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# How Does Law Affect Finance? An Examination of Financial Tunneling in an Emerging Market

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# How Does Law Affect Finance?

## An Examination of Financial Tunneling in an Emerging Market

### **Abstract**

We establish that one channel through which law affects financial markets is by control of financial tunneling. We first develop a model of how legal rules affect two common forms of financial tunneling: dilutive equity offerings and below-market freezeouts, and how these forms affect equity valuations. We then report evidence from Bulgaria, which goes through mass privatization in 1998, followed by extensive post-privatization tunneling. In 2002, Bulgaria adopts securities law changes which rescue a collapsing market by limiting both forms of tunneling, and provide a natural experiment which allows us to test the model predictions. Following the legal changes, minority shareholders participate equally in secondary equity offers, where before they rarely participated and suffered severe dilution; and freezeout prices quadruple (measured as offer price/sales). After the law is adopted, valuation measures (price/earnings, price/sales, and Tobin's  $q$ ) more than double for firms at high risk of tunneling, relative to lower risk firms. We thus present evidence from an emerging market on (i) the importance of legal rules that limit financial tunneling, and (ii) the importance of financial tunneling risk as a factor in determining equity prices.

Keywords: financial tunneling, preemptive rights, dilution, freezeout, corporate governance, securities law, emerging markets

JEL codes: G32, G34, K22

## 1. Introduction

Classic finance theory motivated by the Coase theorem (Coase, 1960) often presumes that financial markets can function well regardless of the legal environment. Yet, a growing literature starting with La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997, 1998) provides evidence that the legal environment is a significant factor in explaining capital market growth and development. Most of this research, however, offers limited insight into the specific channels by which law affects financial markets. Both legal protections and financial market development are typically estimated in the aggregate and evaluated across countries. Specific laws are not linked to specific market outcomes. The lack of detailed evidence on how law affects financial markets leaves the law and finance literature still vulnerable to concerns that existing findings suffer from endogeneity, measurement, or omitted-variable biases.

Our paper contributes to the law and finance research by establishing one channel through which law affects finance. We assert that law affects finance through the control of “tunneling” (the extraction of firm value by controlling shareholders, see Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000). We first develop a simple theoretical model. In contrast to existing models of tunneling which examine only a single form of tunneling, in our model there are three types of tunneling – (i) cash flow tunneling (diversion of ongoing firm cash flow via transfer pricing and other business transactions); (ii) dilutive equity offerings (issuance of shares to insiders at below market value); and (iii) freezeouts (forced sale of minority shares to the controller for below market value). Dilution and freezeout are different flavors of what can be called financial tunneling (the expropriation of minority shareholder value via financial transactions which affect their ownership claims, rather than the firm's operations). We show how control of each method of financial tunneling depends on specific legal rules and

enforcement procedures. The model generates two main testable predictions – (i) specific legal rules, including preemptive rights and appraisal rights, can affect the level of financial tunneling; and (ii) a reduction in financial tunneling due to changes in the law will lead to a larger increase in equity valuations for firms at higher ex ante risk of financial tunneling.

Having analyzed the law- tunneling-finance channel in a simple model, we turn to the empirical core of this paper. We test the predictions of the model using a natural experiment offered by Bulgarian mass privatization of more than 1,000 firms in 1998, followed by extensive post-privatization financial tunneling, and then by changes in Bulgarian securities law in 2002, which sharply limit both dilution and freezeout. The combination of a legal change and detailed, hand-collected data on financial tunneling transactions and firm characteristics provides us with a unique opportunity to examine the relations between law, tunneling, and firm valuations.

Our empirical analysis offers strong support for the first model prediction that law can affect financial tunneling via dilution and freezeout. Prior to 2002, Bulgarian minority shareholders suffer severe dilution. When privately controlled firms issue shares, almost all are purchased by controlling shareholders, often at the minimum lawful price (the shares' par value of one Bulgarian lev per share) and at a large discount to market value. The new law improves minority investors' preemptive rights by requiring the distribution of publicly-tradable warrants to all shareholders when a public company issues shares. After 2002, dilution basically stops. Equity offerings are subscribed to roughly pro-rata by minority and majority shareholders.

Prior to the 2002 legal changes, freezeout offers are at an average of less than 35% of market value, which was often already depressed by prior dilutive offerings and investor anticipation of future tunneling. Informal freezeouts ("going dark" transactions) are common, at prices approaching zero. During 1999-2001, nearly 500 firms (over half of all the listed firms on

the Bulgarian Stock Exchange) either go dark or conduct freezeouts. Smaller, more profitable firms with a private majority owner are more likely to conduct freezeouts. The new law adds several freezeout protections, including regulatory approval of freezeout terms and a ban on going dark transactions. Post 2002, freezeouts of minority shareholders, are at premiums to market value consistent with those in developed markets (DeAngelo, DeAngelo and Rice, 1984), instead of at severe discounts. The ratio of freezeout price to sales roughly *quadruples*, controlling for general changes in share prices.

After documenting the effect of legal changes on dilution and freezeout transaction, we next measure the effect of the legal changes on share prices. Overall stock market prices indeed rise, at times consistent with the legal change contributing to the rise, but this offers only weak identification, because other factors affecting the Bulgarian economy could also explain the rise. To address such concerns we utilize the second prediction of the model and separate firms into those at high risk of tunneling and those at low risk. The differential change in the valuations of high-tunneling-risk firms relative to the low-risk firm isolates the valuation effect of the legal changes from other extraneous factors.

We use two approaches to measure tunneling risk. First, we use a battery of firm financial and ownership characteristics to estimate each firm dilution and freezeout propensity at year-end 2001, just prior to the law change. We find, for both propensity measures, that high-risk firms have larger after-minus-before 2002 increase in valuation measures (price/earnings, price/sales, and Tobin's  $q$ ) than low-risk firms. Second, we use ownership to proxy for tunneling risk. We expect that firms with a private majority owner (treatment group) are at high tunneling risk because the controlling owner has the power and often the incentive to engage in tunneling; while government-controlled firms and firms without a private majority controller are at lower

risk and can form a control group. We conduct a standard difference-in-differences analysis of the two groups, and again find that post-law valuation measures rise for high-risk firms, relative to low-risk firms. The differences are economically large. For both approaches, the post-law relative increase in price/earnings ratio and price/sales for high-risk firms exceeds 100%; increases in Tobin's q are roughly 50%.

