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Multi-payer health insurance systems in Central and Eastern Europe: lessons from the Czech Republic, Slovakia, and Russia

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Abstract

Transition countries in Central and Eastern Europe and the former Soviet Union introduced social health insurance (SHI) to foster universal coverage, stable financial revenues, and consumer equity through a principle of solidarity. In particular, the Czech Republic, Slovakia, and Russia emphasized managed competition between health insurance companies. However, insufficient financing of the health care systems and excessive regulation led to deficiencies of the multi-payer SHI model in the three countries. The paper examines common trends in the development of the SHI systems in the Czech Republic, Slovakia, and Russia, and conducts empirical estimations with data for Russian regions.

Keywords: social health insurance, infant mortality, maternal mortality, managed competition, transition economies

JEL codes: I13, I18

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1. Introduction

A number of transition countries in Central and Eastern Europe and the former Soviet Union introduced social health insurance (SHI) as a model for achieving universal coverage, stable financial revenues, and consumer equity through a principle of solidarity (Balabanova et al. 2012; Gordeev et al., 2011; Zweifel and Breyer, 2006; Preker et al., 2002). But while most transition countries feared adverse selection in multi-payer health insurance markets, the Czech Republic, Slovakia, and Russia allowed the existence of competitive insurers in the new system. In general, theoretical arguments advocate the presence of properly designed competitive insurers, which should help to control costs, reduce moral hazard, respond to the variety of consumer preferences, and enhance health care quality (Wagstaff, 2010; Zweifel and Breyer, 2006;). However, the SHI experience of such EU countries as Germany, Switzerland, France, and the Netherlands demonstrates the need to carefully adjust the multiple insurer model to a country's institutional environment (Boonen and Schut, 2011; Jacobs and Goddard, 2002). The evidence from the Czech Republic, Slovakia, and Russia shows excessive regulation of health insurers and limited instruments for insurer competition within indebted post-reform health care systems (Naigovzina and Filatov, 2010; Besstremyannaya, 2009; Medved et al., 2005). Consequently, the three transition countries may have been over-enthusiastic in putting large emphasis on market forces in the reorganization of health care systems in economies with a legacy of central planning (Diamond, 2002).

A few studies provide theoretical arguments about disassociation between multi-payer social health insurance systems and positive trends in health outcomes in transition countries (Medved et al., 2005; Lawson and Nemec, 2003). However, to the best of our knowledge Twigg's (2001) statistical analysis of infant mortality in Russian regions is the only empirical study measuring the effect of private health insurers on health outcomes in transition economies.

The purpose of this paper is to quantitatively estimate the impact of private health insurance companies on the quality of health care systems in transition. We employ data on Russian regions, where a multi-payer health insurance model was introduced gradually, allowing for econometric analysis in the post-reform period. The results of

our estimations with parametric and non-parametric models indicate that regions with only private health insurers have lower infant, under-five, and maternal mortality. However, given the low degree of competition on the SHI market in Russia, we assume that this effect is explained by positive structural reforms in those regions. To test this hypothesis we employ an instrumental variable approach and find that the effect of private health insurers becomes insignificant. Finally, we offer evidence, which suggests that private health insurers should be given a greater role in determining the methods of provider reimbursement in Russia.

The remainder of the paper is organized as follows. Section 2 describes common trends in the development of multi-payer social health insurance systems in the Czech Republic, Slovakia, and Russia. Section 3 sets up parametric and non-parametric models for estimating the impact of private health insurers on quality-related health outcomes. Section 4 describes the unique dataset on Russian regional health insurance systems, which combines indicators from national statistics, administrative databases, and independent surveys. The results of the empirical estimations are given in section 5. The follow-up discussion is presented in section 6.

2. Development of a multi-payer health insurance model in the Czech Republic, Slovakia, and Russia

At the beginning of their economic transition, the Czech Republic, Slovakia, and Russia established a model for universal coverage of citizens by mandatory health insurance (Balabanova et al., 2012; Medved et al., 2005; Sheiman, 1991). The revenues of the new SHI systems came from a special payroll tax and from government payments for health care provision to the non-working population. The main reason for combining certain features of taxation-based and insurance-based systems was the desire to establish mandatory health insurance as a reliable source of financing in an environment with unstable budgetary revenues (Lawson and Nemec, 2003; Preker et al., 2002; Sheiman, 1994). The insurance systems instituted in the three transition countries correspond to the major SHI principles implemented in Western Europe: contributions by beneficiaries according to their ability to pay; transparency in the flow of funds; and free access to care based on clinical need (Jacobs and Goddard, 2002).

