{ijt}^{s} = \gamma_0 + \gamma_1 X_{ijt}^{s} + \gamma_2 \overline{w}_{jt}^{d} + \gamma_4 Z_{jt} + \mu_{jt}^{s} + \varepsilon_{ijt}^{s}, \qquad (5)$$

where Z_{jt} is a union of $\overline{X}_{jt}^{d}$ and Z_{jt}^{d}, a vector of observable local characteristics, and $\mu_{jt}^{s} = \tilde{\mu}_{jt}^{s} + \mu_{jt}^{d}$ are unobserved idiosyncratic local shocks for bribery.

There are several econometric complications here. The first one is that wages of medical workers are endogenous for the reasons discussed above. In (5), the endogeneity becomes even more obvious. Suppose that patients pay more to more productive doctors, but the productivity of doctors is not fully observed (partially it is captured in wages but the rest is in the error term). If wages and unobserved productivity are positively correlated, then the estimate of γ_2 is likely to be biased upward. The positive correlation could also occur at the regional level as more able doctors may sort themselves into better paying locations. Thus, wages need to be instrumented. Our solution to this problem is to instrument wages of medical workers with regional wage coefficients (or multiples to the base salary) that are inherited from the Soviet era and are still applied to the budgetary medical workers to compensate for unfavorable climate conditions (see discussion in Section 3).

The second econometric complication is that observed bribing is conditional on medical visit (v_{ijt}=1), which in turn is a function of the extent of bribery in location: bribery spread may

reduce visits. Since the decision to visit a doctor depends on expected payments, that is $E\left(\varepsilon_{it}^{s} \mid v_{it} = 1 \text{ or } b_{it}^{s} \text{ is observed}\right) \neq 0$, we have a classical Heckman-type selection problem. The selection term is likely to be negative as higher bribery spread is likely to postpone medical visits. To estimate the Heckman selection model, we need an identifying restriction, the variable that influences visits, but does not affect bribery. We have three potential candidates for identifying restrictions, such as travel cost, pollution, and weather deviations from the monthly norm. Each has its own pluses and minuses that will be discussed in the next section.

The third econometric issue that needs to be considered is that our left hand-side variable is the limited dependent variable. In addition to OLS, we use probit for binary choices, tobit for total bribery expenses, and multinomial logit for multiple categories of payments.

The final econometric issue that needs to be addressed is potential underreporting in b_{ijt}^{s}. For now, we assume the classical measurement error, which should not affect the estimates when the mis-measured variable is on the left-hand side, as in our case. However, the issue of underreporting needs to be addressed more carefully in the future and will require further robustness checks.

6. Results

In this section, we present the estimates of the bribery function. Since we model bribery in the public sector, we omit the discussion of the private sector until later. Table 3 presents the baseline probit estimates of the determinants of four payment types for the treatment visit. Specifically, we estimate the determinants of informal and official payments between 2000 and 2005, the determinants of making any payment, and the determinants of paying for treatment visit over the entire survey period, from 1994 to 2005. The results are consistent across four

specifications. Whether we differentiate between informal or formal payment, being a female, an adult and having higher educational attainment has a positive effect on the probability of paying for a treatment visit. Positive effect of employment on the likelihood of paying may capture greater ability to pay as well as a higher valuation of time by a working individual, relative to someone out of work or out of the labor force. As one would expect, there is a positive association between household income and the probability of paying for treatment; interestingly, the effect of income on the propensity to bribe is stronger than its effect on making an official payment. All of the illness type dummies, and indicator for chronic illness and poor self-evaluation of health status are strongly significant, indicating that weak health and sickness contribute to a higher chance of paying for treatment, with a slightly stronger effect on the official payment, relative to informal payment. The probability of paying informally is higher for a hospital visit, as compared to a visit of polyclinic or home visit. This result is in line with our expectations. Hospital visit generally signals a more serious health problem. The probability of paying officially is predictably lower for home visits because home visits usually occur in the emergency situation, for which patients cannot be legally charged. The log of the inflation-adjusted wages of medical workers has a positive and significant coefficient for all four payment methods, while the effect of medical workers' education is insignificant. This problem of endogeneity of medical workers' wages is addressed further. Coefficient on the regional gross product variable is negative and significant across all specifications, suggesting that the likelihood of paying for a visit is lower in wealthier regions.

Next we estimate the same baseline model but now use the log of the inflation-adjusted expenses made during the treatment visit as our dependent variables. Again, we differentiate among informal payments, official expenses, and gross expenses between 2000 and 2005. We

also estimate the model for gross expenses between 1994 and 2005. Table 4 presents Tobit estimates, since our dependent variable is truncated at zero. Most of the control variables across 4 specifications are statistically significant and the direction of the impact of our explanatory variables is the same as in the probit model, which is what we would expect. An intriguing finding is that the amount of informal payments is more responsive, relative to formal expenses, to increases in household income: a 10 percent increase in the adjusted household income is associated with a 12 percent increase in the predicted informal expenses and a 7 percent increase in the predicted official expenses, *ceteris paribus*. The negative effect of the per capita gross regional product on expenses in all categories continues to hold. In fact, the magnitude of the impact is somewhat larger than we would expect a priori. A 1 percent increase in per capita regional product is associated with a 2.5 percent decrease in the average predicted bribes and a 3.6 percent decrease in the average predicted official expenses. This is an interesting finding as it suggests that economic development has overall cost-reducing and bribery-reducing features.

Sensitivity of the propensity to pay to individual-level characteristics so far has been consistent with the previous literature: those who are better able to pay (i.e., higher income, better educated, employed) or those whose health is worse are more likely to pay and are more likely to have higher expenses, both officially and unofficially. Similar results are obtained in multinomial logit estimation, reported in Table 5. We can check how our explanatory variables differ in their marginal effects on informal and official payments, relative to a base outcome. Three possible outcomes are considered: no payment made during a visit (reference category), informal payment and official payment. We find some interesting differential impacts of our explanatory variables. Compared to the not paying, adjusted household income has a significant positive impact on the probability of informal and formal payments, but the propensity to pay

informally is higher. Supporting our earlier findings from the probit and Tobit estimations, hospital visit is associated with a higher propensity to bribe while home visit by a medical worker decreases the propensity to pay officially. There is a positive association between bribery and the wages of medical workers, but this does not hold for official payment. Again, higher per capita gross regional product lowers the ratios of the probability of official and unofficial payments, relative to the probability of not paying.

Next we address the problem of sample selection. Table 6 shows results of applying the Heckman maximum likelihood estimator to our baseline equation, where we now control for non-random selection into our subsample of patients who had a treatment visit. The equation determining the selection in the analyzed sample (a decision to have or not to have a treatment visit) has the same individual-level controls (illness categories and type of medical facility are excluded because they predict perfectly visits) and regional controls as the main equation, plus a set of instruments. We experimented with many weather indicators and report the results with those that have the highest predictive power in the selection equation (based on F-test). We use deviations from 30-year trend in the average monthly temperature, mean sea level pressure, precipitation, and their interactions as identifying restrictions. An identifying assumption is that these sudden fluctuations in weather indicators do not have any causal effect on the payment methods; neither are they correlated with any unobservable determinants of paying for a treatment. The first stage shows, for example, that lower temperature tends to increase visits, especially in the low air pressure areas.

[*in the future revisions, we will provide evidence on the relationship between health conditions and climate conditions, we have done some preliminary search but did not summarize yet*]

Only in the last specification, we find evidence of a negative sample selection bias: individuals who did not have a treatment visit are less likely to pay informally, which is in line with our expectations. However, it appears that sample selection is not a problem for our primary 2000-2005 sample which suggests that our earlier estimates without controlling for a sample selection are robust. We note that all coefficients estimated by using the Heckman maximum likelihood estimators are similar to the ones we obtained using probit and multinomial logit estimates. For example, the positive coefficient on the medical workers wages and a negative one on per capita gross regional product continue to hold.

