Tax Evasion and Growth: Evidence from Russia

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Abstract

This paper examines the effect of tax evasion on firm growth using a unique set of data that contains 236 million banking transactions of 1.7 million Russian firms during the period 2003 to 2004. First, income diversion in Russia was estimated to be 11.3%–13.1% of GDP, which corresponds to tax evasion of 4.6%–5.8% of GDP. Second, this study develops a direct measure of tax evasion for 46,965 companies and finds that, on average, firms divert 5.7% (31.2%) of their revenue (assets) per year. The paper then documents a negative relation between tax evasion and firm growth. One standard deviation increase in tax evasion is associated with a 1.7%–2.0% (0.7%–0.9%) decrease in the growth of revenue (assets). Finally, the paper examines several factors that could explain this result and finds that tax evaders face restricted access to capital markets. One standard deviation in tax evasion corresponds to a 5–191-basis point increase in debt interest rate. Tax evaders also were found to experience a decline in productivity.

Keywords: Tax evasion, tax avoidance, firm value, growth, governance

JEL Codes: G32, G34, H25, H26, K34

Introduction

The role of taxes in corporate finance has been in the focus of a large body of literature in the last 50 years; for example, see Graham (2003) for a detailed literature review. Although tax evasion is

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a factor of any tax system, remarkably few studies have analyzed how avoiding tax affects a firm's performance. The lack of evidence is not surprising: Tax evasion is difficult to identify and even more difficult to quantify. The absence of reliable measures of tax evasion is the main impediment to conducting empirical research in this area.

From a theoretical perspective, tax evasion could be described as two sides of the same coin. On one side, tax evasion is a transfer of money from the government to a firm; thus, it should increase firm value. On the other side, tax evasion fosters agency problems; therefore, it should decrease firm value. Few recent studies provide empirical evidence on this topic. The seminal paper by Desai, Dyck, and Zingales (2007) analyzes the interaction between corporate taxes, tax avoidance, corporate governance, and corporate market value. They provide evidence that an increase of tax enforcement in Russia was associated with a positive market reaction.

This paper provides three contributions to the literature. First, it develops a direct measure of tax evasion for a sample of 46,965 firms. Second, the paper reports that profitable and unprofitable firms evade different tax types. Finally, it documents a negative relation between tax evasion and growth. This paper extends the analysis of Desai, Dyck, and Zingales (2007) by providing comprehensive empirical evidence why tax avoidance and firm value might be negatively related.

First, the paper reports a new method developed to directly measure tax evasion. The method is based on the identification of special-purpose entities called *spacemen*, which are short-lived firms created for income diversion purposes. To identify spacemen, a unique set of Russian banking transaction data for the period 2003–2004 was used. This data set, which leaked to the public from the Russian Central Bank in 2005, contains 234 million transactions of 1.7 million firms and covers 75%–80% of all banking transactions made in Russia during 2003 and 2004. Each transaction has a detailed description. Empirically, *spaceman* is defined as a firm that pays either zero taxes or infinitesimal taxes relative to its turnover. The Russian tax system requires even an unprofitable firm to pay value added tax (VAT), social security tax (SST), and property tax. Hence, the identification criteria guarantee that such a firm cannot survive even a simple examination by tax authorities. Because a chief executive found guilty of tax evasion is subject to significant fines and even imprisonment, spacemen are typically registered in the names of persons who have lost their identifications or are homeless. Using the criteria stated here, the study identifies 42,483 spacemen. According to the data, an average spaceman exists for 1.5 years and has about $470,000 of monthly cash receipts, four times higher than those of a regular firm's average.

The use of spacemen is popular among all types of Russian firms, from very small ones to very large ones. Consider as an example Gazprom, the largest natural gas producer in Russia. The total

net transfer by Gazprom affiliates to spacemen is estimated to be $1.4 billion in 2003–2004. The mechanism of tax evasion identified in this paper is similar to one used by the infamous Long-Term Capital Management (LTCM) in 1996-1997[1] when it decreased its taxable income by $106 million using artificially created losses of several special-purpose entities. The spacemen schemes work exactly in the same way. Companies record expenses that never took place. The income diversion using spacemen schemes is estimated at $49 billion in 2003 and $77 billion in 2004, which corresponds to 11.3% and 13.1% of GDP, respectively. By transferring funds to spacemen, a firm typically evades VAT (18% rate), profit tax (24%), dividend tax (9%), SST (2%–35.6%), and personal income tax (13%). Depending on the use of the funds, tax evasion using spacemen schemes can be estimated as 4.6%–5.0% of GDP in 2003 and 5.0%–5.8% in 2004.

Second, three measures of tax evasion were constructed at a firm level: net transfer to spacemen as a percentage of firm's total banking payments $ShadowP$, net transfers to spacemen as a percentage of revenue $ShadowR$, and net transfer to spacemen as a percentage of assets $ShadowA$. The calculation of these measures of tax evasion for a sample of 46,965 firms identified the average amount that a company transfers to spacemen to be 7.0% of its total payments, 5.7% of its revenue, or 31.2% of its assets per year. Large companies evade less taxes than small ones. The largest 468 companies in the sample used here (the top 1 percentile) divert 2.9% of their assets per year. These estimates of tax evasion for large companies are much less than ones that Graham and Tucker (2006) reported. Using a sample of 44 U.S. tax shelter cases, they show that the average tax deduction produced by tax shelters is 9% of firm asset value. Based on this finding, we cannot conclude that Russian companies evade less in taxes than U.S. companies. The likely explanation for this difference is the selection bias. Graham and Tucker estimate tax shelter activities for only the companies that were accused of tax evasion whereas this paper estimates tax evasion for all companies.

Several tests were performed to verify the three measures used here. The first step was to analyze the relation between tax payments and transfers to spacemen. All tax evasion measures are negatively related to profit tax, SST, and VAT payments. One standard deviation increase in $ShadowP$ ($ShadowR$, $ShadowA$) corresponds to a 12% (15%, 12%) decrease in profit tax, a 14% (16%, 14%) decrease in VAT, and a 15% (19%, 13%) decrease in SST. Next, the differences in tax evasion behavior between profitable firms and unprofitable firms were analyzed. Because the unprofitable firms do not pay profit tax, they do not need to use spacemen for profit minimization. Therefore, they use spacemen money only to pay under-the-table salaries (evading SST, VAT, and personal income tax) and/or to reclassify expenses (payment for non-VAT expenses that are reported as payment for

[1] See e.g. New York Times, August 28, 2004 for the story

VAT expenses). Both activities should positively impact reported profitability because they decrease actual costs. Contrary to firms with losses, profitable firms also use spacemen to pay under-the-table dividends (evading profit tax, VAT, and dividend tax) and therefore decrease reported profit. Aligned with these theoretical predictions, these tax evasion measures were found to be negatively related to the reported profitability of profitable firms and positively related to reported profitability of firms with losses. Finally, this paper reports that, as predicted by theoretical analysis, $1 transferred to spacemen generates the same VAT savings both for profitable and unprofitable firms.

It is estimated that profitable firms use 56% of transfers to spacemen to make dividend payments, 24% for under-the-table salaries, and 20% of non-VAT expenses (reclassification of expenses). Firms with losses use 22% of spacemen money to pay under-the-table salaries and 78% for reclassification expenses. Based on these estimations, the calculation is that for profitable firms, an average dollar transferred to spacemen decreases their reported profit by 29¢ whereas for firms with losses, $1 transferred increases reported profit by 26¢.

Third, having built a direct measure of tax evasion, the paper analyzes the relation of tax evasion to growth. It is not clear whether tax evasion should increase or decrease firms' growth opportunities. On the one hand, tax evasion creates a competitive advantage via lower costs. Thus, tax evaders can offer lower prices and gain market share from nontax evaders. On the other hand, tax evasion might be associated with additional agency costs and restrict access to capital markets. The empirical results of this study show that tax evasion is negatively related to firm growth. One standard deviation increase in the tax evasion measures is associated with a decrease of 1.7%–2.0% in annual revenue growth rate and with a decrease of 0.7%–0.9% in the growth rate of assets. Similar results are obtained using instrumental variables (IV) regressions for Moscow firms. The study used local tax offices assigned to a particular firm as instrumental variables. Moscow city has 36 local tax agencies, each of which is assigned to a firm based on its address of registration. Except for this distinction, all Moscow firms operate in the same or similar corruption and business environment. Therefore, the local tax agency affects a firm's tax evasion decisions according to the probability of its detection but does not influence other aspects of its business activities. Economic significance of IV estimates is 2–5 times higher than one of ordinary least squares (OLS) estimates. One standard deviation of instrumented tax evasion measures corresponds to a 4.4%–10.6% drop in revenue growth rate and a 3.2%–6.4% decrease in the growth rate of assets.

Finally, the paper explores two possible reasons for the negative relation between tax evasion and growth. The first possibility is that tax evaders face restricted access to capital markets. To support this hypothesis, the paper documents a strong negative relation between tax evasion and the level

of debt financing. One standard deviation increment in the tax evasion measures corresponds to a 4%–10% decrease in debt financing. Graham and Tucker (2006) document similar evidence for the U.S. companies they studied. They find that debt ratios of firms engaged in tax shelters fall by about 8% compared to companies with similar preshelter debt ratios. However, the lower amount of debt financing of tax evaders compared to that of nontax evaders does not necessarily mean that tax evaders face restricted access to capital markets. For example, Graham and Tucker argue that tax shelter activity is an alternative to a debt tax shield, and tax evaders therefore use less debt financing than do nontax evaders. Another alternative explanation might be that tax evaders are reluctant to disclose their financial statements to banks and therefore obtain less financing than nontax evaders. This is why the more direct evidence of the restricted access to capital markets hypothesis might be comparing the cost of debt financing for tax evaders and nontax evaders. This paper shows that tax evaders face higher costs of debt financing than nontax evaders. One standard deviation increment in the tax evasion measures corresponds to a 57–191-basis point increase in the debt interest rate. In addition to restricted access to capital markets, tax-evading firms were found to experience a decline in productivity over 3 years beginning with the study period (2003–2004). One standard deviation increase in the tax evasion measures is associated with a 1.7%–2.8% decrease in the growth rate of revenue to assets ratio and with a 0.3%–1.1% decrease in the growth rate of revenue per employee ratio. An alternative explanation of these findings might be a significant decline in the use of spacemen after 2003–2004. The government significantly increased tax enforcement in 2000–2002 (Desai, Dyck, & Zingales, 2007), and tax evaders might have lost the competitive advantage during the period 2003–2007; therefore, the increase of tax enforcement in Russia might be another reason that explains the negative relation between tax evasion and growth. Unfortunately, the data used for this study cannot test this hypothesis.

The findings of this paper suggest an additional explanation for the fact that existing empirical studies do not find a strong positive relation between tax avoidance and firm value. Although tax evasion increases today's disposable income, it is negatively related to a firm's growth opportunities and, as a consequence, to future free cash flow. This could be one reason that the possible positive effect of tax evasion on firm value (if any) is much smaller than predicted by a simple theory that tax evasion is simply a transfer of money from the government to shareholders.

This paper contributes to the large body of literature on corporate tax avoidance. Two approaches to measure corporate tax avoidance are used in the literature. The first one, the indirect method, is based on book-tax gap and can be applied to large samples of U.S. and international firms. Using this method, Mills (1998) shows that firms cannot costlessly maximize financial reporting benefits and tax

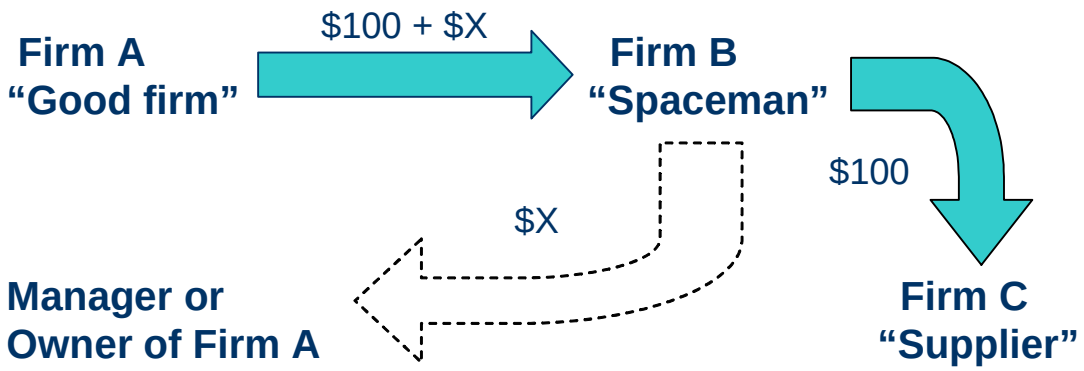
savings independently. Desai and Dharmapala (2006) build a measure of tax avoidance based on the component of the book-tax gap not attributable to accounting accruals. They show that increases in incentive compensation tend to reduce the level of tax sheltering. Based on the similar book-tax gap measure, Desai and Dharmapala (2009) show that the effect of tax avoidance on firm value is not significantly different from zero but is positive for well-governed firms. The second approach is based on direct evidence of tax evasion and usually can be applied only to restricted samples based on data availability. Fisman and Wei (2004) measure tax evasion based on the difference between Hong Kong's reported exports to China at the product level and China's reported imports from Hong Kong. They show that 1 percentage point increase in the tax rate is associated with a 3 percent increase in evasion. Desai, Dyck, and Zingales (2004) document the direct evidence of tax evasion by major Russian oil corporations. They estimate tax evasion based on the difference between the market price of oil and the sales price of oil to affiliated intermediaries of Russian oil companies located in tax heavens. Desai, Dyck, and Zingales show that the increase in tax enforcement in Russia was associated with a positive market reaction. To the best of author's knowledge, the only study that uses a direct measure of tax avoidance for U.S. companies is the Graham and Tucker (2006) study. That study gathers a unique sample of 44 U.S. tax shelter cases for investigating the magnitude of tax avoidance activities and reports that the average tax deduction produced by the tax shelters is 9% of firm asset value. The current paper follows the latter approach to measure evasion. It directly measures tax evasion for the entire Russian economy (the world's sixth largest economy in 2008 according to the World Bank). At the moment, data limitation does not allow the extension of this research to other economies. However, if banking transaction data of some off-shore jurisdictions become available to the public, one can easily apply this methodology to measure tax avoidance of international companies.

The remainder of the paper is structured as follows. Section I gives background information on income diversion using spacemen. Section II describes the data and the spacemen identification strategy. Section III identifies the tax evasion measures used in this study and provides several tests used to verify the measures. Section IV discusses the relation of tax evasion and growth, and Section V concludes the paper.