The Czech Republic, Slovakia, and Russia placed emphasis on managed competition, decreeing that SHI should be offered by multiple private insurance companies with a free choice of the insurer by consumers. Managers of private insurance companies were assumed to perform better than government executives (Lawson and Nemec, 2003; Sinuraya, 2000; Curtis et al., 1995), so an intermediary role for private insurance companies was seen as a key instrument for introducing market incentives and improving the quality of the health care system (Sheiman, 1991).

However, the activity of health insurance companies in the three countries was heavily regulated, since the content of benefit packages, size of subscriber contributions, and the methods of provider reimbursement were decided by government, and tariffs for health care were frequently revised (Lawson et al., 2012; Rokosova et al., 2005; Zaborovskaya et al., 2005; Praznovcova et al., 2003; Hussey and Anderson, 2003). In particular, Russian health care authorities enforced rigid assignments of catchment areas (Twigg, 1999) and imposed informal agreements with health insurance companies to finance providers regardless of the quality and quantity of the health care (Blam and Kovalev, 2006). As a result, the three countries experienced initial emergence of a large number of health insurance companies, followed by mergers between them, resulting in high market concentration (Sergeeva, 2006; Zaborovskaya et al., 2005; Medved et al., 2005).

In Russia the Health Insurance Law (1991) specified that until private insurers appeared in a region, the regional SHI fund or its branches could play the role of insurance companies. Therefore, several types of SHI systems emerged in Russian regions in the 1990s and early 2000s: the regional SHI fund might be the only agent on the SHI market; the regional SHI fund might have branches, acting as insurance companies; SHI might be offered exclusively by private insurance companies; or SHI might be offered by both private insurance companies and branches of the regional SHI fund. The variety of SHI systems reflects the fact that many regions opposed market entry by private insurance companies (Twigg, 1999). Indeed, the boards of directors of regional SHI funds usually included regional government officials (Tompson, 2007; Tragakes and Lessof, 2003) who were reluctant to reduce government control over SHI financing sources (Blam and Kovalev, 2006; Twigg, 2001). The controversy with health insurance legislation created a substantial confusion at the regional and the municipal level (Danishevski et al., 2006).

3. Methodology

While various performance measures reflect different goals of national and regional health care systems (Joumard et al., 2010; Propper and Wilson, 2006; OECD, 2004; WHO, 2000), aggregate health outcomes directly related to the quality of health care are commonly infant, under five, and maternal mortality (Lawson et al., 2012; Gottret and Schieber, 2006; Wagstaff and Claeson, 2004; Filmer and Pritchett, 1999). Consequently, in our analysis we regard these outcomes as parameters reflecting the quality of regional health care systems.

3.1 Parametric models

Baseline model

The model analyzes the impact of the regional SHI system on health outcomes. Let

$$\mathbf{y} = \mathbf{X\beta} + \theta\mathbf{h} + \boldsymbol{\varepsilon}, \quad (1)$$

where *i* is the index for region, **h** is the type of the regional SHI system with unity value corresponding to the presence of private health insurers as the *only* agents at the market. (Following Shishkin et al. (2006) we assume that coexistence of public and private health insurance companies does not enable effective functioning of private health insurers owing to their discrimination by territorial health insurance fund). **X** is the control variables, commonly employed as determinants of health outcomes: per capita gross regional product, public and private health expenditure (Francisci et al., 2008; Byrne et al., 2007; Ivaschenko, 2005; Lopez-Casasnovas et al., 2005; Preker et al., 2002; Carrin and Politi, 1995), and Gini coefficient as an inequality measure. The influence of inflation is taken into account by consumer price index. To incorporate geographical differences among Russian regions we include the share of urban population and January temperature in the list of covariates **X**.

