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Nikita Zakharov

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Department of International Economic Policy
Institute for Economic Research
University of Freiburg
D-79085 Freiburg, Germany
Platz der Alten Synagoge 1

Tel: +49 761 203 2342
Fax: +49 761 203 2414
Email: iep@vwl.uni-freiburg.de

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# Does Corruption Hinder Investment? Evidence from Russian Regions

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**Abstract**

This paper investigates the relationship between corruption and fixed capital investment in a setting of a corrupt country. Using two measures of corruption, registered cases of bribe-taking and incidents of experienced corruption by population, we find a consistently negative relationship between investment and corruption. A problem of endogeneity of corruption is then addressed by instrumental variables approach: when corruption is instrumented with freedom of press and violations of journalists' rights, we find even bigger negative effect. Disaggregating investment by ownership-type shows that only private investment is affected, but not investment made by state-owned companies. The negative effect is larger for companies with a foreign capital.

*Key words*: Corruption, Investment, Russia, Freedom of Press

*JEL classification*: E22; K42; L26; P26

* University of Freiburg, Department of Economics, Platz der Alten Synagoge 1, 79085 Freiburg, Germany, Email: nikita.zakharov@vwl.uni-freiburg.de.

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## 1. Introduction

Corruption has long been recognized as detrimental to economic growth (e.g. Myrdal 1989; Shleifer and Vishny 1993; Blackburn et al. 2006; Aidt 2009). While it affects growth in different ways, its primary and by far the most important channel is a reduction in domestic investment as several studies show (e.g. Pellegrini 2011, Hodge et al. 2011). By creating uncertainty in investment outcomes and reducing the expected returns, corruption discourages investment activity of the businesses, which translates into forgone economic growth (Mauro 1995; Wei 2000). Yet, a significant strand of literature challenges this consensus with a so-called "grease the wheels" hypothesis as proposed by Leff (1964) and Huntington (1968). This hypothesis suggests that corruption allows economic agents to overcome the inefficiencies created by ill-functioning institutions. Indeed, some recent research shows that corruption facilitates the firm entry in highly regulated economies (Dreher and Gassebner 2013), improves economic efficiency in countries with weak institutions (Meon and Weill 2010), and is positively associated with output and productivity of manufacturing plants in Indonesia during the rule of Suharto (Vial and Hanoteau 2010). If corruption helps to fight a rigid bureaucracy in developing countries, would it also promote investment or would its negative consequences outweigh the benefits?

Previous empirical literature does not provide sufficient evidence on the topic. The majority of studies are cross-country comparisons that often find a negative correlation between corruption and investment but suffer from an unobserved heterogeneity bias and do not establish causality.[1] When cross-national analyses control for country fixed effects, they tend to find the relationship not to be consistent across world regions: Asiedu and Freeman (2009), for example, find significant effects for firms in transition countries but not for firms in Latin America and Sub-Saharan Africa; on the opposite, Das and Perry (2011) show that corruption is bad for investment in Sub-Saharan Africa, Latin America and the Caribbean, but not in Asia. Another potential weakness of the previous literature is that it uses almost exclusively perceptions-based measures of corruption , which are often criticized for being biased (Treisman 2007; Aidt 2009). The

1 Major cross-country studies include Brunetti et al. 1998; Brunetti and Weder 1998; Campos et al. 1999; Mo 2001; Habib and Zurawicki 2001; Rock and Bonnett 2004; Méon and Sekkat 2005; Asiedu and Freeman 2009; Das and Parry 2011; Pellegrini 2011; and Hodge et al. 2011.

bias can arise if corruption perceptions are influenced significantly more by the quality of institutions (Andvig 2005; Weber Abramo 2008) or by political competition and press freedom (Sharafutdinova 2010) than by corruption.[2] Finally, very few studies deal with the potential endogeneity of corruption since good instruments for corruption are hard to find (as discussed in Treisman 2007: 225-226). The only two cross-country studies in the field that employed an instrumental variables (IV) approach are the seminal work by Mauro (1995) and its follow-up by Shaw et al. (2011). Mauro (1995) used ethnolinguistic fractionalization as an instrument for corruption and established its strong negative effect on investment, a finding that was later refuted in a replication study by Shaw et al. (2011), who found the instrument to be weak and, thus, unable to prove causality. When Shaw et al. (2011) employed a better instrument for corruption, they found that corruption did not affect investment or economic growth and called it "a result opposite to the wide spread belief in the literature".[3] While the empirical evidence is weak, the "widespread belief" of corruption being bad for economy is often reinforced by the publication bias in economics as found in Brodeur et al. (2016) and especially the publication bias in the literature on corruption and growth as noted in Campos et al. (2010). The bias potentially explains why the majority of published papers report negative effect of corruption and only few of them show that the effect does not exist or holds only for certain regions.

While cross-country literature is unable to provide clear evidence on the consequences of corruption on investment, there is a growing demand for studies of corruption within one country, which would benefit from better measures of corruption and a stronger homogeneity of political, economic, and social conditions. Focusing on one country also allows to employ novel instruments for corruption, which may not be applicable in a cross-country setting. As the only country study on corruption is Johnson et al. (2011), who study the relationship between corruption and growth and investment across the USA. Instead of perception-based indices, they use official data on convictions of public servants. They instrument for corruption with corruption determinants specific to the USA: residency requirements for voting, restrictions on campaign financing, and the time of adoption of state constitution. The study finds a negative relationship between corruption and investment, however, the small sample size of only 50 observations

2 Unsurprisingly, studies do not find a strong correlation between perception-based data and experienced corruption (e.g. Donchev and Ujhelyi 2014, Gutmann et al. 2015).

3 The better instruments is the predicted geographical component of the country's trade share of GDP, as suggested by Frankel and Romer (1999).

and low values (all below 6) of the first stage F-statistics for their instruments leave its results inconclusive.[4]

Our paper attempts to fill the gap in the existing literature in several ways. First, we study corruption within one specific country – Russia. The country is a particular interesting case for this purpose as it is a former superpower and currently the 13th biggest economy in the world in terms of nominal GDP (World Bank estimation for 2015) and it suffers severely from corruption, being ranked 131 out of 176 countries by Transparency International in 2016.[5] While corruption is wide-spread in Russia, its regions are neither equally corrupt (Baranov et al. 2015), nor are they equally economically developed. They are, however, homogeneous in terms of official language, system of law, culture, history, and traditions, which provides an ideal setting for econometric analysis. Moreover, very few empirical papers study the consequences of corruption in Russia and none of them focus on investment.[6]

Second, we employ a new measure of corruption based on actual incidents of bribe-taking by public officials as registered by the police authorities. Corruption incidents registered by the police is similar to the conviction-based corruption measure traditionally used in the empirical literature on corruption in the USA (e.g. Goel and Rich 1989; Goel and Nelson 1998; Glaeser and Saks 2006; Johnson et al. 2011; Alt and Lassen 2014), but, as we will argue below, it is more appropriate for countries with highly corrupt environments, where conviction data is likely to be distorted by persistent corruption in the judiciary. This measure has been previously employed to study determinants of corruption in Russian regions by Schulze et al. (2016). The data are available for the period 2004-2013, allowing the use of a panel estimation with region and time fixed effects, thereby controlling for time-invariant unobserved heterogeneity. We also check the robustness of the results using an alternative measure of corruption based on bribery experiences of the population, derived from a public opinion survey in 2011.