To our knowledge, this is the first paper which shows both that law affects financial tunneling and that financial tunneling risk affects firm valuations. By demonstrating theoretically and empirically how specific legal provisions can affect the outcome of financial tunneling transactions, we contribute to the recent research by La Porta, Lopez-de-Silanes, and Shleifer (2006), who assess which aspects of securities law predict stronger securities markets, and Beck, Demirguc-Kunt, and Levine (2005), who examine the effects of different aspects of legal systems on firm's access to external finance. In particular, our results on the outcome of secondary equity offerings under different legal regimes suggest that legal controls on financial tunneling are necessary for an emerging market to serve as a source of capital instead of as a vehicle for shareholder expropriation.

Last, our results have implications for asset pricing research in emerging markets. In Bulgaria, investors appear to rationally consider financial tunneling risk, updating their assessments as the law changes. Dilution and freezeout propensities vary widely across firms based on their ownership and financial characteristics, and we show that the largest post-law valuation increases occur for firms at greatest risk. The findings suggest that financial tunneling risk has the potential to complement customary asset pricing factors in explaining the cross-section and time-series of expected returns. In emerging markets, investors must update not only their estimates of economic growth (as in any market) but their estimates of financial

tunneling risk, which could vary widely in cross-section. Financial tunneling factors might also shed light on other emerging market investment issues such as home country bias (Kang and Stulz, 1997) as local investors may be better equipped to evaluate financial tunneling risk at the firm-level.

The remainder of the paper is structured as follows. Section 2 develops a model of how financial tunneling through dilutive offerings and below-market freezeouts affects minority shareholder valuations. Section 3 applies the model to the Bulgarian context. Section 4 describes the data we rely on. Section 5 provides empirical results on the effect of the 2002 legal changes on financial tunneling mechanisms (equity dilution and freezeout). Section 6 reports results on the relation between tunneling risk and equity valuations. Section 7 concludes.

## **2. A Theoretical Model of Financial Tunneling**

We begin by offering an overview of the model, which is developed in detail below. The model takes the point of view of minority shareholders, who infer probabilistically the likelihood (and magnitude) of two specific forms of financial tunneling – dilutive equity offerings and freezeout. For background, Table 1 summarizes the recent research on financial tunneling and provides detail about particular financial tunneling methods.

In our model, changes in law cause minority shareholders to update their estimates of financial tunneling probability and magnitude, and rationally adjust the price they are willing to pay for shares. We present the model in detail to illustrate how specific legal rules impact specific aspects of minority shareholders' valuation. Our effort to model how specific legal rules affect tunneling and thus asset prices has no direct precursors (at least we cannot think of any).<sup>1</sup>

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<sup>1</sup> A follow-up paper, Atanasov, Durnev, Fauver, and Litvak (2007), addresses in more detail how law affects dilution. Our effort is also related to Litvak (2007), who uses Monte Carlo simulation to study the effective cost to investors of various default penalties in venture capital partnership agreements.



For purposes of scope, we do not model the optimal tunneling choices from the perspective of the controlling shareholder. This task is left for future research.

Our model is a simple one, but it is a significant extension of prior work. We offer the first multi-period model that distinguishes between cash flow and financial tunneling and between forms of financial tunneling. Prior work does not distinguish between forms of tunneling (Burkart, Gromb, and Panunzi, 1998; Shleifer and Wolfenzon 2002; La Porta, Lopez-de-Silanes, Shleifer and Vishny, 2002; Bertrand, Mehta, and Mullainathan, 2002; Djankov, La Porta, Lopez-de-Silanes and Shleifer, 2008; Cheung, Rau, and Stouraitis, 2006) or models the effect of law on tunneling in a highly stylized way where a single parameter typically captures the cost of tunneling (e.g., Shleifer and Wolfenzon, 2002). This cost increases with the degree of tunneling, as it must, for the model to have an interior solution. But the cost is not directly connected to legal constraints. It could arise from law, reputational costs, future difficulty in raising capital, or other sources. In contrast, we model how specific legal rules – including those conveying preemptive rights, minority shareholder veto rights, appraisal rights, and minimum price rules for share offerings and freezeouts – affect the extent of financial tunneling. As the field of law and finance grows, a more robust effort to link specific laws to financial market outcomes is essential.<sup>2</sup> Our model offers a first step.

### *2.1. Model Setup*

There are  $N$  firms in the economy, indexed by  $n$ , and three relevant time periods, indexed by  $t$  ( $t = 0, 1$ , or  $2$ ). Table 2 summarizes the notation in the model. Each firm has  $S_{n,t}$  shares

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<sup>2</sup> Prior research linking law and finance generally measures legal protection in the aggregate by constructing an index of various protections and rights (e.g., La Porta et al. 1998). Empirical studies connect the overall level of investor protection to measures of firm valuation, ownership structure, or dividend payments (for a survey, see Denis and McConnell, 2003). To our knowledge, only Nenova's (2005) study of Brazil has linked a specific law, which protects minority shareholders against tunneling (in her case, freezeouts), to equity market outcomes.

outstanding. Unless specified otherwise, we develop the analysis for a typical firm and suppress the  $n$ -subscript. Without loss of generality we assume that the firm initially has one share outstanding ( $S_0 = 1$ ). The firm has a controlling shareholder  $C$ , who initially owns  $\alpha_0$  shares, and minority shareholders  $m$ , who initially own the remaining  $(1 - \alpha_0)$  shares. Similar to La Porta et al. (2002), we take the proportion  $\alpha_0$  as exogenous. Making ownership endogenous is necessary in models which study the relations between law, control benefits, and ownership (Bebchuk, 1999; Shleifer and Wolfenzon, 2002), but does not generate much additional insight about the connections between law, tunneling, and firm market value, which are the subject of our paper.