I Income Diversion Using Spacemen

The main types of tax evasion in Russia can be classified as legal, illegal, and semilegal. The legal schemes typically involve the use of external or internal off-shore-affiliated companies in areas that have low tax regimes. For example, in 2001, Sibneft decreased its income tax by 10 billion rubles [RUR] ($330 million) by selling oil through several traders registered in low-tax zones in Chukotka

and Kalmykia (*Vedomosti*, 2002). Desai, Dyck, and Zinglales (2004, Table III) report cases of enormous income diversion in Russia using these legal schemes. For instance, although the average domestic price of oil (net of taxes) in 1999 was $7.20 per barrel and the average export price of oil (net of export costs and excise taxes) was $13.50, Yukos production subsidiaries sold oil for $1.1–$1.8, and Sibneft subsidiaries sold it for $2.2. Desai, Dyck, and Zinglales provide evidence that virtually all major Russian oil companies were involved in tax optimization using transfer pricing. The illegal schemes are usually associated with underreporting of revenues, so called black cash transactions (see Yakovlev, 2001). Black cash tax evasion is widespread among small and medium-size enterprises, but large firms rarely use it. Finally, one of the most popular methods of tax evasion involves using semilegal schemes when companies divert cash flow by inflating expenses through fake contracts. For example, firm A wants to evade $X, so it makes a deal with firm B for rendering goods or services that have a true value of $100, but firm A pays firm B $100 + $X. Firm B pays $100 to a real supplier (firm C) that delivers goods or services and returns $X to firm A's manager or owner. Firm B, often called a *spaceman*[2], comes from nowhere, does not perform any real activities, pays almost zero taxes, and disappears ("flies into space") in 0.5 to 2.0 years. Spacemen are specifically created for tax evasion purposes and are typically registered in the names of homeless people or persons who have lost their identification and usually do not know that they are registered owners of a firm. Some portion of the money a spaceman receives might then be sent to a real supplier or transferred to another spaceman, but the majority of the money is typically returned to the initial sender (firm A) in the form of cash, or a sight draft. Cash flow diversion using spacemen typically involves long chains of transactions with each transaction appearing to be legitimate; however, the entire scheme is illegal.



There are two types of spacemen. The first does not submit accounting statements to authorities and pays no taxes at all. This type of spaceman can exist for only 1 year or even less. High probability

[2]This type of firm is also called a "dump," "flash-light," "bruise," and "hedgehog". See *Vedomosti* (2005b) for a detailed description of these firms.

of tax inspection of firms that do not submit a tax report cause a spaceman to have such short existence. The second type of spaceman imitates the activity of a small firm: It regularly submits financial reports to authorities and pays nominal taxes. According to an unwritten rule, newly created small firms have their first tax inspection only after 2 to 3 years of operations. When this safe time ends, tax authorities would find that a spaceman's banking transactions do not match its submitted reports; however, by this time, the spaceman is no longer operating, the owner or the chief executive is impossible to find, and the bank account is empty. This type of spaceman can be in business for 2 years or slightly more, much longer than the other type

The costs associated with creating a new spaceman usually do not exceed $400, and law firms that specialize in registering new businesses often sell spacemen that are already registered (in their ads, they call spacemen firms "ready for use"). The marginal cost of operating a spaceman is the bank commission (around 0.5%–1% of cash withdrawal). Small and medium firms usually do not have their own spacemen but pay a 1%–3% commission to organizations specializing in providing spacemen services. Radaev (2001) gives a detailed description of this type of semilegal scheme.

What restricts companies from stealing indefinitely? If managers can evade taxes using spacemen, why do they pay taxes at all? In private talks, Russian entrepreneurs note that they should pay some minimum level of tax payments. This level is usually negotiated between an entrepreneur and the authorities and depends on political connections, the importance of each tax payer to the regional budget, and so on. Many entrepreneurs employ relatives of tax inspectors to ensure good relations with tax authorities and to obtain a lower level in the minimum tax categories. In exchange for tax breaks, entrepreneurs are friendly to authorities (e.g., finance elections). For instance, while it is well known that almost all Russian oil companies in 1998–2003 evaded taxes using off-shore traders, only Mikhail Khodorkoversuskiy (head of Yukos[3]) was jailed for tax evasion – and only after he began to finance opposition parties. Therefore, even though no formal criteria define the maximum level of allowed evasion for each entrepreneur, two main factors affect this level: political connections and goodwill to authorities.

[3]In 2003, Yukos was the largest Russian company according to market capitalization. It was accused of tax evasion and forced into bankruptcy. Yukos' assets were sold in 2004–2005 via auctions.

II Data

II.A Banking Transaction Data

The main data set for the empirical work for this study is the banking transaction data for 2003 and 2004. It was leaked to public from the Russian central bank in 2005[4]. These data can be purchased from several Web sites[5]. The data used here were bought from ViveData[6] for $500. This data set includes transactions that took place within Russia only. It does not include operations in foreign currencies, nor does it include transactions made within the same bank (i.e., when a firm pays a supplier that has an account in the same bank). Nor does it include cash deposits and cash withdrawals (i.e., the data do not include daily cash receipts a firm deposits into its bank account).

The data set contains 236 million transactions of 1.7 million firms. Each entry has information on the payer, recipient, date, and amount as well as a detailed description of each transaction. The transactions range from very large to tiny. For example, the data show that on January 26, 2004, Gaztaged, a 100% subsidiary of Gazprom, paid 538 million rubles ($18 million) to Trubniy Torgoviy Dom for pipes for YamalGazInvest. In contrast, Rosneft paid its rental fee for a water cooler of 637 rubles ($21) on July 9, 2003, to Selivanovskaya Voda. This data set allows cash movements for almost every firm in Russia over the 2003–2004 period to be tracked. Using this data set, *Vedomosti, a* Russian business daily, (2005¢) tracked the most notorious acquisition deal of 2004 in which YuganskNefteGaz, the main Yukos production subsidiary, was bought by an unknown firm BaikalFinanceGroup (BFG), which was later acquired by Rosneft. *Vedomosti* reveals that on December 15, 2004, Gazpromneft and BFG transferred 49.35B rubles ($1.75B) each as an advance payment for YuganskNefteGaz, and on December 30, 2004, BFG finalized the transaction by transferring 211.4B rubles ($7.5B) to the Department of Justice.

To reduce measurement error – specifically, misprinted taxpayer numbers (INNs) – all firms that had fewer than 10 transactions over the entire sample period were excluded[7]. Of 1,677,693 firms in the sample, 310,040 appeared only once, 139,553 appeared twice, and 353,973 had 3 to 10 transactions during the 2003–2004 period. In spite of the large number (803,566) of firms with fewer than 10 transactions, they account for only 0.3% of the total turnover. Banks, financial service firms, and insurance companies were excluded from the analysis. Individual entrepreneurs and very small companies (monthly revenue less than 100,000 rubles [$3,300]) also were dropped because they cannot be

[4] Vedomosti (2005a) discusses this incident.

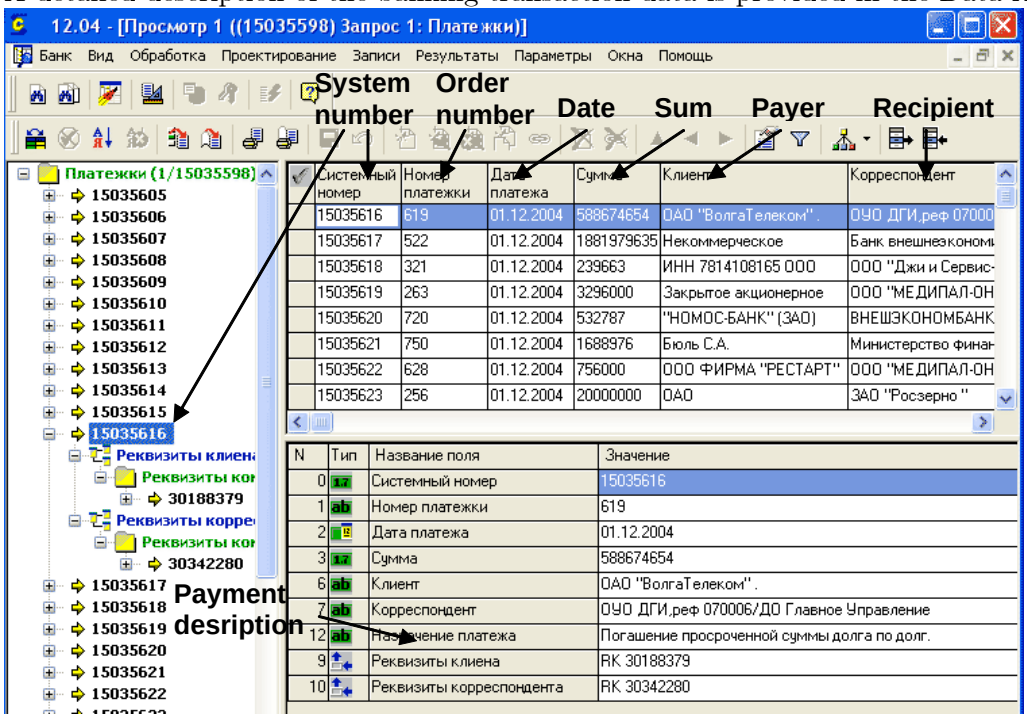
[5] For example, www.mos-inform.com, www.specsoft.info, and www.wmbase.com.

[6] www.vivedata.com.

[7] It might be the case that the same typo in INN presents more than once. For example, if an internal database of firm A contains a typo in INN of firm B, then each time firm A transfers money to firm B, we will observe the same typo in the banking transaction database.

spacemen according to the definition used here[8]. Because firms pay the VAT and the income tax on a quarterly basis in Russia, this study includes only firms that had at least one transaction before October 1, 2004, in the analysis. Exclusion of firms that were begun in the last quarter of the sample period leads to underestimation of income diversion for the fourth quarter of 2004 because spacemen created during this period cannot be identified. This leaves a sample of about 207,000 companies.

A detailed description of the banking transaction data is provided in the Data Appendix.



There is no exact evidence how these data were leaked. An internal investigation of the Russian Central Bank did not yield any results. However, after the scandal caused by the leakage, the central bank stopped the leakage and therefore no banking data for 2005–2008 could be obtained. Babkin (2005), an economist with the Russian Central Bank, observes that many commercial banks commonly use this data set for credit rating evaluation. Using these data banks can verify the accuracy of financial statements, analyze firms' key customers and suppliers, and investigate a firm's financial activities with its affiliates. Note that some Russian media articles state that this data set contains only those transactions made through a Moscow branch of the Russian Central Bank. This hypothesis is tested next.

[8] As described in Section I, the fixed costs to set up a spaceman start from $400, and the marginal costs start at 0.5% of turnover. Considering the fact that a spaceman lives only 1–2 years, it is not profitable to operate spacemen with an average turnover of less than $3,300 per month.

II.B Can We Trust the Data?

Because the Russian Central Bank never confirmed the authenticity of the data, this study examined whether the banking database contains transactions of real companies and how complete it is. For this purpose, the Rosstat[9] database of Russian companies provided by Spark[10] was used. This database contains a firm's INN, name, region, date of registration, industry, directors, owners, and other identifying information about the firm. In addition, it contains basic accounting data, such as revenue, profit, net income, assets, and debt. According to the Russian law, all firms (even small ones) must report their balance sheets and income statements to Rosstat on a quarterly basis. Although this law does not set any explicit penalty for firms that do not report, the majority of Russian firms prefer to report their data to Rosstat to maintain good relations with the tax authorities. Rosstat contains accounting data for about 1.5 million Russian firms. If the banking data used here are accurate, there should be a large degree of similarity between the Rosstat data and the banking data.

Test 1. Matching Rosstat to Banking Data

Using the Rosstat database, up to 3,000 companies with highest revenues from the 20 largest Russian regions were selected for the study[11]. Columns (1) and (2) of Table I contain average revenue for 2003 for every region. Clearly, an average company from Moscow has about 15 times higher revenue($98.4M) than that of an average one from outside of Moscow ($6.3M). This is not surprising because the majority of large Russian corporations that operate in different regions have their headquarters in Moscow (e.g., Gazprom, United Energy System, Lukoil[12], Rosneft, Russian Railways, Aeroflot[13]). According to expert estimates supported by Rosstat data, about 80–90% of all Russian business activities are concentrated in Moscow.

This sample of companies was matched to the banking database by INN. Columns (3)–(5) of Table I show the results: 71% of the firms from Rostat are also present in the banking database. The match rate for Moscow city and Moscow region (94–97%) is much higher than the match rate for other regions (49–84%, average 69%)[14]. The results of this test are consistent with the hypothesis that the database leaked from the Moscow branch of the Russian Central Bank because the probability that a Moscow firm uses a Moscow bank is much higher than that of a regional firm using a Moscow bank. Also, an

[9] Rosstat is an official Russian statistical agency.

[10] spark.interfax.ru

[11] Spark allows up to 3000 companies to be selected in one selection. Because some companies' records are missing INNs (the primary ID number in this study), the study has a sample of 58,527 companies, not 60,000

[12] The largest private Russian oil production company.

[13] The largest Russian airline company.

[14] A previous version of this paper used a sample of 100 random companies from the 20 largest regions (2000 firms in total). The results were similar: 90%–92% match for Moscow city and Moscow region and 67% average match for other regions.

average firm from column (4) has 30% greater revenue than an average one from column (2). The regional firms caused this difference in size. This result is also consistent with the hypothesis of leakage from Moscow because the probability that a large regional firm has an account in a Moscow bank is much higher than that of a small regional firm having one. See column (6) of Table I for the results of the match weighted by revenue. Even for firms from outside Moscow, the match rate is 79%–97% with an average of 90%. Columns (7)–(10) show firms that have at least 100 banking transactions present in the banking data set. As expected, these companies are much larger; the average revenue of a firm from column (8) is $23.2M whereas the average revenue of a firm from column (4) is $13.9M. Even though only 39% of the firms from the original sample have at least 100 transactions in the banking database, they account for about 85% of the total revenues.

[Insert Table I here]

Summarizing the results of this test leads to the conclusion that this study's banking data set is significantly biased toward Moscow. Of the 3000 largest firms from Moscow city and Moscow region, 94%–97% are present in the banking database (90%–95% have at least 100 transactions). The match rate for firms outside of Moscow is much lower; on average, 69% of regional firms are present in this study's banking data set (account for 90% of the total revenues) and only 34% of them have more than 100 transactions (account for 76% of the total revenue). Because about 80–90% of financial and business activities are concentrated in Moscow, this data set covers 75% –80% of the banking transactions of all Russian firms.

Test 2. Matching Banking Data to Rosstat

From this banking data set, 1,000 firms were randomly chosen. To avoid inclusion of spacemen, only those firms that have a ratio of tax paid to total turnover of more than 1% were selected[15]. As discussed in Section I, spacemen are less likely to provide their financial statements to authorities and therefore are less likely to be present in the Rosstat database. A comparison of these 1,000 firms with the Rosstat database by INN matched 676 of the 1,000 firms. Why are 32% of the firms not found in the Rosstat database? One possible explanation is the presence of typos in the INNs in the banking database (the Data Appendix describes this problem in detail). Although several attempts were performed to clean this data set, it is possible that not everything was cleaned. Another possible explanation is that due to the lack of punishment for nonreporting, some firms chose not to send their reports to Rosstat

Test 3. Analysis of the Matched Firms

Of the firms that are present in both Rosstat and the banking data set, 500 were randomly selected.