4 It is also arguable whether the USA are a good case study for corruption since they do not suffer from rampant corruption and belong to the 20 countries with the lowest corruption according to the Transparency International ranking (2016).

5 Transparency International grades countries on a scale from 0 (most corrupt) to 100 (not corrupt); Russia's score is 29 (https://www.transparency.org/news/feature/corruption_perceptions_index_2016, accessed on 01.02.2017). Data on the GDP estimation by the World Bank is available at World Bank, World Indicators, http://databank.worldbank.org/data/download/GDP.pdf (accessed on 01.02.2017).

6 We find only three cited articles in the field: Safavian et al. (2001) use data from a survey of micro-enterprises in one Russian region to show that corruption is similar to regressive tax and might discourage innovation and growth; Weill (2011) finds evidence that higher corruption is associated with less bank-lending to the private sector and to individuals; and Kuzmina et al. (2014) find for 40 Russian regions, in which data on corruption was available, that better governance quality attracts foreign direct investment.

Third, we introduce new instruments to control for the endogeneity of corruption. We take advantage of an idiosyncratic development of regional mass media in Russia and introduce indicators of regional press freedom as instrumental variables for corruption. Previous studies have found that a free press effectively reduces corruption both across countries (Brunetti and Weder 2003) and in Russia (Schulze et al. 2016). We assemble two measures of the regional press freedom based on expert surveys by *Glasnost Defense Foundation* (GDF) and actual data on violations of rights of journalists in Russia and show that they are strong predictors of regional corruption. At the same time, we find no empirical evidence that press freedom is associated with any regional characteristics such as revenues in advertising, income inequality, natural resources, state financial support of local press, relative salaries in television and radio broadcasting, or profitability of mass media. The idiosyncratic occurrence of regional freedom of press has been reported previously by a wide range of studies of Russian media (Koltsova 2006; Azhgikhina 2007; Roudakova 2008; Beumers et al. 2008; Erzikova and Lowrey 2010) and was attributed to a chaotic and unstable local media environment. It was caused, on one hand, by an overlook of federal authorities who exercised increasing political pressure on the national mass media but paid little attention to the regional press (Becker 2004: Eismont 2007; Gehlbach 2010; Lipman 2010), and, on the other hand, by pluralistic and fluid cross-institutional power arrangements at the local level (Erzikova and Lowrey 2012: 138).

Finally, while the majority of the literature uses an aggregate investment, we are able to show the effect of corruption on different groups of investment with respect to its ownership type: we differentiate between state and municipal companies and companies with full or partial private ownership. Additionally we look at the domestic investment made by companies with a foreign share above 10% of their capital as we expect them to be more averse to insecurity of the property rights caused by corruption, however we do not study how corruption affects foreign direct investment as it represents a very specific type of investment and has been previously investigated in Kuzmina et al. (2014) for the case of Russian regions.

Our results show that corruption decreases overall investment in fixed capital in Russian regions. The effect is significant for companies with private ownership, but it is statistically insignificant for fully state-owned companies. Investment by companies with foreign capital is most sensitive to corruption as predicted by the literature (Habib and Zurawicki 2001). The results are robust to the inclusion of various

social-economic controls, different measures of corruption, and the use of instrumental variables.

The paper is organized as follows: Section 2 explains our methodology and data; section 3 presents the results and discussion; section 4 provides robustness checks, and section 5 concludes.

## 2. Data and estimation strategy

We study investment and corruption in Russian regions for the period 2004 to 2013. The time frame is determined by the availability of data on regional corruption, since no data records are accessible for the time before 2004, and by the political events following the annexation of Crimea by Russia in early 2014, which might have introduced distortions in the investment behavior as a result of Western sanctions, Russian counter-sanctions, and external political pressure (Doronina 2014).

The beginning of the period coincides with the end of the democratic transition, when Russia became a normal middle-income country with a market economy and a semi-democratic political regime (Schleifer and Treisman 2005). The whole period is characterized by a stable political situation as the actual power in the country was consolidated in the hands of the second Russian President, Vladimir Putin, and his friends.[7] Russia has suffered from widespread corruption: Transparency International (TI) has given Russia consistently a score below 30 points out of 100 on their corruption perception index.[8] Meanwhile the government has made no real effort to fight corruption during those years. Even the introduction of the National Anti-Corruption plan in 2009 by the then President, Dmitry Medvedev, did not make any difference, as was later acknowledged by Medvedev himself in 2011.[9] The growing corruption did not mobilize the population either.

For our analysis, we collected the data for 79 Russian regions, which account for 99% of the total

7 Even when Putin had to step down from the presidency in 2008 as the Russian Constitution does not allow three consecutive terms, he became Prime Minister and had his former colleague and good friend Dmitry Medvedev occupy the President's position for one term, allowing him to come back after the elections in 2012.

8 Higher score for perceived corruption implies less corruption.

9 The full interview from 26.01.2011, where Dmitry Medvedev discusses the consequences of the anti-corruption campaign, is available at *Vedomosti* Web site at http://www.vedomosti.ru/newspaper/articles/2011/01/26/politicheskaya_konkurenciya_neobhodima_dmitrij_medvedev (in Russian, accessed on 02.02.2017).

population.[10] All regions have the same official language, taxation, and law systems, and are similar in terms of traditions and culture, but strongly different in the scope of investment: during 2004-2013, the region with the highest investment (*Tyumen Oblast)* had on average almost 18 times as much investment per capita as the region with the lowest investment (*Republic of Ingushetia)*. The growth in investment over time is also very heterogeneous. While the overall national investment per capita doubled between 2004 and 2013, the region *Tuva Republic* demonstrated a growth rate of over 670%, whereas the biggest decline over these 10 years was 32% in *Vologda Oblast.*

To analyze the effect of corruption on investment, we employ the following estimation model:

$$Investment_{it} = \alpha + \beta Corruption_{i(t-1)} + \eta\, X_{i(t-1)} + \varsigma_i + \tau_t + \varepsilon_{it}\ ,$$

where $i = 1,\ldots,79$ and $t = 2004,\ldots 2013$ index regions and years respectively, $Investment_{it}$ is a logarithm of total annual per capita investment in the region $i$ in the year $t$ in constant rubles, $Corruption_{i(t-1)}$ is a logarithm of registered cases of bribe-taking per 100,000 population plus one, lagged for one year ; $X_{i(t-1)}$is a vector of control variables lagged for one year; $\varsigma_i$ and $\tau_t$ are region and year fixed effects; and $\varepsilon_{it}$ is an error term. All independent variables are lagged for one year to allow time for their effect on investment and to minimize the possibility of simultaneity. We use fixed effects regression to remove time-invariant factors specific for each region (e.g. climate, geography, and political factors) and include time dummies to capture common time trend. Standard errors are clustered at the regional level to account for serial auto-correlation.