Define the firm's "intrinsic value", assuming counterfactually that no tunneling is possible, as  $V_{no-tun}$ , and its intrinsic income per share as  $E_{no-tun}$ . The controlling shareholder engages in cash-flow tunneling, diverting a fraction  $d_{cf}$  of  $E_{no-tun}$ . Minority shareholders, however, observe only the firm's income at  $t = 0$  after cash flow tunneling:

$$E_{obs} = E_{no-tun} (1 - d_{cf}).^3$$

Let shareholders value shares using a simple no-growth discounted cash flow model, and a discount rate  $r$ , which we assume does not depend on the level of tunneling. This implicitly assumes that cash flow tunneling is expected to be permanent. The firm's per-share value to minority shareholders, with cash-flow tunneling but no financial tunneling,  $V_{no-fin}$ , equals:

$$V_{no-fin} = E_{obs} * \frac{1}{r} = V_{no-tun} (1 - d_{cf}) \quad (1)$$

In equilibrium, minority shareholders value the firm at  $t = 0$  based on its observed income  $E_{obs}$ , but also taking into account the risk of future financial tunneling. We assume that minority investors infer the probability and magnitude of financial tunneling (which are exogenous

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<sup>3</sup> We do not model the determinants of  $d_{cf}$ . See Durnev and Kim (2005) for a detailed model of cash flow tunneling.

variables in the model), and thus price shares correctly on average, but do not know which firms will engage in financial tunneling.

The controller can also engage in financial tunneling through share dilution or freezeout. For simplicity, we assume that dilution happens only once (at  $t = 1$ ) and that freezeout occurs only at  $t = 2$  and only following a dilutive offering. There is a probability  $\pi_d$  that at  $t = 1$ , the controlling shareholder will cause the firm to issue  $i$  new shares to its existing shareholders at a price  $P_{dilut}$ , which is at a discount  $d_{dilut}$  to the firm's intrinsic value before financial tunneling  $V_{no-fin}$ . The controlling shareholder will acquire any shares not purchased by other shareholders. If a dilutive offering occurs, there is a further probability  $\pi_f$  that at time  $t = 2$ , the controlling shareholder will acquire all minority shares through a tender offer at a price  $P_{freeze}$  that is below the firm's intrinsic post-dilution/pre-freezeout value  $V_{no-freeze}$  by a fraction  $d_{freeze}$ . The model algebra would be more complicated, but the basic results would be similar, if we allow a tunneling channel in which freezeouts can proceed without prior dilution.

The dilution and freezeout probabilities  $\pi_d$  and  $\pi_f$  are known to minority shareholders at  $t = 0$ , but are not directly observable. We do not model explicitly the determinants of these probabilities (we estimate them empirically in Section 6.1). They could depend on legal rules and on characteristics of the firm and controller, including share ownership  $\alpha_0$ , nature of the controller (private or state), firm size, the firm's expected need for equity capital, profitability, possible political pressure, and the behavior of other firms in the market. These probabilities can also depend on each other, on the dilution and freezeout discounts, and on the extent of cash-flow tunneling. For example, investors might judge that a firm with high cash-flow tunneling also has a high likelihood of financial tunneling. Investors might also infer from a dilutive offering that a future freezeout is more likely.

We next summarize the market prices and intrinsic values that arise in the model. Market prices ( $P$ -variables) are less than intrinsic pre-tunneling values ( $V$ -variables) because they reflect shareholder anticipation of the risk of future tunneling. Intrinsic values are observable to shareholders, but are not achievable in market transactions. We have defined  $V_{no-tun}$  as the intrinsic per-share value of the firm with no tunneling and  $V_{no-fin}$  as the per-share value with cash-flow tunneling but no financial tunneling. Let  $V_{no-freeze}$  be the firm's per-share value after a dilutive offering in a world without freezeouts, and  $V_{freeze}$  be the per-share value in a freezeout transaction. We have defined  $P_{dilut}$  as the price at which new shares are issued at  $t = 1$ . Let the equilibrium market price of minority shares at time  $t$  be  $P_0$  at  $t = 0$ ,  $P_1$  at  $t = 1$  (after the dilutive offering is completed); and  $P_{freeze}$  be the freezeout price at  $t = 2$ . Once a freezeout is completed, these series converge, so  $P_{freeze} = V_{freeze}$ .

## 2.2. Specific Financial Tunneling Mechanisms

In this sub-section we model tunneling through dilution and freezeout, and develop the links between legal rules (including rules which establish preemptive rights, appraisal rights, minority shareholder vetoes, and minimum prices for share offerings and freezeouts) and financial tunneling outcomes.<sup>4</sup>

### 2.2.1. Period 1: Dilution

At time  $t = 1$ , the firm issues  $i$  shares at a discounted price  $P_{dilut} = V_{no-fin} * (1 - d_{dilut})$ . Because investors anticipate possible dilution and tunneling, market value  $P_0 < V_{no-fin}$ . The discount to intrinsic value  $d_{dilut}$  will not be directly observed, and will exceed the observable discount to market price  $d_1$ . The minority shareholders acquire a fraction  $k*(1-\alpha_0)$  of the newly

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<sup>4</sup> For convenience, we refer to these rules as securities law. In Bulgaria, they are included in the securities law, but in other countries, similar rules may be part of securities law, corporate law, or stock exchange rules.

issued shares, where  $k \in [0, 1]$  is the fractional take-up of shares by minority shareholders, relative to the number they would need to acquire to maintain their percentage ownership. Since the shares are offered at a discount to intrinsic value, the controlling shareholder has an incentive to minimize  $k$ , to the extent permitted by law.