[15] See the next subsection for the reasoning for this selection criteria.

Using similar logic as in Test 2, only the firms that have a ratio of tax paid to total turnover of more than 1% were selected. Then all banking transactions for these 500 firms were chosen from the banking sample, resulting in a sample of about 300,000 transactions. Each firm's transactions that correspond to revenue receipts and profit tax payments according to the description of each transaction were manually classified. Next, these transactions at the firm level for 2003 and 2004 were aggregated. For revenue ($Revenue\_B$) cash basis accounting principles (i.e., if a transaction took place in 2003, it is accounted for in 2003) were used because it is often impossible to determine the time of performing the service from the transaction description. For profit tax payments ($Profit\_tax\_B$), the transaction description was used to identify the period because all tax payments must include the corresponding tax period in the transaction description. $Profit\_B$ is defined as $Profit\_tax\_B/Tax\_rate$. Because a portion of profit tax for 2004 should be paid at the beginning of 2005 and the banking data set used does not have 2005 transactions, $Profit\_B$ for 2004 is underestimated. Reported revenue ($Revenue$) and profit before taxes ($Profit$) for each firm were obtained from the Rosstat database, and $Margin\_B = Profit\_B/Revenue\_B$ and $Margin = Profit/Revenue$ are defined. In addition, a firm's age was calculated as the number of years for which it reports nonzero activities (profit or revenue) during 1994–2005. According to this methodology, a firm's age is between zero to 12 years. The average firm age for the sample employed is 4.04 years.

See Table II for summary statistics and correlations.

[Insert Table II here]

The table data indicate that sample characteristics for the Rosstat data are quite similar to those for the banking data. The correlation between $Log(Revenue)$ and $Log(Revenue\_B)$ is 0.76 for 2003 and 0.56 for 2004, the correlation between $Log(Profit)$ and $Log(Profit_B)$is 0.87 for 2003 and 2004, and the correlation between $Margin$ and $Margin\_B$ is 0.66 for 2003 and 0.49 for 2004. Furthermore, 26%–28% of the firms have banking revenues within [-10%, +11%][16] of the reported revenues, and 64%–71% have their banking and reported revenue within the [–39%, +65%] range[17]. These facts suggest that the banking data set contains real transactions of real firms. However, it is likely that some transactions might be missing or mistyped; otherwise correlations between analogous characteristics should be higher. Figure 1, which plots $Log(Revenue)$ against $Log(Revenue\_B)$ and $Log(Profit)$ against $Log(Profit\_B)$ provides additional evidence of similarity between Rosstat and banking transaction data.

[Insert Figure 1 here]

Three main conclusions were drawn about the data by summarizing the results of these tests. The

[16] ±0.1 in exponential terms.
[17] ±0.5 in exponential terms.

first is that the banking data are real but incomplete. The sample contains data for about 75%–80% of all Russian firms, and data for about two-thirds of them are accurate. Therefore, the sample contains accurate data for about 50%–55% of all Russian firms (*accurate* refers to data that are reported to Rosstat). The second conclusion is that the sample is biased toward the Moscow city and Moscow region, which comes from the fact that the data were leaked from the Moscow branch of the Russian Central Bank. The third conclusion is that the data contain some errors due to misprints or other unknown reasons.

II.C Identification of Spacemen

The tax evasion identified in this study is based on companies' transfers to spacemen. Empirically, spacemen are identified as firms that pay no or only negligible taxes relative to their turnover. The quality of the data does not allow identification of specific tax payments; therefore any transfer to the federal treasury, a tax authority, or a social security fund[18] is treated as a tax payment. This potentially leads to overestimation of a firm's tax burden[19]. A firm is identified as a spaceman if it satisfies all of the following criteria: (a) the ratio of taxes paid to the difference in fund inflows and outflows (*net tax rate*) is less than 0.1%; (b) SST paid is less than 216 rubles ($7.2) per month, which approximately corresponds to one minimum wage[20]; (c) the firm is not an open joint stock corporation; and (d) the firm's fund inflows are higher than outflows. According to the Russian tax system, even a firm with a loss must pay VAT, SST, and property taxes; hence, these criteria guarantee that such a firm cannot survive even a simple examination by tax authorities.

The definition of a firm's gross tax rate is

$$gross\ tax\ rate = \frac{tax\ paid}{(funds\ inflow\ +\ funds\ outflow)/2}$$

Because the price for spaceman services in 2003–2004 started as low as 1%, the nature of their business prevents such firms from paying taxes higher than 1% of average turnover. Therefore, a firm is classified as regular if it has a gross tax rate of more than 1%, and firms with tax rates between 0.1% and 1% represent a mix of spacemen and regular firms and therefore are not attributed to either class

See Table III for summary statistics. Column (1) describes the base sample of the analysis. An

[18] Upravleniye Federalnogo Kaznacheystva (UFK), Otdeleniye Federalnogo Kaznacheystva (OFK), Finansovo-Kaznacheyskoe Upravlenie (FKU), Gosudarstvennaya Nalogovaya Inspekciya (GNI), and Fond Socialnogo Strahovaniya (FSS).

[19] For example, if a local tax inspector sublets a part of its building to a cafe, then each rental payment made by the cafe will be treated as a tax payment.

[20] The minimum wage in Russia was 450 rubles ($15) per month in 2003 and 600 rubles ($20) starting October 1, 2003.

average firm performs 38 transactions per month, has receipts of $283,371, spends $245,640, and has an average tax payment of $7,913 including $288 in SST, which corresponds to approximately a $950[21] average wage bill per firm[22]. Column (2) includes only the firms that received fewer funds than they paid out, and column (3) comprises the firms with more fund inflows than outflows. The percent of spacemen in column (3) is much higher than in column (2) because regular firms can have banking fund outflows higher than inflows, but spacemen cannot. For example, according to the banking data, in 2003–2004, The Seventh Continent (INN 770500562), a large Moscow retailer, had inflows of 10B rubles ($330M) and outflows of 30B rubles ($1B). This situation is common for the firms in this industry because in the retail sector, a significant portion of firms' revenue comes in the form of cash receipts from private individuals, transactions that are not present in the banking data set. In contrast, spacemen will always have banking inflows higher than outflows because, by the nature of their business, spacemen cash out a major part of their inflows, and outflow transactions are not present in the banking data. However, spacemen might be present in column (2) because the banking data set is incomplete; for example, if a spaceman receives revenues from a client from the same bank, transactions for this spaceman are not in the data and therefore cannot be identified. A higher concentration of spacemen in column (3) in comparison to column (2) explains why the firms in column (3) pay lower taxes both in relative and in absolute terms compared to the firms in column (2): the average gross tax rate for the firms in column (3) is 27% lower (5.9% versus 8.1%) than that for the firms in column (2), and in absolute terms, column (3) firms pay taxes almost half ($5,916 versus $11,217) that of column (2) firms.

[Insert Table III here]

Column (4) of Table III contains only regular firms, column (5) comprises regular firms that have fund inflows more than outflows, and column (6) includes only spacemen. These subsample statistics indicate that a spaceman has more than 2.5 times higher monthly turnover than a regular firm ($641,535 versus $251,247) but performs 40% fewer transactions (25 versus 42), so an average spaceman transaction is 4.3 times higher than an average regular firm transaction. Furthermore, a spaceman exists almost 200 fewer days than a regular firm (391 days versus 588 days) when *firm age* is defined as the date of the last transaction minus the date of the first transaction in the sample. These simple statistics exclude several alternative explanations of spacemen, one of which is that these firms have better ability to avoid taxes than do regular firms, and, thus, the firms considered spacemen in

[21] In 2003-2004, Russia had a diminishing marginal social tax scale starting at 35.6% for small wages and decreasing to 2% for wages of more than $20,000 per year. According to the Russian ministry of finance, the effective social tax rate in 2004 was 30.4%. http://www1.minfin.ru/off_inf/769.htm.

[22] This is much lower than a real wage bill because the majority of Russian firms, especially small and medium-size ones, pay also wages "under the table."

this study are actually winners, and regular firms are losers. However, in that case, winners should operate longer than losers on average, but the estimates here show that spacemen have a much shorter life than regular firms. Another possible explanation is that the most spacemen are recently started firms that go bankrupt within a short period of time and therefore pay zero taxes. However, by design, spacemen have fund inflows higher than outflows. Moreover, as the data indicate, spacemen on average have almost four times higher receipts than regular firms ($472,813 versus $121,735), so they are much larger than regular firms. Therefore, we can exclude the hypothesis of recently started bankrupts.

Figure 2 provides further evidence on spacemen nature. The probability that a spaceman goes out of business within 1 year is three to six times higher than that for a regular firm. A comparison of recently created firms with existing ones (presented in the sample before January 20, 2003) indicates that the probability that a recently started regular firm goes out of business within 1 year is about twice as high than that for an existing firm. This is consistent with the survival story: Firms that were present at the beginning of the sample period have a much higher average quality than start-ups; therefore, they have a longer expected life. However, an existing spaceman has a 20% higher chance of closing within 1 year than a start-up spaceman does. This means that a spaceman's longevity does not depend on its performance; therefore, an existing one should cease to exist more quickly just because it is older than a new one.

[Insert Figure 2 here]

See Figure 3 for the density of the age distribution for regular firms and spacemen. The age of spacemen clearly is almost uniformly distributed from about 3 months to 2 years. Because this sample period is only 2 years, this graph underestimates the age of firms; nevertheless, it illustrates that there is a key difference in the longevity of regular firms and spacemen.

[Insert Figure 3 here]

Table IV shows the sensitivity of spacemen characteristics to various selection criteria. Columns (1) and (2) describe the difference between spacemen that do not pay taxes and those that pay some nominal level of taxes. The table shows that spacemen-taxpayers (column [2]) exist about 1 month longer (408 days versus 392 days) and have more than four times higher monthly receipts than spacemen-nontaxpayers ($946,461 versus $231,724). As described in Section I, paying nominal taxes significantly decreases the probability of tax inspection and therefore spacemen-taxpayers can afford to live longer and operate at higher capacity than their nontax-paying peers. Firms in column (3) with a net tax rate of 0.1% to 1% have characteristics somewhere between spacemen and regular firms; see columns (5) and (6) of Table III.

[Insert Table IV here]

Figure 4 depicts the density of the age distribution of firms with net tax rate less than 0.1% (columns [1] and [2] of Table IV) and firms with net tax rate from 0.1% to 1% (column [3] of Table IV). The age density of firms in column (3) spikes around 2 years, similar to the age density of regular firms, although this spike is much smaller. This leads to the conclusion that these firms represent a mix of spacemen and regular firms and hence were excluded from the analysis. Columns (4) and (5) of Table IV are composed of spacemen based on the gross tax rate. The main results are robust to the preceding selection criteria.

[Insert Figure 4 here]

Using the approach discussed, 42,483 spacemen were identified[23]. In 2003, spacemen received 2,324B (RUR) and spent 824B RUR; thus, net transfers to spacemen in 2003 can be estimated as 1,500B RUR, or $49B. The 2004 estimated net transfers to spacemen total 2,223B RUR, or $77B. In GDP terms, net transfers to spacemen were 11.3% of GDP in 2003 and 13.1% of GDP in 2004.

By transferring funds to spacemen, a firm avoids several taxes. If the funds are used to pay dividends are transferred, a firm evades 18% VAT, 24% profit tax, and 9% dividend tax that totals 41%[24]. If the funds transferred to spacemen are used to pay under-the-table salaries, the firm evades 18% VAT tax, 2%–35.6% SST, and 13% personal income tax. According to the Russian ministry of finance, the effective social tax rate in 2004 was 30.4%; hence, total tax evasion in this case is estimated to be 44%[25]. Based on these assumptions, tax evasion using spaceman schemes is estimated to be 4.6%–5.0% of GDP in 2003 and 5.4%–5.8% of GDP in 2004.

II.D Sample of Companies

The sample of 100,313 regular firms identified in previous subsection were matched to Rosstat database by using INN. The number of companies present in the Rosstat database was 89,722; of these, 62,643 have nonzero reported revenues for either 2003 or 2004. As previously discussed, the banking sample used is incomplete, which is why this research chose only those firms for which reported revenues for 2003 and 2004 are relatively close to their banking cash receipts. More precisely, the sample includes the firms for which $|\log(total\ revenue) - \log(total\ funds\ inflow)| < 1$[26], where *total revenue* is the total of reported revenues for 2003 and 2004 taken from Rosstat database, and *total funds inflow* of total cash receipts for 2003 and 2004 were taken from the banking data set. This yields a sample

[23] A list of all spacemen can be found at http://www.mironov.FM/data_spacemen/all_spacemen.xls.

[24] $1 - 1/1.18 \cdot 0.76 \cdot 0.91 = 0.41$.

[25] $1 - 1/1.18/1.306 \cdot 0.87 = 0.44$.

[26] The analysis was also performed using $|\log(total\ revenue) - \log(total\ funds\ inflow)| < 0.5$ inclusion criteria. All main results remain unchanged.

of 46,965 companies. *Profit tax* was estimated as the difference between *EBT* and *Net Income*. Rosstat data do not include VAT and SST, which is why those payments were calculated using a verbal description of payments from the banking data set. Use of this methodology might underestimate VAT and SST because of the incompleteness of the banking data set and inability to classify every payment by using its verbal description.

See Table V for summary statistics. All statistics are averaged for 2003–2004. An average (medium) company has assets of $1.3M ($76K), revenue of $1.6M ($262K), and net income of $118K ($3K). Employment data for 31,622 companies were present in Rosstat. An average (medium) company has 85 (47) employees. Interest payment data were present for 5,554 companies. *Debt Interest Rate* for year t was calculated as $\frac{Interest\ Payment_t}{(Debt_t+Debt_{t-1})/2}$. An average (medium) company pays 12.4% (9.6%) interest on its debt. As the table data indicate, the reported profitability for sample companies is quite low. The average (medium) earnings before taxes (EBT) margin is 2.06% (1.24%), and its net income margin is 1.09% (0.87%). Low reported profitability is reflected in relatively low tax payments. An average (medium) firm pays 1.44% (0.61%) of its revenue as a profit tax, 2.82% (1.44%) as VAT, and 1.49% (0.63%) as SST. Firms from Moscow city and the Moscow region represent 96% of the sample. Two main factors are responsible for the overrepresentation of Moscow firms: the bias of the banking data set toward Moscow and the fact that 80%–90% of all Russian business and finance activities are concentrated in Moscow. As noted in the last row of Table V, an average (medium) firm from the sample performs 1,125 (600) banking transactions per year.