The data on fixed capital investment come from the Federal State Statistics Service (FSSS). The annual data include officially documented capital expenditures aggregated on a regional level and adjusted for the "unobserved" economy.[11] The data allow us to differentiate between investment made by organizations completely owned by state (INV_pub), investment made by private or partially private

10 In 2004, Russia consisted of 89 regions. Six small autonomous regions were officially merged with the neighboring larger regions in later years. The remaining three small autonomous regions are normally aggregated with their bigger neighbors for statistical purposes by the Russian Federal Statistic Service, and we employ only the aggregate data on the extended regions. We exclude the region of Chechen Republic due to ongoing military conflict and a concern of data reliability (see Fuller 2013).

11 "Unobserved" economy includes shadow economy, illegal activities, and individual and household investment that are not reported to statistics authorities. The full official methodology is explained in FSSS Decree №569, dated18.09.2014 „On the approval of official statistical methodology to determine fixed capital investment at the regional level", available online at http://www.consultant.ru/document/cons_doc_LAW_169551/ (accessed on 02.02.2017).

companies (INV_priv), and investment made by companies with full or partial (above 10%) foreign ownership (INV_for). Investment is divided by population to account for the size of the region.[12]

Our measure of corruption (CORR) is the logarithm of a number of cases of bribe-taking by public officials as registered by the police annually per 100,000 population plus one. The definition of bribery according to the Russian Criminal code (Article 290) is "the acceptance of money, securities, or other valuables by a public official (personally or through an intermediary) for his/her performance (action or inaction) for the benefit of a giver or an affiliated person, if such action implies that the public official exploits his/her position or authority or installs patronage". This definition is in line with the common understanding of corruption as "a misuse of public office for private gain" (World Bank, 1997). Bribery itself does not exclude political corruption from our data, however, we expect the majority of cases to refer to a bureaucratic type of corruption, which is more relevant for the decision to invest. The corruption variable is lagged one year to allow some time for its effect on investment to materialize.

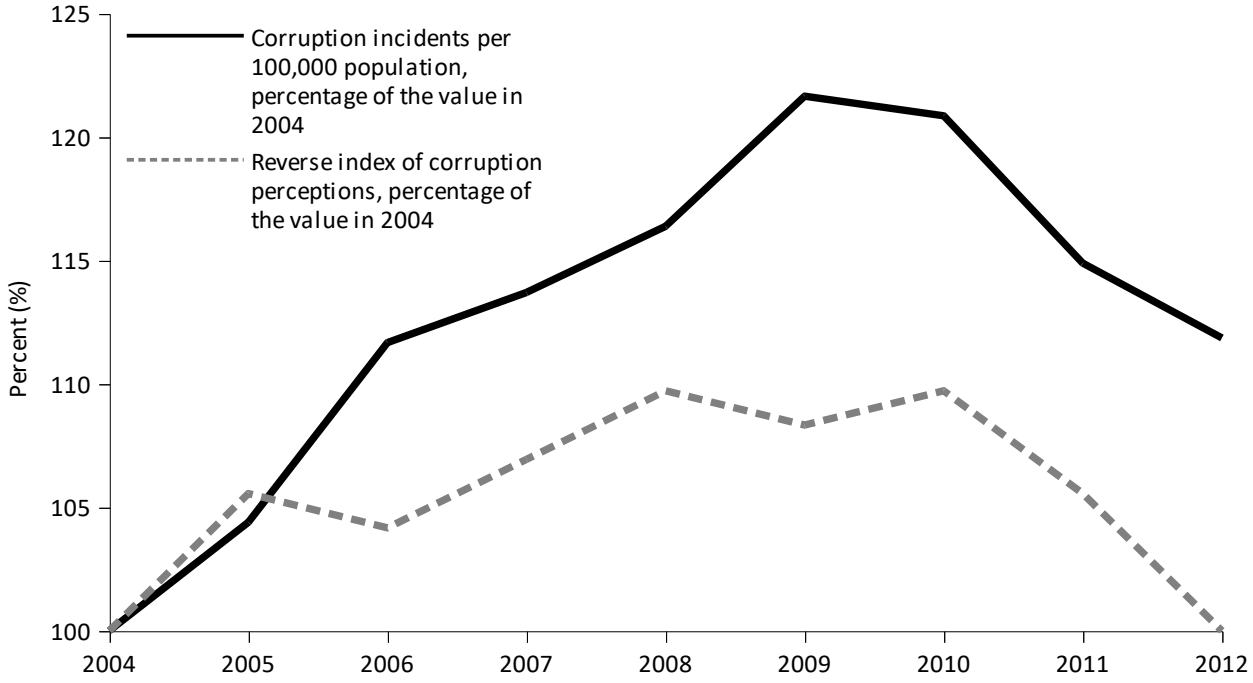
Registered corruption is very similar to the conviction rate of corrupt officials often used by studies on corruption in the US (e.g. Johnson et al. 2011), however, it has several advantages as discussed in Schulze et al. (2016: 141-142). First, registration of crime as a first stage of criminal prosecution is not affected by any corruption that might occur during the investigation and legal process preceding conviction. Corruption could still affect the registration itself but to a lesser extent than conviction, and Schultze et al. (2016) argue that it would be relatively easier for the police to obstruct an on-going investigation than to refuse to register a crime, especially since this practice can be seriously punished if a person reporting corruption filed a complaint to a higher official. Second, the time of the registration is closer to the time of the actual corruption incident as any crime has to be registered within three days after its detection according to the law. Conviction, on the other hand, takes place after a longer period of investigation and legal proceedings and therefore enters the statistical records only after some time. Third, registered corruption reflects the number of actual incidents of bribe taking and not the number of people found guilty (as in the case of convictions), and therefore reports the volume of the crime and not the criminals. That makes our measure

12 While most of the studies on corruption and investment use a ratio of investment to GDP, Lambsdorff (2005: 44) warns that GDP itself might be negatively influenced by corruption and therefore the Investment/GDP ratio underestimates the effect of corruption on investment.

a better proxy for the scope of regional corruption.

