Corruption Measurement: the case of Russian Federation

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Abstract

This study develops the approach of corruption measurement based on the income-expenditure comparison. Using micro-level data on reported household earnings, expenditures and assets provided by Russian Longitudinal Monitoring Survey for the period 2000-2009 we find that households with workers in the public sector receive lower earnings than their private sector counterparts, but enjoy the same level of consumption expenditures, in other words there exists an expenditure-income gap in favor of the public sector. Controlling for the reported level of earnings, households with workers in the private sector do not show neither a significantly higher probability of possessing country houses, cars and computers, nor living in better housing conditions, nor having higher financial wealth. The analysis of current and accumulated savings, risk aversion and volatility of wages does not show any sign of distinction between two sectors. Thus, differences in assets and precautionary motives of workers cannot reconcile the sizeable expenditure-income gap. Unexplained differences are referred to unreported income, or bribes.

Keywords: corruption measurement, expenditure-income gap, RLMS, Russian Federation.

1 Introduction

Today corruption exists in almost all the countries of the world. Researchers investigate which countries/regions are the most corrupt, how corruption affects economic growth and development, should the world fight against corruption and which methods are the most efficient. To answer all these questions first we should be able to measure corruption. But corruption is a hidden phenomenon by its nature, thus its measurement is not a trivial task.

The measures of corruption based on surveys may be understated as they depend on voluntary disclosure, and places where corruption is most severe might be less likely to disclose it. The measures of corruption based on case studies may be overstated as researchers may concentrate on situations where they expect to find corruption. Developing careful and rigorous metrics of corruption, that are not subject to this type of selection bias, is an important area of research.

In this paper we develop the measure of corruption based on the income-expenditure comparison using micro-level data of Russian economy. This method was proposed for the first time by Gorodnichenko and Peter [2007] and applied to Ukrainian data. In transition economies it is common to find that workers in the public sector receive lower monetary compensations. This is usually explained by lower efforts, social status, prestige etc., but in this case lower wages should translate into lower consumption expenditures, unless public sector workers have non-reported income. This logic may fail because of the unobserved heterogeneity, for instance private sector employees may save more, and thus consume less, since their job is more uncertain. We study in details the consumption-savings behavior of workers, in particular their assets and wealth, in order to control for potential suspects of the selection bias.

In line with previous research of transition economies we find that wage premium in the private sector in Russia is statistically large and economically significant. Along with this we document a significant negative expenditure-income gap, meaning that households with the same level of income and other observable characteristics consume less if their members are employed in the private sector. In principle it is possible that "public households" [1] save more because of their job uncertainty, but analyzing current and accumulated savings we do not find support for that. Controlling for the reported level of earnings, households with workers in the private sector do not show neither a significantly higher probability of possessing country houses, cars and computers, nor living in better housing conditions, nor having higher wealth. Thus, differences in assets can not reconcile the found expenditure-income gap. Unexplained differences are refereed to unreported income, or bribes.

The chapter is organized as follows. Section 2 presents the literature review of the studies of corruption, with a particular emphasis on corruption measurement. Section 3 contains

1. Properly defined in the text.

the evidence of corruption in Russian Federation. Section 4 describes the data, presents the econometric specification of the model and estimation results. Section 5 concludes. Appendix C1 contains the detailed description of expenditure and income data.

2 Literature review

We summarize existing research on corruption along two directions. First, we summarize various determinants of corruption and theoretical models that link corruption to the functioning of the society. Second, we summarize and analyze existing empirical approaches to corruption measurement.

2.1 Models of corruption

By definition corruption is the use of resources by government officials and employees for personal gains by means of mismanagement, fraud, bribes. Corruption is a concern of many modern democracies. It weakens democratic institutions, restricts public services, lowers economic growth and development. All existing models may be divided into two blocks: the first block of models explains the causes of corruption; the second block explains the consequences of corruption for the society.

Let us start with the first block: causes of corruption. Rose-Ackerman [1978] was the first who proposed the explanation of political corruption using an agency model. In her model government officials care for two things: (1) their income that can be increased using power for private gain; (2) their chances of being re-elected that naturally decrease from such a behavior. In the world of perfect information corruption is not possible since fully informed voters will lead politicians to implement their promises or vote out for corrupt politicians. But in more realistic world where voters are not fully informed about actions of politicians there is a trade-off for politicians between increasing gain from corruption and reducing chances for reelection and, thus, there is a potential for corruption. There are authors who developed this reasoning recognizing that some politicians may not only get economic benefits from their positions but also design policies to increase these benefits (see, for example, Lien [1990], Kurer [1993]).

Another explanation of corruption is so-called rent-seeking behavior. While traditional

neo-classical economics consider the government as a benevolent exogenous agent, new neo-classical political economists argue that the government has its own agenda. Rent-seeking activities of the firms consist in making illegal payments for the government for some "services". Some researchers (Paul and A.Wilhite [1994], Linster [1994]) use game theory approach to show how firms will behave when there is competition for rent-seeking and derive optimal level of bribes in the game between firms and politicians.

Let us now move to the second block: consequences of corruption. Here we summarize research that analyze how corruption affects economic performance. Firstly, corruption influences bureaucratic efficiency. In the corrupted country the most efficient producer does not necessary get a contract. The most efficient producer has a large ability to offer a large bribe (since he has the highest surplus) but the corrupted producer is able to offer even larger bribe since he is compromising on the quality of his goods or services. Secondly, corruption affects resource allocation. Corruption may result in resource misallocation since corrupted politician considers bribes as one of decision criteria. And ranking of projects based on their social value normally differs from ranking based on unofficial payments that decision makers expect to receive.

Another way in which corruption may lead to inefficiency is its impact on government's ability to correct externalities. For example, if someone can bribe a police officer instead of paying an official fine, the marginal cost of breaking the law is reduced from the official fine to the amount of the bribe. And if the police officer extracts the same bribe regardless of whether the person has broken the law, the marginal cost of breaking the law tends to zero.

Social losses of corruption also come from inefficient allocation of talent, technology and capital (Murphy, Shleifer, and Vishny [1991], Murphy, Shleifer, and Vishny [1993]). When entrepreneurs understand that profits or potential profits will be taken away from firms through corruption they prefer not to start firms or not to expand them. Moreover, entrepreneurs may illegally shift part or all of their profit to their personal accounts instead of developing their business. If entrepreneurs expect to be forced to pay bribes in the future they have incentives to adopt inefficient "fly-by-night" which allows them to react more flexibly to demands from corrupt officials and more credibly threaten to shut down operations (Choi and Thum [1998]). Svensson [2003] provides an empirical support for inefficient "fly-by-night" hypothesis using firm-level capital stock data. He finds that the amount of bribes a firm needs to pay is

negatively correlated with the degree of reversibility of the capital stock.

The important social consequence of corruption is that it affects the distribution of income in the society. It is common to think that corruption favors the rich. Gupta, Davoodi, and Alonso-Terme [1998, p.6] argue that corruption affects income inequality through "biased tax system, poor targeting of social programs, human capital formation, education inequalities, and uncertainty in factor accumulation". They confirm their propositions empirically. Using instrumental variables, they argue that corruption causes poverty and increases income inequality.