Since there is no problem of sample selection, we will apply a probit estimator without sacrificing efficiency. Next we incorporate local shocks to the baseline model to explore their effect on bribery. Table 7 shows the probit estimates of paying informally based on the presence of various regional shocks. Somewhat surprisingly, variables which account for the short-run budgetary problems, including the regional budget deficit and four controls for wage arrears in health care industry, do not explain the likelihood of informal payments. There is some evidence that greater budget expenditures on health care are associated with a lower probability of bribery. In separate specifications, both the share of budget expenditures on health care and health care expenditure per capita have negative and significant coefficients. Two controls for the long-run endowment resources of the health care sector, including the number of hospital beds and the number of medical workers, are both negative and significant. At first this result may seem counterintuitive: one would expect that abundance of health care resources, without appropriate controls for the *quality* of services provided, would not lower bribery because patients would have to pay for better quality with bribes. However, if quality is fixed, scarcity of these resources would be expected to increase the price of services. Since official price for services

are either zero or are very rigid, the implication is that the unofficial price would have to compensate for this disparity. Consistent with the previous estimates, the log of the adjusted per capita gross regional product has a substantial negative effect on the probability of bribery. More prosperous regions are able to provide better financing to the health care facilities, and out-of-pocket financing by patients becomes obsolete. Another explanation is that economic growth is correlated with increased competition across health care providers, which drives down the costs.

The effect of the wages of medical workers is mostly positive (with the exception of the Goskomstat regional wages in the health care sector). However, as we discussed earlier wages of medical doctors are endogeneous, and their effect is likely to be overstated if wages and abilities and correlated and bribery is increasing with doctors' abilities. Table 8 presents results of the IV estimates of the baseline equation where the wages of medical workers are instrumented with regional wage coefficients. Regional wage coefficients are designed to compensate workers for residing in locations with harsh climates and severe weather conditions. By definition, regional wage coefficients do not affect bribery but are very strong predictors of medical workers wages. We present 6 specifications with different combinations of the regional wage coefficients as the instruments (which have the highest predictive power in the first stage). Once the wage of medical doctors is instrumented, the coefficient is no longer significant. Per capita gross regional product also loses its significance. The result is robust across all specifications, however more robustness checks will be required in order to conclude that there is no statistically meaningful association between the wages paid to medical workers and the likelihood of bribery.

Next we test the responsiveness of our results to some sample restrictions. Table 9 presents separate estimates for adult and children subsamples. As one would expect, individual-level characteristics do not have as much explanatory power for children as they do for adults since children are likely be limited in their independent decision-making, particularly in decisions involving their health. An intuitively appealing result is that the estimated coefficient on the household income is very close in both specifications. For children, having a heart problem and an injury but not other illnesses are strong predictors of informal payment. It is also interesting that visiting a hospital does not have an impact on the likelihood of paying a bribe for a child respondent, while it has a positive and significant effect for adult respondents. The final specification in Table 9 considers a treatment visit both in the public and private sectors. We include and additional control for the average share of privately owned medical facilities in the region. The results are interesting. Public ownership of a medical facility has a significant negative impact on the probability of informal payment, while the share of privately owned medical facilities across regions has a positive effect on bribery, although the effect is slightly smaller. One possible interpretation for this finding is that privately owned medical facilities have a greater incentive to foster unofficial payment channels due to tax evasion motives, although this issue should be explored in more detail in future revisions.

Finally, Table 10 presents results of the multinomial logit estimation where we compare the determinants of informal and official pay across all three types of medical services: treatment visit, hospital stay, and check-up. The reference category is no pay. There are some notable differences in the impact of our explanatory variables on the outcomes. Employment is a stronger predictor of the official pay for the check-up than for any other service and pay type. An employed individual may have a higher cost of illness, relative to someone without a steady

job, so he or she is more likely to engage in preventative care. Poor health is a strong predictor of unofficial pay at the hospital but is not significant for the official pay, relative to no pay. Regional per capita GDP is negative and significant across all categories of medical services.

7. Conclusion

In this paper, we explore empirically the determinants of bribery in the Russian health care sector from 1994 to 2005. We build on the existing literature which has demonstrated that individual characteristics, such as gender-age-education composition, play an important role in explaining individual decision to briber. We take our analysis a step further and build an equilibrium model of bribery which allows us to test several determinants of bribery. Specifically, we use a variety of regional shocks to test whether bribery can be attributed to the short-run budgetary fluctuations, low wages of medical workers or scarce resources.

The IV results are not consistent with results from other models (probit, Heckman, mlogit, tobit, etc.). For the most part we find positive association between doctors' wages and bribery. We do not find evidence that regional budget deficits and wage arrears of medical workers have a discernable impact on the probability of bribing. Per capita expenditures on health care and greater economic development, captured by the regional GDP per capita, reduce bribery. Factors which account for the long run endowment of health care industry, such as hospital beds rate and medical workers rate, have a consistent negative effect on informal payments. However, the IV results suggest that some of the above results may not be robust. We also find evidence that private health care sector is more prone to corruption, perhaps due to the tax evasion incentives.

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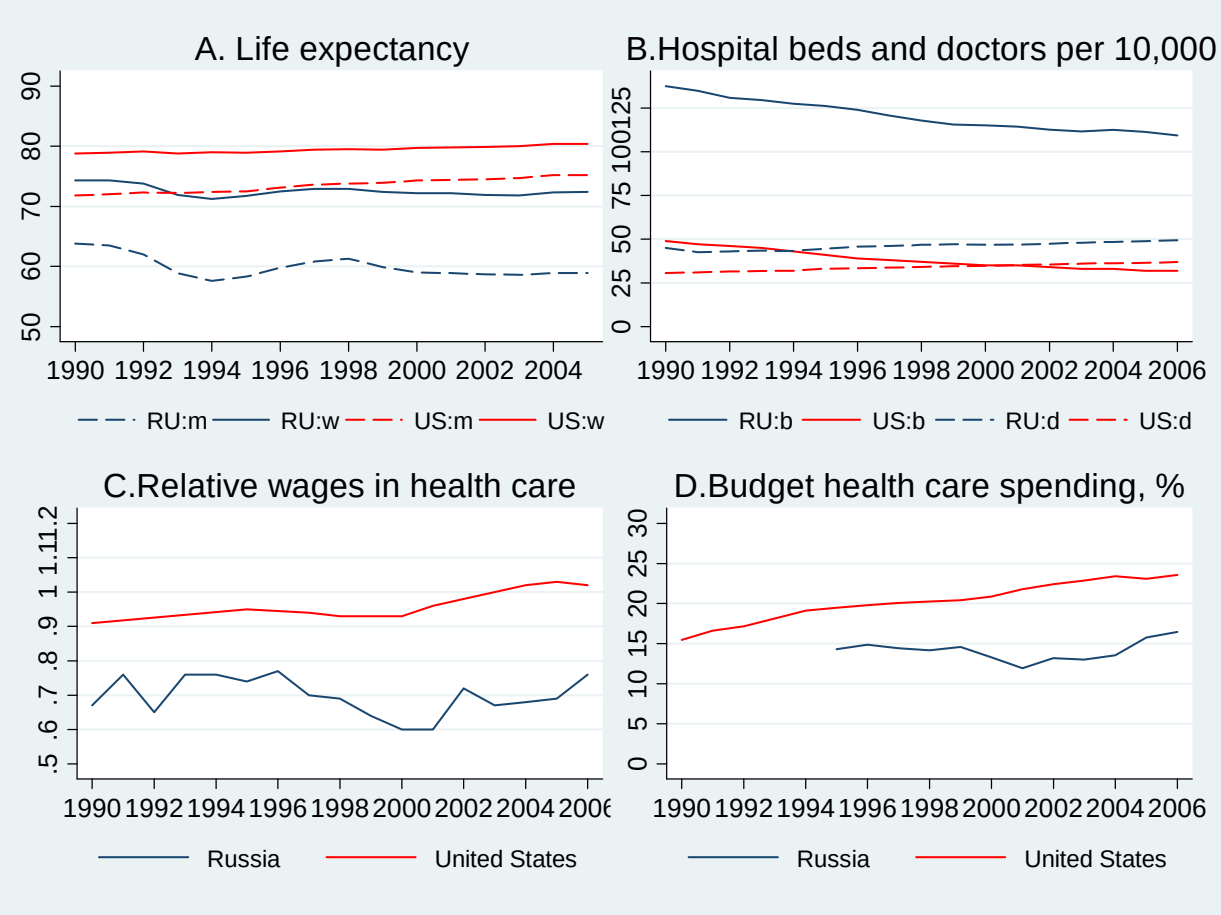
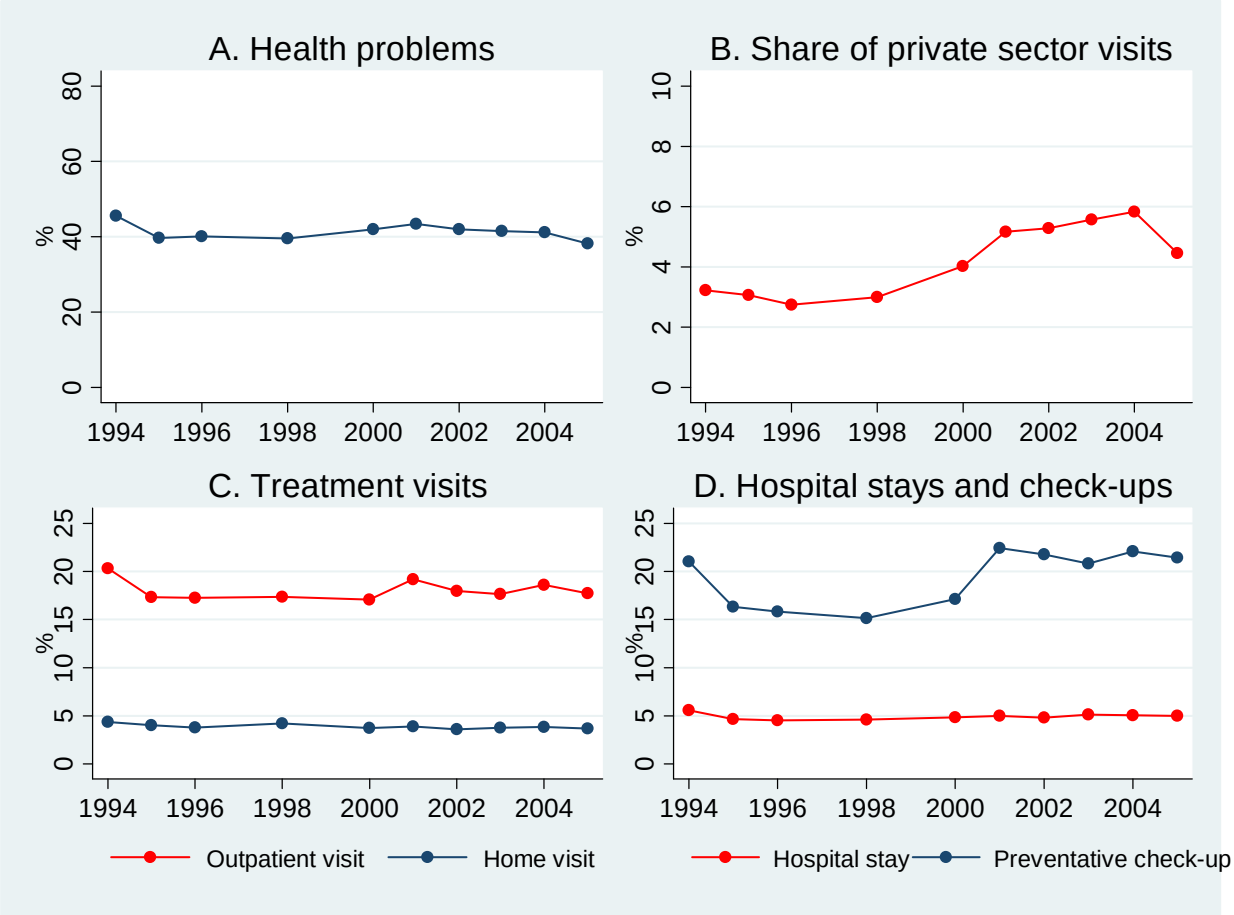
Figure 1: Key Health Indicators: Russia and U.S.