[Insert Table V here]

III Measuring Tax Evasion

III.A Construction of Tax Evasion Measures

Tax evasion was calculated at the company level as the sum of net transfers to spacemen. This approach to measuring evasion captures only one channel of tax evasion and does not cover other ways to evade taxes. For example, it does not indicate evasion related to transfer pricing, which Desai, Dyck, and Zinglales (2004) document to be enormous in Russia. However, the channel being measured in this study is quite substantial. As discussed in the previous section, tax evasion using spacemen accounts for about 5%–6% of GDP.

Note that not all of the monies transferred to spacemen constitute tax evasion. A firm that pays a spaceman for nonexistent consulting services decreases its taxable income by 100% of the payment. However, if a firm orders some goods from a spaceman, the income diversion is only a fraction of the

transfer. To illustrate, consider a manager who wants to decrease taxable income by buying a computer for more than its fair price. The manager buys a computer from a spaceman for $3000, the spaceman transfers $1000 to a real firm that sells computers, the real firm delivers the computer, and the manager receives $2000 cash back. In this case, the income diversion is $2000, not $3000. Empirically, the net transfer to a spaceman was estimated as the difference between the money transferred to the spaceman and the money that the spaceman transferred to the regular firms.

Three measures of tax evasion at the firm level were constructed:

$$ShadowP = \frac{net\ transfers\ to\ spacemen}{total\ payments}$$

$$ShadowR = \frac{net\ transfers\ to\ spacemen}{revenue}$$

$$ShadowA = \frac{net\ transfers\ to\ spacemen}{assets},$$

where *net transfers to spacemen* are the net funds transferred to spacemen by a firm, *total payments* represent the total amount of money paid from the firm's bank account, and *revenue* and *assets* are book revenue and assets taken from Rosstat data. To reduce the influence of outliers and measurement error, the measures of tax evasion were winsorized at the top 95th percentile.

See Table VI for summary statistics of the tax evasion measures used in this study. Annually, an average firm transfers to spacemen 7.0% of its total payments, 31.2% of its book assets, and 5.7% of its revenue. The standard deviations of *ShadowP*, *ShadowA*, and *ShadowR* are 13.6%, 65.0%, and 10.0% respectively. Large firms transfer to spacemen less than small ones. Consider a firm from the bottom quartile sorted by assets. On average, it diverts 8.5% of its total payments, 52.6% of its book assets, and 6.7% of its revenue. In contrast, an average firm from the top quartile transfers to spacemen 5.6% of its total payments, 13.0% of its book assets, and 4.8% of its revenue. The largest 468 companies in this study's sample (top 1 percentile) divert 2.9% of their assets and 3.3% of their revenue per year. Presented estimates of tax evasion for the large companies are much less than ones that Graham and Tucker (2006) reported. Using a sample of 44 U.S. tax shelter cases, they show that the average tax deduction produced by the tax shelters is 9% of firm asset value. The likely explanation for this difference is selection bias. Graham and Tucker estimate tax shelter activities for only the companies that were accused of tax evasion whereas this study estimates tax evasion for the entire economy.

[Insert Table VI here]

III.B Verification of the Tax Evasion Measures

Does the process used here really measure tax evasion, or, in other words, do firms in fact evade taxes by transferring money to spacemen[27]? The most intuitive way to test the tax evasion hypothesis is to relate a firm's tax payments to the tax evasion measures developed here. As described in Section I, companies use spacemen to evade profit, dividend, value added, social security, and personal income taxes. Rosstat data were used to measure profit tax, and using the banking data, payments of VAT and SST were reconstructed. Therefore, the present study can explore the relation between tax payments and transfers to spacemen by running the following regressions:

$$Tax\ Ratio = \alpha + \beta Shadow + \gamma controls + \varepsilon$$

where $Tax\ Ratio$ is either $\frac{profit\ tax}{revenue}$, or $\frac{VAT}{revenue}$, or $\frac{SST}{revenue}$, or $\frac{SST}{employment}$. $Shadow$ is either $ShadowP$, or $ShadowA$, or $ShadowR$. The results of these regressions appear in Table VII. According to the table data, all of the tax evasion measures are negatively related to tax payments, and this relation is highly statistically significant (t-stats vary from –9 to –41). Economic significance is also substantial. According to columns (1)–(9), 1 standard deviation of $ShadowP$ ($ShadowA$, $ShadowR$) corresponds to a 12% (15%, 12%) decrease in profit tax, a 14% (16%, 14%) decrease in VAT, and a 15% (19%,13%) decrease in SST. Firms that use more spacemen pay less SST per employee. Columns (10)–(12) show that 1 standard deviation of $ShadowP$ ($ShadowA$, $ShadowR$) corresponds to 10% (6%, 10%) decrease in SST paid per employee.

[Insert Table VII here]

Next the theoretical prediction for β coefficients were compared with the empirical findings. Firms typically use spacemen for either profit minimization or payment of under-the-table salary or to re-classify expenses (payment for non-VAT expenses and accounting as payment for VAT expenses). If the money transferred to spacemen is used for dividend payments, the firm evades profit tax (24%), VAT (18%), and dividend tax (9%). If it uses spacemen money to pay under-the-table salary, it evades SST (30.4%)[28], VAT (18%), and personal income tax (13%). If a firm uses spacemen money to pay for non-VAT expenses, it evades VAT (18%). The following table summarizes the effect of a $1 payment to spacemen on VAT, EBT, profit tax (applicable only for firms with positive reported profit), dividend tax, SST, and personal income tax depending on the money usage.

[27] When explaining spacemen activities to tax inspectors, firms usually argue that they did not know that some of their suppliers happened to be spacemen. They work with spacemen and transfer money to them along with legitimate suppliers, and it is not the firm's fault that some of its suppliers do not pay taxes.

[28] According to the Russian ministry of finance, the effective social tax rate in 2004 was 30.4%

Money Usage	VAT	EBT	Profit Tax	Dividend Tax	Income Tax	SST
Profit minimization	–0.153	–0.847	–0.203	–0.058		
Under the table salary	–0.153	0.653	0.157		–0.149	–0.352
Non-VAT expenses	–0.153	0.153	0.037			

Making exact predictions regarding coefficients for the tax evasion measures for profit tax and SST is a challenging task because the distribution of spacemen money among these three items is unknown. However, VAT is evaded in all three cases. Therefore, \$1 transferred to spacemen should correspond to 15.3¢ VAT savings. The data in column (6) of Table VII reveal that on average, \$1 transferred to spacemen corresponds to 3.8¢ in VAT savings, which is 4 times less than the theoretical prediction. One of the possible explanations of such underestimation is the endogeneity problem. More efficient firms *ceteris paribas* would be expected to evade more taxes than their less efficient peers. There are several possible reasons for that. First, the higher the firm's actual earnings are, the higher are the potential benefits of tax evasion. Second, more profitable firms can divert more income without risk of being detected than their less profitable peers can. Probability of tax inspection typically depends on a firm's reported earnings: The higher are the reported earnings, the lower is probability of scrutiny by tax authorities. Therefore, firms with high actual earnings have more room for tax evasion without risk of being detected. Last, firms might pursue a strategy of smoothing their reported earnings: Evade more taxes in good times and less in bad times.

The test of the described endogeneity hypothesis involved analyzing how changes in firms' productivity are related to tax evasion behavior. However, measuring firms' productivity in the presence of tax evasion is not a trivial task. Reported earnings cannot be used for this purpose because they are the difference between actual earnings and underreported earnings. If a firm for some reason increases the amount of underreporting, this decreases reported earnings by the same amount. Therefore, reported earnings and the tax evasion measures identified here are mechanically negatively correlated. Because reported earnings cannot be relied on, revenue growth was used as a direct measure of firms' performance. Increased assets and employment are used as an indirect measure of performance. A firm experiencing a positive productivity shock can then be expected to hire more staff and acquire more assets in order to meet future growth opportunities. In contrast, a firm cutting its workforce and decreasing its assets indicates a negative productivity shock. The following regressions were estimated to analyze the relation between change in firm's performance and tax evasion:

$$Shadow_t = \alpha + \beta \left(\log \left(Measure_t \right) - \log \left(Measure_{t-1} \right) \right) + \gamma Shadow_{t-1} + \delta controls + \varepsilon$$

where $Measure$ is either *revenue*, *assets*, or *employment*, $Shadow$ is either $ShadowP$, or $ShadowA$, or $ShadowR$. Regressions of $ShadowA$ on assets growth and $ShadowR$ on revenue growth were not estimated because these pairs of variables are mechanically correlated by construction. See Table VIII for the results. As the table shows, coefficients in all specifications except one – column (6) – are positive and statistically significant at the 1%–5% level. These results lead to the conclusion that if a firm experiences a positive productivity shock, it increases its transfers to spacemen as a percentage of its total payments, revenue, or assets. In other words, the data supports the endogeneity hypothesis that more efficient firms evade more taxes than their less efficient peers.

[Insert Table VIII here]

Another possible check of the tax evasion measures is to compare profitable and unprofitable firms[29]. The key difference between them is that unprofitable firms do not need to use spacemen for profit minimization because they do not pay profit tax. Because of that, unprofitable firms might use spacemen only to pay under-the-table salary and non-VAT expenses. The impact on reported profit is positive in both cases. Therefore, a positive relation between unprofitable firms' tax evasion measures and reported profitability should be observed. Contrary to unprofitable firms, profitable ones do generate taxable profit and therefore have incentives to use spacemen to minimize reported profits. The net effect on reported profitability depends on the mix of spacemen money usage. For example, if a company uses 1/3 of spacemen money for profit minimization, 1/3 for salary payments, and 1/3 for non-VAT expenses payment, \$1 transferred to spacemen should correspond to a 1.4¢ decrease in reported profitability. Generally speaking, if the use of spacemen for profit minimization is large enough, a negative relation between reported profitability and the tax evasion measures identified in this study should occur. To test this prediction, regressions of reported profitability on the tax evasion measures were run separately for profitable and unprofitable firms (see Table IX for the results). The data in columns (4)–(6) indicate that all of the tax evasion measures are positively related to the reported profitability for unprofitable firms. All coefficients are significant at the 1% level. Economic significance is also large. As column 6 indicates, \$1 transferred to spacemen on average corresponds to a 7.3¢ increase in reported profitability. For profitable firms, the situation is the opposite. All tax evasion measures are negatively related to reported profitability with t-statistics ranging from –19 to –34; see columns (1)–(3). Economically, \$1 transferred to spacemen corresponds on average to a 7.2¢ decrease in reported profitability; see column (3). All differences between coefficients for profitable and unprofitable firms are significant at the 1% level; see column (7).

[29] A firm is denoted as a profitable if it has a positive NI both for 2003 and 2004. A firm is denoted as unprofitable if it has negative NI both for 2003 and 2004. Firms that have positive NI in 2003 (2004) and negative NI in 2004 (2003) are excluded from this analysis.

[Insert Table IX here]

The result for VAT is different. According to the theoretical prediction, \$1 transferred to spacemen should generate a 15.3¢ VAT savings for all firm types. Therefore, we should observe a negative relation between VAT and the tax evasion measures for both profitable and unprofitable firms. Moreover, this relation should be the same. Table IXa reports the results of regressions of VAT on the tax evasion measures. Coefficients for all of the tax evasion measures are negative for both profitable and unprofitable firms. The differences in coefficients for $ShadowP$, $ShadowA$, and $ShadowR$ between profitable and unprofitable firms are statistically insignificant from zero; see column (7). These empirical findings support the theoretical prediction that \$1 transferred to spacemen generates the same VAT savings for both profitable and unprofitable firms.

[Insert Table IXa here]

Finally, let's consider the case of SST payments. There is no exact theoretical prediction regarding whether coefficients for the tax evasion measures should be higher, lower, or the same for profitable and unprofitable firms. This depends on the distribution of spacemen money among different usages; therefore, the result can be in either direction. However, the theory provides a clear prediction: If any profitable firms and any unprofitable firms use some of the spacemen money to pay under-the-table salary, a negative relation should be observed between SST and the tax evasion measures for both profitable and unprofitable firms. This prediction was examined by estimating the regressions of SST payments on the tax evasion measures separately for profitable and unprofitable firms (see Table IXb for the results). According to the data in columns (1)–(6), all coefficients for the tax evasion measures are negative and statistically significant at the 1% level (t-statisticss vary from –5.8 to –26.7), which is in line with the theoretical predictions.

[Insert Table IXb here]

A summary of the results of the verification tests leads to the following conclusions. First, all measures of tax evasion identified in this study are negatively related to firms' actual tax payments. Second, a positive relation exists between firms' productivity shocks and tax evasion. Third, as the theoretical analysis proposed, there is a positive relation between reported profitability and the tax evasion measures identified for unprofitable firms and a negative relation between the same variables for profitable firms. Last, as predicted by the theoretical analysis, the study documents the negative relation between VAT/SST and the tax evasion measures for both profitable and unprofitable firms.

IV Tax Evasion and Growth

Does tax evasion benefit a firm and its shareholders? From the theoretical point of view, the answer is unclear. On the one hand, tax evasion is de facto a transfer of money from the government to a firm and therefore should be in shareholders' interests. On the other hand, in addition to direct costs associated with tax evasion, tax evasion might also cause a firm to incur additional indirect costs. For example, tax evasion is always associated with accounting manipulations, and therefore it creates an opportunity for employees to use these manipulations for their own private benefits. Empirical evidence on this topic is very limited. Desai, Dyck and Zingales (2007) document the relation between an increase of tax enforcement in Russia with a positive market reaction. Using a large sample of U.S. firms, Desai and Dharmapala (2009) show that the average effect of tax avoidance on firm value is not significantly different from zero but is positive for well-managed firms. This current study analyzing how tax evasion is related to firms' long-time performance extends this literature.

Because 99.9% of the firms in this paper's sample are not traded, Tobin's q cannot be used. Therefore, a long-term growth rate was used as an indicator of a firm's performance. It is not clear whether tax evasion should increase or decrease a firm's growth opportunities. On the one hand, tax evasion creates a competitive advantage via lower costs. Therefore, tax evaders can offer lower prices and gain market share from nontax evaders. On the other hand, tax evasion is associated with additional agency costs and restricts the access to capital markets. Using the direct measure of tax evasion determined here, this study empirically investigates which effect is stronger.

A growth variable is denoted as follows:

$$\Delta Measure_{t,t+n} = \frac{\log\left(Measure_{t+n}\right) - \log\left(Measure_{t}\right)}{n}$$

where $Measure$ refers to *revenue*, *assets*, and *employment*.Because the banking data used here are limited to 2003 and 2004 and the Rosstat data were available until 2007, this study estimates 3 years of growth starting in 2003 and 2004 (i.e. $t = 2003$, 2004 and $n = 3$). To decrease the influence of outliers, the growth variables were winsorized at 1% and 99% percentiles. In addition to growth variables, the study estimates growth of firm productivity. Because actual earnings for 2006 and 2007 cannot be estimated due to data limitations, revenue per employee and revenue to assets ratio were used as a proxy for firm productivity.