Some researchers mention positive effects from corruption. It is argued that corruption helps to overcome bureaucratic rigidities and helps maintain allocation efficiency when there is competition between bribers (Bardhan [1997]). It is also argued that unofficial payments to politicians speed up bureaucratic processes and hence promote economic growth (Leff [1964]), this is so-called "grease-the-wheels" argument. But these arguments fail empirically. Kaufmann and Wei [2000] using cross-country analysis argue that there is a positive relationship between the incidence of bribery in a country and the time that managers of firms spend with bureaucrats.

2.2 Corruption measurement

By its nature, corruption is unobserved and, hence, its measurement is the primary challenge in the empirical literature. A researcher who develops quantitative measures of corruption faces the question of what should be included in such a measurement and then tries to measure something that everybody involved in the process is trying to hide. The empirical measures of corruption are indispensable to test theoretical hypothesis and models, to quantify the magnitude of corruption, to assess anticorruption policies, therefore that is an issue of current importance.

In the literature there are different approaches to measure corruption. Most measures of corruption are based on perceptions such as surveys and expert opinions, in which individuals and firms' managers are asked about their evaluation of corruption in their environments. Johnston [2001] provides a detailed survey and discussion of such measures. The most well-known index is the Transparency International Corruption Perception index. Transparency

International is the organization devoted to fighting bribery around the world, it measures perception of corruption in different countries. Their index is an aggregated indicator that ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians. This is an aggregate index that combines different sources of information, i.e. different surveys and assessments from independent institutions. [1] There are others organizations that publish some indexes of corruption. For example, Business International Corporation publishes a number of ratings on countries, including an assessment of the level of corruption in various countries. Political Risk Services Inc. publishes an annual report, *International Country Risk Guide*, that includes a corruption index.

The main advantage of perception-based measures is their breadth which allows to run large cross-countries studies (for example, Mauro [1995]). The main problem with all measures based on perceptions is perception bias. In most cases surveys ask direct questions on whether individuals or firms pay bribes to government officials. In such situations people tend to be afraid or, possibly, be ashamed, and hide the information, thus results distort the depth and breadth of corruption. Second, the aggregate nature of the data gives us little information about the relationship between corruption and individual agents, thus we are not able to explain the within-country variation of corruption. And, finally, this measure focuses on perceptions of corruption rather than on the actual bribes paid or the actual theft of resources. This corruption index does not provide information about the type and level of corruption in a country. For example, in the Transparency International Corruption Perception Index for 2011 Russia, Azerbaijan, Belarus, Comoros, Mauritania, Nigeria, Togo and Uganda have the same index value. However, this value does not tell us which is the form and the level of corruption in these very different countries.

There are methods that provide physical audits of governmental processes. For example, Bertrand, Djankov, Hanna, and Mullainathan [2007] followed individuals through the process of obtaining a driver's license in India, and found extra-legal payments made and the rules that were broken in exchange for these extra-legal payments. Similarly, Barron and Olken

1. In the year 2010 these institutions were the African Development Bank, the Asian Development Bank, the Bertelsmann Foundation, the Economist Intelligence Unit, Freedom House, Global Insight, International Institute for Management Development, Political and Economic Risk Consultancy, the World Economic Forum, and the World Bank.

[2007] made a case study in which surveyors accompanied truck drivers on 304 trips along their regular routes in two Indonesian provinces. These surveyors accompanied truck drivers on their regular routes and noted the illegal payments that drivers made to the traffic police and military officers. They found that, in total, the illegal payments represented 13% of the cost of the trip. Sequeira and Djankov [2010] used a similar methodology in Mozambique and South Africa, they analyzed shadowing clearing agents who processed customs for cargo as it passed through the ports. They observed bribe payments to port and border post officials and found that, on average, bribes represent 14% of shipping costs in Mozambique and 4% in South Africa.

Recently the literature turned to evaluating corruption using policy experiments by comparing the amount of transfers disbursed from a federal grant to the amount that actually reaches the intended recipient of the transfer. The pioneering study by Reinikka and Svensson [2004] analyze total public expenditures spent on education in the mid-1990s in Uganda. They compare data from records on central government disbursements and a public expenditure tracking survey to measure the dissipation in a school grants in Uganda. They found that schools, on average, received only 13% of the grants, most schools received nothing. They also found considerable variation in grants received across schools, meaning that schools use their bargaining power to secure greater funding. There is a similar paper by Mironov and Zhuravskaya [2012] which tries to provide a reliable measure of corruption by measuring the amount of cash tunneled illegally out of firms around the time of regional elections and relating it to the probability that the firms obtained procurement contracts from the government.

There are methods that collect data from the bureaucrat documenting how the government resources were spent in achieving a task and then compare them with an objective measure of how much it costs to conduct the required task. The difference then is estimated as how much was "stolen". For example, Olken [2007] compared the official expenditure reports with an independent measure of what it should have cost to build a road of a particular quality. To obtain independent measures, he sampled each road to determine the materials and labor used, and then used local prices to cost these items. He found that, on average, about 24% of expenditures across the roads were missing. Golden and Picci [2005] propose the measure of corruption that consists of the difference between a measure of the physical quantities of public infrastructure and the cumulative price government pays for public capital stocks. Where

the difference is larger between the money spent and the existing physical infrastructure, more money is being siphoned to mismanagement, fraud, bribes, that is corruption is greater. In this way Golden and Picci [2005] create the measure of corruption for Italy's 95 provinces and 20 regions. The main problem of this approach consists in the interweaving of corruption to the efficiency.

Experiments that allow corruption evaluation are rare and cover only a limited part of corrupt activities, thus we are not able to deeply analyze the determinants and consequences of corruption. And the main limitation of above-mentioned approaches is that it is difficult to distinguish between corruption and mismeasurement or simple bureaucrat incompetence. In Olken [2007] it is possible that road quality is mismeasured or that the bureaucratic apparatus is not good in building roads. In Reinikka and Svensson [2004] it remains possible that the resources that should have gone to schools were actually spent on other important programs and did not end up in the pockets of government officials.

In the literature there is an other approach to measuring corruption that uses equilibrium conditions in the labor market. People being in the public sector must be indifferent between their public sector job and alternative job in the private sector. If controlling for their job opportunities, salaries are lower in the public sector it should simply reflect a compensating wage differentials (fringe benefits, job security etc). But if salaries in the public sector are lower and consumption level is the same, it may infer that public sector workers receive some unobserved compensation. This approach proposed for the first time in Gorodnichenko and Peter [2007] requires important assumptions about equal consumption-savings behavior in two sectors. We borrow their approach, develop it, and apply it to Russian data.

3 Evidence of corruption in Russia

According to various estimates Russian Federation is one of the most corrupt countries in the world, and the issue of measuring corruption in this country is particulary acute. Transparency International published its 2011 Corruption Perceptions Index and ranked Russia 143 out of 180. The country has the same rank (2.4 out of 10) as such African countries as Nigeria, Togo, Uganda have. For comparison US has 7.1, France - 7.0, Germany - 8.0, Spain - 6.2.