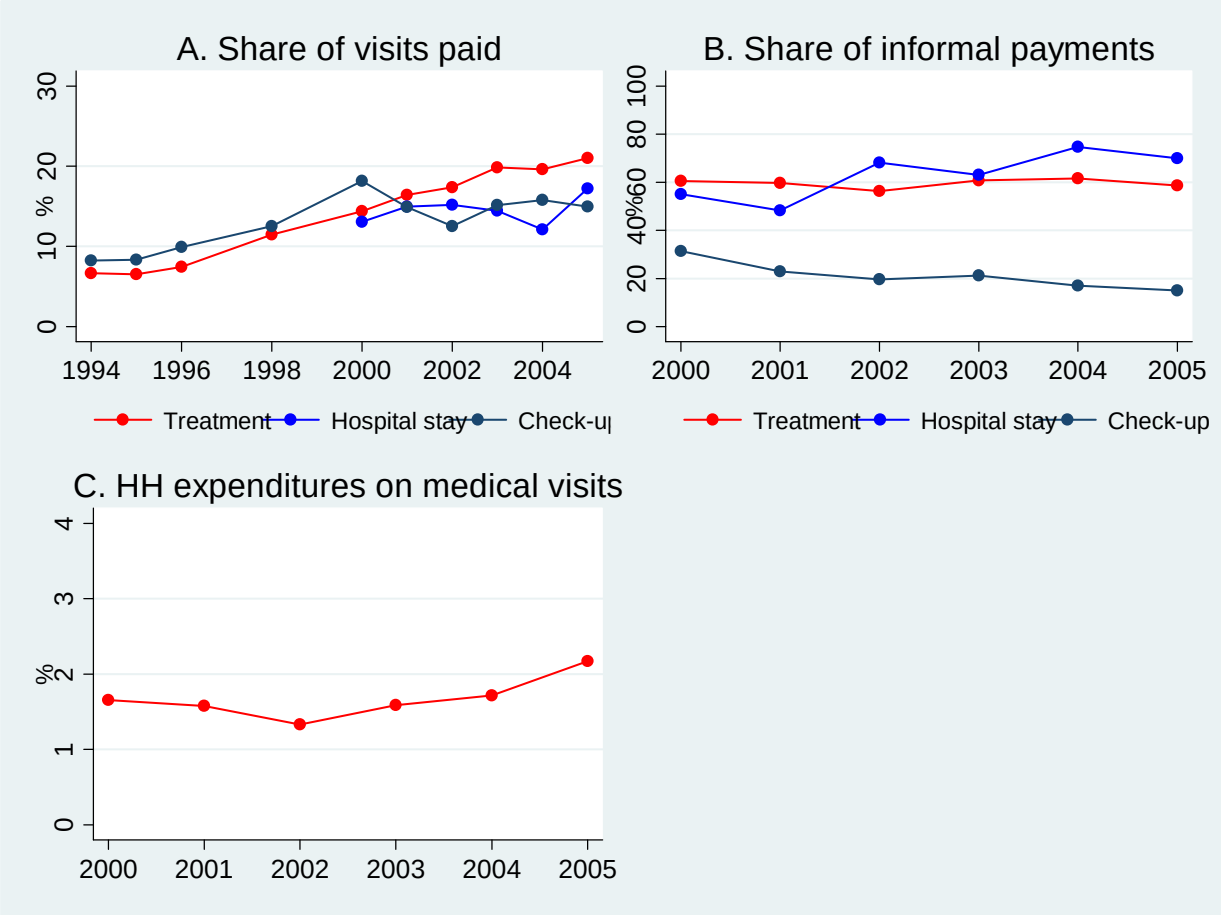
Notes. Figure A1 shows life expectancy in years by gender in Russia and the U.S. (Panel A), number of hospital beds and number of doctors per 10,000 population in Russia and the U.S. (Panel B), the ratio of the average wages in the health care industry to the average wages in other industries in Russia and the U.S., excluding the farm sector in the U.S. (Panel C), and the percent share of budget expenditures on health care in Russia and the U.S. (Panel D).