Extended model with instrumental variables

As was noted in section 2, the presence of private health insurers as the only agents at the regional SHI market is related to the quality of governance, which in turn, has an influence on health outcomes. Therefore, it is plausible to assume that **h** becomes an

endogenous variable in (1). To account for endogeneity we employ an instrumental variable approach, with latent variable $\mathbf{h}^*$ and the observed variable **h**. Let

$$\mathbf{h}^* = \mathbf{X\beta_1} + \mathbf{Z\delta_1} + \boldsymbol{\varepsilon_1} \quad (2)$$

$$\mathbf{y} = \alpha\mathbf{h}^* + \mathbf{X\beta_2} + \boldsymbol{\varepsilon_2} \quad (3)$$

$$h_i = \begin{cases} 0, \text{ if } & h_i^* < c_0 \\ 1, \text{ if } & c_0 \leq h_i^* < c_1 \end{cases} \quad (4)$$

$$\boldsymbol{\varepsilon_1} = N(0,\sigma^2 I),\ \boldsymbol{\varepsilon_2} = N(0, I),\ \boldsymbol{\varepsilon_1} \text{ and } \boldsymbol{\varepsilon_2} \text{ are independent,} \quad (5)$$

$$\boldsymbol{\varepsilon_1} \text{ and } \mathbf{X} \text{ are independent, } \boldsymbol{\varepsilon_1} \text{ and } \mathbf{Z} \text{ are independent,} \quad (6)$$

$$\boldsymbol{\varepsilon_2} \text{ and } \mathbf{X} \text{ are independent, } \boldsymbol{\varepsilon_2} \text{ and } \mathbf{h}^* \text{ are independent,} \quad (7)$$

where **Z** is the instruments for the type of regional SHI system and unknown cutoff points satisfy the condition $c_0 < c_1$.

Imposing conditions (5)-(7) enables us estimating the system (2)-(4) with two stage least squares: the fitted values of $\mathbf{h}^*$ are obtained in (2) and then plugged in (3). Since $\boldsymbol{\varepsilon_1}$ and $\boldsymbol{\varepsilon_2}$ are independent, the resulting equation is

$$\boldsymbol{y} = \alpha\,\hat{\mathbf{h}}^* + \mathbf{X\beta_2} + \boldsymbol{\varepsilon_2} + \alpha(\mathbf{h}^* - \hat{\mathbf{h}}^*) \quad (3`)$$

Given assumptions (6)-(8), (4`) provides for consistent estimates since

$$\operatorname{plim}_{n\to\infty} \alpha(\mathbf{h}^* - \hat{\mathbf{h}}^*) = \boldsymbol{\varepsilon_1} \text{ and } E(\boldsymbol{\varepsilon_1}) = E(\boldsymbol{\varepsilon_2}) = 0.$$

We assume that the instruments have no other influence on the analyzed health outcomes but through the type of regional SHI system.

3.2 Non-parametric kernel regressions

Since specifying a parametric model implies a number of restrictions (Hardle and Linton, 1994), we use kernel density estimators which make no assumptions about the functional form and become a widely applied instrument for non-parametric regressions with large sample sizes and few explanatory variables. We consider kernel functions for a mixture of discrete and continuous explanatory variables (notations follow Racine and Li, 2004):

$$y_i = g(h_i, X_i) + u_i \quad (8)$$

$$u_i \text{ and } h_i \text{ are independent; } u_i \text{ and } X_i \text{ are independent} \quad (9)$$

$$\hat{g}(x) = \left(\sum_{i=1}^{n} y_i W_{b,ix}\, l_{\lambda,i}\right) / \left(\sum_{i=1}^{n} W_{b,ix}\, l_{\lambda,i}\right), \quad (10)$$

where i is the index for region, y_i is health outcome, g is the unknown smooth function, $\hat{g}$ is the estimate of g, h_i is the types of regional SHI system, X_i are control variables, $W_{b,ix}$ is kernel function for continuous variables X_i with associated bandwidth b, l is kernel function for discrete variable **h**, λ is a smoothing parameter for l, and n is the total number of observations.

The analysis below treats W(.) as a local-constant (Nadaraya-Watson) estimator with Gaussian kernel of second order and employs Li and Racine's (2003) kernel functions for mixed discrete and continuous variables, which allow conducting more powerful kernel tests if compared to the estimations with Wang and van Ryzin's (1981) kernel functions for discrete ordered variables (Hsiao et al., 2007; Li and Racine, 2003). Bandwidths are selected according to Li and Racine's (2003) crossvalidation. The code is written in the R language (ver.2.12.2) using "np" package (ver.0.40-4) "Nonparametric kernel smoothing methods for mixed data types" (Hayfield and Racine, 2011; Hayfield and Racine, 2008).