It is widely accepted that corruption is one of the main obstacles to the country's economic growth and development. It is a major barrier to business in Russia. *BNP Paribas estimates that perceptions of corruption costs Russia the equivalent of 4 per cent of GDP in lost foreign investment each year. The general public identified it as the biggest block to economic growth in a recent survey by independent pollsters Levada Centre. The Association of European Business agrees: "extras" can account for 20% of the cost of doing business in Russia* [1].

President Dmitry Medvedev has made fighting corruption one of the top goals of his presidency, and has launched an anti-corruption campaign. Building on Putin's Anti-Corruption Commission, established in 2004, he introduced a National Plan to Counteract Corruption only a month after taking office. New legislation came into force on January 10, 2009, requiring civil servants to disclose all income and assets, putting in place a framework for determining conflicts of interest, and simplifying the Criminal Code to hold corrupt judges to account. But most Russians remain sceptical about the efficiency of these reforms. Analysts argue that the problem is not with the legislation but with its implementation. Some officials apparently agree. Russian Prosecutor-General, Yuri Chaika, claimed that *Russian law-enforcers were only rooting out minor cases of bribery, ignoring large-scale corruption, while many believe the corruption cases brought by the authorities are little more than a pretext to dismiss officials who have fallen out of favour.*

Let us now explore the mechanisms of corruption in different industries in Russia. According to Transparency International's Global Corruption Barometer 2010, the Russian police is considered to be the most corrupt public institution in the country. Demands for bribes are especially huge among the traffic police, despite the recent tightening of legislation, drivers prefer pay bribes since it is time-consuming, nobody wants wait in bank lines to pay the fines. Bribes are paid to get unjustified driving licenses, to falsify the information on road accidents for the benefit of interested parties. Bribes affect the decision of the Interior Ministry employees to open or close the case; to take unjust decision; to contradict decisions of different judges on the same case.

Corruption is high on customs: firms pay bribes for letting forbidden goods across border, return of confiscated goods and currencies, reduction of customs fees, to avoid ungrounded delays at the border, unjustified delays of customs payments etc. Corruption in the tax

1. http://www.ukti.gov.uk/export/countries/europe/easterneurope/russia/overseasbusinessrisk.html

authorities is manifested in the not collection of taxes, the return of VAT, the suspension of production caused by competitor firms. Corruption in healthcare and education is also huge. Healthcare is supposed to be free in Russia, but Russians know that every hospital has its under-the-table price list, and for the care of quality you have to pay. It is common to pay bribes to get false medical papers and certificates or to get served faster at the expense of other customers. Corruption in education may take many different forms. The state registration and accreditation of higher education institutions is carried out through bribes. A common practice for teachers, both in schools and especially higher educational institutions, to "suggest" to students that in order to improve grades or guarantee certain exam scores, they must receive extra tutoring, and the income of the professor in prestigious University for one private lesson may exceed his monthly salary. Hidden costs wait any student trying to get into a good university or a prestigious faculty, and quite often people with unsatisfactory level of knowledge are admitted to prestigious Universities (mainly ones in law and economics), that reduces significantly the value of the diploma. Moreover, there is a market for diploma: it is possible to buy and sell it.

We described the main areas of corruption in Russia but there are various other forms: paying bribes to get necessary papers and permits, to release from army service, to get certification and accreditation of some institutions, to construct buildings, notarize transactions etc. Despite all these facts the evidence of corruption in Russia is scarce in the academic literature. There are some papers that examine the impact of corruption on the Russian economy. There are papers that highlight the negative effect of corruption on the development of small and medium entreprises in Russia. For example, Safavian, D.Graham, and C.Gonzalez-Vega [2001] construct a theoretical model to explorer the mechanism through which corruption affects micro and small firms in Russia. They conclude that corruption in Russia prevents the development of small entreprises in Russia and thus has a negative effect on investment activities and economic growth. Later Yakovlev and Zhuravskaya [2009] highlight one more time that corruption is an obstacle to the development of small and medium entreprises in Russia. Using the data on Russian state capture [1] constructed by Slinko, Yakovlev, and Zhu-

1. To measure capture and firms' political power they construct a database of regional laws and regulations that treat selected large firms in these regions preferentially. They deem an enterprise to be treated preferentially if it receives any of the following benefits: tax breaks, investment credits, subsidies, subsidized loans,

ravskaya [2005] , the authors argue that large firms which receive privileges from the regional government tend to be profitable and faster developing. A high state capture index reflects the political influence of large firms and implies worse performance for small business.

There are some papers that analyze differences in corruption between Russian regions. For example, Popova [2010] investigates the effects of regional differences in corruption on electoral results in Russia and on the voting behavior of people with different employment status. The author uses two measures of corruption: Corruption Perception Index of Transparency International measured for Russian regions and the state capture index constructed by Slinko, Yakovlev, and Zhuravskaya [2005]. The paper finds that corruption positively influences participation in elections, moreover, it shows that even after controlling for corruption, people with different employment statuses vote differently.

P.Dininio and R.Orttung [2005] analyze regional differences in corruption using corruption perception data. The authors find that corruption in Russia is a structural problem, and not the one related to its institutions. They find that within each region the amount of corruption increases as the size of regional economy grows, the GDP per capita decreases, and the population decreases.

The recent Mironov and Zhuravskaya [2012] paper proposes an innovative measure of corruption that consists in measuring the amount of cash tunneled illegally out of firms around the time of regional elections and relating it to the probability that these firms obtain procurement contracts from the government. Using this measure they reject the "efficient greasing" hypothesis by showing that in more corrupt regions, public procurement contracts are allocated to less efficient firms, and therefore have negative implications to economic growth.

We see that several effects of corruption in Russia have been analyzed in the literature but the issue of the measurement of corruption is not well developed. To the best of our knowledge there are only three approaches:

- The Corruption Perception Index for Russian regions measured by Transparency International. It involves the perception bias problem related to the difficulty of inducing people to talk about corruption.
- State capture index developed by Slinko, Yakovlev, and Zhuravskaya [2005].

official delays in tax payments, free grants of state property, or a special "open economic zone status" for their territory.

– The measure of corruption recently developed by Mironov and Zhuravskaya [2012].

In the literature another approach, so called income-expenditure approach, exists. For the first time it was proposed by Gorodnichenko and Peter [2007] for the analysis of Ukrainian economy. In the next section we apply it to Russian economy.

4 Measuring bribery: expenditures versus income

4.1 Data description

The data used in this study stem from the Russian Longitudinal Monitoring Survey. The information comes from both individual and household questionnaires. The data from individual questionnaire are aggregated to household level. We consider the time period 2000-2009.