Figure 1 shows the evolution of our corruption measure for the whole of Russia over the years and compares it to the corruption index by Transparency International.[13] Both measures exhibit a similar inverted U-shaped trend during the period under investigation, which indicates a common capacity to reflect actual corruption levels by both measures.

Figure 1: Dynamics of Corruption in Russia




For an alternative measure of corruption, we employ data on experiences of bribery from a survey by the Public Opinion Foundation and the Russian Ministry of Economic Development, which was conducted in February of 2011. The survey covered the 70 biggest regions and surveyed over 54 thousand citizens, making it the largest public opinion survey of the Russian population on corruption.[14] Respondents were asked if, in the past two years, they have encountered a situation, in which a public official demanded or expected any unofficial payment or favor for the services provided. The alternative measure of corruption (CORREXP) is the share of respondents who answered the question positively. Most literature considers an experience-based measure of corruption to be more reliable than a perceptions-based one

13 The values of the Transparency International corruption index are reversed for convenience: higher value means more corruption.

14 The omitted regions are the least populated regions in Siberia and Caucasus. The full survey is available at http://economy.gov.ru/minec/activity/sections/anticorruptpolicy/doc20110614_027 (accessed on 1.08.2017).

(e.g. Dininio and Orttung 2005, Treisman 2007, Weber Abramo 2008, Razafindrakoto and Rouband 2010).[15] As the data are available for one year, only a cross-sectional estimation is possible.

Our econometric model includes control variables commonly used in the literature (Mauro 1995; Brunetti et al. 1998; Campos et al. 1999; Mo 2001; Meon and Sekkat 2005; Das and Parry 2011; Johnson et al. 2011). A logarithm of per capita income in the previous year (INC) is used as a measure for economic development, the share of population with professional education in the previous year (EDU) as a proxy for human capital, and a logarithm of total population (POP) controls for the size of the region. We also include the regional consumer price index from the previous year (CPI) as a proxy for inflation, which is expected to be negatively associated with investment (Asiedu and Freeman 2009; Das and Parry 2011). Moreover, we control for oil and natural gas production (OIL) since several Russian regions benefit directly from extracting natural resources. The size of bureaucracy (GOV) is included since a bigger number of public officials in the executive branch of power might create bureaucratic competition and eventually improve conditions (e.g. reducing red tape) for investors as suggested by Drugov (2010). Finally, we introduce a crime rate of major and gravest crimes per population (CRIME) as an additional control to show that corruption is not just a proxy of regional level of crime. Crime data are produced by regional law-authorities and might capture the effort of the police to register more criminal offenses, which is a potential source of noise in our dependent variable. Table 1 provides a short description of data and summary statistics.

Table 1: Summary of main variables

| Variable | Description | Mean | St. Dev. |
|---|---|---|---|
| CORR | Number of registered incidents of bribe-taking by public officials per 100,000 population, logarithm lagged for one year | 1.58 | 0.51 |
| CORREXP | Corruption experienced by population in a region as a share of respondents who reported an encounter of a situation where a public official demanded or expected an unofficial payment or favor for his or her services (available only for 70 regions in 2011) | 16.54 | 7.06 |
| INV_total | Aggregate annual capital investment in the region, logarithm of thousand constant rubles per capita | 10.10 | 0.66 |
| INV_priv | Capital investment made by companies and entities with private ownership in constant rubles per capita, logarithm of thousand constant rubles per capita | 9.79 | 0.76 |
| INV_pub | Capital investment made by government-owned companies and public sector, logarithm of thousand constant rubles per capita | 8.63 | 0.64 |
| INV_for | Capital investment made by companies with foreign ownership (10% or more of capital belongs to foreign residents), logarithm of thousand constant rubles per capita | 7.54 | 1.55 |

15 Corruption perceptions in Russia often tend to reflect political competition (Sharafutdinova 2010) or political awareness (Rose and Mishler 2010).

| | | | |
|---|---|---|---|
| CRIME | Number of registered major and most serious criminal offenses (crimes penalized with imprisonment for five years or more) 100,000 population, logarithm lagged for one year | 6.25 | 0.43 |
| INC | Regional average monthly income per capita, in constant rubles logarithm lagged for one year | 8.76 | 0.41 |
| OIL | Oil and gas production in the region, in constant thousand rubles per capita lagged for one year | 12.64 | 59.90 |
| CPI | Consumer price index from the previous year | 110.03 | 2.93 |
| GOV | Number of governmental officials in executive branch of power per 10,000 of population by the end of the past year | 112.55 | 50.56 |
| EDU | Share of adult population with professional education in the previous year | 68.89 | 7.19 |
| POP | Average annual population in thousands, logarithm | 7.13 | 0.90 |

## 3. Results

### *3.1 Fixed effects estimation*

Table 2 presents the results from the OLS estimation with region and time fixed effects. Higher corruption in the previous year is associated with lower per capita fixed capital investment in the region. The coefficient in column 1 suggests that one standard deviation increase in corruption is associated with a decrease of 5.5% of standard deviation of aggregate regional investment in fixed capital. The effect is statistically significant at the 10% confidence level.

Table 2: Effect of corruption on investment, OLS with fixed effects

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dep. Variable: | INV_total | INV_priv | INV_pub | INV_for |
| CORR | -0.071* | -0.093** | -0.079 | -0.377*** |
| | (-1.77) | (-2.14) | (-1.42) | (-2.76) |
| CRIME | 0.056 | 0.085 | 0.182 | 0.506 |
| | (0.63) | (0.72) | (1.40) | (0.77) |
| INC | 0.486*** | 0.559** | 0.559*** | 0.308 |
| | (3.90) | (2.38) | (3.03) | (0.38) |
| OIL | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.52) | (0.35) | (0.06) | (0.66) |
| CPI | 0.001 | -0.005 | 0.0128* | -0.0860** |
| | (0.13) | (-0.37) | (1.72) | (-2.58) |
| GOV | 0.001 | 0.007*** | -0.001 | 0.0287* |
| | (0.62) | (2.66) | (-0.23) | (1.79) |
| EDU | -0.00546** | -0.0108** | 0.001 | -0.011 |
| | (-2.19) | (-2.02) | (0.28) | (-0.73) |

| | | | | |
|---|---|---|---|---|
| POP | -0.413 | 0.017 | -0.186 | 1.603 |
| | (-0.47) | (0.02) | (-0.16) | (0.32) |
| Region FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Observations | 711 | 711 | 711 | 711 |
| R2 | 0.66 | 0.60 | 0.37 | 0.24 |

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01. Robust standard errors are clustered at the region level.