4. Data

We employ pooled data on health outcomes, the types of regional SHI systems, and socio-economic variables for Russian regions in 2000-2006 (Table I). The usage of pooled data is explained by our desire to conduct both parametric and non-parametric estimations, and, consequently, construct a large sample for kernel regressions. For the purposes of studying Russian regional economies which have overcome the 1998 economic crisis we used the data since 2000. The availability of data on social health insurance systems – the variable is reported by the Federal Mandatory Health Insurance Fund till 2004 and could be reconstructed on the basis of independent surveys (namely, "Implementation of health reform in the subjects of Russian Federation") for the years 2005 and 2006 – limited our analysis to the period 2000-2006. Following most of the models for aggregated health production, health outcomes and per capita gross regional product in the empirical analysis are taken in logs.

Table I. Descriptive statistics for pooled data in 2000-2006

5. Empirical analysis

5.1 Baseline model

The results of the estimations with the parametric model (Table II) demonstrate the significance of the type of regional SHI system (**h**) in explaining infant and under five mortality. Kernel regressions show that regional SHI system is "significant'" explanatory variables in case of all the three analyzed health outcomes. Indeed, in the models explaining infant mortality, under-five mortality, and maternal mortality the values of smoothing parameters for **h** equaled correspondingly 0.311, 0.327, and 0.240 (which is smaller than the unit value of this binary variable).

The share of private health care expenditure in GRP has negative estimated coefficient in explaining infant mortality and under five mortality in parametric regressions. This implies that an increase in the share of private health care expenditure in GRP leads to a decrease in both mortality indicators. The result is consistent with numerous findings about the association between personal income and health status in Russia (Balabanova et al., 2012; Sparling, 2008). At the same time, the share of public health care expenditures in GRP has positive estimated coefficients in explaining the three mortality indicators, which may be interpreted as ineffectiveness of public health care expenditure. As regards maternal mortality, the result corresponds to Danishevski et al.'s (2008) conclusion about ineffectiveness of medical care in Russian maternity units.

Small smoothing parameters for log of per capita GRP may be interpreted as "significance'" of this variable in kernel regressions. Given insignificance of the variable in parametric regressions, the result suggests nonlinear relation between log of per capita GRP and health outcomes. Large smoothing parameter for CPI, as well as the absence of variation of the dependent variable on the diagrams for confidence intervals with respect to CPI in kernel regressions, indicate that CPI may be disregarded as a regressor. The "insignificance" of CPI corresponds to the results of parametric estimations. Arguably, time dummies capture all annual macroeconomic effects, including those related to the dynamics of CPI.

The results are robust with respect to including Gini coefficient or a binary variable "fees*"* (with unit value corresponding to prospective reimbursement) in the list of controls. Moreover, "fees*"* turned out to be negatively significant in explaining the three mortality indicators in Russian regions.

5.2 Extended model

Since the policy of coercion of regional authorities and underfinancing are the major issue for the social health insurance systems in transition, we chose financial risk (RA expert) as an instrument for the type of SHI system in Russian regions. Financial risk is an expertly determined rank ordered variable which reflects the balance of the budgets of enterprises and governments in the region, with lower ranks corresponding to smaller risk. The existing theory on testing for weak instruments (Stock and Yogo, 2002; Staiger and Stock, 1997) deals with the values of F-statistics. However, chi-squared distribution is the asymptotic distribution for F-statistics when the number of observations increases. Therefore, we can make a rough comparison of chi-squared statistics obtained in our estimations for binary dependent variable with the corresponding benchmark figures. Chi-squared statistics in the first stage regression with financial risk as an instrument was 6.81. This is below the rule of thumb value of 10, yet it is above the minimal value of 5 and implies the maximal size of a 5 per cent Wald test (based on TSLS or LIML test) equal to 0.20 (Stock and Yogo, 2002; Staiger and Stock, 1997).

The results of the analysis with the extended model show that the fitted values for the type of regional SHI system ($\hat{\mathbf{h}}^*$) are insignificant in explaining infant and under-five mortality. In other words, the type of SHI system is significant in explaining the quality related health outcomes, since it serves a proxy for institutional environment in the region.