Labor compensation data are taken from individual questionnaire and are aggregated to household level as the sum of the reported income of all household's earners. To make our analysis more accurate we use three different definitions of labor compensation. *Actual wage* denotes all wages received by all household members at their primary jobs during last 30 days. If some household member does not have a job his contribution is equal to zero. *Contractual wage* denotes the sum of contractual wages of all household members at their primary jobs. Contractual wages of individuals who are on leave, including maternity leave, are also included. Contractual wage is an important indicator since it is less affected by transitory income shocks and may serve as a proxy for permanent income, thus the problem of different wage volatility in two sectors may be partially solved. All wages are net of taxes. *Total earnings* denote all actual wages received by all household members at all their jobs during the last 30 days plus the income from selling livestock, crops, agricultural products or collected in the forest berries and mushrooms.

To account for non-labor compensation we use *total income* which is defined as the sum of total earnings and social payments that include fuel subsidies, pensions, stipends, unemployment benefits, payments for children, rents on property, interests on deposits and dividends. [1]

1. Financial income, defined as the sum of rents on property, interests on deposits and dividends, is not a big part of the income of workers in our sample, there are less than 2% who report to have non-zero financial income. People may also underreport this type of income in the survey because they hide it from the tax.

Household composition data are constructed using individual questionnaire. Earner is a member of household who works or has paid (or unpaid) leave, including maternity leave. A member of household under 18 is considered as a child. Individual is a pensioner if he is older than 60 years (55 for women). The definition of the private/public household is tricky. It is clear that a household may consist of two people, one of which is employed in the public sector, another in the private one. In this situation it is difficult to assign it to be public or private. We define the household to be private (public) if more than 75% of earners are employed in the private (public) sector. With this specification we loose the 50/50 households, it is 19% of observations in our sample. We also employ the head of household specification: the household "follows" the sector of its head, where the head of household is the person with the highest observed wage.

The Mincerian variables used in our regressions include age, hours of work, number of males, experience and three types of education (secondary complete, university diploma and PhD degree). We also add dummies for urban areas and Moscow/Saint-Petersburg. All these data come from the individual dataset. For the aggregation we compute the average age of working household members, the sum of hours of work of all earners, the sum of work experience computed separately for males and females, the number of employed household members with complete secondary education, university diploma, PhD degree.

Household expenditures data come from the family questionnaire. In the survey the responsible person in the family answers the question about the total expenditures of the household during the last 30 days. In our analysis we use different subsets of permanent [1] expenditures: (1) food expenditures both for eating at home and away from home; (2) cloths expenditures both for adults and children; (3) services including transport, repair, laundry, hairdressing, mobile phone, Internet; (4) leisure expenditures including travels, cinema, theater; (5) all medical expenditures including drug purchasing. Other expenditures include insurance and loan payments, alimony and taxes. Total expenditures on non-durables are computed as the sum of all of the above.

We have household assets data that also come from the family questionnaire. We have the information about housing conditions, including value of housing (evaluated by the household)

1. We do not have data on expenditures for durable goods, but we have information about the presence of these goods in the household which is used later in the robustness analysis.

and housing space; the presence of a computer, a car and a country house.

4.2 Household income estimates

First, we estimate the following income equation.

$$\ln w_h = \beta_0 + \beta_1 N_h^{PR} + \beta_2 N_h^{TOT} + \beta_3 N_h^{EAR} + \beta_4 N_h^{CH} + \beta_5 N_h^{PN} + \gamma \bar{X}_h + \epsilon_h \qquad (4.2.1)$$

where w_h denotes the sum of total labor compensation of all household earners; N_h^{PR} denotes the number of household members employed in the private sector; N_h^{TOT} is the number of total household members. N_h^{EAR}, N_h^{CH} and N_h^{PN} denote the number of household earners, children and pensioners respectively. $\bar{X}_h$ is a vector of Mincer's covariates that affect income aggregated to the household level.

To make estimates in household income and expenditures comparable we need to add the non-labor portion of household income.

$$\ln Y_h = \hat{\beta}_0 + \hat{\beta}_1 N_h^{PR} + \hat{\beta}_2 N_h^{TOT} + \hat{\beta}_3 N_h^{EAR} + \hat{\beta}_4 N_h^{CH} + \hat{\beta}_5 N_h^{PN} + \hat{\gamma} \bar{X}_h + \hat{\epsilon_h} \qquad (4.2.2)$$

where Y_h is total household income including labor income of all the household earners and non-labor compensation (stipends, pensions, other social payments, alimonies, rental income etc). For the elimination of the inflation effect all income measures are considered in 2000-year prices.

Table 1 reports results. We observe that if one member of household working in the public sector was in the private sector this would increase the total household income by 12%, this holds for all considered income measures. The income premium associated with the household member working in the private sector is large and statistically significant, as it was at the individual level. The coefficients on other covariates are consistent with economic theory, for instance we observe a positive and statistically significant return on all levels of education and experience of both males and females. Estimates state that one working male brings 25% of the additional income to the household. The revenues of families in urban areas are significantly higher, especially in Moscow and Saint-Petersburg. The presence of pensioners and children in the household reduce their total earnings but positively affect total income because of social payments (pensions, child support).

Table 1: Household income estimates, 2000-2009.

	Actual wage	Contractual Wage	Total earnings	Total income
Earners	0.08	0.07	0.08	0.06
	(0.00)	(0.01)	(0.01)	(0.00)
Pensioners	-0.09	-0.09	-0.09	0.17
	(0.00)	(0.00)	(0.01)	(0.00)
Children	-0.01	-0.01	0.03	0.06
	(0.01)	(0.00)	(0.01)	(0.00)
Age work	-0.01	-0.01	-0.01	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)
Hours	0.003	0.003	0.003	0.02
	(0.00)	(0.00)	(0.00)	
Male work	0.27	0.27	0.23	0.21
	(0.01)	(0.01)	(0.02)	(0.02)
Urban	0.42	0.41	0.28	0.28
	(0.01)	(0.01)	(0.01)	(0.01)
Moscow/St.Petersburg	0.51	0.50	0.51	0.42
	(0.01)	(0.01)	(0.01)	(0.01)
Complete secondary	0.05	0.07	0.06	0.06
	(0.00)	(0.00)	(0.01)	(0.00)
University work	0.27	0.25	0.27	0.24
	(0.01)	(0.01)	(0.01)	(0.00)
PhD work	0.28	0.23	0.31	0.21
	(0.03)	(0.03)	(0.03)	(0.03)
Experience male work	0.007	0.007	0.008	0.005
	(0.000)	(0.000)	(0.000)	(0.000)
Experience female work	0.006	0.006	0.006	0.005
	(0.000)	(0.000)	(0.000)	(0.000)
Year	0.13	0.13	0.12	0.12
	(0.00)	(0.00)	(0.00)	(0.00)
Private sector	0.127	0.123	0.126	0.116
	(0.00)	(0.00)	(0.00)	(0.00)
N	25282	25679	25986	25034
R^2	0.49	0.69	0.56	0.57
F-statistics	1442.29	3540.91	2093.22	2195.22

The table reports the $\hat{\beta}_1$ estimate of the eq.(4.2.2) for different income measures (defined in the text) that all are used in logarithmic form. All covariates are also defined in the text. Robust standard errors are given in parenthesis. We exclude households if at least one member does not report his income or sector (10% of observations).