Note that a possible survival bias is a serious issue in the sample: 42% of the firms that had nonzero revenue in 2004 are missing in 2007. Not all of these firms necessarily went bankrupt. Perhaps they did not submit statistics forms in 2007, or Rosstat did not include their information in 2007 data.

However, bankruptcy is one of the key reasons for their absence. To account for survival bias, the growth variable's value was set at the bottom 1% percentile for the firms that disappeared from that sample and had negative total net income for the last 3 years before disappearance. A firm that had a positive total net income for the last 3 years before it disappeared from the sample was considered as not being present due to some random reason(s) and therefore was not included in this study's sample. See Table X for summary statistics of the growth variables. The first five rows represent initial variables, and the last five rows represent variables updated for survival bias. The data in the table indicate that survival correction significantly changes the statistics of the growth variables: mean (median) of the revenue growth decreases from 18.9% (19.2%) to –11.0% (10.8%), mean (median) of the asset growth decreases from 26.2% (22.1%) to 5.0% (13.6%), and mean (median) of the employment growth decreases from –0.9% (–0.8%) to –18.9% (–8.1%). Further analysis used the growth variables corrected for survival bias.

[Insert Table X here]

To study the relation between growth and tax evasion, the following regression was estimated:

$$\Delta Measure_{t,t+3} = \alpha + \beta Shadow_t + \gamma \frac{Profit_t}{revenue_t} + \delta controls_t + \varepsilon$$

where $Measure$ is either $revenue$, $assets$, or $employment$; $Shadow$ is either $ShadowP$, $ShadowA$, or $ShadowR$. Because of mechanical correlation by construction, regressions of revenue growth on $ShadowR$ and assets growth on $ShadowA$ are not estimated. A nontrivial issue concerns what variable to use as a proxy for firm's profitability. A naive way to estimate the specified growth regressions is to use reported EBT in place of $Profit_t$. See Table XI for the estimates of this specification. As these table data show, the overall relation between tax evasion and growth is unclear. There is a strong positive relation between growth in assets and the tax evasion measures $ShadowP$ and $ShadowR$; see columns (3)–(4); however, the relation for growth in revenue and in employment is statistically insignificant for all of the study's evasion measures (columns (1), (2), and (4)–(7). The possible explanation of such mixed evidence is an incorrect regression specification. Reported EBT includes only a fraction of the actual earnings. Another (underreported) part is included in the measures of tax evasion. Therefore, the coefficient as specified covers two effects: that of additional profitability, which is included in the tax evasion measures but not in reported EBT and that of tax evasion alone. To solve this problem, the firms' true profitability was estimated using the findings from the previous subsection.

[Insert Table XI here]

Let a firm spend x part of the spacemen money to pay under-the-table dividends (profit mini-

mization) and y part for under-the-table salary. Then using the theoretical analysis from the previous subsection, an average dollar transferred to spacemen should generate

$$x \cdot 0.153 + y \cdot 0.153 + (1 - x - y) \cdot 0.153 = 0.153$$

of VAT savings,

$$y \cdot 0.352$$

of SST savings, and

$$x \cdot 0.847 - y \cdot 0.654 - (1 - x - y) \cdot 0.153$$

of EBT underreporting. An average dollar transferred to spacemen is associated with a 3.8¢ VAT savings (column [6] of Table VII), which is 4 times lower than the theoretical prediction. As discussed in the previous subsection, the possible reason for such underestimation is the endogeneity problem. Because the underestimation effect for EBT and SST cannot be directly estimated, further analysis assumes that the underestimation effect is the same across VAT, EBT, and SST. Using the empirical estimations from columns (3) of Tables 9 and 9b, the following system of equations can be derived for profitable firms

$$\begin{aligned} y_p \cdot 0.352 &= 0.021 \cdot 4 = 0.0851 \\ x_p \cdot 0.847 - y_p \cdot 0.654 - (1 - x_p - y_p) \cdot 0.153 &= 0.072 \cdot 4 = 0.2875 \end{aligned}$$

that provides estimates of $x_p = 0.561$ and $y_p = .242$. Because the firms with losses do not pay profit tax, they are assumed not to use spacemen money for profit minimization or, in other words, $x_l = 0$. Use of the coefficient estimation from column (6) of Table IXb derives y_l as

$$y_l = \frac{0.0737 \cdot 4}{0.352} = 0.223.$$

Naturally, whether the assumption $x_l = 0$ finds support in the data should be tested. Given $y_l = 0.223$, an average dollar transferred to spacemen should generate $-0.223 \cdot 0.654 - (1 - 0.223) \cdot 0.153 = -0.264$ of EBT underreporting (or 0.264 overreporting) for the unprofitable firms. Considering the extent of overestimation, the prediction for coefficient in the relevant regression should be $0.264/4 = 0.066$. Column (6) of Table IX shows that the estimation of the coefficient for $ShadowR$ is 0.073 with 95% confidence interval of $[0.0412, 0.106]$. Therefore, we cannot reject the hypothesis that $x_l = 0$ at 5% level.

Based on these research findings, we conclude that profitable firms use 56% of transfers to spacemen

for dividend payments, 24% for payment of under-the-table salary, and 20% for expense reclassification (payment of non-VAT expenses, which is accounted for as payment for VAT expenses). Unprofitable firms use 22% of spacemen money for payment of under-the-table salary and 78% for expense reclassification. Using the derived corrections, actual earnings are measured as

$$Actual\ EBT = \begin{cases} EBT + 0.2875 \cdot net\ transfers\ to\ spacemen,\ if\ EBT > 0 \\ EBT - 0.264 \cdot net\ transfers\ to\ spacemen,\ if\ EBT < 0 \end{cases}$$

Before using *Actual EBT* in the analysis, a simple check was performed do determine whether it is a better proxy for firms' profitability than EBT. For this purpose, univariate regressions of the growth variables $EBT/revenue$ and $Actual\ EBT/revenue$ were estimated (see the results in Table XII). As the data in this table indicate, *Actual EBT* better explains cross-section variation of future growth than EBT. For prediction of revenue growth (columns [1]–[2]), R-squared yields 14%; for assets growth (columns [3]–[4]), R-squared is higher by 20%, and R-squared gains 12% for employment growth [(columns (5)–(6)].

[Insert Table XII here]

Then the growth regressions are estimated using *Actual EBT* instead of EBT as a proxy for a firm's profit (Table XIII). The coefficient estimations for the tax evasion measures in Table XIII differ significantly from those in Table XI. The coefficient estimates for tax evasion measures are negative and statistically at the 1%–5% levels in all regression specifications. Economic significance is also large. One standard deviation increase in $ShadowP$ ($ShadowA$) corresponds to a drop in revenue growth by 2.0% (1.7%) in annual terms (columns [1] and [2]). For assets growth (columns [3] and [4]), the effect is smaller but present. One standard deviation increment in $ShadowP$ ($ShadowR$) is related to 0.9% (0.7%) decrease in the growth rate of assets. In case of employment growth, 1 standard deviation increase in the tax evasion measures is associated with a decrease in the annualized employment growth rate by 0.9%–1.3%.

[Insert Table XIII here]

The evidence of a negative relation between tax evasion and growth does not establish the causality of this relation. Obviously, tax evasion is not an exogenous variable, and another unobservable variable, which affects both tax evasion and growth, might exist. Finding proper instrumental variables for tax evasion is a challenging task because most variables that affect tax evasion also directly affect growth prospects. Consider the situation with corruption. Corrupt officials close their eyes to tax evasion and simultaneously hinder business development. Therefore, a regional corruption index cannot be used as an instrumental variable for tax evasion. Moreover, cross-section variation in corruption might be a

reason for the observed negative relation between tax evasion and growth. Nor can other widely used instruments such as changes in the law or variation in regional tax laws be applied because during 2003–2004, Russian regions had no tax law changes or variation in tax regimes. Although proper instrumental variables cannot be obtained for the entire sample, IV approach can be applied to a subsample of Moscow city firms. Based on their registration address, every Moscow firm is assigned to one of 36 local tax agencies to check its tax filings and perform a tax investigation if necessary. Except for this distinction, all Moscow firms operate in the same or similar business and corruption environment: They have the same registration office (interdistrict tax agency 46), and apply to the same central agencies for a license to work in a specific industry (e.g., construction, food service, brokerage) based on their business type, not their registration address; other government entities that can hinder business development (for example, agencies pertaining to fire and sanitary regulations) are not affiliated with local tax agencies. Therefore, a local tax agency affects only participation in tax evasion, not other aspects of doing business. A local tax agency affects tax evasion because the equilibrium level of tax evasion is determined by the likelihood that a firm engaged in tax evasion will be caught and the punishment it will receive as a result. Federal law determines penalties; people who check tax fillings and perform the tax investigations directly affect the likelihood that a firm will be caught. Therefore, the intelligence and corruption of employees who perform the tax inspections affect the level of tax evasion. However, the choice of tax agency for many Russian firms is not exogenous. Russia has no law requiring a firm's legal and operating address to be the same. The address of registration for many business owners depends on whether they have relatives or friends among the employees of a local tax agency. Almost 56% of Moscow firms in the current sample have a registration address that differs from their actual address. Although firms prefer that their legal address differ from their actual address for many reasons, the friendliness of tax inspectors to a particular business owner is a key reason. Therefore, the subsample for IV regressions includes only firms that have the same legal and actual address because the high probability of their choice of tax agency was exogenous.[30]

See Table XIV for the IV estimations for the sample of Moscow firms that have the same legal and actual address. Instrumental variables were 35 dummies that correspond to a firm's local tax agency. In comparison to Table XII, regressions of revenue growth on *ShadowR* and asset growth on *ShadowA* have been added because the mechanical correlation problem between corresponding variables is solved by using the instruments. Tax evasion is negatively related to revenue growth, and all coefficients are statistically significant at the 1%–5% level; see columns (1)–(3). Economically, 1

[30]If we assume that relatives and friends of business owners (if any) are uniformly distributed among tax agencies independent on business location, it is only a 1/36 probability that a business owner with connections at a local tax agency will register its business at the address of its actual location.

standard deviation of instrumented tax evasion measure corresponds to a drop in revenue growth by 4.4%–10.6% in annual terms. Tax evasion is also negatively related to asset growth—columns (4)–(6)—and all related coefficients are statistically significant at the 5%–10% level. One standard deviation increment in instrumented tax evasion measures is related to a 3.2%–6.4% decrease in the asset growth rate. As indicated in columns (7)–(9), the coefficients in the regressions of employment growth on tax evasion measures are negative but statistically insignificant. However, the economic significance is still substantial. One standard deviation increment in instrumented tax evasion measures corresponds to a 0.9%–2.3% drop in increased employment annually. A summary of the results of IV regressions leads to the conclusion that tax evasion is negatively related to a firm's growth.

[Insert Table XIV here]

Why is the economic effect of tax evasion on growth in IV regressions much larger than in OLS regressions? At least two possible explanations can account for this. The first possible explanation is the quality of relations with authorities. A firm that has good relations with government officials can evade more taxes and has more opportunities to obtain necessary licenses and permissions. A second possible explanation is management intelligence. Smart management can better avoid taxes and explore business opportunities. Unfortunately, these explanations of the observed endogeneity using this study's data cannot be empirically explored.

The important economic issue is why tax evasion and growth are negatively related. Two possible explanations of this empirical finding can be explored based on the data used. The first is tax evaders' restricted access to capital markets. Firms that are able to divert income from the government can do the same from banks; therefore, banks are reluctant to provide financing to tax-evading firms. The other possible explanation is that an agency conflict exists. Tax evasion distorts employees' incentives for rent-seeking behavior and decreases a firm's productivity. Alternative explanation of the findings might be the significant decline of spacemen usage after 2003–2004. The government significantly increased tax enforcement in 2000–2002 (Desai, Dyck and Zingales, 2007). Tax evaders could have lost their competitive advantage during 2003–2007; therefore, the increase of tax enforcement in Russia might be another explanation of the negative relation between tax evasion and growth. Unfortunately, the data developed in this study cannot test this hypothesis.

Restricted Access to Capital Markets.

If a firm can hide income from the government, it can do the same from banks. For this reason, banks might be reluctant to provide financing to tax evaders; therefore, tax evaders cannot finance their growth opportunities. This research study investigates this hypothesis by estimating regressions of leverage and debt interest rate on tax evasion measures (Table XV). All tax evasion measures

are negatively related to debt financing, and the coefficients are statistically significant at the 1% level; see columns (1)–(3). However, the lower level of debt financing is not necessarily evidence that tax evaders cannot obtain debt financing. It might be that tax evaders prefer to use more internal financing for various reasons, such as not wanting to disclose their financial information to third parties. The more direct evidence of restricted access to capital markets might be the cost of debt financing. Columns (4)–(6) of Table XV report regressions of debt interest rate on tax evasion measures, actual profitability, and leverage. The coefficient for tax evasion measures are positive and significant at the 1% level in all specifications. Economic significance is also large. An increment of 1 standard deviation in $ShadowP$ ($ShadowA$, $ShadowR$) corresponds to an 82- (191-, 57-) basis point increase in debt interest rate. This regression specification assumes that banks can identify a firm's true profitability, but it is not obvious that banks can do it. For this reason, columns (7)–(9) of Table XV use reported profitability, not actual profitability, as an observable measure of firm effectiveness. Results barely change. All coefficients for tax evasion measures remain significant at the 1% level, and 1 standard deviation increment in $ShadowP$ ($ShadowA$, $ShadowR$) corresponds to 77- (184-, 53-) basis point increase in debt interest rate. Summarizing the results of these tests, we can conclude that there is both direct and indirect evidence of restricted access to capital markets for tax evaders. Direct evidence is that tax evaders are forced to pay higher interest rates given the same observable characteristics. Indirect evidence is that tax evasion and the amount of debt financing are negatively related.

[Insert Table XV here]

Agency Conflict.

A firm's tax evasion activities might distort employee incentives towards rent-seeking behavior. Stealing money from the government (another way of defining tax evasion), might act as a moral justification for employees to steal from the firm. Therefore, tax evasion might decrease firm productivity and growth prospects. See Table XVI for regressions of productivity growth on tax evasion measures. Tax evasion is negatively related to growth of revenue to assets ratio, and all coefficients for tax evasion measures are significant at the 1% level; see columns (1)–(3). An increase of 1 standard deviation in tax evasion measures corresponds to a 1.7%–2.8% decrease in revenue/assets annual growth rates. We can observe the similar relation for revenue growth per employee; see columns (4)–(6). All coefficients for tax evasion measures are negative and statistically significant at the 1%–5% level in two of three cases. Summarizing results of this test, we can conclude that tax evasion is associated with the future decline in firm productivity.