After the offering, the minority shareholders own the following proportion of the company:

$$(1 - \alpha_1) = \frac{(1 - \alpha_0) + k(1 - \alpha_0)i}{(1 + i)} = \frac{(1 - \alpha_0)[1 + k * i]}{(1 + i)} \quad (2)$$

After the issuance, the firm's intrinsic value, assuming no freezeout, equals  $[1+i*(1-d_{dilut})]*V_{no-fin}$  and the number of outstanding shares is  $(1 + i)$ . The per-share intrinsic value of minority shares, without anticipation of a freezeout or further dilution, drops to:

$$V_{no-freeze} = \frac{(1 + i * (1 - d_{dilut}))}{1 + i} * V_{no-fin} = \left(1 - d_{dilut} \frac{i}{(1 + i)}\right) V_{no-fin} \quad (3)$$

Minority shareholder wealth decline is given by the following proposition (all proofs are in Appendix A).

*Proposition 1. The wealth transfer  $D_{dilut}$  from minority shareholders to the controlling shareholder in a dilutive offering (as a fraction of the no-financial tunneling intrinsic value of minority shares  $V_{no-fin}$ ) equals:*

$$D_{dilut} = [1 - \alpha_0] d_{dilut} \frac{i}{1 + i} (1 - k) \quad (4)$$

If there are no legal protections against dilutive share offerings, then  $d_{dilut}$  can approach 1,  $k$  can approach 0, and  $i$  can approach  $\infty$ . In this case, the controlling shareholder can acquire an arbitrarily large number of shares at an arbitrarily low price, thus expropriating the minority shareholders' entire initial ownership of the firm;  $D_{dilut} \approx (1 - \alpha_0)$ . Most legal systems, however,

include some rules that limit dilutive offerings. Based on Equation (5), these rules can be classified into three main groups: 1) preemptive rights which affect  $k$  and attempt to make it closer to one; 2) minimum pricing rules that regulate  $d_{dilut}$  and attempt to reduce it toward zero; and 3) shareholder approval rules that limit  $i$ . See Appendix A for more detailed discussion of each type of legal statutes and their effect on  $k$ ,  $d_{dilut}$ , and  $i$ .

### 2.2.2. Period 2: Freezeout.

We next analyze the post-dilution scenario in which, at  $t = 2$ , the controlling shareholder takes the company private and freezes out the minority shareholders at a discount  $d_{freeze}$  to the no-freezeout intrinsic value of the shares. After the freezeout, there will be no further financial tunneling, so the  $V$  series of "intrinsic" values (which assume no further financial tunneling) converges to the  $P$  series of market prices (which anticipate future tunneling): The controller pays a discounted freezeout price  $P_{freeze}$  for the minority shares:

$$P_{freeze} = V_{no-freeze} (1 - d_{freeze}) = V_{no-fin} \left[ 1 - d_{dilut} \frac{i}{1+i} \right] (1 - d_{freeze}) \quad (6)$$

The freezeout affects minority shareholder wealth as follows:

*Proposition 2. The wealth transfer  $D_{freeze}$  from minority shareholders to the controlling shareholder in a freezeout (as a fraction of no financial tunneling value  $V_{no-fin}$ ) equals:*

$$D_{freeze} = \frac{(1 - \alpha_1) * V_{no-freeze} * d_{freeze}}{V_{no-fin}} = \frac{(1 - \alpha_0) [1 + k * i]}{(1 + i)} \left[ 1 - d_{dilut} \frac{i}{1+i} \right] d_{freeze} \quad (7)$$

With no legal protections, the controlling shareholder can offer an arbitrarily low freezeout price, so  $d_{freeze}$  approaches 1, and the minority shareholders' remaining wealth is expropriated. However, many countries' laws offer some protection against discounted freezeout offers. The law can limit  $d_{freeze}$  via appraisal rights, fiduciary duty rules, or by requiring minority

shareholder approval of the freezeout price. See Appendix A for further discussion of the effect of each of these statutes on  $d_{freeze}$ .

### 2.3. Financial Tunneling and Equity Valuations

We next model the effect of financial tunneling on equity prices. The firm's value to minority shareholders with cash-flow tunneling alone is  $V_{no-fin}$ . To simplify the algebra while maintaining the intuition, we assume that a dilutive offering, if it occurs, will involve a large number of shares ( $i \gg 1$ ). Then the post-dilution per share value without freezeout risk will be  $V_{no-fin} * [1 - d_{dilut}]$ , and the minority shareholders' fractional loss of wealth from the dilutive offering will be  $D_{dilut} = d_{dilut}(1 - k)$ . Investors will realize the following payoffs:

No dilution or freezeout:  $V_{no-fin}$  with probability  $(1 - \pi_d)$

Dilution but no freezeout:  $[1 - d_{dilut}(1 - k)]V_{no-fin}$  with probability  $\pi_d(1 - \pi_f)$

Dilution and freezeout:  $[1 - d_{dilut}(1 - k)](1 - d_{freeze})V_{no-fin}$  with probability  $\pi_d * \pi_f$

We can combine these payoffs to determine the equilibrium market price at time  $t = 0$ .

*Proposition 3. If dilutive offerings, when they occur, are large ( $i \gg 1$ ), the market price of minority shares at  $t = 0$  will equal:*

$$P_0 = V_{no-fin} \times \left\langle 1 - \pi_d * \left\{ 1 - [1 - d_{dilut}(1 - k)](1 - \pi_f d_{freeze}) \right\} \right\rangle \quad (8)$$

Define the financial tunneling discount  $d_{fin}$  as the difference between  $P_0$  and  $V_{no-fin}$ , which equals:

$$d_{fin} = \pi_d * \left\{ 1 - [1 - d_{dilut}(1 - k)](1 - \pi_f d_{freeze}) \right\} \quad (9)$$

Combining cash-flow and financial tunneling, the price of minority shares at  $t = 0$ , will be:

$$P_0 = V_{no-tun} * (1 - d_{cf})(1 - d_{fin}) \quad (10)$$

We next derive an important result that allows us to separate the valuation effects of cash-flow and financial tunneling. We assume that, to a first order, cash flow tunneling does not affect the discount rate  $r$  differently than financial tunneling. In our no-growth model, the Price/Earnings (PE) ratio with no tunneling will be  $P_{\text{no-tun}}/E_{\text{no-tun}} = 1/r$ . Both cash flow and financial tunneling will affect share prices. But:

*Proposition 4: If cash flow tunneling does not affect investors' discount rate  $r$  differently from financial tunneling, then cash-flow tunneling does not directly affect PE ratios while financial tunneling does.*

The PE ratio with only cash-flow tunneling  $PE_{\text{no-fin}}$  will be:

$$PE_{\text{no-fin}} = \frac{P_0}{E_{\text{obs}}} = \frac{E_{\text{obs}} \frac{1}{r}}{E_{\text{obs}}} = \frac{1}{r} \quad (11)$$

In contrast, the PE ratio with financial tunneling  $PE_{\text{fin}}$  will be:

$$PE_{\text{fin}} = \frac{P_0}{E_{\text{obs}}} = \frac{E_{\text{obs}} \frac{1}{r} (1 - d_{\text{fin}})}{E_{\text{obs}}} = \frac{1}{r} (1 - d_{\text{fin}}) \quad (12)$$

We can thus distinguish between the effects of cash-flow and financial tunneling using a particular financial metric. Cash-flow tunneling need not affect PE ratios while financial tunneling affects PE ratios directly. The logic is that cash flow tunneling is an operational activity that reduces *current* earnings to all shareholders while financial tunneling is a financial activity which does not affect the level of the firm's earnings, but transfers ownership of some proportion of those *future* earnings to the controller. Note that if minority investors actually demand higher rates of return  $r$  for financial tunneling risk than for cash flow tunneling risk, the differences in PE ratio will be even more pronounced than in the case stated in Proposition 4.



#### 2.4. Comparative Statics and a Numerical Example

Observed equity valuations are affected by the five parameters that enter the expression for  $d_{fin}$  in Equation (9):  $k$ ,  $d_{dilut}$ ,  $d_{freeze}$ ,  $\pi_f$ , and  $\pi_d$ . We formulate the following proposition for the effect of these five parameters on the financial tunneling discount  $d_{fin}$ . For this proposition, we assume that the variables are continuous and can be differentiated. Under the view that these variables move in discrete jumps, similar logic would prevail by taking ratios of the discrete degrees of change in each variable.

*Proposition 5. The partial first derivatives of  $d_{fin}$  are:*

$$\frac{\partial d_{fin}}{\partial k} = -\pi_d d_{dilut} (1 - \pi_f d_{freeze}) < 0 \quad (13)$$

$$\frac{\partial d_{fin}}{\partial d_{dilut}} = \pi_d (1 - k) (1 - \pi_f d_{freeze}) > 0 \quad (14)$$

$$\frac{\partial d_{fin}}{\partial d_{freeze}} = \pi_d \pi_f [1 - (1 - d_{dilut} (1 - k))] > 0 \quad (15)$$

$$\frac{\partial d_{fin}}{\partial \pi_d} = [1 - (1 - d_{dilut} (1 - k)) * (1 - \pi_f d_{freeze})] > 0 \quad (16)$$

$$\frac{\partial d_{fin}}{\partial \pi_f} = \pi_d d_{freeze} * (1 - d_{dilut} (1 - k)) > 0 \quad (17)$$

Proposition 5 provides several empirical predictions. First, an increase in minority investor participation  $k$ , perhaps through improved preemptive rights, reduces  $d_{fin}$ . This effect is stronger when the probability of dilution or the expected discount on newly issued shares is larger. Large freezeout probability and discount reduce the effect of increasing  $k$ . In the extreme, when  $\pi_f * d_{freeze}$  is large enough,  $k$  will be zero, and legal rules that affect dilution will no longer affect valuations (see Appendix A for a formal discussion of the interactions between freezeout and dilution).

Second, decreasing the tunneling discounts  $d_{dilut}$  or  $d_{freeze}$  also reduces  $d_{fin}$ . However, the effect of decreasing  $d_{dilut}$  ( $d_{freeze}$ ) is reduced when the discount for the other form of financial tunneling transaction  $d_{freeze}(d_{dilute})$  is larger. These results are consistent with protections against dilution and freezeout working in tandem to reduce the overall discount due to financial tunneling. Addressing them together generates more wealth for minority shareholders than dealing with each issue separately.

Third, the effect of reducing  $d_{freeze}$  is larger for companies with high probability of freezeout  $\pi_f$ . Respectively reducing  $d_{dilut}$  will have a larger valuation effects for companies with high  $\pi_d$ .

Fourth, decreasing the tunneling probabilities  $\pi_d$  or  $\pi_f$  reduces  $d_{fin}$  and thus increases firm market value. The magnitude of this effect is increasing in  $d_{dilut}$  and  $d_{freeze}$ . Also, though outside the model, a change in legal rules that reduces the tunneling discounts  $d_{dilut}$  and  $d_{freeze}$  makes tunneling less profitable and therefore less likely. Legal rules that affect tunneling discounts can thus have a large effect on valuation, by directly affecting  $d_{dilut}$  and  $d_{freeze}$  and indirectly affecting  $\pi_d$  and  $\pi_f$ .

To put these comparative statics results in perspective, assume that Company A operates in an economy with poor legal protections and has  $d_{dilut}$  and  $d_{freeze} = 0.6$ ,  $k = 0$ , and  $\pi_d$  and  $\pi_f = 0.75$ . Using Equation (9), the resulting value for  $d_{fin}$  is 0.59 – Company A will trade at a 59% discount to its no-financial-tunneling value. Now, imagine that protections against both dilution and freezeout are improved, so that  $k$  increases to 1, and  $d_{dilut}$  and  $d_{freeze}$  drop to 0.2, while  $\pi_d$  and  $\pi_f$  remain unchanged. The wealth effects for minority shareholders will be large. *Ceteris paribus*,  $d_{fin}$  will drop from 0.59 to 0.11, and Company A's market valuation will increase by more than 113%. Now consider Company B, for which the pre-law freezeout and dilution

probabilities are only 0.25 instead of 0.75, while  $d_{dilut}$ ,  $d_{freeze}$ , and  $k$  are the same as for Company A. Company B's pre-law discount will be only 0.17. The law changes will reduce this to 0.013. Company B's market value will increase by 18%, compared to 113% for Company A.