Figure 2: Key Health Indicators from RLMS



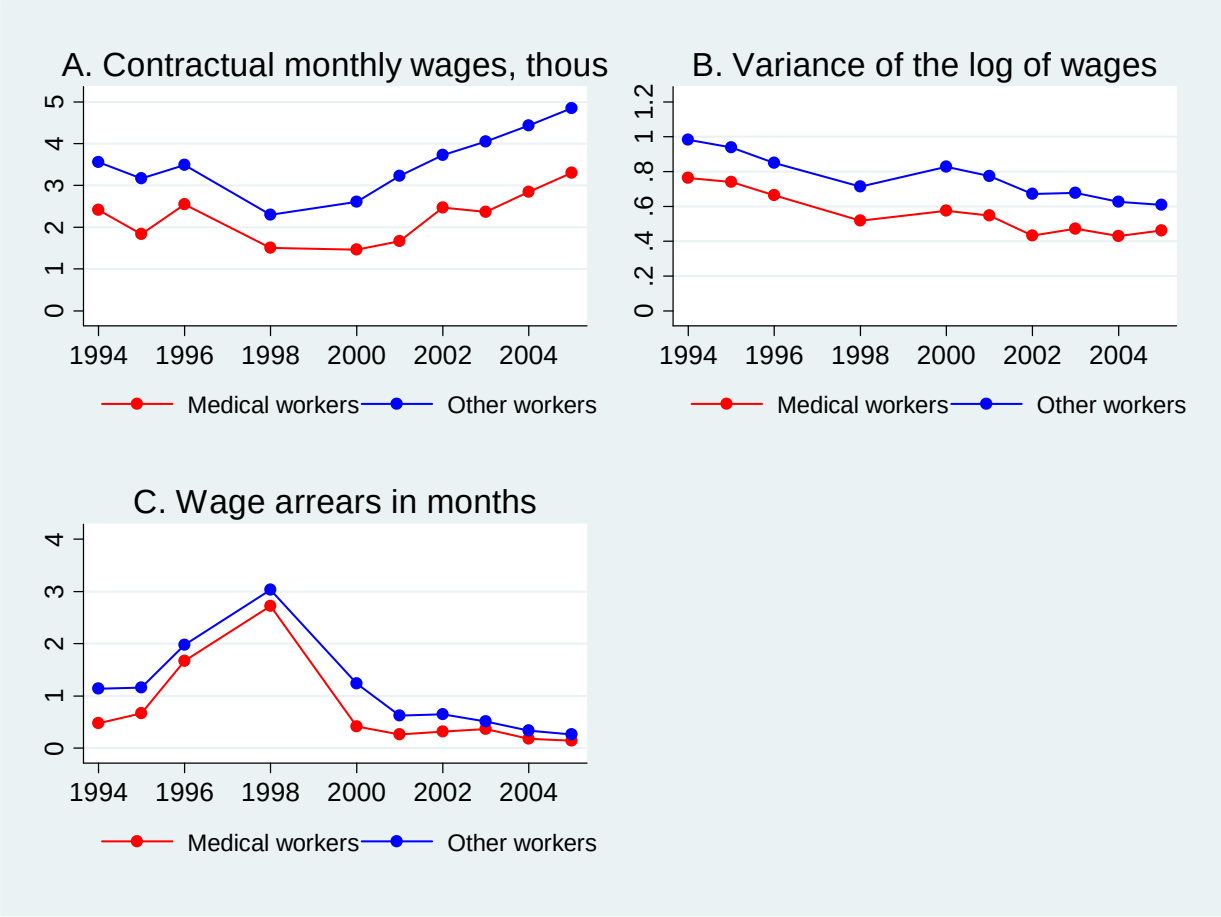
Notes. Figure 1 shows the percent share of respondents who experienced health problems in the last 30 days (panel A), visited doctor for treatment ("outpatient visit") or had a doctor's visit at home in the last 30 days (panel C), stayed overnight at the hospital and visited a doctor for preventative check-up in the last 3 months (panel D). Private sector visits in panel B include visits to the private doctor or private medical facility for treatment.

Figure 3: Payments for Medical Visits, RLMS



Notes. Figure 2 shows the percent share of respondents who paid for a treatment visit in the last 30 days ("outpatient visit" or had a doctor's visit at home), paid for a hospital stay or a preventative check-up visit in the last 3 months (Panel A), the percent share of informal payments for these visits (Panel B), and the percent share of household expenditures (on durables, deflated using national monthly CPI) for treatment visit, hospital stay and preventative check-ups, excluding medicine (Panel C).

Figure 4: Wages of Medical Workers, RLMS



Notes. Figure 3 shows contractual monthly wages of medical workers and other workers deflated using national monthly CPI (Panel A), variance of the log of contractual deflated wages of medical workers and other workers (Panel B), and wage arrears in months for medical and other workers (Panel C).

TABLE 1: Variable Description, RLMS

Variable name	Definition	Years available
Female	=1 if a respondent is female	
Age	Age in years	
Adult (dummy 14+)	=1 if a respondent's age is greater than or equal 14	
Schooling (years)	Adjusted years of schooling	
Employment (dummy)	=1 if a respondent is currently employed	
Disposable HH income	Real disposable after-tax household income, deflated using national monthly CPI	
Type of medical visit		
Treatment visit	=1 if a respondent had a treatment visit in the last 30 days ("outpatient visit" or had a doctor's visit at home)	
Hospital stay	=1 if a respondent stayed at a hospital in the last 3 months	
Preventative check-up	=1 if a respondent had a preventative check-up in the last 3 months	
Type of illness		
Respiratory system	Mild respiratory diseases, such as common cold and flu, and more serious diseases, such as pneumonia, bronchitis, lung inflammation and asthma.	Treatment visit only
Heart and circular system	Heart attack, hypertension, blood pressure diseases, cardiovascular problems and other ill-defined heart aches	Treatment visit only
External organs	Injuries caused by external factors as well as musculoskeletal system diseases and connective tissue diseases	Treatment visit only
Other systemic diseases	Infectious diseases; diseases of the nervous system and sensory organs; skin diseases and subcutaneous tissues; digestive diseases; diseases related to female reproductive organs; neoplasms, tumors and cancers; and other systemic diseases	Treatment visit only
Symptoms and ill-defined conditions	Symptoms include headaches, stomach aches, nausea, tooth ache, alcoholic dependency, and general tiredness	Treatment visit only
Unclassified/ no answer	=1 if illness is unclassified or no answer is provided	Treatment visit only
Chronic illness (dummy)	=1 if a respondent has a chronic illness	
Poor health (dummy)	=1 if a respondent rated his health as "bad" or "very bad"	
Place of medical services		
Hospital	=1 if a respondent visited a hospital during a treatment visit ("outpatient" services) in the last 30 days	2000-2005, treatment visit only
Home visit	=1 if a medical worker visited an individual at home in the last 30 days	2000-2005, treatment visit only
Urban (dummy)	=1 if a respondent resides in urban are	
Regional categories	8 categories	

Note. Years available are 1994-1996, 1998, 2000-2005 unless otherwise specified.

Table 1A: Summary Statistics (to be provided)

TABLE 2: Variable Description, Regional Variables

Variable Name	*Variable Description*	*Units*	*Years available*	*Source: publication*	*Source: table*
		Regional variables: Health care resources			
Employment in health care industry	Number of workers employed at establishments and organizations of the "Health Care" sector by regions of the Russian Federation	thousands	1990, 1995-2006	Health Care in Russia, 2001; Health Care in Russia, 2005; Health Care in Russia, 2007	10.23; 3.21; 4.16
Monthly wages in health care industry	Nominal monthly wage paid to the workers employed at establishments and organizations of the "Health Care" sector by regions of the Russian Federation	thousands of rubles in 1990, 1995-1997; rubles in 1998-2006	1990, 1995-2006	Health Care in Russia, 2001; Health Care in Russia, 2005; Health Care in Russia, 2007	10.24; 4.21; 4.17
N of public hospitals	Number of hospitals by ownership type for the subjects of the Russian Federation in 2006. State medical establishments, total	number	2006	Health Care in Russia, 2007	3.15
N of non-public hospitals	Number of hospitals by ownership type for the subjects of the Russian Federation in 2006. Non-public medical establishments	number	2006	Health Care in Russia, 2007	3.15
Hospital bed per 10,000	Number of hospital beds per 10,000 population, end of year	number	1990, 1995-2006	Regions of Russia, 2004; Regions of Russia, 2007	6.2
Doctors per 10,000	Number of doctors per 10,000 population, end of year	number	1990, 1995-2006	Regions of Russia, 2004; Regions of Russia, 2007	6.7
Associate med. pers. per 10,000	Number of associate medical personnel per 10,000 population, end of year	number	1990, 1995-2006	Regions of Russia, 2004; Regions of Russia, 2007	6.10

Notes: Komi-Permyatski okrug is merged with Permskaya oblast in 2005. Data for Ingushetia for 1990 includes Chechnya. Health care industry includes physical culture and social work. Original table for oblast include data for autonomous republics. Morbidity rate is not provided for autonomous okrugs; it is taken from oblast numbers

Regional variables: Budget

Budget expenditure	Consolidated budgetary expenditures of the subjects of the Russian Federation	millions of rubles; prior to 1998-in billions	1995-2006	Regions of Russia, 2004; Regions of Russia, 2007	20.3; 22.3; 22.4
Budget revenue	Consolidated budgetary income of the subjects of the Russian Federation	millions of rubles; prior to 1998-in billions	1995-2006	Regions of Russia, 2004; Regions of Russia, 2007	20.1; 22.1; 22.2
Health expenditure	Consolidated budgetary expenditures of the subjects of the Russian Federation on health care and physical culture	millions of rubles; prior to 1998-in billions	1995-2006	Treasury Budget Data, annual; Health Care, 2005; Regions of Russia 2007	8.6; 22.5

Notes: Data for autonomous republics are included into data for oblasts (necessary recalculations are performed to make variables consistent over time). Social policy is not included in budget expenditures on health care and physical culture. Data for Chechnya in 2000 is presented from municipal (local) budgets.