In the *Table 2* the first line OLS(1) provides the $\hat{\beta}_1$ estimate of the eq.(4.2.2) discussed above. The second line OLS(2) provides the estimates of the equation with the dummy for the private household instead of the number of members employed in the private sector:

$$\ln Y_h = \hat{\beta}_0 + \hat{\beta}_1 Z_h + \hat{\beta}_2 N_h^{TOT} + \hat{\beta}_3 N_h^{EAR} + \hat{\beta}_4 N_h^{CH} + \hat{\beta}_5 N_h^{PN} + \hat{\gamma}\bar{X}_h + \hat{\epsilon_h} \tag{4.2.3}$$

where $Z_h = 1$ if more than 75% of earners are employed in the private sector, and $Z_h = 0$ if more than 75% of earners are employed in the public sector. All the other variables are defined as above.

Table 2: Household income estimates, alternative specifications.

	Actual wage	Contractual Wage	Total earnings	Total income
OLS(1)	0.13^{***}	0.12^{***}	0.13^{***}	0.12^{***}
	(0.00)	(0.00)	(0.00)	(0.00)
OLS(2)	0.18^{***}	0.17^{***}	0.17^{***}	0.15^{***}
	(0.01)	(0.00)	(0.01)	(0.01)
OLS(3)	0.19^{***}	0.19^{***}	0.18^{***}	0.16^{***}
	(0.01)	(0.01)	(0.00)	(0.01)
FE	0.08^{***}	0.07^{***}	0.06^{**}	0.06^{**}
	(0.01)	(0.00)	(0.01)	(0.02)
N of obs.	25282	25679	25986	25034

Robust standard errors are given in parenthesis. ** significant at 5%; *** significant at 1%. The specifications OLS(1), OLS(2), OLS(3) and (FE) are defined in the text.

OLS(3) provides the $\hat{\beta}_1$ estimates of the eq.(4.2.3) where $Z_h = 1$ if the head of household is employed in the private sector, $Z_h = 0$ otherwise (later this is called the head of household specification). To control for the unobserved variables that can affect household income (preferences, friends influence etc) we use fixed effect estimates that account for all time-invariant omitted variables.

$$\ln Y_{ht} = \beta_0 + \beta_1 Z_{ht} + \beta_2 N_{ht} + \gamma X_{ht} + \alpha_h + u_{ht} \tag{4.2.4}$$

where N_{ht} combines the variables of the household composition, and α_h denotes individual fixed effect. The estimates β_1 of the eq.(4.2.4) are reported in the last line of the *Table 2*.

OLS(2) and OLS(3) estimates indicate that if we switch from the public household to the private one having the same composition (the number of earners, children, pensioners) and the

same Mincerian characteristics (age, education, experience) we will observed a 17% increase in the household income. FE estimates confirm these results, but with smaller premium. We conclude that private sector premium is economically large and statistically significant.

4.3 Measuring bribery: methodology

The method presented here was first proposed by Gorodnichenko and Peter [2007, p.978-981]. We have found that households with workers in the private sector are associated with large and significant premium in the observed income, it is common result for economies in transition. This is usually explained by lower efforts in the public sector, bonuses, social status, prestige etc. However in this case lower wage must translate into lower consumption expenditures [1]. In other worlds, the sectoral gap in expenditures should be equal to the gap in earnings, unless public sector workers have unobservable, non-reported income (bribes). To verify this we estimate the following equation:

$$\ln E_h - \ln Y_h = \beta_0 + \beta_1 N_h^{PR} + \beta_2 N_h^{TOT} + \beta_3 N_h^{EAR} + \beta_4 N_h^{CH} + \beta_5 N_h^{PN} + \gamma \bar{X}_h + \theta Y_h + \epsilon_h \quad (4.3.1)$$

where N_h^{PR} follows the head of household specification. E_h are the household total expenditures. We control for the level of earnings Y_h. As the measure of income Y_h we use contractual wages rather than actual wages because they are less affected by transitory income shocks and thus may serve as a proxy for permanent income. All other variables are defined as above.

The strong property of this specification is that it controls for any omitted variable that affects both household income and consumption. The weak property is that is involves identical specifications of household income and household consumption. β_1 denotes the expenditures-income gap. For example, $\hat{\beta}_1 = -0.1$ means that if we consider two identical private and public households (identical in terms of household composition and Mincerian covariates), private households consume 10% smaller share of their income.

The main critics of this method is the unobserved heterogeneity, in particular the fact that public and private sector employees may have different consumption-savings behavior that may be due to different risk in two sectors. Private sector employees may save more, and thus consume less, because their job is more uncertain, and this is also the reason of the expenditure-income gap between two sectors discussed above. In the following section

1. Unless private sector employees save more because of risk and wage uncertainty, this is discussed later.

we explorer further the consumption-savings behavior, compare assets and wealth between sectors.

Table 3 reports results. We observe that expenditure-income gap is negative and significant. It means that workers with comparable levels of earnings consume a higher part of their income if they are employed in the public sector. Consider two identical families consisting of two adults, husband and wife, and two children. In both families men have a university degree and full-time job with 10-years experience, women do not work. Both earn 50.000RuR per month. The only difference that the first one is employed in the public sector, while the second one works in the private sector. Our estimates predict that if the second family periodically spends 40.000RuR of their income for current expenditures, the public one will spend 10% more, i.e. 44.000RuR.[1] We tend to explain it by the fact that workers in the public sector systematically have "additional", non-reported compensation, and thus are able to increase their expenditures.

All the other variables are consistent with the economic intuition. For instance, we observe that one pensioner decreases the expenditures for cloths by 9% but increases medical consumption by 23%. The expected result is that the net effect of hours of work and experience on consumption is null.

We can extend further this analysis by exploring the consumption-income gap in the eq.(4.3.1) across different occupational subgroups (managers, professionals etc) and subsectors (education, health care). If the bribery hypothesis holds, then the groups that perceive more bribes should detect larger discrepancies between expenditures and income.

In Section 3 we have discussed that health care and education are among the most corrupt industries in Russia. These industries provide services that have highly inelastic demand and, thus, create the greatest opportunities to extract bribes. The bribery hypothesis of our analysis is consistent with this evidence. We find that consumption-income gap is considerably higher in education and health care: 0.13 and 0.15 log points respectively, versus 0.09 found previously. *Table 4* also provides the estimates of the gap across occupations. We do not find the evidence of the gap among managers (it may be due to insufficient number of observations), but we find that expenditure-income differentials between private and public sectors are large and significant for professionals, service and clerks.

1. This method allows us to capture monetary bribes, and ignores bribes in kind.

Table 3: Expenditure-income gap estimates, 2000-2009.