Table II. Explaining health outcomes

6. Discussion

Arguably, improvement in infant and under five mortality in the Czech Republic, Slovakia, and Russia can be attributed primarily to increase of health care spending (Gordeev et al. 2011; Besstremyannaya, 2009; Lawson and Nemec, 2003) rather than to the effect of a multi-payer SHI model. It should also be noted that insufficient government payments for the non-working population and decline of gross domestic product in the early transition years left SHI systems in the three countries indebted (Naigovzina and Filatov, 2010; Sheiman, 2006; Medved et al., 2005), which undermined development of the managed competition in the health care provision.

Indeed, our empirical analysis with the Russian data reveals that, instrumented by financial risk in the region, the type of SHI system (i.e. the presence of only private health insurers) in Russia regions loses its significance in explaining mortality indicators. In Russia (and also in the Czech Republic and Slovakia) there is little competition between insurers, and surveys show that the main factors causing consumers to change their health insurance company are change of work or residence, and not dissatisfaction with the insurer (Baranov and Sklyar, 2009). The fact that law suits on defense of SHI patient rights are rarely submitted to courts through health insurers (Federal Mandatory Health Insurance Fund, 2005) may also be evidence of the failure of Russian health insurance companies to win customers on the basis of their competitive strengths.

Our finding concerning significance of the binary variable "fees*"* (the prospective methods of provider reimbursement) suggests the existence of a quasi-insurance mechanism in the Russian SHI market. Operating in an institutional environment where provider reimbursement is based on prospective payment, private insurance companies in effect shift a part of their risk to providers (Glied, 2000; Sheiman, 1997; Chernichovsky et al., 1996). The methods for provider reimbursement in Russia have been determined primarily by specially created commissions within regional SHI funds, possibly with the participation of executives from regional health departments. Although the right of private health insurance companies to participate in the process of setting provider rates was guaranteed by the 1991 Health Insurance Law, in practice only a few regions allowed participation by private health insurers in the commissions at the time when they set up their SHI systems. A "Regulation on the tariff commission of the St. Petersburg mandatory health insurance system", calling for the inclusion of private insurer representatives in the tariff commission, was enacted in Russia's second city as early as 2000. But in most other Russian regions similar documents appeared only in 2008-2009. Overall, our empirical findings confirm the desirability of greater involvement by insurers in setting provider rates, which would be a step towards the selective contracting model.

7. Conclusion

The paper outlines the shortcoming in development of multi-payer social health insurance systems in the Czech Republic, Slovakia, and Russia. Arguably, improvements of infant mortality in the three transition economies are not associated with the positive role of managed competition in the social health insurance system, and this lack may be related to inadequate financial flows and excessive public regulation.

The findings of parametric and non-parametric analyses conducted for quality-related health outcomes in Russian regions in 2000-2006 demonstrate the positive effect of private health insurers. However, the effect is arguably related to financial environment, rather than the existence of insurance mechanisms or competition between insurers. Accordingly, the health insurance reform, implemented in Russia in 2010 addressed underfinancing by raising payroll tax rates. We note that the 2010 reform also took a step towards fostering provider competition, by allowing private providers to enter the SHI market.

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Table I. Descriptive statistics for pooled data in 2000-2006

Variable	Definition	Obs	Mean	Std.Dev.	Min	Max
Health outcomes						
infant	Infant mortality= infant deaths per 1,000 live births	550	13.40	4.07	4.70	42.10
under5	Under-five mortality = the probability of death from birth to five years of age per 1,000 aged 0-5	550	16.96	5.36	6.70	61.40
mother	Maternal mortality = maternal mortality per 100,000 live births	515	35.66	24.08	3.80	291.50
SHI system						
h	=1 if private health insurance companies are the only agents at the SHI market, 0 otherwise	550	0.58	0.49	0	1
Controls						
pGRP	Per capita gross regional product, rubles	550	70839.91	68908.45	7751.70	765204.20
public	Share of public health expenditure in gross regional product, percent. Public health expenditure = the expenditure of the regional budget on health care and sports + expenditure of the regional SHI fund	550	5.32	2.48	0.89	20.58
private	Share of private expenditure on medical services in gross regional product, percent	550	0.63	0.46	0.08	3.82
Gini	Gini coefficient	393	0.36	0.04	0.30	0.62
CPI	Consumer price index, December to December of the previous year, per cent	550	114.35	4.59	105.50	138.70
temperature	Temperature in January, degrees Celsius	550	-11.18	8.39	-37.10	4.30
urban	Share of urban population, per cent	550	69.20	12.62	25.90	100
fees	=1 if providers are reimbursed according to diagnosis-related groups or each diagnosis, 0 otherwise	240	0.225	0.418	0	1
Instrument for SHI system						
finance	Financial risk in the region. Reflects the balance of the budgets of enterprises and governments in the regions. Discrete variable, regions are ordered according to their ranks, with rank '1' denoting the region with the minimal risk.	435	38.82	22.97	1	88