Regional variables: Additional

Gross regional product per capita	Gross Regional Product per capita	rubles; before 1996-thousands of rubles	1994-2006	Russian Statistical Yearbook, 2001; Regions of Russia, 2004; Regions of Russia, 2008	12.23; 10.2; 11.2
Water pollution	Discharge of polluted sewage water to water bodies	millions of cubic meters	1995-2005	Environment, 2001; Environment, 2006	7.20; 7.18
Air pollution	Discharge of substances polluting atmosphere from stationary sources	thousands of tons	1995-2005	Environment, 2001; Environment, 2006	8.8; 8.5

Notes: Data for autonomous republics are included into data for oblasts. Gross regional product is not calculated separately for autonomous regions before 2000. When computing per capita measures, mid year population estimates are used.

Regional variables: Regional wage coefficients

Base wage coefficient	Base regional wage coefficient	number	2001-2006	Ministry of Finance of the Russian Federation, Inter-budgetary relations, various years	2-2-1; 3-2-1; ИБР
N. markups	Average wage markup in the regions of Extreme North and in territories equated to them	number	2001-2006	Ministry of Finance of the Russian Federation, Inter-budgetary relations, various years	2-2-1; 3-2-1; ИБР

Total wage coefficient	Conditional computed wage coefficient (with markups and compensation)	number	2001-2006	Ministry of Finance of the Russian Federation, Inter-budgetary relations, various years	2-2-1; 3-2-1; ИБР

Notes: Data reported as of January 1 of each year. Conditional wage markup for transportation expenditures in Northern locations is a multiple of average wage markup in the regions of Extreme North and zone coefficient for compensation of transportation cost. Total wage coefficient is the sum of all coefficients. 2006 data are missing information on autonomous republics; assumptions are made based on previous values

Regional variables: Wage arrears

WA due to budget problems	Wage arrears due to lack of budget financing	thousands of rubles; millions of rubles before 1998	1995-1999, 2001-2005	Wage arrears, Goskomstat	T2A91500; 91500T10; T15
Employees with WA	Workers for whom an establishment has wage arrears, number	number	1999, 2001-2005	Wage arrears, Goskomstat	T15
Establishments with WA	Number of establishments (organizations) which have wage arrears, number	number	1995-1999, 2001-2005	Wage arrears, Goskomstat	T2A91500; 91500T10; T15
Share of WA due to budget problems	Wage arrears due to lack of budget financing as a percent of the total volume of wage arrears	percent	1995-1999, 2001-2005	Wage arrears, Goskomstat	T2A91500; 91500T10; T15
WA total	Wage arrears for workers, total	thousands of rubles; millions of rubles before 1998	1995-1999, 2001-2005	Wage arrears, Goskomstat	T2A91500; 91500T10; T15
WA as a percent of wage bill	Wage arrears, as a percent to the monthly wage bill	percent	1995-1999, 2001-2005	Wage arrears, Goskomstat	T2A91500; 91500T10; T15

Notes: Komi-Permyatskii okrug merged with Permskaya oblast in 2005. Data for all years are as of the end of year, except for 1999. Data for 1999 as of July 1, 1999.

Table 2A: Summary Statistics of Regional Variables

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Average monthly wage	Mean	1771.762	2585.037	2541.649	1499.519	1463.715	1729.741	2183.287	3030.114	3161.162	3543.774	4047.450
in health care	St. dev.	732.753	1145.944	1146.808	682.959	577.655	874.287	1066.515	1175.453	1249.355	1284.339	1486.150
Doctor to nurses ratio	Mean	0.382	0.384	0.392	0.397	0.399	0.408	0.410	0.411	0.412	0.412	0.418
	St. dev.	0.058	0.062	0.063	0.065	0.066	0.068	0.069	0.069	0.071	0.072	0.074
Budget deficit, %	Mean	-0.330	-0.879	-2.043	-0.166	0.091	0.076	-0.189	-0.565	-0.427	-0.252	-0.178
of regional GDP	St. dev.	0.590	1.402	1.222	0.855	0.678	0.967	0.528	0.824	0.895	0.999	0.543
Wage arrears per	Mean	875.780	2387.254	363.915	1585.880	571.997	258.171	33.823	66.907	48.294	13.692	4.958
worker in health care	St. dev.	647.269	2417.054	798.641	1353.607	602.293	276.231	82.705	158.034	133.912	41.963	6.740
Monthly wage bills	Mean	1.106	1.651	1.082	2.147	1.329	1.069	0.809	0.689	0.528	26.542	0.739
owed in health care	St. dev.	0.429	0.756	0.742	0.902	0.721	0.664	0.855	0.702	1.251	161.842	1.228
Share of workers with	Mean					31.935	16.930	1.925	2.712	1.887	0.597	0.256
wage arrears	St. dev.					23.399	12.828	4.671	5.728	4.243	1.542	0.464
Real regional GDP	Mean	41857	46704	46745	27906	33665	44380	48028	49623	55439	63572	73098
per capita	St. dev.	14420	14682	16897	10758	14773	52447	52638	49429	56580	67445	89138
Real health care	Mean	1.108	1.406	1.652	0.775	0.903	1.124	1.126	1.385	1.472	1.667	2.039
expenditure per capita	St. dev.	0.524	0.830	1.243	0.566	0.826	1.286	0.946	0.939	0.847	0.933	1.339
Medical personnel,	Mean	144.589	147.929	146.943	147.855	148.415	145.587	144.933	146.889	147.679	148.902	149.267
per 10,000	St. dev.	16.354	15.012	15.695	15.502	15.736	17.837	18.768	20.182	20.414	19.313	20.167
Hospital beds,	Mean	123.091	120.833	118.120	115.548	113.754	113.443	113.215	111.755	111.471	112.714	112.519
per 10,000	St. dev.	12.551	10.213	9.829	9.737	10.115	12.306	12.819	12.650	12.312	12.289	12.093
Share of regional	Mean	14.750	15.148	15.189	14.706	16.412	15.523	13.792	15.045	15.149	15.927	17.166
budget expenditure	St. dev.	1.803	2.123	2.235	2.444	2.564	2.471	2.160	2.040	1.764	1.674	1.567

Table 3: Determinants of Paying for Treatment Visit by Payment Type, Probit Estimates