[Insert Table XVI here]

These findings suggest an additional explanation for the fact that existing empirical studies do not find a strong positive relation between tax avoidance and firm value. Although tax evasion increases today's disposable income, it is negatively related to a firm's growth opportunities. The possible reasons for slower growth are restricted access to capital markets and decline in productivity associated with tax evasion. This might be a reason that the possible positive effect of tax evasion on firm value (if any) is much smaller than predicted by a simple theory that tax evasion is just a transfer of money from the government to shareholders.

V Conclusion

This study develops a new approach to measuring tax evasion. Using a unique data set of Russian banking transactions, it identifies special-purpose entities referred to as spacemen that are specifically created for diversion purposes. Tax evasion at the firm level is measured as the sum of transfers to spacemen. This paper estimates spacemen activities in Russia as 11.3%–13.1% of GDP, which corresponds to tax evasion of 4.6%–5.8% of GDP.

Based on transfers to spacemen, a direct measure of tax evasion was created for a sample of 46,965 firms. The findings show that an average company annually transfers to spacemen 7.0% of its total payments, 5.7% of its revenue, or 31.2% of its assets. Tax evasion behavior of profitable and firms with losses is different, however. For profitable firms, \$1 transferred to spacemen is associated with a 29¢ cent profit from underreporting, whereas for firms with losses, \$1 transferred to spacemen is related to a 26¢ profit overreporting. These findings are consistent with the hypothesis that profitable and unprofitable firms have incentives to evade different taxes.

Using the direct measure of tax evasion, this paper analyzed the interaction between tax evasion and a firm's performance. Revenue growth, assets growth, and employment growth were used as measures of performance. A strong negative relation exists between all of the paper's tax evasion measures and firms' growth. A 1 standard deviation increase in these tax evasion measures is associated with a drop in annual revenue growth of 1.7%–2.0%. The IV estimations confirm these results. The findings suggest an additional explanation of why previous empirical studies do not find a strong positive relation between tax avoidance activities and firm value.

Several areas for future research can be suggested. First, following Desai, Dyck and Zingales (2007), one could relate tax evasion activities and private benefits of control. It is important to analyze whether good corporate governance can curb tax evasion activities. Second, this study does not identify what factors determine the size of a particular firm's tax evasion. A significant improvement in this research would be an analysis of different factors (e.g., government attention, media attention, and

shareholders' political connections) that affect firms' ability to evade taxes. Finally, income diversion is often associated with corruption, and corruption is a way for firms to obtain some benefits from politicians. Analysis of spacemen activities on and around elections may reveal the types of service politicians provide to firms.

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A Data Appendix

Banking transaction data were obtained through www.ViveData.com. After duplicate transactions were deleted, the sample included 102,238,090 transactions for 2003 and 134,479,418 for 2004. Each entry had information about a payer and recipient (name, INN (individual taxpayer number, 9- or 10-digit code), bank account, verbal description of transaction, and an amount in Russian rubles. Key identification of an agent was INN. Because data had many typos, similar INNs within one bank account were combined under the most often used INN. Government agencies within one bank account

were treated as one organization. After combining similar INNs, the sample contained transactions of 1,682,197 unique entities. Organizations and individuals that share one bank account were excluded from analysis because of the lack information for private accounts; only bank accounts were available (in Russia, individuals commonly have private accounts within one bank account). Incorrect INNs (not 9 or 10 digits) were also excluded from the sample. After performing these iterations, the sample consisted of 885,489 entities with separate bank accounts and correct INNs. The following dummies were defined for each agent:

gov: 1 for federal and regional treasuries, tax collection agencies, customs, government social security or pension funds

oao: 1 for open joint-stock companies

ooozao: 1 for limited partnerships and closed joint-stock companies

pboul: 1 for individual entrepreneurs

mgup: 1 for any 100% state-affiliated entity

zavod: 1 if name contains plant (zavod)

bank: 1 if name contains bank or abbreviation KB (commercial bank)

broker: 1 if name contains broker or exchange (birzha)

fond: 1 for not for profits, charities, and educational organizations

inostr: 1 for foreign companies (includes foreign abbreviation such as Ltd., Inc., GmbH)

Any transfers to agencies that might collect taxes (gov=1) were treated as tax payments. Any transactions to these agencies with description containing SST (social security tax) were treated as social tax payments. Obviously, such simple algorithm significantly overestimates tax payments. All program code for transformation procedures and variable creation can be found at http://www.mironov.FM.

B Appendix

Table I. Rosstat and Banking Data Match Across Regions

	Rosstat		Banking				N of transactions ≥ 100			
	N	Revenue, $000's	N	Revenue, $000's	% N	% Rev	N	Revenue, $000's	% N	% Rev
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bashkortostan	2,962	6,140	1,888	8,751	64	91	848	16,627	29	78
Chelyabinsk	2,956	4,926	2,057	6,507	70	92	876	13,002	30	78
Irkutsk	2,886	2,625	1,836	3,605	64	87	719	7,346	25	70
Kemerovo	2,896	4,077	1,744	6,145	60	91	612	14,504	21	75
Krasnodar	2,936	4,649	2,385	5,213	81	91	1,303	7,874	44	75
Krasnoyarsk	2,975	5,947	1,723	9,489	58	92	764	18,347	26	79
Leningrad	2,942	2,561	1,453	4,524	49	87	448	12,197	15	73
Moscow city	2,837	98,358	2,678	97,716	94	94	2,548	99,865	90	91
Moscow region	2,937	12,716	2,840	12,764	97	97	2,799	12,575	95	94
Nizhniy Novgorod	2,925	5,698	2,348	6,478	80	91	1,396	9,525	48	80
Novosibirsk	2,933	4,258	2,085	5,321	71	89	1,095	7,799	37	68
Omsk	2,970	1,559	1,530	2,396	52	79	569	4,987	19	61
Perm	2,938	4,173	1,819	6,095	62	90	724	12,902	25	76
Rostov	2,911	4,158	2,222	4,891	76	90	1,187	7,284	41	71
Samara	2,897	7,770	2,111	9,110	73	85	1,051	15,713	36	73
St. Petersburg	2,883	15,465	2,410	16,089	84	87	1,802	18,566	63	75
Sverdlovsk	2,949	7,918	2,338	9,011	79	90	1,284	14,444	44	79
Tatarstan	2,930	5,881	1,918	8,266	65	92	1,001	13,611	34	79
Tyumen	2,921	16,759	2,377	19,888	81	97	1,186	37,214	41	90
Volgograd	2,943	2,398	1,962	3,322	67	92	824	6,730	28	79
Entire sample	58,527	10,751	41,724	13,929	71	92	23,036	23,161	39	85

Up to 3000 of the largest firms from each of the 20 largest Russian regions were chosen using the Rosstat database (www.spark.interfax.ru). After that, these firms were matched to the banking sample. In Table I, column (1) has the initial number of firms from each region. Column (2) is the mean of revenue. Column (3) reports the number of firms present in the banking sample. Column (4) shows the mean of revenue for matched firms. In column (5), the percentage of matched firms is calculated. In column (6), the percentage of matched firms weighted by revenue is calculated. Columns (7)–(10) report the same characteristics for the firms that have at least 100 banking transactions.

Table II. Summary Statistics of Rosstat and Bank Data Matched Sample

	2003			2004		
	Mean	St. dev.	N of obs	Mean	St. dev.	N of obs
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Revenue_B, $000's	808	2,263	411	748	2,052	452
Revenue, $000's	866	1,912	317	950	2,024	309
Profit_B, $000's	35.4	93.8	281	36.1	111.8	133
Profit, $000's	25.8	81.2	325	35.0	97.9	315
Margin_B, %	5.6	9.6	278	4.8	8.8	132
Margin, %	6.4	9.4	244	6.6	10.1	234
$\% \left\|\log\left(Rev\right) - \log(Rev\_B)\right\| < 0.1$	26.2		309	28.1		292
$\% \left\|\log\left(Rev\right) - \log(Rev\_B)\right\| < 0.5$	70.9		309	64.0		292
Correlations						
Log(Rev), Log(Rev_B)	0.759		309	0.560		292
Log(Profit), Log(Profit_B)	0.872		206	0.868		87
Margin, Margin_B	0.660		199	0.491		85

The sample consists of 500 random firms that are present in both the Rosstat database and the banking data set. $Profit\_B$ is calculated as profit tax payment for the corresponding years divided by .24 (profit tax rate). Profit tax payments are taken from the banking data set and attributed to a year based on the transaction's description. $Revenue\_B$ is the sum of cash receipts for the corresponding years taken from the banking data set. Reported $Profit$ and $Revenue$ are taken from Rosstat. $Log(Revenue)$ and $Log(Revenue\_B)$ are natural logarithms of $Revenue$, and $Revenue\_B$. $\% \left|Log(Revenue) - Log(Revenue\_B)\right|$<0.1 (0.5) indicates the percentage of observations for which an absolute difference between logarithms of $Revenue$ and $Revenue\_B$ is less than 0.1 (0.5). $Margin$ is $Profit/Revenue$. $Margin\_B = Profit\_B/Revenue\_B$. Averages for $Margin$, $Margin\_B$, $Revenue$, $Revenue\_B$, $Profit$, and $Profit\_B$ are calculated only for nonzero observations.

Table III. Summary Statistics Spacemen vs Regular firms

Variable	All, (1)	All, sum_r< <sum_p (2)	All, sum_r> >sum_p (3)	Regular (4)	Regular sum_r> >sum_p (5)	Space-men (6)
N	207,176	78,049	129,127	100,313	57,996	42,483
% presented before 1.20.03	44.56	50.36	41.06	61.94	60.11	18.68
% presented after 12.15.04	70.46	73.15	68.84	83.09	82.40	52.24
% b. 1.20.03 & af. 12.15.04	31.56	36.98	28.29	51.57	49.54	5.41
Mean age, calendar days	506	526	493	588	581	391
Mean N of trans per month	38	43	36	42	38	25
Mean funds rec. per month, $	283,371	208,908	328,379	121,735	133,711	472,813
Mean funds paid per month, $	245,640	384,715	161,579	129,512	84,702	168,722
Mean tax paid per month, $	7,913	11,217	5,916	15,900	12,761	26
Mean SST paid per month, $	288	375	235	572	503	0
Mean gross tax rate, %	6.70	8.07	5.87	13.68	12.91	0.01

Age is defined as the difference in days between the last and the first observed transaction. *Gross tax rate* is defined as the ratio of taxes paid to average turnover, sum_r is total funds received, and sum_p is total amount of funds paid. Column (1) includes companies that have Ltd. or Inc. in their names (ooozao or oao) with at least 10 observed transactions and appeared in the sample before October 1, 2004; it excludes government agencies, banks, brokerage firms, insurance firms, state-affiliated enterprises, and nonprofit organizations whose average inflow of funds exceed 100,000 rubles ($3,300) per month and that had higher inflow than outflow. Column (2) includes firms from column (1) that had higher outflow than inflow. Column (3) contains firms from column (1) that received more funds than they transferred. Column (4) includes regular firms (i.e., firms with a gross tax rate >0.01. Column (5) contains regular firms that had more outflow than inflow. Column (6) includes spacemen and firms from column (3) that satisfy following criteria: (a) net tax rate < 0.001, (b) SST paid $<$ $6.5 per month, and (c) not oao.

Table IV. Sensitivity of Spacemen's Characteristics to Selection Criteria

		Selection by net tax rate		Selection by gross tax rate	
	Tax=0	0<t<0.1%	0.1%<t<1%	0<t<0.1%	0.1%<t<1%
Variable	(1)	(2)	(3)	(4)	(5)
N	28,153	14,330	9,297	18,004	10,835
% presented before 1.20.03	13	29	33	29	33
% presented after 12.15.04	51	54	57	55	57
% b. 1.20.03 & af. 12.15.04	4	8	12	8	13
Mean age, calendar days	382	408	448	408	450
Mean N of trans per month	12	50	49	51	47
Mean funds rec. per month, $	231,724	946,461	400,240	837,057	354,553
Mean funds paid per month, $	90,467	322,462	210,226	344,744	176,451
Mean tax paid per month, $	0	77	681	84	955
Mean SST paid per month, $	0	1	1	1	1
Mean gross tax rate, %	0	0	0	0	0

Age is defined as the difference in days between the last and the first observed transaction. *Gross tax rate* is defined as the ratio of taxes paid to average turnover, sum_r is total funds received, and sum_p is total amount of funds paid. Column (1) includes spacemen that pay no taxes. Column (2) includes spacemen with a net tax rate higher than 0 and less than 0.001; Column (3) includes spacemen with a net tax rate higher than 0.001 and less than 0.01; Column (4) contains spacemen with a gross tax rate higher than 0 and less than 0.001; Column (5) includes spacemen with gross tax rate higher than 0.001 and less than 0.01.

Table V. Summary Statistics for Sample of Companies

Variable	Mean (1)	Median (2)	St. dev. (3)	N of obs (4)	N of firms (5)
Assets, $000's	1,304	76	33,379	81,372	46,827
Revenue, $000's	1,592	262	12,547	81,816	46,965
Employment	84.7	47.0	615.2	44,597	31,622
EBT, $000's	148.4	3.1	12,599.6	81,287	46,810
Net Income, $000's	118.1	2.2	10,615.1	81,070	46,766
Debt / Assets, %	13.25	0.00	26.24	81,372	46,827
Debt Interest Rate, %	12.35	9.60	12.44	8,076	5,554
EBT / Revenue , %	2.08	1.24	11.91	80,131	46,563
Net Income / Revenue, %	1.09	0.87	10.72	79,955	46,535
Profit Tax / Revenue , %	1.44	0.61	2.27	56,591	37,073
VAT / Revenue , %	2.82	1.44	3.53	65,110	40,026
SST / Revenue, %	1.49	0.63	2.28	76,666	44,790
SST per employee, $000's	0.135	0.060	0.211	42,099	30,086
Moscow city, %	81.96			81,816	46,965
Moscow region, %	13.91			81,816	46,965
N of Transactions	1,125	600	1,856	81,699	46,942

Assets, Revenue, Employment, EBT (earnings before taxes), Net Income, and Debt are taken from Rosstat. Profit tax is calculated as EBT minus NI for the firms with positive EBT. Value added tax (VAT) and social security tax (SST) are calculated as the total of relative payments using the banking data. Moscow is a dummy variable equal to 1 for firms from Moscow city and Moscow region. N of transactions is the total number of banking transactions presented in the banking data.