Everhart et al. (2009) emphasize the importance to differentiate between public and private investment since both can be affected by corruption differently. Private investors are discouraged by corruption since it lowers the expected returns on private investment. Public investment is not directly driven by expected returns; it has strong connections to the government and might therefore be less targeted by corrupt officials. Previous studies find even a positive correlation between corruption and public investment (Keefer and Knack 2007; Baliamoune-Lutz and Ndikumana 2008) and argue that public investment provides more opportunities for rent seeking and misappropriation of resources

We test the effect of corruption on capital investment by its ownership type: state-owned companies and companies with private ownership are analyzed separately (columns 2 and 3). The coefficient of CORR is negative for both types of investment, but it is significant only for investments made by privately owned companies and not for investment made by companies and organizations fully owned by the state. The effect for private investment is bigger than for the overall investment: an increase in one standard deviation of corruption measure is associated with 6.2% of standard deviation decrease in private investment.

Investment in fixed capital made by companies with full or partial foreign ownership is negatively associated with corruption (column 4): an increase of one standard deviation in corruption is associated with a 12.4% of standard deviation decrease in this type of investment. The effect is much stronger for this type of investment as compared to aggregate investment and is statistically significant at the 1% level.

Table 2 shows that the effect of corruption is independent from the average level of crime in the region as coefficients of CRIME are close to zero and statistically insignificant in all specifications. Alternative measures for criminal environment, such as number of registered murders, thefts, robberies, or drug-

dealing are likewise insignificant and do not affect our main results for corruption.[16]

Other significant determinants of investment are per capita income, education, size of bureaucracy, and consumer prices. Income per capita is positively associated with all types of investment and highly significant for INV_total, INV_priv and INV_pub (columns 1-3). The result for our measure of education being negatively associated with investment is surprising and contradicts the cross-country evidence (e.g. Campos et al. 1999; Meon and Sekkat 2005), but it is in line with Johnson et al. (2011), who find the same negative relationship for US American states. Our education measure may simply proxy shifts in the structure of the regional economy when, for example, the development of the service sector demands more skilled labor but at the same time requires much less physical investment than extracting or manufacturing sectors. Growth in consumer prices has a negative and significant relationship to the investment made by companies with foreign ownership as they are more sensitive to the value and the stability of the Russian currency. The size of the bureaucracy is positively correlated with private and foreign investment, and we assume that this may be a result of the competition across public servants or reduction of the red-tape due to the availability of more labor in public service. Production of oil and gas is not associated with investment activities.

### *3.2 Alternative measure of corruption*

In order to test our findings with respect to an alternative measure of corruption (CORREXP), we employ the same econometric model as in our main regression. Table 3 reports the results. Corruption reduces overall investment and especially investment by private companies; the effect is two times bigger for companies with foreign ownership. For state-owned companies no effect is found . The magnitudes are relatively close to the previous estimates (as presented in Table 2): one standard deviation in experienced corruption decreases overall investment by 14% of its standard deviation, and companies with private and foreign ownership reduce investment by 20% and 44% respectively.

16 Results are available upon request.

Table 3: Effect of experienced corruption on investment, OLS

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dep. Variable: | INV_total | INV_priv | INV_pub | INV_for |
| CORREXP | -0.0115* | -0.0170** | 0.004 | -0.0373** |
| | (-1.87) | (-2.45) | (0.45) | (-2.17) |
| CRIME | -0.021 | -0.138 | 0.263 | 0.571 |
| | (-0.12) | (-0.70) | (1.01) | (1.65) |
| INC | 1.324*** | 1.335*** | 1.188*** | 1.699*** |
| | (5.41) | (4.91) | (4.76) | (2.99) |
| OIL | 0.002*** | 0.003*** | 0.000 | 0.001 |
| | (3.30) | (4.09) | (-0.26) | (1.12) |
| CPI | 0.016 | 0.016 | 0.033 | -0.109 |
| | (0.30) | (0.27) | (0.47) | (-0.95) |
| GOV | 0.002 | 0.003 | 0.002 | 0.002 |
| | (0.99) | (1.08) | (0.61) | (0.31) |
| EDU | -0.005 | -0.003 | -0.007 | 0.0424** |
| | (-0.65) | (-0.28) | (-0.72) | (2.37) |
| POP | -0.030 | 0.005 | -0.088 | 0.177 |
| | (-0.28) | (0.04) | (-0.67) | (0.57) |
| Observations | 70 | 70 | 70 | 70 |
| R2 | 0.61 | 0.58 | 0.44 | 0.53 |

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors are robust to heteroskedasticity.

The cross-sectional analysis thus confirms our main results derived in a fixed effects panel regression with corruption measured with bribe-taking incidents.

### *3.3 Estimations with instrumental variables*

The OLS estimations demonstrate a strong negative relationship between corruption and investment but do not assert its causation because of the potential endogeneity of corruption. The endogeneity can arise from several sources, e.g. from an omitted variable bias or from reverse causation, which are both likely for corruption and investment as corruption does not occur exogenously and as both corruption and investment can be driven by some omitted factor, such as political cycles. Another problem would be a measurement bias since our corruption measure is not perfect. We address the issue of endogeneity by using instrumental variables, which are not directly correlated with investment but can be used to predict corruption. This section discusses the instruments and presents estimation results robust to endogeneity of corruption.

It is a challenge to find valid instruments for corruption that do not correlate with error term as

discussed by Shaw et al. (2009) and Treisman (2007). While the literature on determinants of corruption has grown rapidly in recent years, commonly accepted instruments have not been established so far. Some previous cross-country studies employ instruments that are time-invariant and are often derived from a distant past, such as colonial history and ethno-linguistic fractionalization (Mauro 1995) or length of exposure to democracy (Gupta et al. 2002). This solution is not optimal for our analysis since it does not allow to instrument for time-variant corruption levels in our panel data set and since historical data might also influence the current economic conditions through different channels and not exclusively through corruption as discussed in Aidt (2009). While many panel studies of the consequences of corruption employ lagged explanatory variables as instruments (e.g. Gupta 2001; Del Monte and Papagni 2001; Das and Parry 2011), we are reluctant to use this strategy because it fails to eliminate the endogeneity problem for reasons summarized in Reed (2015) and Bellemare et al. (2015).[17] Instead, we turn to a contemporary determinant of corruption that has been widely supported empirically.