	Informal pay (2000-2005)	Official pay (2000-2005)	Any pay (2000-2005)	Any pay (1994-2005)
Female	0.015***	0.014***	0.025***	0.021***
	(0.005)	(0.005)	(0.007)	(0.004)
Age	-0.001***	-0.001***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Adult (dummy 14+)	0.036***	0.056***	0.091***	0.070***
	(0.006)	(0.007)	(0.010)	(0.007)
Schooling (years)	0.004***	0.004***	0.008***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Employment (dummy)	0.009*	0.015**	0.024***	0.016***
	(0.005)	(0.006)	(0.007)	(0.005)
Disposable HH income (log)	0.014***	0.009**	0.022***	0.015***
	(0.004)	(0.004)	(0.005)	(0.003)
Illness type				
Heart disease	0.023***	0.028***	0.047***	0.039***
	(0.007)	(0.008)	(0.011)	(0.008)
External	0.048***	0.055***	0.091***	0.070***
	(0.013)	(0.009)	(0.015)	(0.010)
Other systemic	0.062***	0.075***	0.117***	0.092***
	(0.012)	(0.012)	(0.015)	(0.010)
Symptoms	0.073***	0.118***	0.179***	0.144***
	(0.013)	(0.017)	(0.021)	(0.017)
Unclassified/ no answer	0.050***	0.050***	0.095***	0.070***
	(0.015)	(0.014)	(0.019)	(0.013)
Chronic illness (dummy)	0.012**	0.016***	0.022***	…
	(0.005)	(0.006)	(0.008)	
Poor health (dummy)	0.012*	0.017**	0.026***	0.012**
	(0.006)	(0.007)	(0.008)	(0.006)
Place of medical services (clinic is omitted)				
Hospital	0.062***	0.011	0.060***	0.041***
	(0.013)	(0.010)	(0.016)	(0.011)
Home visit	0.003	-0.039***	-0.035**	-0.021**
	(0.009)	(0.007)	(0.014)	(0.009)
Urban (dummy)	0.003	0.009	0.009	0.011
	(0.008)	(0.009)	(0.012)	(0.008)
Regional wages of medical workers (log)	0.033***	0.023*	0.048***	0.022**
	(0.010)	(0.012)	(0.013)	(0.009)
Average schooling of medical workers (years)	-0.004	-0.003	-0.006	-0.002
	(0.004)	(0.004)	(0.005)	(0.003)
Regional real GDP per capita (log)	-0.030***	-0.059***	-0.082***	-0.060***
	(0.007)	(0.013)	(0.014)	(0.011)
N	11554	11905	12164	19393
Pseudo R^2	0.080	0.091	0.088	0.113
Wild χ^2	554.1***	1155.5***	1154.1***	2047.1***

Notes: Robust standard errors clustered by location are in parentheses, *** significant at the 1%, ** - significant at the 5%, * - significant at the 10%. Sample consists of respondents who had a treatment visit at a non-privately owned medical facility in the last 30 days. Reported are marginal effects. The omitted category is a clinic for the place of medical

services and respiratory disease for the type of illness. HH=household. Household income and wages of medical workers are after-tax and deflated using national monthly CPI. Year and region dummies are included but their coefficients are not reported. For the children subsample, schooling and employment are for the head of the household.

Table 4: Determinants of Expense during Treatment Visit by Payment Type, Tobit Estimates

	Informal expense, in logs (2000-2005)	Official expense, in logs (2000-2005)	Total expense, in logs (2000-2005)	Total expense, in logs (1994-2005)
Female	1.299***	0.912***	0.914***	1.044***
	(0.444)	(0.313)	(0.256)	(0.234)
Age	-0.060***	-0.055***	-0.055***	-0.054***
	(0.011)	(0.010)	(0.008)	(0.008)
Adult (dummy 14+)	3.560***	4.475***	4.056***	4.424***
	(0.555)	(0.592)	(0.475)	(0.442)
Schooling (years)	0.341***	0.282***	0.283***	0.292***
	(0.062)	(0.049)	(0.039)	(0.038)
Employment (dummy)	0.889**	0.863**	0.901***	0.839***
	(0.396)	(0.382)	(0.275)	(0.240)
Disposable HH income (log)	1.196***	0.695***	0.872***	0.762***
	(0.360)	(0.242)	(0.189)	(0.179)
Illness type				
Heart disease	1.813***	1.706***	1.704***	1.894***
	(0.546)	(0.454)	(0.388)	(0.385)
External	3.291***	2.842***	2.878***	3.006***
	(0.801)	(0.415)	(0.457)	(0.389)
Other systemic	4.151***	3.719***	3.662***	3.848***
	(0.604)	(0.484)	(0.434)	(0.377)
Symptoms	4.691***	5.193***	5.076***	5.249***
	(0.627)	(0.608)	(0.527)	(0.484)
Unclassified/ no answer	3.024***	2.356***	2.720***	2.853***
	(0.793)	(0.657)	(0.528)	(0.505)
Chronic illness (dummy)	1.009**	0.976**	0.855***	…
	(0.466)	(0.399)	(0.308)	
Poor health (dummy)	0.780	0.862**	0.771**	0.540**
	(0.520)	(0.386)	(0.304)	(0.274)
Place of medical services (clinic is omitted)				
Hospital	3.431***	0.594	1.843***	1.680***
	(0.656)	(0.548)	(0.455)	(0.413)
Home visit	0.215	-2.731***	-1.396***	-1.162***
	(0.646)	(0.412)	(0.478)	(0.404)
Urban (dummy)	0.300	0.649	0.387	0.593
	(0.705)	(0.541)	(0.441)	(0.430)
Regional wages of medical workers (log)	2.840***	1.528**	1.902***	1.361***
	(0.814)	(0.738)	(0.479)	(0.481)
Average schooling of medical workers (years)	-0.399	-0.212	-0.232	-0.143
	(0.331)	(0.251)	(0.192)	(0.156)
Regional real GDP per capita	-2.513***	-3.567***	-2.928***	-3.009***

(log)	(0.514)	(0.861)	(0.519)	(0.584)
N	11497	11875	12087	19292
Pseudo R^2	0.048	0.054	0.050	0.066
F-test	16.421	39.767	39.040	68.579

Notes: Robust standard errors clustered by location are in parentheses, *** significant at the 1%, ** - significant at the 5%, * - significant at the 10%. Sample consists of respondents who had a treatment visit at a non-privately owned medical facility in the last 30 days. Reported are marginal effects. The omitted category is a clinic for the place of medical services and respiratory disease for the type of illness. HH=household. Household income and wages of medical workers are after-tax and deflated using national monthly CPI. Year and region dummies are included but their coefficients are not reported. For the children subsample, schooling and employment are for the head of the household.

Table 5: Determinants of Informal and Official Payments for Treatment Visit, 2000-2005, MNL Estimates

	Informal pay (2000-2005)	**Official pay (2000-2005)**
Female	0.013***	0.010**
	(0.004)	(0.004)
Age	-0.001***	-0.001***
	(0.000)	(0.000)
Adult (dummy 14+)	0.039***	0.063***
	(0.007)	(0.009)
Schooling (years)	0.004***	0.003***
	(0.001)	(0.001)
Employment (dummy)	0.007*	0.014***
	(0.004)	(0.005)
Disposable HH income (log)	0.013***	0.008**
	(0.004)	(0.003)
Illness type		
Heart disease	0.019***	0.022***
	(0.006)	(0.007)
External	0.035***	0.037***
	(0.008)	(0.006)
Other systemic	0.042***	0.045***
	(0.007)	(0.007)
Symptoms	0.051***	0.070***
	(0.007)	(0.008)
Unclassified/ no answer	0.036***	0.036***
	(0.009)	(0.008)
Chronic illness (dummy)	0.010**	0.010*
	(0.005)	(0.005)
Poor health (dummy)	0.010*	0.013**
	(0.005)	(0.005)
Place of medical services (clinic is omitted)		
Hospital	0.041***	0.003
	(0.007)	(0.007)
Home visit	0.003	-0.043***
	(0.008)	(0.007)

Urban (dummy)	0.002	0.008
	(0.008)	(0.008)
Regional wages of medical workers (log)	0.029***	0.013
	(0.009)	(0.010)
Average schooling of medical workers (years)	-0.002	-0.003
	(0.004)	(0.003)
Regional real GDP per capita (log)	-0.026***	-0.047***
	(0.007)	(0.012)

Note: Robust standard errors clustered by location are in parentheses, *** significant at the 1%, ** - significant at the 5%, * - significant at the 10%. Sample consists of respondents who had a treatment visit at a non-privately owned medical facility in the last 30 days. N = 12161. Pseudo R-squared = 0.0875 The reference category is no payment. Reported are marginal effects. The omitted category is a clinic for the place of medical services and respiratory disease for the type of illness. HH=household. Household income and wages of medical workers are after-tax and deflated using national monthly CPI. Year and region dummies are included but their coefficients are not reported. For the children subsample, schooling and employment are for the head of the household.