	Food	Cloths	Leisure	Medecine	Total current expenditures
Earners	-0.34	-0.29	-0.31	-0.37	-0.35
	(0.01)	(0.02)	(0.07)	(0.03)	(0.02)
Pensioners	0.16	-0.09	0.08	0.23	0.12
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Children	-0.07	0.04	-0.30	-0.08	-0.04
	(0.01)	(0.01)	(0.03)	(0.01)	(0.01)
Age work	0.01	0.01	0.01	0.01	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hours	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	
Male work	-0.16	-0.36	-0.21	-0.26	-0.20
	(0.01)	(0.02)	(0.06)	(0.02)	(0.01)
Urban	0.14	-0.26	0.02	-0.24	0.08
	(0.01)	(0.01)	(0.06)	(0.02)	(0.01)
Moscow/St.Petersburg	0.06	-0.38	0.35	-0.10	0.02
	(0.01)	(0.02)	(0.05)	(0.02)	(0.01)
Complete secondary	-0.06	0.02	0.05	-0.01	-0.04
	(0.01)	(0.00)	(0.03)	(0.01)	(0.00)
University work	-0.1	-0.02	0.07	-0.01	-0.07
	(0.01)	(0.01)	(0.02)	(0.01)	(0.00)
PhD work	-0.12	0.02	0.09	0.23	-0.07
	(0.03)	(0.03)	(0.1)	(0.03)	(0.02)
Experience male work	0.01	0.01	0.01	0.01	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Experience female work	0.01	0.01	0.01	0.01	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year	0.06	0.01	0.12	0.08	0.07
	(0.00)	(0.00)	(0.00)	(0.00)	
The gap	-0.093^{***}	-0.082^{***}	-0.16^{***}	-0.11^{***}	-0.092^{***}
	(0.00)	(0.00)	(0.00)	(0.00)	
N	24372	18386	4546	17151	24372
R^2	0.24	0.19	0.17	0.14	0.27
F-statistics	486.15	235.82	57.30	166.21	514.45

The line "the gap" reports the β_1 OLS estimate in the eq.(4.3.1). The log of contractual wage is an income measure. Standard errors are given in parenthesis. Expenditure measures are defined in the text.

Table 4: The expenditure-income gap by subsector and occupational group, head of household specification, 2000-2009.

All sectors, all occupations				
	-0.09^{***}			
	(0.00)			
	[24372]			
The gap by subsector				
Health care		-0.15^{**}		
		(0.05)		
		[2030]		
Education		-0.13^{**}		
		(0.04)		
		[1744]		
The gap by occupation				
Managers			0.02	
			(0.04)	
			[1136]	
Professionals			-0.14^{***}	
			(0.01)	
			[6226]	
Service				-0.08^{**}
				(0.03)
				[1402]
Clerks				-0.12^{***}
				(0.04)
				[885]

The table reports the β_1 OLS estimate in the eq.(4.3.1). Standard errors are given in parenthesis, number of observations is given in brackets. * significant at 1%; ** significant at 5%; *** significant at 1%.

Our findings clearly suggest that workers with the same level of income and other characteristics consume less if they are in the private sector. But in principle, private sector employees having the same level of true earnings as their public sector counterparts could save more (and, thus, consume less) because of their job uncertainty. We provided a partial treatment to this effect using contractual wage as a measure of income that is less affected by income shocks. To make one more step in this direction let us now analyze the volatility of wages in both sectors and compare savings and wealth (accumulated savings) of households employed in the public and private sectors.

4.4 Robustness of the previous results

Savings and wealth comparison

If the found discrepancies are explained by different consumption-savings behavior, than savings and wealth should differ between two sectors. The family questionnaire contains questions about households' current monetary savings. Using these data we compute the share of savings $\frac{S}{Y}$ using two different measures of the household income: total income and total earnings. *Table 5* reports results.

Table 5: Households current savings, pooling 2000-2009.

	Private sector N=7983		Public sector N=12653	
	$\frac{S_{cur}}{Earn_{tot}}$	$\frac{S_{cur}}{Inc_{tot}}$	$\frac{S_{cur}}{Earn_{tot}}$	$\frac{S_{cur}}{Inc_{tot}}$
% of households with zero savings	84.6%		85.3%	
% of households without answer	1.3%		1.2%	
min	0.02	0.002	0.002	0.0002
max	0.89	0.89	0.89	0.9
mean	0.31	0.28	0.34	0.28
standard deviation	0.2	0.19	0.21	0.19

Note: Descriptive statistics (mean and standard deviation) are computed for the subsample of households who report non zero savings.

Analyzing the descriptive statistics we do not find support for the claim that households with workers in the private sector have higher current savings. The paired T-test predicts that there is no significant difference between two subsamples. Moreover, we observe that 85% of households report to have zero savings. Among those with non-zero savings families in both sectors on average save 30% of their income. We run OLS and FE regressions with the same controls as in the eq.(4.3.1), we do not find that sector significantly affects the share of savings in earnings.

The survey also contains information about accumulated monetary savings, i.e. wealth, that includes deposits (both in home and in a bank) in rubles or currency, securities and bonds. This question has been started to ask in the year 2006, thus we possess the 4-years information. *Table 6* makes an overview of the descriptive statistics. We compare mean savings in two sectors using the paired T-test. The test predicts that there is no significant difference between two subsamples. As well as with current savings we observe that the majority of households

Table 6: Households accumulated savings, 2006-2009.

	2006		2007	
	Private $N = 1269$	Public $N = 1643$	Private $N = 1260$	Public $N = 1586$
% of households with zero savings	70%	70.9%	68%	69.7%
% of households without answer	10%	10%	12.1%	11.6%
min	0	0	0	0
max	502.000	500.000	2.000.000	800.000
mean	7169	6388	11529	8030
standard deviation	33032	29320	83570	41827
	2008		2009	
	Private $N = 1331$	Public $N = 1468$	Private $N = 1385$	Public $N = 1446$
% of households with zero savings	69.8%	67.8%	64.8%	62.7%
% of households without answer	12.4%	11.5%	15.2%	15.2%
min	0	0	0	0
max	500.000	1.000.000	800.000	1.000.000
mean	9517	8838	11429	11488
standard deviation	37216	39635	48159	51459

Note: All numbers are given in Russian rubles. For information on average $1\$ \simeq 30RuR$ in 2006-2009.

(70%) report zero monetary savings. We estimate the eq.(4.3.1) restricting the sample only to households with zero wealth. Previous results hold, we find the significant expenditure-income gap of 9% between private and public sectors. It means that the found discrepancies can not be attributed to the differences in savings.

It is possible that private sector workers convert quickly their savings into assets. In our data set we have the information about the value of housing and housing space. Also we know whether the family has a country house, a car (domestic or foreign) and a computer. To evaluate the differences in possessing these assets we estimate OLS and probit regressions where asset measure is a dependent variable. Controls are the same as in the basic equation (4.3.1).

Table 7 reports results. Households with workers in the private sector do not show neither a significantly higher probability of possessing country houses, cars and computers nor living in better housing conditions. At the same time the coefficients on other covariates are consistent with standard theoretical predictions: education and earnings increase the probability of having each of those goods. These results are verified when we apply the head of household

Table 7: Household assets estimates, pooling 2000-2009.