Our suggested instrument for corruption is freedom of the local press. Previous literature has found persistent evidence that a free and independent press reduces corruption across countries (e.g. Brunetti and Weder 2003; Chowdhury 2004; Freille et al. 2007); a recent study by Schulze et al. (2016) produced similar findings for Russian regions. While some cross-country studies suggest that freedom of press can be endogenous to economic conditions, such as income inequality (Petrova 2008) or oil rents (Egorov et al. 2009), we show that this not the case for a sub-national variation of press freedom in Russia. The idiosyncratic nature of regional press freedom is corroborated by the previous literature on regional media in Russia and our empirical evidence as discussed further.

Following Schulze et al. (2016), we adopt the same data on freedom of press across Russian regions to construct our instrument. The data were provided by a non-governmental organization of journalists, *Glasnost Defense Foundation* (GDF), which conducted three surveys across 78 Russian regions in 2006, 2008, and 2010.[18]

The GDF ranking is similar to the Freedom House index of freedom of press used by cross-country

17 They find that lagging dependent variables shifts the channel of the endogeneity bias and imposes an untestable assumption of „no dynamics among unobservables".

18 Surveys provide data for all the regions except one: Chukotka Autonomous Okrug.

studies as it is based on the opinions of local journalists and experts of mass media, but it is relatively more simple and straightforward. While the Freedom House index is assembled by weighting various aspects of press freedom derived from a structured survey, GDF asks its experts only to evaluate regional press freedom in Russia across four categories: "free", "relatively free (characteristics of free press are partially observable)", "relatively unfree (characteristics of free press are barely observable)", and "unfree". The categories are not strictly defined, but the experts are offered a set of guideline questions to make their evaluation. All three surveys are produced by the same methodology and the same set of regional experts.

As not a single region was ranked as „free", our main concern was whether a „relatively free" press is sufficiently strong to discourage public officials from corrupt practices. Yet, Schulze et al. (2016: 155) show that there is still less corruption when a region is classified as „relatively free". To test the statistical power of the ranking from GDF surveys to predict corruption, we construct a variable (FREEPRESS) similar to Schulze et al. (2016): we set a value of one in a year when a region is considered as "relatively free" by experts and zero otherwise for the years 2006, 2008, and 2010. The values for 2007 and 2009 are linearly interpolated. Table 5, column 1 reports a regression of our corruption measure on relative freedom of press: it is associated with a decrease of 29.3% of the standard deviation in corruption, and the effect is significant at the 10% level. The low explanatory power might be caused by the imprecision of our freedom measure: FREEPRESS may correctly indicate the presence of independent journalism, but it tells us little about its power to criticize local authorities.

A particular aspect of the free press that is suggested by the methodology of Freedom House and directly linked to the ability of journalists to carry out their job is whether their professional rights are violated. The violations of rights can be either physical violence or administrative pressure from the authorities. We assume that the presence of such violations will countervail the effect of free press on corruption. We use data from a joint project of the International Federation of Journalists, the Russian Union of Journalists, GDF and the Center of Journalism in Extreme Situations. The data include incidents of actual physical violence against journalists or its threat, arrests and detentions by the police, censorship, expulsion, and murders.[19] We construct a dummy (VIOLATED) that equals one if at least one violation is

19 The database can be accessed at http://mediaconflictsinrussia.org/ (accessed on 03.02.2017). We did not include

registered in a region in a given year.[20] Column 2 in table 4 demonstrates a strong positive relationship between corruption and the presence of violations: corruption is 16.8% of its standard deviation higher if at least one violation is registered, which is more than a half of the effect of FREEPRESS alone. It seems that violations of press freedom clearly reduce the ability of the local press to hold public officials accountable. We expect that violations are not relevant for the accountability in the regions without any free press as discussed in Djankov et al. (2003: 365). To test this assumption, we create an interaction term of FREEPRESS and VIOLATED, which equals one if at least one violation of press freedom was registered in a region ranked as „relatively free" by GDF experts and zero otherwise.[21] Column 3 in table 4 shows that the corruption reducing effect of a relatively free press shrinks to less than a half of its value if the media are intimidated: the effect of a free press increases through the introduction of the interaction term from -0.139 to -0.295; yet, in the presence of violations media, freedom has an effect of -0.111 only; the simple presence of violations (VIOLATED) has no longer a significant effect. Consequently, we use FREEPRESS and the interaction term VIOLATED*FREEPRESS as our instruments for corruption with their effect reported in column 4, table 4. We find that presence of violations is an important dimension of the ability of press to deter corruption, and it improves significantly the statistical power of our primary measure of press freedom.

Table 4: The effect of regional press freedom on corruption

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | CORR | CORR | CORR | CORR | CRIME |
| FREEPRESS | -0.141* | -0.139* | -0.295*** | -0.318*** | -0.045 |
| | (-1.89) | (-1.89) | (-3.33) | (-4.01) | (-1.24) |
| VIOLATED | | 0.0806** | 0.03 | | |
| | | (2.00) | (0.69) | | |
| VIOLATED*FREEPRESS | | | 0.184** | 0.210*** | 0.011 |
| | | | (2.34) | (3.17) | (0.54) |
| Region FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |

the data on the prosecutions of journalists by the court for several reasons: first, we consider the proceedings of the court to be within a legal framework of Russian law and, therefore, it is not a direct violation of the press freedom; second, a big share of the legal cases are initiated on the account of extremism and nationalistic publications, which are not relevant for the ability of press to keep public servants accountable. If we include the incidents of legal prosecutions of journalists, we find similar results as in our main IV estimation with slightly worse first stage statistics since prosecutions substantially inflate the number of observations with violations present. Results are available upon request.

20 Data on violations are available for the whole period under investigation.

21 For the years 2007 and 2009, VIOLATED*FREEPRESS reports the presence of violations (can equal one or zero) only if the interpolated value of FREPRESS is not zero.

| | | | | | |
|---|---|---|---|---|---|
| Observations | 390 | 390 | 390 | 390 | 390 |
| R2 | 0.07 | 0.08 | 0.10 | 0.10 | 0.77 |

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01. Robust standard errors are clustered at the region level.

To demonstrate that our instruments are not correlated with regional crime rates, we run a placebo regression of our CRIME variable on FREEPRESS and VIOLATION_FREE in column 5, and find no significant relationship.[22]

Table 5 presents the results of the IV estimation with fixed effects and the same control variables as in our basic OLS setting (table 2). It reports the p-values for the underidentification and overidentification tests and the Kleibergen and Paap (2006) weak identification F-statistic from the first stage of IV. The underidentification test yields zero p-values and thus confirms that our instruments are correlated with the endogenous regressor. The test on overidentifying restrictions does not reject the null hypothesis that both instruments are valid and correctly excluded from the estimation equation. The F-statistic from the first stage is above 10, which indicates strong instruments (Staiger and Stock 1997).