Table 6: Determinants of Paying for Treatment Visit by Payment Type, Heckman sample selection correction, ML Estimates

	Informal pay (2000-2005)	**Official pay (2000-2005)**	**Any pay (2000-2005)**	**Any pay (1994-2005)**
Female	0.016***	0.016***	0.026***	0.022***
	(0.005)	(0.005)	(0.007)	(0.005)
Age	-0.001***	-0.001***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Adult (dummy 14+)	0.049***	0.077***	0.115***	0.096***
	(0.008)	(0.012)	(0.014)	(0.012)
Schooling (years)	0.004***	0.004***	0.007***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Employment (dummy)	0.011*	0.020**	0.028***	0.020***
	(0.006)	(0.008)	(0.008)	(0.006)
Disposable HH income (log)	0.016***	0.011**	0.023***	0.016***
	(0.004)	(0.004)	(0.005)	(0.004)
Illness type				
Heart disease	0.019***	0.024***	0.039***	0.033***
	(0.006)	(0.007)	(0.009)	(0.007)
External	0.040***	0.046***	0.076***	0.063***
	(0.009)	(0.007)	(0.011)	(0.008)
Other systemic	0.057***	0.070***	0.104***	0.088***
	(0.010)	(0.011)	(0.012)	(0.008)
Symptoms	0.061***	0.105***	0.155***	0.135***
	(0.010)	(0.015)	(0.016)	(0.014)
Unclassified/ no answer	0.042***	0.039***	0.077***	0.064***
	(0.012)	(0.011)	(0.014)	(0.012)
Chronic illness (dummy)	0.009*	0.015**	0.016*	…
	(0.005)	(0.007)	(0.008)	
Poor health (dummy)	0.011*	0.015**	0.021**	0.009
	(0.007)	(0.007)	(0.009)	(0.007)
Place of medical services (clinic is omitted)				

Hospital	0.074***	0.015	0.071***	0.050***
	(0.016)	(0.013)	(0.018)	(0.013)
Home visit	0.003	-0.036***	-0.031**	-0.018**
	(0.009)	(0.008)	(0.013)	(0.008)
Urban (dummy)	0.003	0.012	0.011	0.014
	(0.009)	(0.010)	(0.013)	(0.010)
Regional wages of medical	0.036***	0.022*	0.047***	0.021*
workers (log)	(0.010)	(0.012)	(0.012)	(0.012)
Average schooling of medical	-0.004	-0.002	-0.005	-0.001
workers (years)	(0.004)	(0.005)	(0.005)	(0.004)
Regional real GDP per capita	-0.033***	-0.063***	-0.083***	-0.066***
(log)	(0.007)	(0.012)	(0.013)	(0.013)
Constant	0.025	0.431***	0.419***	0.464***
	(0.088)	(0.139)	(0.134)	(0.115)
Selection equation:				
Female	0.076***	0.082***	0.084***	0.107***
	(0.012)	(0.012)	(0.012)	(0.009)
Age	0.001	0.001	0.001	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Adult (dummy 14+)	-0.591***	-0.573***	-0.564***	-0.473***
	(0.035)	(0.035)	(0.035)	(0.030)
Schooling (years)	0.002	0.002	0.003	0.009***
	(0.003)	(0.003)	(0.003)	(0.002)
Employment (dummy)	-0.103***	-0.095***	-0.095***	-0.080***
	(0.018)	(0.019)	(0.019)	(0.014)
Disposable HH income (log)	0.049***	0.049***	0.051***	0.040***
	(0.012)	(0.013)	(0.013)	(0.010)
Chronic illness (dummy)	0.505***	0.511***	0.516***	…
	(0.021)	(0.020)	(0.020)	
Poor health (dummy)	0.671***	0.679***	0.685***	0.842***
	(0.024)	(0.025)	(0.024)	(0.021)
Urban (dummy)	0.032	0.040	0.040	0.090**
	(0.039)	(0.039)	(0.039)	(0.038)
Regional wages of medical	-0.070	-0.065	-0.061	-0.060*
workers (log)	(0.043)	(0.043)	(0.043)	(0.032)
Average schooling of medical	0.014	0.012	0.009	0.009
workers (years)	(0.021)	(0.021)	(0.021)	(0.018)
Regional real GDP per capita	0.156***	0.148***	0.142***	0.156***
(log)	(0.047)	(0.048)	(0.047)	(0.048)
Residual temperature	-0.011***	-0.011***	-0.011***	…
	(0.003)	(0.003)	(0.003)	
Residual pressure	0.003*	0.003	0.003	…
	(0.002)	(0.002)	(0.002)	
Residual temperature*	0.002**	0.002*	0.002**	-0.021**
Residual pressure	(0.001)	(0.001)	(0.001)	(0.010)
Residual max temperature	…	…	…	-0.003***
				(0.001)
Residual precipitation	…	…	…	0.010
				(0.050)
Constant	-2.806***	-2.732***	-2.682***	-2.812***
	(0.587)	(0.592)	(0.581)	(0.596)

Selection term (ρ)	-0.019	-0.021	-0.030	-0.026*
	(0.021)	(0.019)	(0.027)	(0.014)
N of all observations	70023	70374	70633	111932
N of censored observations	58469	58469	58469	92539
LR χ^2	0.796	1.147	1.213	3.299
LR p-value	0.372	0.284	0.271	0.069
Lambda	-0.005	-0.006	-0.010	-0.008
SE lambda	0.005	0.006	0.009	0.004

Notes: Robust standard errors clustered by location are in parentheses, *** significant at the 1%, ** - significant at the 5%, * - significant at the 10%. Sample consists of respondents who had a treatment visit at a non-privately owned medical facility in the last 30 days. Dependent variable in the selection equation is an indicator variable equal to 1 if a respondent had a treatment visit in the last 30 days. Reported are marginal effects. The omitted category is a clinic for the place of medical services and respiratory disease for the type of illness. HH=household. Household income and wages of medical workers are after-tax and deflated using national monthly CPI. Year and region dummies are included but their coefficients are not reported. For the children subsample, schooling and employment are for the head of the household.

Table 7: Determinants of Informal Payment with Regional Variables, 2000-2005, Probit Estimates

	(1)	(2)	(3)	(4)	(5)
Regional wages of medical workers (log), RLMS	0.034*** (0.010)			0.025** (0.010)	
Regional component of regional wages of medical workers, RLMS		0.040*** (0.012)			0.037*** (0.011)
Average regional monthly wage in health care industry (log)			-0.010 (0.017)		
Average schooling of medical workers (years), RLMS	-0.004 (0.004)			-0.003 (0.004)	
Skill component of regional wages of medical workers, RLMS		-0.002 (0.027)			-0.003 (0.026)
Doctors/nurses			0.044 (0.052)		
Budget deficit, % of regional GDP	0.004 (0.003)				
Wage arrears per worker in health care, (log)		-0.002 (0.002)			
Monthly wage bills owed in health care			-0.000 (0.000)		
Share of workers with wage arrears in health care				0.000 (0.001)	
Months of unpaid wages for medical workers, RLMS					0.004 (0.006)
Regional real GDP per capita (log)	-0.030*** (0.008)		-0.017** (0.008)	-0.027*** (0.007)	-0.035*** (0.007)
Real health expenditure per capita (log)		-0.041*** (0.009)			
Medical personnel, rate			-0.033** (0.016)		
Hospital beds, rate				-0.001** (0.000)	
Share of regional budget expenditure on health care and physical education					-0.003* (0.002)
N	11554	11554	11554	11554	11554
Pseudo R^2	0.080	0.081	0.079	0.082	0.081
Wild χ^2	555.345	1002.327	13884.068	644.694	623.162

Notes: Robust standard errors clustered by location are in parentheses, *** significant at the 1%, ** - significant at the 5%, * - significant at the 10%. Sample consists of respondents who had a treatment visit at a non-privately owned medical facility in the last 30 days. Reported are marginal effects. Dependent variable is a binary variable equal to 1 if paid informally and 0 if didn't pay or paid officially. All monetary variables are deflated using national monthly CPI.