The numerical example illustrates how improvements in tunneling protections can have large value effects for companies with high *ex ante* risk (propensity) of tunneling and relatively minor effects for companies with low risk. Consequently, if tunneling risk varies across companies, this risk becomes a determinant of the cross-sectional and time-series variation in equity prices and expected returns, with the potential to complement some commonly used factors, such as market risk and momentum, and to interact strongly with others, such as firm size and book/market. Size is likely correlated with tunneling risk (as we confirm below for Bulgaria, and high book/market ratios could reflect high tunneling risk (compare Black (2001a; Russia); Glaeser, Johnson, and Shleifer (2001; Czech Republic)).

### **3. Applying the Theoretical Framework to Bulgaria - Empirical Predictions**

In this section we apply our theoretical framework to analyze the weaknesses of the Bulgarian law governing dilutive offerings and freezeouts pre 2002 and evaluate the 2002 improvements in these minority investor protections. We then formulate testable predictions about the impact of the 2002 changes on financial tunneling and share values.

#### *3.1. An Analysis of Preemptive and Appraisal Rights in Bulgarian Law*

In Bulgaria prior to 2002, there were no minimum price rules for secondary equity issues, and thus no limits on  $d_{dilut}$ , other than the background corporate law rule requiring shares to be issued at a price no less than par value. Preemptive rights existed but these rights were not transferable. Even if preemptive rights rules had been stronger, freezeout rules were weak enough so that most minority shareholders would rationally not participate in equity offerings

(see Appendix A). Thus, we expect  $k$  to be close to 0. There was also no realistic possibility for an equity offering to raise capital from outside investors. We are not aware of any such offerings during the period from the 1998 mass privatization until the 2002 reforms. So the reputational cost of a dilutive offering, in reduced future access to equity capital, was not an important constraint.

Minimum price rules in a freezeout were so weak that many controlling shareholders did not need to use the two-stage process of dilution accompanied by freezeout described in Equation (7). They could expropriate most minority shareholder wealth via freezeout alone. The tender offer rules required only that the freezeout price could not be lower than the three-month weighted average stock price. The Bulgarian market was also very illiquid. There were several means by which controlling shareholders could freeze out minority shareholders at a discount  $d_{freeze}$  that approached and sometimes effectively equaled 100%. One was to execute large block trades with related parties at depressed prices during the three-month period prior to the freezeout. These block trades would form the vast percentage of trading during the three-month period, and de facto set the appraisal price.

In many cases, a company's shares did not trade at all in the three months preceding a freezeout. This allowed controllers to delist the company without making any offer to minority shareholders. Companies undergoing bankruptcy procedures could also be delisted, with no check on whether these companies were actually insolvent. A controlling shareholder could then use the bankruptcy process to freeze out minority shareholders at a zero price.

If a Bulgarian company is delisted (goes dark), minority shareholders formally retain their shares. However, once the company is delisted, it is not subject to the securities laws, which govern public corporations. Private firms are governed by the Bulgarian Commercial

Code, which offers no protections against dilutive offers or freezeouts, and does not require disclosure of company financials to shareholders. A going dark transaction is likely to be equivalent to a freezeout at a close to zero price.

In the summer of 2001, a newly elected government headed by the former Bulgarian king came into power. One priority outlined by the new government was to improve the functioning of capital markets. In December 2001 the government proposed to the Bulgarian Parliament several changes to the securities laws. Table 3 summarizes these changes, which became effective in June 2002.

The first main change involved strengthening preemptive rights. An increase in firm equity could be implemented only through distributing tradable preemptive rights (warrants) to all shareholders. These warrants had to be listed and traded on the Bulgarian Stock Exchange.

The second major change was the regulation of going-private transactions. The law now recognizes three critical ownership levels: 50%, 67%, and 90%. A tender offer for all minority shares becomes mandatory when a shareholder reaches each of these critical levels, and a controlling shareholder can delist a company only when reaching 90% ownership or greater. The law also requires a majority of the minority shareholders to vote to approve the terms of the mandatory tender offer. Finally, minority shareholders are now entitled to receive a minimum fair price for their shares in a tender offer. The fair price is calculated using a combination of *DCF* valuation and comparison to peer firms. The freezeout price must exceed the greater of this fair price or the three-month trade-weighted average stock market price (excluding block trades) to set a lower limit on the freezeout price. Since block trades are now disregarded in computing the market price, manipulating the market price is more difficult.

The changes in the law were accompanied by a reorganization and dramatic increase in the powers of the securities regulator. The newly established Bulgarian Financial Supervision Commission (FSC) succeeded the Bulgarian Securities and Stock Exchange Commission (SSEC) with the goal of protecting the interests of minority investors. Since its creation the FSC has both enforced the 2002 Law and drafted several important regulations that strengthen the enforcement of and clarify the protections built in the law. These changes are consistent with arguments made by Glaeser, Johnson, and Shleifer (2001) and Black (2001) on the importance of a strong securities regulator in an emerging market. For example, the FSC reviews all tender offers and has often required majority shareholders to increase the freezeout price, before the FSC will approve the transaction. Also, in early 2003 the FSC issued rules for computing freezeout prices. For liquid stocks the minimum price is based on a combination of the market price and *DCF* and peer-multiple valuations. For illiquid stocks the minimum price is based only on DCF and peer multiple valuations. The freezeout price must also equal or exceed estimated liquidation value.

### *3.2. Empirical Predictions and Framework to Test Them*

Our theoretical model and the discussion of Bulgarian legal changes imply that 1) the improved legal protections will reduce the extent of financial tunneling via equity dilution and freezeout; 2) the reduction in financial tunneling will lead to increased equity valuations; and 3) the increase in equity values will be larger for firms at higher risk of tunneling. We now translate these predictions into a testable framework.