Table 5: Effect of corruption on investment, IV estimation with fixed effects

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dep. Variable: | INV_total | INV_priv | INV_pub | INV_for |
| CORR | -0.546** | -0.652** | -0.306 | -1.895** |
| | (-2.36) | (-2.13) | (-0.71) | (-2.30) |
| CRIME | 0.191 | 0.079 | 0.172 | 0.372 |
| | (0.97) | (0.28) | (0.50) | (0.45) |
| Controls | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Observations | 390 | 390 | 390 | 390 |
| Kleibergen-Paap rk Wald F-Stat | 11.28 | 11.28 | 11.28 | 11.28 |
| Underidentification test (p-value) | 0.00 | 0.00 | 0.00 | 0.00 |
| Overidentification test (p-value) | 0.26 | 0.27 | 0.83 | 0.59 |

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01. Robust standard errors are clustered at the region level. Controls include: CRIME, INC, OIL, CPI, GOV, EDU, POP.

22 Unfortunately, we are not able to test how press freedom correlates with the measure of experienced corruption that was available for 2011 since there are too few regions that have a relatively free press and all of them suffer from incidents of violation of press freedom.

Results of IV are qualitatively similar to the OLS estimation: increasing corruption decreases total aggregate investment in fixed capital (column 1), yet, the effect is larger for investment made by companies with private and foreign ownership (columns 2 and 4). Again, there is no statistically significant effect for investment by companies with full state-ownership (column 3). Estimated coefficients are much larger than in basic OLS: now, one standard deviation increase in corruption reduces total investment by 44.4% of its standard deviation, private investment by 46.2%, and investment of companies with foreign ownership by 69.4%.[23] The differences in the size of coefficients between OLS and IV estimations underline the endogeneity of corruption: corruption reduces investment causally, and at the same time a lower investment provides fewer entry points for corruption. Therefore, the OLS estimate for the effect of corruption is lower in absolute value than the IV estimate. Additionally, we show that CRIME as a proxy for the overall crime in the region is not a significant determinant of investment.

The findings suggest that corruption has a strong influence on the level of investment in fixed capital in Russia. The magnitude is striking: if, in 2012, Russia had had a corruption level as low as in 2004, the national economy would have received 16% more investment in fixed capital in 2013. The missing investment amounts to 2.1 trillion rubles (66 billion dollars) in nominal values for 2013 or to about 4% of the gross domestic product of the same year.[24]

The main source of exogeneity of regional press freedom comes from an uneven and accidental development of the local press as described by most of the literature on Russian media (Koltsova 2006, Azhgikhina 2007, Roudakova 2008, Beumers et al. 2008, Erzikova and Lowrey 2010). While federal authorities focused exclusively on restricting press freedom at the national level, local press enjoyed relative freedom (Gehlbach 2010; Lipman 2010). Why did not every region then sustain free press? Erzikova and Lowrey (2012) suggests that press freedom was a result of erratic and provisional alliances between journalists, politicians, and economic elites.[25] Since these alliances were not rooted in clientilistic ties or mutual loyalties (Roudakova 2008), the variation in freedom of press in our sample is idiosyncratic and does

23 The magnitudes are estimated using the standard deviations calculated for the IV sample: years 2007-2011 and 78 regions.

24 Numbers for overall investment in fixed capital and GDP are taken for calculation for the year 2013.

25 Erzikova and Lowrey (2012:138) observe that „power structures at the local level are pluralistic and not absolute: cross-institutional power arrangements are in flux and influential elites are diverse and shifting, sometimes opening cracks for journalistic autonomy".

not exhibit a systematic pattern.[26]

While the aforementioned studies on the Russian media provide mostly qualitative evidence of the random variation of press freedom, we produce an additional quantitative investigation of its potential determinants to show that they are not associated with our instrumental variables.

First, we test empirically several determinants suggested by the previous literature: advertising revenues (Petrova 2011), income inequality (Petrova 2008), oil rents (Egorov et al. 2009), and funding from the government (Di Tella and Franceschelli 2011).[27] Petrova (2011) shows that growth in the advertising market in 19th century USA was responsible for the independence of American newspapers; we test this hypothesis in a similar way by running a regression of FREEPRESS on logarithm of average per capita revenues in regional advertising (ADVERTISING_REVENUE). As reported in table 6, column 1, we find no effect of advertising on our measure of free press.[28] Petrova (2008) suggests that rich elites are interested in capturing free media and provides some cross-country evidence for the relationship between media freedom and inequality measured by Gini coefficient (GINI). In column 2, table 6, we show that inequality is not associated with press freedom in Russian regions even controlling for average income as in Petrova (2008). Egorov et al. (2009) predict that nondemocratic regimes may allow freedom of press to improve the quality of its bureaucracy, but the availability of natural resources reduces these incentives and free media is less likely to exist in resource-rich countries. Egorov et al. (2009) empirically find a strong negative relationship between oil measured as oil production and media freedom. Following them, we employ our previous variable for oil production (OIL) to test this relationship in our data set. Column 3 in table 5 reports no association between OIL and FREEPRESS. Finally, another determinant of press freedom as suggested by Di Tella and Franceschelli (2011) is monetary transfers from the government. Monetary transfers for media is captured by a logarithm of per capita budgetary expenditures for television, radio-broadcasting, and newspapers in the region (PRESS_GOV). The regression coefficient of PRESS_GOV in column 4 is insignificant and close to zero.

26 The chaotic environment of regional media was typical for Russia and best summarized by Koltsova (2001:320): „Values are unclear and rules are predominantly informal, individuals identify themselves with their institutions very loosely, and act counter to institutional interests; agents make choices in an atmosphere of uncertainty and relatively low predictability; their decisions are situational and their strategies are short-term".

27 For a review of literature on media freedom and media capture see Enikolopov and Petrova (2015).

28 The number of observations is lower due to missing data points for several regions.

Second, we look at characteristics of regional media to show that free press is not different from unfree media in any dimension other than its ability to scrutinize regional public officials. We collect data on average salaries of employees in the television and radio-broadcasting sector relative to the average salary in the region (PRESS_SALARY) as a proxy for the income of journalists, and the data on the average annual number of employees in the television and radio-broadcasting sector (PRESS_SIZE) as a proxy for the size of the local press. Both variables yield insignificant regression coefficients as reported in table 6, column 5, which means that a free press is not driven by a better pay of journalists or the size of the media sector. The same conclusion can be made after regressing of FREEPRESS on logarithm of average per capita revenues of the television and radio-broadcasting sector (PRESS_REVENUE): column 6 shows that regions with free press do not have a higher aggregate revenue of media outlets than other regions.