Table VI. Summary Statistics of Tax Evasion Measures

	Mean	Median	St. dev.	N of obs	N of firms
Variable	(1)	(2)	(3)	(4)	(5)
All companies (mean assets=$1,304K)					
ShadowP, %	6.98	0.75	13.62	81,576	46,931
ShadowA, %	31.18	1.38	64.97	79,540	46,207
ShadowR, %	5.73	0.57	9.97	81,130	46,841
Bottom quartile (mean assets=$47K)					
ShadowP, %	8.47	0.20	16.27	19,111	11,727
ShadowA, %	52.56	0.00	87.76	17,540	11,211
ShadowR, %	6.72	0.14	11.33	18,999	11,686
Second quartile (mean assets=$61K)					
ShadowP, %	7.13	0.54	13.61	20,358	11,702
ShadowA, %	37.30	2.06	69.44	20,119	11,654
ShadowR, %	5.91	0.43	10.19	20,286	11,675
Third quartile (mean assets=$182K)					
ShadowP, %	6.85	0.96	13.11	20,713	11,714
ShadowA, %	25.79	2.06	54.76	20,633	11,697
ShadowR, %	5.58	0.72	9.59	20,596	11,681
Top quartile (mean assets=$4,707K)					
ShadowP, %	5.61	1.06	11.10	21,251	11,713
ShadowA, %	12.98	1.16	34.53	21,248	11,711
ShadowR, %	4.81	0.82	8.63	21,107	11,691
Top percentile (mean assets=$73,984K)					
ShadowP, %	3.15	0.68	8.10	874	468
ShadowA, %	2.91	0.36	13.20	875	468
ShadowR, %	3.25	0.55	6.89	869	468

ShadowP, *ShadowA*, and *ShadowR* are tax evasion measures defined in Section III. Firms are sorted by quartiles according to book assets.

Table VII. Relation Between Tax Evasion Measures and Tax Payments

Dependent Var:	Profit Tax / Revenue			VAT / Revenue			SST / Revenue			SST / Employement		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ShadowP	-0.0127			-0.0289			-0.0161			-0.0985		
	(0.0006) ***			(0.0009) ***			(0.0005) ***			(0.0069) ***		
ShadowA		-0.0034			-0.007			-0.0043			-0.012	
		(0.0001) ***			(0.0002) ***			(0.0001) ***			(0.0014) ***	
ShadowR			-0.0175			-0.0382			-0.02			-0.1294
			(0.0009) ***			(0.0012) ***			(0.0008) ***			(0.0097) ***
Log(Assets)	0.0021	0.0019	0.0021	0.0005	-0.0001	0.0006	-0.0009	-0.0012	-0.0008	0.0232	0.0229	0.0233
	(0.0001) ***	(0.0001) ***	(0.0001) ***	(0.0001) ***	(0.0002)	(0.0001) ***	(0.0001) ***	(0.0001) ***	(0.0001) ***	(0.0008) ***	(0.0008) ***	(0.0008) ***
Debt/Assets	-0.002	-0.0022	-0.002	-0.0036	-0.0038	-0.0035	0.0017	0.0016	0.0016	-0.0374	-0.0376	-0.0371
	(0.0006) ***	(0.0006) ***	(0.0006) ***	(0.0007) ***	(0.0007) ***	(0.0007) ***	(0.0004) ***	(0.0004) ***	(0.0004) ***	(0.0049) ***	(0.005) ***	(0.0049) ***
Industry	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
R-sq	0.1047	0.1044	0.1043	0.0946	0.0992	0.096	0.076	0.0834	0.076	0.0668	0.0635	0.0671
N of obs	56058	54993	55846	64432	62895	64037	75882	74250	75381	41819	41308	41616
N of firms	36768	36226	36683	39689	39077	39569	44433	43822	44335	29872	29534	29767

This table contains OLS regressions of tax payments on the tax evasion measures. Profit tax is calculated as EBT minus NI for the firms with positive EBT. Value added tax (VAT) and social security tax (SST) are calculated as the sum of relative payments using the banking data. $ShadowP$, $ShadowA$, and $ShadowR$ are tax evasion measures defined in Section III. Standard errors are clustered by firms..

Table VIII. Relation Between Tax Evasion Measures and Productivity Shocks

Dependent Var:	ShadowP			ShadowA		ShadowR	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δlog(Revenue)	0.0047			0.0438			
	(0.0006) ***			(0.003) ***			
Δlog(Employment)		0.0028			0.0215	0.0006	
		(0.0014) **			(0.0066) ***	(0.0011)	
Δlog(Assets)			0.0014				0.0015
			(0.0006) **				(0.0005) ***
ShadowP[-1]	0.4829	0.4815	0.4732				
	(0.0049) ***	(0.008) ***	(0.0049) ***				
ShadowA[-1]				0.4131	0.4469		
				(0.0053) ***	(0.0085) ***		
ShadowR[-1]						0.4692	0.4479
						(0.0084) ***	(0.0052) ***
log(Assets)[-1]	-0.0032	-0.0039	-0.0036	-0.036	-0.0388	-0.0032	-0.0026
	(0.0003) ***	(0.0005) ***	(0.0003) ***	(0.0016) ***	(0.0024) ***	(0.0004) ***	(0.0002) ***
Debt/Assets[-1]	-0.0125	-0.0064	-0.0103	-0.0921	-0.0523	-0.003	-0.0086
	(0.0026) ***	(0.0037) *	(0.0025) ***	(0.0125) ***	(0.0178) ***	(0.0029)	(0.002) ***
Industry	Y	Y	Y	Y	Y	Y	Y
R-sq	0.2091	0.2459	0.2134	0.2005	0.2246	0.2246	0.2002
N of obs	33158	12677	34470	33923	12738	12738	33815

This table contains OLS regressions of tax evasion measures on changes in performance measures. $ShadowP$, $ShadowA$, and $ShadowR$ are tax evasion measures defined in Section III.. $Variable[-1]$ means $Variable$ lagged by 1 year. $\Delta\log(Variable)$ is defined as $\log(Variable) - \log(Variable[-1])$.

Table IX. Relation Between Reported Profit and Tax Evasion Measures.

Dependent var: EBT/Revenue							
	Panel A. Profitable Firms			Panel B. Loss Generating Firms			A - B
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ShadowP	-0.0511			0.0771			-0.1283
	(0.0025) ***			(0.0119) ***			(0.0121) ***
ShadowA		-0.0147			0.0259		-0.0406
		(0.0004) ***			(0.0025) ***		(0.0025) ***
ShadowR			-0.072			0.0737	-0.1457
			(0.0038) ***			(0.0165) ***	(0.0169) ***
Log(Assets)	0.0087	0.0078	0.0088	-0.0072	-0.005	-0.0071	
	(0.0003) ***	(0.0003) ***	(0.0003) ***	(0.0009) ***	(0.001) ***	(0.0009) ***	
Debt/Assets	-0.0106	-0.0121	-0.0115	-0.0799	-0.0795	-0.0808	
	(0.0029) ***	(0.0029) ***	(0.0028) ***	(0.0059) ***	(0.0059) ***	(0.0059) ***	
Industry	Y	Y	Y	Y	Y	Y	
R-sq	0.1076	0.1091	0.1082	0.0865	0.0879	0.0849	
Number of obs	42908	42154	42734	7339	7233	7289	
Number of firms	21641	21494	21615	4084	4059	4072	

This table contains OLS regressions of reported EBT on the tax evasion measures. A firm is denoted as profitable if it has a positive NI both for 2003 and 2004. A firm is denoted as unprofitable if it has a negative NI both for 2003 and 2004. $ShadowP$, $ShadowA$, and $ShadowR$ are tax evasion measures defined in Section III. Standard errors are clustered by firms.

Table IXa. Relation Between VAT Payments and Tax Evasion Measures.

Dependent var: VAT/Revenue							
	Panel A. Profitable Firms			Panel B. Loss Generating Firms			A - B
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ShadowP	-0.0307			-0.0353			0.0046
	(0.0012) ***			(0.0032) ***			(0.0034)
ShadowA		-0.0075			-0.0082		0.0007
		(0.0002) ***			(0.0008) ***		(0.0008)
ShadowR			-0.042			-0.0398	-0.0021
			(0.0016) ***			(0.0049) ***	(0.005)
Log(Assets)	0.0004	-0.0002	0.0005	0.0004	-0.0003	0.0005	
	(0.0001) ***	(0.0001)	(0.0001) ***	(0.0003)	(0.0003)	(0.0003)	
Debt/Assets	-0.0075	-0.0079	-0.0076	-0.0028	-0.0029	-0.0026	
	(0.0011) ***	(0.0012) ***	(0.0011) ***	(0.0018)	(0.0019)	(0.0018)	
Industry	Y	Y	Y	Y	Y	Y	
R-sq	0.1105	0.1169	0.1132	0.078	0.0795	0.0765	
Number of obs	36276	35539	36092	5214	5106	5161	
Number of firms	19665	19491	19622	3214	3177	3195	

This table contains OLS regressions of VAT on the tax evasion measures. A firm is denoted as profitable if it has a positive NI both for 2003 and 2004. A firm is denoted as unprofitable if it has a negative NI both for 2003 and 2004. $ShadowP$, $ShadowA$, and $ShadowR$ are tax evasion measures defined in Section III. Standard errors are clustered by firms.

Table IXb. Relation Between SST Payments and Tax Evasion Measures

Dependent var: SST/Revenue							
	Panel A. Profitable Firms			Panel B. Loss Generating Firms			A - B
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ShadowP	-0.0153			-0.0214			0.006
	(0.0007) ***			(0.0021) ***			(0.0022) ***
ShadowA		-0.0041			-0.0056		0.0016
		(0.0002) ***			(0.0005) ***		(0.0005) ***
ShadowR			-0.0213			-0.0196	-0.0017
			(0.001) ***			(0.0034) ***	(0.0035)
Log(Assets)	-0.0011	-0.0014	-0.001	-0.0002	-0.0006	-0.0001	
	(0.0001) ***	(0.0001) ***	(0.0001) ***	(0.0002)	(0.0002) ***	(0.0002)	
Debt/Assets	-0.002	-0.0021	-0.0019	0.0003	0	-0.0003	
	(0.0006) ***	(0.0006) ***	(0.0006) ***	(0.0013)	(0)	(0.0013)	
Industry	Y	Y	Y	Y	Y	Y	
R-sq	0.0945	0.1033	0.0964	0.0606	0.064	0.0586	
Number of obs	40889	40112	40676	7228	7106	7140	
Number of firms	21014	20841	20984	3959	3926	3947	

This table contains OLS regressions of SST payments on the tax evasion measures. A firm is denoted as profitable if it has a positive NI both for 2003 and 2004. A firm is denoted as unprofitable if it has a negative NI both for 2003 and 2004. $ShadowP$, $ShadowA$, and $ShadowR$ are tax evasion measures defined in Section III. Standard errors are clustered by firms.

Table X. Summary Statistics of Growth Variables.

Variable	Mean (1)	Median (2)	St. dev. (3)	N of obs (4)	N of firms (5)
Revenue Growth, %	18.93	19.18	45.95	49,179	28,952
Assets Growth, %	26.23	22.11	45.85	51,779	30,268
Employment Growth, %	-0.87	-0.79	28.86	25,014	18,032
Revenue/Assets Growth, %	-10.06	-6.78	41.13	48,881	28,812
Revenue/Employment Growth, %	18.95	19.61	32.95	24,938	17,983
Accounted for Survival Bias					
Revenue Growth, %	-10.95	10.75	74.35	60,684	36,032
Assets Growth, %	5.12	13.64	63.65	61,845	36,504
Employment Growth, %	-17.20	-7.20	42.60	30,864	22,570
Revenue/Assets Growth, %	-36.34	-15.41	65.92	60,243	35,843
Revenue/Employment Growth, %	-2.99	13.38	54.05	30,816	22,540

The table contains summary statistics for growth variables. $Variable$ Growth is defined as $[\log(Variable_{t+3}) - \log(Variable_t)]/3$. Corrections for survival bias are described in Section IV.

Table XI. Tax Evasion and Growth, Controlled for Reported Profitability

Dependent var:	Revenue Growth		Assets Growth		Employment Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ShadowP	0.0085		0.0623		-0.0097		
	(0.026)		(0.0231) ***		(0.022)		
ShadowA		0.0009				0.0022	
		(0.0052)				(0.0044)	
ShadowR				0.1051			0.006
				(0.0297) ***			(0.0281)
EBT/Revenue	1.2121	1.2058	0.9891	0.9949	0.6943	0.6922	0.7069
	(0.0303) ***	(0.0304) ***	(0.0225) ***	(0.0226) ***	(0.0222) ***	(0.0222) ***	(0.0223) ***
Log(Assets)	0.0088	0.0068	-0.0311	-0.0311	-0.0022	-0.003	-0.0023
	(0.0017) ***	(0.0018) ***	(0.0015) ***	(0.0015) ***	(0.0014)	(0.0015) **	(0.0014) *
Debt/Assets	-0.1392	-0.1399	-0.1163	-0.1193	-0.0911	-0.0923	-0.0921
	(0.0151) ***	(0.0151) ***	(0.0125) ***	(0.0125) ***	(0.0116) ***	(0.0116) ***	(0.0116) ***
Industry	Y	Y	Y	Y	Y	Y	Y
R-sq	0.0644	0.0646	0.0638	0.0642	0.0645	0.065	0.0659
Number of obs	58558	57566	60058	59774	30785	30506	30674
Number of firms	35290	34866	35929	35848	22488	22282	22417

This table contains OLS regressions of growth variables on the tax evasion measures controlled for reported profitability. $Variable$ Growth is defined as $\left[\log(Variable_{t+3}) - \log(Variable_t)\right]/3$. Corrections for survival bias are described in Section V. ShadowP, ShadowA, and ShadowR are tax evasion measures defined in Section IV. Standard errors are clustered by firms.

Table XII. Different Measures of Firms' Profitability and Growth.

Dependent var:	Revenue Growth		Assets Growth		Employment Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
EBT/Revenue	1.325		1.006		0.742	
	(0.029) ***		(0.022) ***		(0.021) ***	
Actual EBT/Revenue		1.235		0.962		0.699
		(0.026) ***		(0.02) ***		(0.019) ***
R-sq	0.053	0.06	0.041	0.049	0.051	0.058
Number of obs	59262	59262	60453	60453	31016	31016
Number of firms	35628	35628	36127	36127	22659	22659

This table contains OLS regressions of growth variables on reported profitability (EBT/Revenue) and actual profitability (Actual EBT/Revenue). $Variable$ Growth is defined as $[\log(Variable_{t+3}) - \log(Variable_t)]/3$. Corrections for survival bias and for actual profitability are described in Section IV. ShadowP, ShadowA, and ShadowR are tax evasion measures defined in Section III. Standard errors are clustered by firms.