Our first empirical prediction is that minority participation in equity issues  $k$  will increase following the legal changes in Bulgaria. We cannot observe  $k$  directly. However, we observe the controller's pre-offering ownership ( $\alpha_0$ ), post-offering ownership ( $\alpha_1$ ), and the number of new

shares issued ( $i$ ), so we can estimate  $k$ . The relationship between  $k$  and  $\alpha_0$ ,  $\alpha_1$ , and  $i$  is described by the following equation:

$$1 - \frac{(1 - \alpha_1)}{(1 - \alpha_0)} = \frac{i}{(1 + i)}(1 - k) \quad (18)$$

The left-hand-side of Equation (18) can be interpreted as a measure of dilution. It equals 1 if minority shareholders are completely diluted ( $k = 0$ ); and 0 if they participate pro rata in new issues ( $k = 1$ ), and will be negative if the firm raises capital principally from outside investors ( $k > 1$ ). The term  $i/(1+i)$  is a measure of equity increase. A regression of the left hand side of Equation (18) on the equity increase measure will provide an estimate of  $(1 - k)$ . If the 2002 legal changes are effective, we expect  $(1 - k)$  to decline (shareholder participation to increase) after the changes.

Our second empirical prediction about the link between law and financial tunneling is that after the legal changes the average discount in freezeouts  $d_{freeze}$  will decrease or even turn negative (freezeout at a premium). We can test this prediction partly by documenting the extent of going dark transactions pre-2002. These transactions were essentially implemented at  $d_{freeze} = 1$  and banned by the 2002 legal changes. We can also compare the average discount in freezeout tender offers before the legal changes with such transactions afterwards.

Our third prediction is that the post-law reduction in financial tunneling following the legal changes will translate into increased firm value, and in particular, increased PE ratios. PE ratios should increase if financial tunneling declines, even if controllers compensate by increasing cash-flow tunneling (Proposition 4). Our comparative statics results (Proposition 5) show that PE ratios can be positively impacted by any combination of an increase in  $k$ , a decrease in  $d_{dilut}$  or  $d_{freeze}$ , or a decrease in  $\pi_d$  or  $\pi_\phi$ . Unless controllers fully offset reduced financial tunneling opportunities through greater cash-flow tunneling, a similar result should

hold for other valuation metrics. Our estimating strategy, then, will be to compare the PE ratios of firms pre- and post-2002 (following the legal changes). We use price/sales and Tobin's q ratios as alternate valuation measures. These alternate measures provide larger sample size, at the cost of being sensitive to both cash-flow and financial tunneling.

A simple comparison of average valuation ratios before and after the legal change has a major weakness, however. Other policy changes or events during the same period will also affect equity valuations. For example, the new Bulgarian government set to zero the capital gains tax for securities traded on the Bulgarian Stock Exchange, effective from the beginning of 2002. Lower taxes reduce the required rate of return on equity investments and should increase the valuations for all listed companies.

We employ a two-prong identification strategy to connect changes in valuations to the legal changes. The first approach is based on a result outlined in Proposition 5 that firms with a higher probability of tunneling should have a larger valuation increase following the improvements in the law. We test this result in a two-stage estimation framework. At the first stage we use the pre-law experience with tunneling to estimate the propensity of financial tunneling for each firm, while at the second state we relate the estimated tunneling propensities to changes in valuation metrics following the adoption of new laws. In particular, in the first stage, we estimate pre-law dilution propensity using a logit model:

$$\text{Prob}(dilut_i = 1 | X_i) = \frac{e^{\alpha+cX_i}}{1 + e^{\alpha+cX_i}} \quad (19)$$

Here *dilut* is a dummy variable which equals 1 if a dilutive offering occurs pre-2002 and 0 otherwise; and  $X_i$  is a vector of firm financial, ownership, and other characteristics. The freezeout propensity equation is similar.



In the second stage, we use the first-stage coefficients to estimate each firm's dilution and freezeout probabilities  $tunprop_{i,d}$  and  $tunprop_{i,f}$ . We then estimate valuation ratios (equation shown for PE, similar for other ratios) as follows:

$$PE_{it} = A_i + B_t + \Delta * postlaw + \sum_{j=d,f} (\beta_j * tunprop_{i,j} * postlaw) + \varepsilon_{it} \quad (20)$$

where  $i$  indexes companies and  $t$  indexes time. The terms  $A_i$  are firm fixed effects which control for unobservable differences in firm quality;  $B_t$  are time fixed-effects, which control for country-wide changes (like the capital gains tax reduction);  $postlaw$  is a post-law-change dummy variable. The coefficient on the  $postlaw$  dummy gives the predicted change in PE ratio for a firm with zero tunneling propensities. The coefficients  $\beta_d$  and  $\beta_f$  predict the extra change in PE ratio for a 0-to-1 change in the respective tunneling propensity.

Our second approach is differences-in-differences (DiD) estimation (see Bertrand, Duflo, and Mullainathan, 2004). We expect, and confirm for our sample, that companies with a controlling private owner are at higher risk of financial tunneling than state-controlled firms. If so, we view privately controlled firms, which are sensitive to the 2002 reforms, as the treatment group for the reforms, and state-controlled firms, which are less sensitive to the reforms, as a control group. Changes in valuation of the control group will hopefully capture the effect of other changes in the Bulgarian markets, such as the reduction in capital gains tax. If reduction in tunneling causes higher valuations, valuation ratios for privately controlled firms should increase around the time of the law change, relative to ratios for state controlled firms.

More specifically, we estimate the following DiD equation (shown for PE ratio, similar for other valuation measures):

$$PE_{it} = A_i + B_t + (\Delta * postlaw) + \sum_g (\beta_g * LawInt_{gt}) + \varepsilon_{it} \quad (21)$$

where  $i$  indexes companies,  $t$  indexes time,  $g$  indexes groups of companies that have different pre-law probability of financial tunneling (privately controlled firms, state-controlled firms, and an intermediate category of firms with no controlling owner); and  $LawInt_{gt}$  are interactions between a post-law dummy and the group dummies (state-controlled firms are the omitted group).  $\beta_{private\ control}$  measures the extra after-minus-before change in valuation ratio for privately controlled firms, relative to state-controlled firms.