Notes: All variables are estimated on the annual basis. Gini coefficient is reported in national statistics since the year 2002. Data on variable *fees* are available from independent surveys only in 2004-2006 ('Implementation of health reform in the subjects of Russian Federation'). Financial risk in the years 2000-2003 is estimated only for 51-54 regions. Since the number of regions was 89 in early 2000s, and was decreased to 85 in late 2000s, the maximal value of variable *finance* is larger than 85.Private expenditure does not include expenditure on drugs and informal payments. Data sources: Russian Statistical Agency (Demographic Yearbook, Health care in the Russian Federation; Regions of Russia, Socio-Economic Situation and the Level of Life of Russian Population); Russian Statistical Agency (2010a,b); Federal Mandatory Health Insurance Fund of the Russian Federation ('An overview: 10 years of Mandatory Health Insurance in the Russian Federation. 1993–2003' and annual yearbooks on Mandatory Health Insurance in the Russian Federation, Expert RA.

Table II. Explaining health outcomes

	log infant			log under5			log mother		
	baseline	**kernel**	**extended**	**baseline**	**kernel**	**extended**	**baseline**	**kernel**	**extended**
h	-0.066***	0.311		-0.071***	0.327		-0.072	0.240	
	(0.017)			(0.016)			(0.052)		
$\hat{h}^*$			-0.035			-0.024			-0.209
			(0.055)			(0.050)			(0.153)
log(pGRP)	-0.040	0.347	-0.054	-0.028	0.417	-0.040	-0.055	0.068	-0.134
	(0.031)		(0.040)	(0.030)		(0.038)	(0.078)		(0.010)
public	0.027***	2.467	0.013	0.031***	0.835	0.019*	0.043**	0.625	0.032
	(0.006)		(0.011)	(0.005)		(0.010)	(0.019)		(0.029)
private	-0.016	0.230	-0.011	-0.017	0.262	-0.016	-0.111*	0.419	-0.096
	(0.018)		(0.029)	(0.016)		(0.026)	(0.066)		(0.098)
urban	-0.003***	0.056	-0.002**	-0.003***	0.053	-0.003***	0.002	0.294	0.006*
	(0.001)		(0.001)	(0.001)		(0.001)	(0.002)		(0.003)
temperature	-0.012***	0.561	-0.012***	-0.013***	0.617	-0.013***	-0.022***	0.492	-0.023***
	(0.001)		(0.002)	(0.001)		(0.002)	(0.003)		(0.004)
CPI	0.001	6.437	-0.003	-0.002	5344225	-0.003	0.011	4272184	0.017
	(0.005)		(0.005)	(0.005)		(0.005)	(0.013)		(0.014)
Constant	2.613***		3.040***	3.017***		3.134***	2.044		0.922
	(0.626)		(0.761)	(0.581)		(0.729)	(1.657)		(1.780)
Annual dummies/year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Years	7	7	7	7	7	7	7	7	7
Observations	550	550	435	550	550	435	515	515	411
Determination coefficient	0.525	0.958	0.388	0.588	0.963	0.438	0.179	0.564	0.123
CV error		0.021			0.003			0.178	
Chi-squared in the first stage regression			6.81			6.81			6.81

Notes: *** Significance at 0.01 level, ** significance at 0.05 level, *significance at 0.1 level. Robust standard errors in parentheses. In case of kernel regressions, the table presents the value of the smoothing parameter for binary variable h; while for continuous variables the tables gives the values of bandwidths, divided by the standard deviation. Determination coefficient stands for adjusted R^2 in case of parametric models. CV error is computed for minimized least squares crossvalidation function with leave-one-out kernel estimator (see Hsiao et al., 2007, eq.2.6). For each health outcome the results of the estimations with the baseline model and with kernel regressions were robust with respect to using subsamples of observations, employed in corresponding extended models (namely observations for which variable *finance* was defined). The results are robust with respect to including Gini coefficient or variable *fees* in the list of controls.