Table 6: Determinants of press freedom

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dep. Variable: | | | FREEPRESS | | | |
| ADVERTISING_REVENUE | -0.005 | | | | | |
| | (-0.18) | | | | | |
| INC | | 0.614 | | | | |
| | | (1.50) | | | | |
| GINI | | -3.001 | | | | |
| | | (-0.67) | | | | |
| OIL | | | 0.001 | | | |
| | | | (0.38) | | | |
| PRESS_GOV | | | | 0.071 | | |
| | | | | (1.37) | | |
| PRESS_SIZE | | | | | -0.006 | |
| | | | | | (-0.06) | |
| PRESS_SALARY | | | | | 0.001 | |
| | | | | | (0.72) | |
| PRESS_REVENUE | | | | | | 0.002 |
| | | | | | | (0.09) |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 298 | 390 | 390 | 390 | 390 | 360 |
| R2 | 0.02 | 0.03 | 0.01 | 0.02 | 0.02 | 0.01 |

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01. Robust standard errors are clustered at the region level.

Since the literature on the determinants of violations of journalists' rights is scarce, we run the same

estimation tests for our second instrumental variable VIOLATED*FREEPRESS. Table 7 shows that the presence of violation of rights of journalists in regions with free press is independent from revenues in advertising (column 1), average income and income inequality (column 2), natural resources (column 3), transfers from regional budget (column 4), average relative salary, and size of television and radio-broadcasting sector (column 5) or its aggregate revenues (column 6). Results also hold if we control for the presence of free press.[29]

Table 7: Determinants of violations of rights of journalists in regions with free press

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dep. Variable: | VIOLATED*FREEPRESS | | | | | |
| ADVERTISING_REVENUE | 0.016 | | | | | |
| | (0.61) | | | | | |
| INC | | 0.685 | | | | |
| | | (1.45) | | | | |
| GINI | | -2.252 | | | | |
| | | (-0.43) | | | | |
| OIL | | | 0.002 | | | |
| | | | (0.91) | | | |
| PRESS_GOV | | | | 0.087 | | |
| | | | | (1.08) | | |
| PRESS_SIZE | | | | | -0.063 | |
| | | | | | (-0.60) | |
| PRESS_SALARY | | | | | 0.003 | |
| | | | | | (1.27) | |
| PRESS_REVENUE | | | | | | 0.012 |
| | | | | | | (0.45) |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 298 | 390 | 390 | 390 | 390 | 360 |
| R2 | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.02 |

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01. Robust standard errors are clustered at the region level.

Freedom of press can influence economic outcomes only via an accountability channel as suggested by the existing literature (e.g. Brunetti annd Weder 2003; Besley and Prat 2006; Bhattacharyya and Hodler 2015). As we show that regions with and without free press are not significantly different, we also exclude the possibility that investment and freedom of press are simultaneously driven by any omitted factor.

29 Results are available upon request.

## 4. Robustness check

One concern about the reliability of our results arises from the nature of the corruption measure, which was generated by police authorities and could be associated not only with corruption but also with regional characteristics of law-enforcement. Schulze et al. (2016) demonstrate a strong correlation between the number of registered cases of bribe taking and the resolution rate for major and most serious criminal offenses (crimes penalized with imprisonment of 5 years or more) as reported by the police. We include resolution rate (RESOLUTION) in the IV estimation in Table 8. Our main results remain unaffected by the proxy for police efficiency; RESOLUTION is not a significant predictor for any investment variables.

Table 8: Robustness check for the resolution rate of major criminal offenses, IV estimation with fixed effects

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dep. Variable: | INV_total | INV_priv | INV_pub | INV_for |
| CORR | -0.538** | -0.643** | -0.300 | -1.920** |
| | (-2.33) | (-2.07) | (-0.70) | (-2.25) |
| RESOLUTION | -0.002 | -0.003 | -0.003 | 0.019 |
| | (-0.71) | (-0.79) | (-0.65) | (1.47) |
| Controls | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Observations | 390 | 390 | 390 | 390 |
| Kleibergen-Paap rk Wald F-Stat | 10.986 | 10.986 | 10.986 | 10.986 |
| Underidentification test (p-value) | 0.002 | 0.002 | 0.002 | 0.002 |
| Overidentification test (p-value) | 0.262 | 0.280 | 0.835 | 0.542 |

Notes: t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01. Robust standard errors are clustered at the region level. Controls include: CRIME, INC, OIL, CPI, GOV, EDU, POP.

## 5. Conclusion

Our paper finds a strong effect of corruption on regional investment in fixed capital. The effect is robust to controlling for social-economic conditions and the endogeneity of corruption by using freedom of press and violations of journalists' rights as instrumental variables.

Our research is novel in several aspects: First, we employ a new data set on registered cases of bribe taking by public officials in order to create a better proxy for corruption as compared to conventional

perception-based data. The data allow to run a panel regression model for the Russian regions controlling for various factors and region-specific and time fixed effects. The use of an alternative corruption measure produces similar results.

Second, we employ freedom of press and violations of journalists' rights as new instruments for corruption that have not been used in the literature before. The exogeneity of our instruments comes from an idiosyncratic development of regional mass media in Russia as reported by the existing literature on Russian regional journalism and confirmed by our additional empirical tests. Freedom of press has an effect on investment by reducing corruption through improving the accountability of public officials, but does not correlate with regional economic conditions or characteristics of local mass media or even direct financial support from the government. This instrument is complemented by adding the interaction between press freedom and violation of journalists rights as (relatively) free and unintimidated press are able to reduce corruption levels much more effectively than if they are the object of repression.

Third, we are able to differentiate between different ownership-types of investment. While previous studies show the effect of corruption mostly on the aggregate investment, our findings suggest that corruption mainly affects investment made by privately owned companies and not investment made by companies with full state-ownership. The effect of corruption is particularly large for companies with foreign ownership.

Finally, our study contributes to the literature on consequences of corruption in Russia. The country offers an extremely interesting environment for corruption research due to heterogeneity in both regional corruption and social-economic conditions, and it has not been sufficiently studied previously. Our findings provide important evidence on the reason behind an increasing under-investment in the country. We estimate that the increase in corruption during the period under investigation is responsible for the lack of 16% of national investment in fixed capital in 2013 and that the share of missing investment is likely to remain constant in the upcoming years if corruption maintains at the current level.

While the empirical evidence presented in this paper emphasizes the detrimental role of corruption for the economy in developing countries, it also suggests a policy implication for fighting corruption: corruption may be reduced by sustaining freedom of press and allowing journalists to carry out their

professional duty independently without the risk to be censored, oppressed, or physically harassed. As a consequence, regions will see growth in fixed capital investment and thus in GDP.

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