	Private sector	University degree	Earnings	N
Total wealth	0.07	0.27^{***}	0.45^{***}	2390
/OLS/	(0.09)	(0.04)	(0.04)	
Value of housing	0.03^{***}	0.15^{***}	0.24^{***}	15275
/OLS/	(0.00)	(0.01)	(0.00)	
Housing space	0.007	0.06^{***}	0.05^{***}	23815
/OLS/	(0.006)	(0.01)	(0.00)	
Country house	-0.004	0.03^{***}	0.03^{***}	24967
/probit/	(0.006)	(0.01)	(0.00)	
Car	-0.02^{*}	0.06^{***}	0.09^{***}	24683
/probit/	(0.00)	(0.00)	(0.00)	
Car, foreign brand	-0.01	0.02^{***}	0.05^{***}	24683
/probit/	(0.01)	(0.00)	(0.00)	
Computer	0.01^{**}	0.11^{***}	0.10^{***}	24670
/probit/	(0.00)	(0.00)	(0.00)	

Household is the unit of observation. Value of housing, total earnings and total wealth are used in the logarithmic form. Private household: more than 75% of earners are employed in the private sector. Standard errors are given in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. All specifications include covariates from the eq.(4.3.1). Marginal effects are reported for the probit estimates.

specification. Thus, differences in assets can not reconcile the found expenditure-income gap.

Volatility of income

We first try to verify that the attitude to risk does not differ between individuals employed in the private and public sectors. In the year 2006 RLMS starts to ask questions about insurance programs. They ask about life and accident insurance, home insurance, summerhouse insurance, vehicle insurance (not including compulsory liability coverage) and agricultural property insurance. As the measure of risk aversion we compute the indicator equals to the number of insurance programs in which individual participates divided by the total number of insurance to which he is applicable.

We find that the majority of individuals do not participate in any insurance program. Among those who participate we do not observe the evidence for the difference in risk aversion between two sectors. The paired T-test predicts that there is no significant difference between two subsamples. We run control regressions (with the same controls as in the eq.4.3.1) and do not find that sector affects the risk. Subject to the correctness of the risk aversion measure

Table 8: Individual risk, 2006-2009

	Private N=11364	Public N=12478
% of households without insurance	0.87	0.84
mean	0.3	0.29
standard deviation	0.16	0.16

Note: Descriptive statistics are computed for the subsample of individuals who participates in at least one insurance program.

used, we conclude that both types will behave identically under uncertainty conditions. But the uncertainty conditions may differ, let us control for these conditions analyzing the volatility of wages.

The ideal comparison of the risk between two types would be the volatility of earnings for the lifetime of two identical individuals initially employed in different sectors. But these data are not available and we are restricted by 10-years period. We set the year 2000 as the initial period. We consider the subsample of individuals who has a job and aged between 18 and 50 (45 for women) at the starting point (year 2000). Only 1983 respondents in the sample satisfy above criteria, among them we can follow 1487 individuals for the whole period 2000-2009.

For each individual i we compute the mean (E_i) and the variance (Var_i) of their contractual wages for the period 2000-2009. For individuals being unemployed at period t we set $w_t = 0$. The variance of income during the lifetime (ten years in our case) conditionally on individual characteristics is the approximation for the risk. We estimate the following equation:

$$\ln Var_i = \alpha_0 + \alpha_1 X_i + \beta_1 Z_i + \epsilon_i \tag{4.4.1}$$

where X_i are the Mincerian variables, and Z_i is the dummy variable for the sector.

Table 9 reports that the sector dummy is not significant, meaning that the claim about higher volatility of wages in the private sector can not be confirmed. 30% of wage variance is explained. We state that agents with higher education are more heterogenous in terms of wage volatility. High-skilled employees (managers, professionals) are associated with greater volatility of wages than lower-skilled workers. Finally, we observe that wages differ much more in urban areas, especially in Moscow and Saint-Petersburg.

The analysis of current and accumulated savings, risk aversion and volatility of wages has

Table 9: Wage volatility, 2000-2009.

	All population		Males	
	Coefficient	St.errors	Coefficient	St.errors
Age	-0.11^{***}	0.00	-0.12^{***}	0.00
Hours	0.00	0.00	0.01	0.02
Male	0.50^{***}	0.03	-	
Married	0.03	0.04	0.14^{*}	0.08
Urban	0.09	0.04	0.06	0.07
Complete secondary	0.03	0.05	0.08	0.07
University	0.15^{***}	0.05	0.04	0.09
PhD	0.05	0.23	-0.09	0.16
Experience	0.06^{***}	0.00	0.06^{***}	0.00
Job training	-0.18	0.16	-0.29	0.13
Private sector	0.02	0.05	0.04	0.06
Manager	-0.09	0.09	0.06	0.13
Professional	-0.04	0.05	0.00	0.09
Service	-0.16	0.07	-0.05	0.12
Agriculture worker	-0.30	0.26	-0.39	0.31
Unskilled	-0.27^{***}	0.06	-0.31^{***}	0.09
Moscow/Saint-Petersburg	0.01	0.05	-0.05	0.14
Second job	0.31^{***}	0.08	0.31^{**}	0.13
Life satisfaction	-0.03^{*}	0.01	-0.02	0.08
N	1487		831	
R^2	0.30		0.43	

The sample includes only those who report their salary and sector in the year 2000. The dependent variable is the log of individual's wage variance for the period 2000-2009. All explanatory variables are given for the initial period (year 2000). * significant at 10%; ** significant at 5%; *** significant at 1%.

not shown any sign of distinction between private and public households. Finally, to account for potential differences in consumption-savings behavior we estimate the expenditure-income gap equation including the proxy for risk aversion and wage uncertainty as explanatory variables.

$$\ln E_h - \ln Y_h = \beta_0 + \beta_1 N_h^{PR} + \beta_2 N_h + \gamma \bar{X}_h + \theta Y_h + \lambda R_h + \xi V_h + \epsilon_h \tag{4.4.2}$$

where N_h denotes the composition of household defined above; $\bar{X}_h$ is the aggregated set of Mincerian variables; N_h^{PR} follows the head of household specification. We also control for

the level of earnings Y_h; the risk aversion R_h defined through the participation in insurance programs; and the income uncertainty V_h defined as the volatility of the total household earnings during the last five years. Thus, this equation may be estimated for the period 2006-2009.

Table 10: Expenditure-income gap estimates, 2006-2009.

	(1)	(2)
The gap	-0.091^{***}	-0.087^{***}
	(0.00)	(0.02)
Risk aversion		0.09
		(0.12)
Volatility of income		0.00
		(0.00)
N	11000	10972
R^2	0.29	0.31
F-statistics	255.00	267.00

The specification (1) includes all the covariates from the eq.(4.3.1). The specification (2) also includes the risk aversion measure and the volatility of income defined in the text. Standard errors are given in parenthesis.

Table 10 reports results. Neither risk aversion nor wage volatility do not enter with significant coefficients into regressions. The expenditure-income gap stays huge and significant after controlling for these two phenomena. We performed some robustness checks. To compute volatility we tried different income measures (actual wages, contractual wages, total earnings, total income); for the computation of the gap we used food and cloths expenditures separately along with total current expenditures. These modifications did not alter results, meaning that uncertainty can not serve an explanation to the observed differences in expenditures.