Table XIII. Tax Evasion and Growth, Controlled for Actual Profitability

Dependent var:	Revenue Growth		Assets Growth		Employment Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ShadowP	-0.1486		-0.0695		-0.0961		
	(0.0257) ***		(0.0228) ***		(0.0218) ***		
ShadowA		-0.0256				-0.0137	
		(0.0052) ***				(0.0044) ***	
ShadowR				-0.0658			-0.1037
				(0.0293) **			(0.0277) ***
Actual EBT/Revenue	1.1569	1.1523	0.95	0.9854	0.6663	0.6627	0.696
	(0.0271) ***	(0.0273) ***	(0.0204) ***	(0.0209) ***	(0.0203) ***	(0.0203) ***	(0.0205) ***
Log(Assets)	0.0081	0.0045	-0.0317	-0.0319	-0.0025	-0.0041	-0.0028
	(0.0017) ***	(0.0018) **	(0.0015) ***	(0.0015) ***	(0.0014) *	(0.0014) ***	(0.0014) **
Debt/Assets	-0.1297	-0.132	-0.1079	-0.1072	-0.0862	-0.0883	-0.0845
	(0.015) ***	(0.0151) ***	(0.0125) ***	(0.0125) ***	(0.0115) ***	(0.0116) ***	(0.0116) ***
Industry	Y	Y	Y	Y	Y	Y	Y
R-sq	0.072	0.071	0.071	0.0721	0.0708	0.0702	0.0732
Number of obs	58558	57566	60058	59774	30785	30506	30674
Number of firms	35290	34866	35929	35848	22488	22282	22417

This table contains OLS regressions of growth variables on the tax evasion measures controlled for actual profitability. $Variable$ Growth is defined as $[\log(Variable_{t+3}) - \log(Variable_t)]/3$. Corrections for survival bias and for actual profitability are described in Section IV. ShadowP, ShadowA, and ShadowR are tax evasion measures defined in Section III. Standard errors are clustered by firms.

Table XIV. Tax Evasion and Growth, IV estimations

Dependent var:	Revenue Growth			Assets Growth			Employment Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ShadowP	-1.7529			-1.2893			-0.4521		
	(0.8647) **			(0.7758) *			(0.5645)		
ShadowA		-0.5673			-0.3401			-0.1238	
		(0.1977) ***			(0.1681) **			(0.1128)	
ShadowR			-3.126			-2.2667			-0.5112
			(1.1604) ***			(1.0347) **			(0.6512)
Actual EBT/Revenue	1.4031	1.467	1.4856	1.0869	1.082	1.1584	0.6956	0.7101	0.7219
	(0.0993) ***	(0.0977) ***	(0.0949) ***	(0.088) ***	(0.0805) ***	(0.0831) ***	(0.0557) ***	(0.0541) ***	(0.0493) ***
Log(Assets)	0.0017	-0.033	-0.0003	-0.0349	-0.0529	-0.0363	-0.0054	-0.014	-0.005
	(0.0053)	(0.0147) **	(0.0059)	(0.0048) ***	(0.0125) ***	(0.0045) ***	(0.0039)	(0.0091)	(0.0034)
Debt/Assets	-0.1812	-0.2099	-0.1723	-0.1384	-0.1557	-0.1319	-0.1053	-0.1115	-0.1039
	(0.0256) ***	(0.0285) ***	(0.0259) ***	(0.0215) ***	(0.0236) ***	(0.0215) ***	(0.0189) ***	(0.0201) ***	(0.0188) ***
Industry	Y	Y	Y	Y	Y	Y	Y	Y	Y
R-sq (not meaningful)	0.0145	.	.	0.0172	.	.	0.0732	0.0589	0.0788
Number of obs	22305	21890	22167	22920	22492	22778	11908	11772	11860
Number of firms	13148	12992	13120	13395	13234	13364	8628	8533	8603

This table contains IV regressions of growth variables on the tax evasion measures controlled for actual profitability. $Variable$ Growth is defined as $[\log(Variable_{t+3}) - \log(Variable_t)]/3$. Corrections for survival bias and for actual profitability are described in Section IV. ShadowP, ShadowA, and ShadowR are tax evasion measures defined in Section III. Instrument variables are dummies which correspond to a local tax inspection assigned to a particular firm. Only Moscow firms with the same legal and actual address are included in the sample. Standard errors are clustered by firms.

Table XV. Tax Evasion and Debt Financing

Dependent var:	Debt/Assets			Interest Rate			Interest Rate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ShadowP	-0.0652			0.06			0.0565		
	(0.0065) ***			(0.0173) ***			(0.0172) ***		
ShadowA		-0.0204			0.0293			0.0283	
		(0.0013) ***			(0.0061) ***			(0.0061) ***	
ShadowR			-0.058			0.0572			0.0533
			(0.0094) ***			(0.0203) ***			(0.0203) ***
Actual EBT/Revenue				-0.0268	-0.0281	-0.0226			
				(0.0078) ***	(0.0075) ***	(0.0076) ***			
EBT/Revenue							-0.0246	-0.026	-0.0238
							(0.008) ***	(0.008) ***	(0.0081) ***
Log(Assets)	0.0157	0.0147	0.0156	-0.0102	-0.009	-0.01	-0.0102	-0.0091	-0.01
	(0.0006) ***	(0.0006) ***	(0.0006) ***	(0.0009) ***	(0.0009) ***	(0.0009) ***	(0.0009) ***	(0.0009) ***	(0.0009) ***
Debt/Assets				-0.0919	-0.0906	-0.092	-0.0914	-0.0902	-0.0919
				(0.0051) ***	(0.0051) ***	(0.0052) ***	(0.0051) ***	(0.0051) ***	(0.0052) ***
Industry	Y	Y	Y	Y	Y	Y	Y	Y	Y
R-sq	0.0664	0.0675	0.0645	0.0877	0.0922	0.0862	0.0873	0.0918	0.0862
Number of obs	80733	79133	80294	7729	7718	7678	7729	7718	7678
Number of firms	46568	45973	46477	5401	5396	5375	5401	5396	5375

This table contains OLS regressions of leverage (columns (1)-(3)) and debt interest rate (columns (4)-(9)) on the tax evasion measures. ShadowP, ShadowA, and ShadowR are tax evasion measures defined in Section IV. Standard errors are clustered by firms.

Table XVI. Tax Evasion and Productivity Growth

Dependent var:	Revenue/Assets Growth			Revenue/Employment Growth		
	(1)	(2)	(3)	(4)	(5)	(6)
ShadowP	-0.163			-0.083		
	(0.0211) ***			(0.0264) ***		
ShadowA		-0.0424			-0.0045	
		(0.0041) ***			(0.0054)	
ShadowR			-0.1751			-0.0867
			(0.0277) ***			(0.0341) **
Revenue/Assets	-0.0051	-0.0054	-0.0051			
	(0.0002) ***	(0.0002) ***	(0.0002) ***			
Rev/Employment				-0.0032	-0.0031	-0.0032
				(0.0002) ***	(0.0002) ***	(0.0002) ***
Actual EBT/Rev	0.9862	0.9908	1.0251	0.8662	0.8566	0.8989
	(0.0239) ***	(0.0243) ***	(0.0244) ***	(0.0267) ***	(0.0269) ***	(0.0269) ***
Log(Assets)	0.0348	0.0315	0.034	0.039	0.038	0.0386
	(0.0016) ***	(0.0017) ***	(0.0016) ***	(0.002) ***	(0.0021) ***	(0.002) ***
Debt/Assets	-0.1359	-0.1387	-0.1329	-0.0888	-0.0913	-0.0868
	(0.0132) ***	(0.0133) ***	(0.0132) ***	(0.0148) ***	(0.0149) ***	(0.0149) ***
Industry	Y	Y	Y	Y	Y	Y
R-sq	0.1281	0.1221	0.129	0.1066	0.1042	0.1086
Number of obs	58465	57482	58186	30019	29748	29915
Number of firms	35251	34826	35168	22048	21845	21980

This table contains OLS regressions of productivity growth on the tax evasion measures controlled for actual profitability. $Variable$ Growth is defined as $[\log(Variable_{t+3}) - \log(Variable_t)]/3$. Corrections for survival bias and for actual profitability are described in Section IV. ShadowP, ShadowA, and ShadowR are tax evasion measures defined in Section III. Standard errors are clustered by firms

C Appendix

Figure 1. Rosstat and Banking Data Correspondence

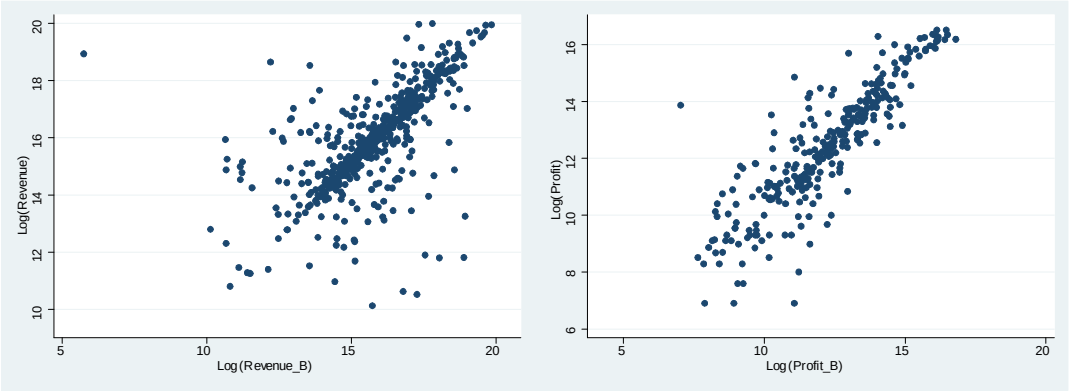

Figure 2. Kaplan-Meier Survival Estimates. Regular Firms vs. Spacemen

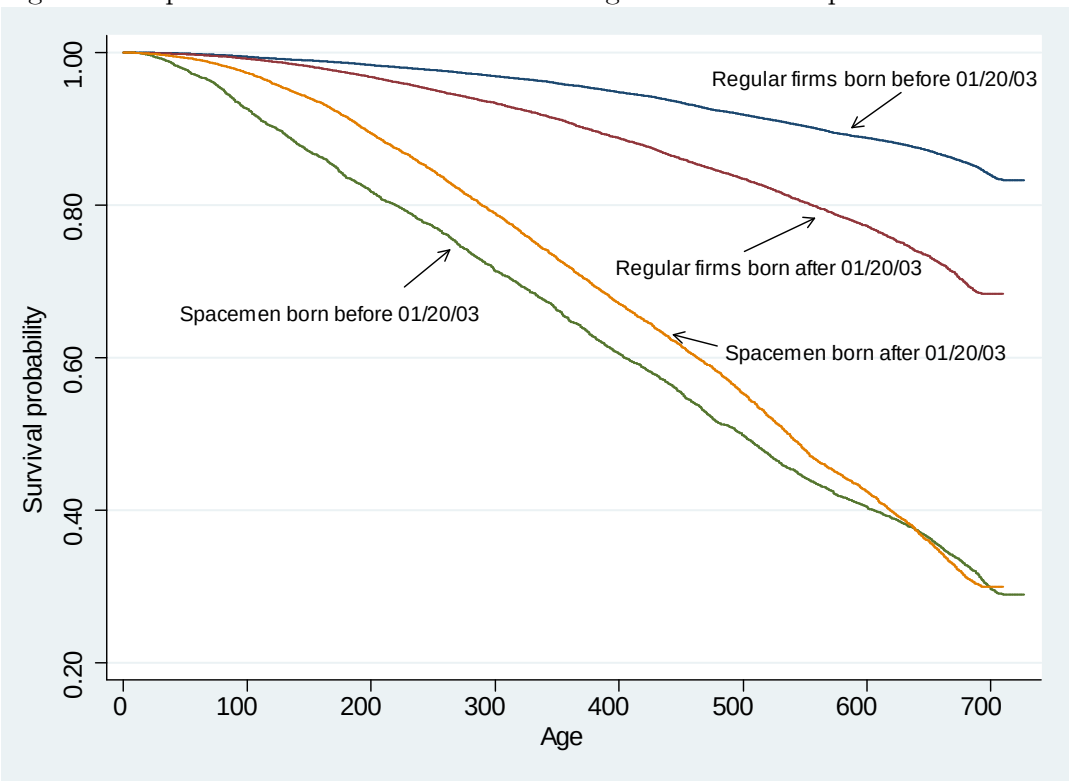

Figure 3. Density of Age Distribution. Regular Firms vs. Spacemen

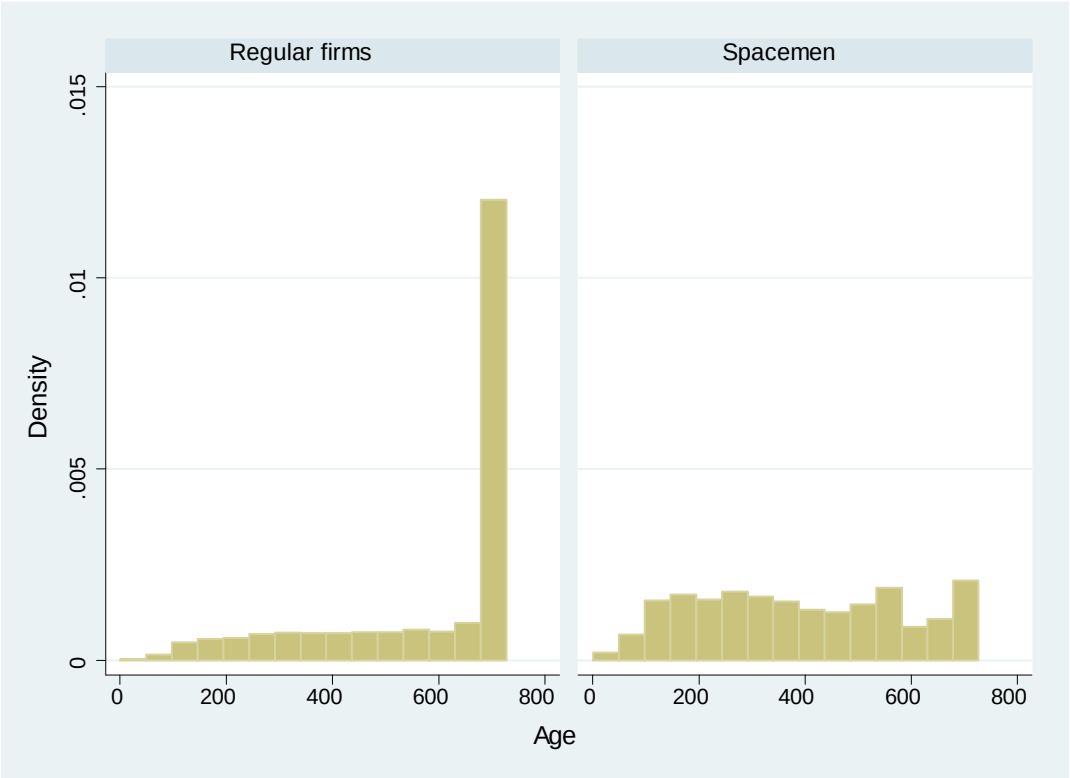

Figure 4. Age Distribution by Spacemen Type