Table 8: Determinants of Paying for Treatment Visit by Payment Type, IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.016***	0.016***	0.016***	0.016***	0.016***	0.016***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Age	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Adult (dummy 14+)	0.046***	0.046***	0.046***	0.046***	0.046***	0.046***
	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Schooling (years)	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment (dummy)	0.009	0.010	0.010	0.010*	0.010*	0.011*
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Disposable HH income (log)	0.020***	0.018***	0.018***	0.018***	0.018***	0.017***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Illness type						
Heart disease	0.018***	0.019***	0.019***	0.019***	0.019***	0.019***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
External	0.040***	0.040***	0.040***	0.040***	0.040***	0.040***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Other systemic	0.057***	0.057***	0.057***	0.057***	0.057***	0.057***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Symptoms	0.061***	0.061***	0.061***	0.061***	0.061***	0.061***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Unclassified/ no answer	0.043***	0.043***	0.043***	0.043***	0.043***	0.042***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Chronic illness (dummy)	0.010	0.010*	0.010*	0.010*	0.010*	0.011*
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Poor health (dummy)	0.013*	0.013**	0.013**	0.013**	0.013**	0.014**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Hospital	0.073***	0.074***	0.074***	0.074***	0.074***	0.074***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Home visit	0.004	0.003	0.003	0.003	0.003	0.003
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Urban (dummy)	0.005	0.004	0.004	0.004	0.004	0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)
Regional wages of medical workers (log)	-0.066	-0.017	-0.020	-0.006	-0.010	0.021
	(0.080)	(0.052)	(0.054)	(0.053)	(0.053)	(0.047)
Average schooling of medical workers (years)	-0.005	-0.019	-0.018	-0.022	-0.021	-0.029*
	(0.023)	(0.016)	(0.017)	(0.017)	(0.016)	(0.016)
Regional real GDP per capita (log)	0.018	0.008	0.008	0.005	0.006	-0.001
	(0.019)	(0.012)	(0.013)	(0.012)	(0.012)	(0.011)
1st F-test	8.144	19.991	15.502	24.435	23.544	16.130
1st pvalue	0.005	0.000	0.000	0.000	0.000	0.000
1st partial R^2	0.025	0.043	0.046	0.051	0.047	0.052
Hansen J0	0.000	0.000	0.035	0.155	0.107	2.545
R^2 overall	0.033	0.040	0.040	0.041	0.040	0.042
Hansen pvalue0			0.852	0.694	0.744	0.111

Notes: Robust standard errors clustered by location are in parentheses, *** significant at the 1%, ** - significant at the 5%, * - significant at the 10%. Dependent variable is a binary variable equal to 1 if paid informally and 0 if didn't pay or paid officially. Sample consists of respondents who had a treatment visit at a non-privately owned facility in the last 30 days. N = 11554. Reported are marginal effects. The omitted category is a clinic for the place of medical services and respiratory disease for the type of illness. HH=household. Household income and wages of medical workers are after-tax and deflated using national monthly CPI. Year and region dummies are included but their coefficients are not reported. For the children subsample, schooling and employment are for the head of the household. Year and region dummies are included but their coefficients are not reported. All the combination of instruments satisfies the following 2 conditions: F>10 and J p-value>0.1.

Table 9: Determinants of Paying for Treatment Visit by Payment Type, Probit Estimates

	Adults (2000-2005)	Children (2000-2005)	Private sector (2000-2005)
Female	0.021***	-0.003	0.014***
	(0.005)	(0.007)	(0.005)
Age	-0.001***	-0.001	-0.001***
	(0.000)	(0.001)	(0.000)
Adult (dummy 14+)	…	…	0.040***
			(0.006)
Schooling (years)	0.004***	0.003**	0.004***
	(0.001)	(0.002)	(0.001)
Employment (dummy)	0.010*	-0.004	0.010**
	(0.006)	(0.009)	(0.005)
Disposable HH income (log)	0.014***	0.013**	0.013***
	(0.005)	(0.005)	(0.005)
Illness type			
Heart disease	0.024***	0.121***	0.023***
	(0.008)	(0.047)	(0.007)
External	0.055***	0.048*	0.049***
	(0.015)	(0.027)	(0.013)
Other systemic	0.071***	0.028	0.058***
	(0.014)	(0.017)	(0.011)
Symptoms	0.090***	0.022	0.071***
	(0.015)	(0.018)	(0.011)
Unclassified/ no answer	0.064***	0.016	0.055***
	(0.018)	(0.017)	(0.012)
Chronic illness (dummy)	0.011	0.009	0.011**
	(0.006)	(0.009)	(0.005)
Poor health (dummy)	0.009	0.040*	0.014**
	(0.006)	(0.023)	(0.007)
Place of medical services			
Hospital	0.070***	0.015	0.061***
	(0.016)	(0.022)	(0.013)
Home visit	0.003	0.001	-0.046***
	(0.011)	(0.008)	(0.011)
Urban (dummy)	…	…	0.238***
			(0.049)
Regional wages of medical workers (log)	0.006	-0.006	0.001
	(0.010)	(0.010)	(0.009)

Average schooling of medical workers (years)	0.033**	0.025**	0.032***
	(0.013)	(0.012)	(0.011)
Regional real GDP per capita (log)	-0.004	-0.003	-0.004
	(0.004)	(0.006)	(0.004)
Public (dummy)	…	…	-0.070***
			(0.018)
Regional share of private medical facilities	…	0.002**	
			(0.001)
N	9251	2303	12171
Pseudo R^2	0.076	0.127	0.120
Wild χ^2	465.602	327.536	1750.390

Notes: Robust standard errors clustered by location are in parentheses, *** significant at the 1%, ** - significant at the 5%, * - significant at the 10%. Dependent variable is a binary variable equal to 1 if paid informally and 0 if didn't pay or paid officially. In (1) the sample is restricted to the adult respondents who had a treatment visit at a non-privately owned facility in the last 30 days. In (2) the sample is restricted to children (age < 14 years) respondents who had a treatment visit at a non-privately owned facility in the last 30 days. In (3) sample consists of respondents who had a treatment visit at in the last 30 days, both in private and pubic sector. Reported are marginal effects. The omitted category is respiratory disease for illness type. HH=household. Household income and wages of medical workers are after-tax and deflated using national monthly CPI. Year and region dummies are included but their coefficients are not reported. For the children subsample, schooling and employment are for the head of the household. Share of private medical facilities is measured in 2006.

Table 10: Determinants of Informal and Official Payments, All Medical Services, 2000-2005, MNL

	Treatment Informal	Treatment Official	Hospital Informal	Hospital Official	Check-up Informal	Check-up Official
Female	0.008**	-0.000	0.023***	0.013**	0.001	0.010
	(0.003)	(0.002)	(0.008)	(0.007)	(0.003)	(0.007)
Age	-0.000***	-0.000***	0.000	-0.000	-0.000**	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Adult (dummy 14+)	0.032***	0.042***	-0.003	0.044***	0.014***	0.223***
	(0.007)	(0.005)	(0.014)	(0.012)	(0.005)	(0.012)
Schooling (years)	0.002***	0.002***	0.003*	0.002*	0.002***	0.003**
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Employment (dummy)	0.006**	0.001	0.025***	0.000	-0.003	0.062***
	(0.003)	(0.003)	(0.008)	(0.008)	(0.004)	(0.006)
Disposable HH income (log)	0.010***	0.005**	0.018**	0.005	0.008***	-0.008**
	(0.003)	(0.002)	(0.008)	(0.006)	(0.002)	(0.003)
Chronic illness (dummy)	0.002	-0.003	-0.000	0.001	0.010***	-0.010*
	(0.004)	(0.003)	(0.010)	(0.007)	(0.003)	(0.005)
Poor health (dummy)	0.002	-0.007*	0.024**	-0.003	0.002	-0.005
	(0.004)	(0.004)	(0.011)	(0.010)	(0.005)	(0.010)
Urban (dummy)	-0.003	-0.008**	0.003	0.026**	0.004	-0.000
	(0.006)	(0.004)	(0.012)	(0.012)	(0.005)	(0.010)
Regional wages of medical workers (log)	0.024***	-0.003	0.047***	0.034**	0.012**	0.024*
	(0.008)	(0.006)	(0.016)	(0.015)	(0.006)	(0.012)
Average schooling of medical workers (years)	0.001	0.004*	0.009	-0.018***	0.001	-0.004
	(0.003)	(0.002)	(0.007)	(0.006)	(0.003)	(0.005)
Regional real GDP per capita (log)	-0.014***	-0.024***	-0.051***	-0.038	-0.020***	-0.011
	(0.005)	(0.005)	(0.012)	(0.025)	(0.004)	(0.011)
N	12237	12237	3481	3481	14800	14800
Pseudo R2	.	.	.	.	.	.

Notes: Robust standard errors clustered by location are in parentheses, *** significant at the 1%, ** - significant at the 5%, * - significant at the 10%. Sample consists of respondents who had a treatment visit at a non-privately owned medical facility in the last 30 days, stayed in hospital in the last 3 months and had a preventative check-up in the last 3 months. The reference category is no payment. Reported are marginal effects. HH=household. Household income and wages of medical workers are after-tax and deflated using national monthly CPI. Year and region dummies are included but their coefficients are not reported. For the children subsample, schooling and employment are for the head of the household.