To confirm the bribery hypothesis we studied the question of risk and uncertainty in the private and public sectors. Potentially sectoral differences in job uncertainty may induce private sector workers to make more savings, and that can explain the observed expenditure-income gap. But we find that households with workers in the private sector do not hold more monetary savings or assets. We report that employees in the private and public sectors have identical probabilities of possessing country houses, cars and computers. The regression estimates confirm these results: neither risk aversion nor volatility of income explain differences in expenditures. Hence, the precautionary motives of workers can not reconcile the sizeable

gap in income with the minor gap in expenditures and assets. We refer the unexplained discrepancies to bribes.

5 Conclusion

In our days corruption has reached enormous proportions and has become part of every day life in many countries. There is huge research that examines the impact of corruption on economic development. And the problem of corruption measurement has become especially relevant. We develop the estimate of bribery based on the comparison of income and expenditures between the private and the public sectors, and we apply it to the analysis of Russian economy. We find that public sector households receive lower earnings than their private sector counterparts but enjoy the same level of consumption expenditures. The precautionary motives of workers are not able to reconcile these discrepancies. And the unexplained expenditures-income gap is referred to bribes.

The presented method has several advantages. First, it overcomes the imperfections of perception-based measures and case studies. Second, since household surveys are available in many countries it may be easier replicated for the analysis of corruption throughout the world. We believe that this approach is practically helpful and may be useful in the fight against corruption.

Appendix

A1. Variable definitions

The data are provided by the Russian Longitudinal Monitoring Survey, this is the largest household survey in Russia. The survey is conducted by the National Research University Higher School of Economics and ZAO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology RAS. The data can be accessed from the HSE website [1].

Data have been collected 19 times since 1992. Each household was interviewed once per year. In each round there are four questionnaires: household, adult, child and community. In our analysis we used data from household and adult questionnaire for the period 2000-2009. The household is the unit of observation. Below we provide the code of each variable used in the analysis, thus it can be easily found in the questionnaire.

Expenditure data.

Expenditure data are provided by the household questionnaire. In each interview the reference period for expenditure covers three months or one month (differs according to the type of expenditure) prior to the interview month. We data are reduced to the monthly period. If household refuse to answer the observation is dropped.

The data used in the analysis are calculated in the following way [2].

- Food = e4*4.
- Cloths = (e6_1 + e6_2)/3.
- Leisure = e13_2b + e13_21b.
- Medicine = e13_22b + e13_23b + e13_31b.
- Other = e13_6b + e13_8b + e13_9b.
- Total current expenditures = food + cloths + leisure + medicine + other.

Income data.

Income data are provided by the adult questionnaire and are aggregated to the household level. While collapsing data if some household member does not report his income, it is

1. http://www.cpc.unc.edu/projects/rlms-hse/data
2. Stata do-files are available upon request.

Code	Question in the interview
e4	How much money did all members of your family spend on eating at home and away from home in the last 7 days?
e6_1	How much did you and other household members spend on the purchase of clothing and shoes for adults in the course of the last three months?
e6_2	How much did you and other household members spend on the purchase of clothing and shoes for children in the course of the last three months?
e13_2b	How much did you and other household members spend in the last 30 days for sanatoriums, vacation homes, children's camps, tourist travel etc, excluding cost of transportation?
e13_21b	How much did you and other household members spend in the last 30 days for tickets to the theater, circus, concerts, recreation parks and other forms of entertainment?
e13_22b	How much did you and other household members spend in the last 30 days for treatment or examination in hospitals, military hospitals or clinics, not including payments for medicine?
e13_23b	How much did you and other household members spend in the last 30 days for treatment or examination in a policlinic, not including payments for medicine?
e13_31b	How much did you and other household members spend in the last 30 days for medicine, including vitamins and other drugs?
e13_6b	How much did you and other household members spend in the last 30 days for insurance premiums: life, health, car, home etc?
e13_8b	How much did you and other household members spend in the last 30 days for alimony payments?
e13_9b	How much did you and other household members spend in the last 30 days for payments of taxes for real estate and vehicles, membership fees, duties, visas and document processing, excluding income taxes and taxes for land?

assumed to be equal to zero in the total sum. But in the following analysis such observations are considered as unreliable and are excluded.

We work with four income measures. *Contractual wage* (code j13.2) represents the answer to the question: "In the last 12 months how much was your average monthly wage after taxes from your fist job - regardless of whether it was paid to you on time or not. If you have work there for less than 12 months, what has been your average monthly wage for that time? If you receive all or a part of your wage in foreign currency please convert it to rubles". *Actual*

Code	Question in the interview
d10	How much did your family receive in the last 30 days from selling crops harvested from your land during the last 12 months?
d13	How much did your family receive in the last 30 days from selling living livestock, fowl or bees?
d16	How much did your family receive in the last 30 days from selling products of living livestock, fowl or bees that were produced in your household?
d21	How much did your family receive in the last 30 days from selling gathered mushrooms, nuts, berries or fish?
f4	How much money was your family paid additionally for fuel in the last 30 days?
f7	How much money have your family received in the last 30 days as benefits for children aged up to 18 months?
f7_2	How much money have your family received in the last 30 days as benefits for children aged 18 months to 18 years?
f12_1b	How much money have your family members received in the last 30 days for pensions?
f12_2b	How much money have your family members received in the last 30 days for stipends?
f12_3b	How much money have your family members received in the last 30 days for unemployment benefits?
f12_5b	How much money have your family members received in the last 30 days for rents on property?
f12_6ab	How much money have your family members received in the last 30 days for interests on deposits?
f12_6bb	How much money have your family members received in the last 30 days for dividends?

wage (code j10): "How much money did you receive in the last 30 days from your primary job after taxed?"

We aggregate data to the household level

$$w_h = \sum_{i=1}^{N} w_i$$

where N is the number of working individuals in the household, and w_i denotes actual or contractual wage respectively.

To compute two other measures, *total earnings* and *total income*, we use data from the household questionnaire.

Total earnings $= \sum_{i=1}^{N} w_i + \frac{d10}{4}$ + d13 + d16 + d21, where w_i is the actual wage of i's

household member on *all* his current jobs.

Total income = Total earnings + f4 + f7 + f7_2 + f12_1b + f12_2b + f12_3b+f12_5b+f12_6ab+f12_6bb.

Capital and savings data.

Capital and savings data are provided by the household questionnaire. We have data on current monetary savings as the answer to the question "How many rubles did your family save in the last 30 days" (e17). We also have information about total accumulated savings: "How much did your family manage to save, i.e. what savings does your family have today, at home or in bank deposits, in securities or bonds? If it is in other currency please covert in into rubles." (f17).

Household are asked to report "the market value of a residence similar to yours" (c1_1), and the housing space: "How much general usable living space does your family have, that is, the total area of bedrooms, living room, kitchen, bathroom etc in the apartment (house)?" (c6). We also know whether the household has a computer (c9_6_2a), a domestic car (c9_7_2a), a foreign car (c9_7_3a), a country house (c9_12a). The information about the age of each of the above capital units is also available but did not use in our analysis.

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