#### **4. Data and Summary Statistics**

Testing our model requires firm-level stock ownership, accounting, trading, and price data. Each raises its own challenges in the Bulgarian context. We summarize our data collection effort here. Appendix B provides details and shows how data availability affects the sample size for different tests.

*Overall sample.* The list of all 1,040 Bulgarian companies that participated in the mass privatization process in 1996 and were then listed on the Bulgarian Stock Exchange (BSE) in May 1998 is obtained from the Center for Mass Privatization. Atanasov (2005) and Miller and Petranov (2000) provide details on the mass privatization process and discuss the significant ownership concentration which resulted from the process. Following the completion of mass privatization auctions in 1998, more than 90% of all firms had a 20%+ blockholder.

*Share ownership.* We obtain year-end shares outstanding, ownership of the largest shareholder, and ownership by shareholder type (government, private companies, individuals, financial intermediaries) for 1998 to 2003 for 1,021 of the 1,040 firms from the Bulgarian Central Depository.

*Delisting and financial data.* We obtain listing date and delisting date (if any) from the online database of the Bulgarian Financial Supervision Commission. We exclude 190 firms

which never traded or filed financial reports, and nine companies which were acquired or went bankrupt in 1998 and have no data available. This reduces the sample from 1,021 to 822 firms. The remaining firms are required to file financial data annually with the Bulgarian Financial Supervision Commission, and most do so, in the form of separate spreadsheets for balance sheet, income statement and cash flow), which we are able to obtain from the Commission. There is, however, no standard form for these spreadsheets, so we go through a series of steps described in Appendix B to extract data items from the spreadsheets and manually correct obvious data entry errors. In the end, we extract reasonably complete data for 738 of the 822 firms, for at least one year from 1999-2002.

*Stock prices.* We have trade-by-trade volume and price data from the BSE tapes, through the end of 2003. The market is thin with a mean (median) of 15 (3) trades per firm per year over this period, and many firms having zero or nearly zero trading. Tender offer prices for freezeouts are hand collected from news tapes provided by the BSE; these are available only beginning in 2001.

We next turn to the pre-law dynamics of ownership and financial tunneling for the 822 firms with ownership and delisting data. We trace change in control events and financial tunneling events (equity dilution and delisting). We define equity dilutions as a firm issuing 20% or more new shares in a single year; we show below that these issuances are in fact highly dilutive. Figure 1 shows the occurrence of these events. Some aspects of Figure 1 are worth noting. First, the number of state owned firms declines over this period from 124 to 13, largely due to the state selling its controlling stake (106 firms) as part of the privatization process. The state does not engage in dilutive offerings, and freezes out minority shareholders only once (the other four delisted state-owned firms went bankrupt).

Second, 560 of the 822 firms experience a financial tunneling event. Of these firms, 492 are delisted, some after an initial dilution, and 68 are diluted but remain publicly traded by the end of 2001. Dilution and delisting (freezeout) are common for both privately controlled and firms with no majority owner. Some non-majority blockholders use dilutive offerings to obtain majority control.

Third, firms steadily transition from state control to another form of control, from no control to private control, and from public to private. This overall pattern is consistent with the argument by Fama and Jensen (1983) that public ownership and private majority control are unstable unless legal rules or reputational constraints limit expropriation, and Bebchuk's (1999) argument that dispersed ownership is unstable if private benefits of control are high.

The year-by-year number of financial tunneling events (delistings and equity dilutions) is shown in Table 4. Most of the delistings are concentrated in the 2000-2001, while the largest number of equity dilutions is in 1999. Most equity issues are highly dilutive (100%+ increase in shares outstanding). Our choice of a 20% cutoff level to define dilutive offerings is thus not critical for the empirical tests below.

## **5. Dilution and Freezeout: Pre- versus Post-Law Differences**

We now turn to the empirical analysis of the interaction between the 2002 legal change and financial tunneling. Section 5.1 analyzes dilution from equity offers. Section 5.2 discusses going dark and freezeout transactions.

### *5.1. Dilution*

We do not have data on the offer prices for most equity offerings so we cannot measure  $d_{dilut}$ . However, based on a limited number of announcements in the BSE news tapes, pre-law offer prices cluster at 1 lev per share even for companies with pre-offering market prices above

10 levs.<sup>5</sup> One lev is the shares' par value, and under the company law, shares cannot be issued below par value. Moreover, most offerings are very large, the number of outstanding shares more than doubles for 124 of the 153 offerings by non-state-controlled firms.

We can, however, estimate minority shareholder participation in equity offerings based on Equation (18). We construct on a year-by-year basis the dilution measure  $1 - (1 - \alpha_t)/(1 - \alpha_0)$ , based on year-end ownership by the largest shareholder. We construct the equity increase measure  $EquityInc = i/(1+i)$  based on year-end shares outstanding  $S$ :  $i = (S_1 - S_0)/S_0$ . We regress the dilution measure on  $EquityInc$  and an interaction term  $postlaw\ dummy * EquityInc$ , where  $postlaw\ dummy$  equals 1 for years 2002 and 2003, and zero otherwise.<sup>6</sup>

Table 5 reports the results of the equity dilution regressions for 153 firms which make large offerings (defined as a year-over-year increase in shares outstanding of at least 20%). None of the 153 firms which issue 20% or more equity has government majority ownership at the time of the offering.<sup>7</sup> We obtain similar results using cutoff levels of 50% and 100%. The results are consistent with the prediction that dilution should decline following the changes to minority investors' preemptive rights. Our pre-2002 estimate for  $(1 - k)$  is close to 1 (thus, our estimate for  $k$  is roughly zero). This implies that minority shareholders are (on average) completely excluded from new equity issues. After 2002, the estimate of  $(1 - k)$  is close to 0, meaning that  $k$  is close to 1. The drop in  $(1 - k)$  provides evidence that the 2002 changes

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<sup>5</sup> For example, the shares of Sopharma, AD traded around 13 lev immediately before it announced an equity issue at 1 lev a share in December 2000.

<sup>6</sup> We pool the pre- and post-2002 observations in order to report and F-test whether the estimates of  $(1 - k)$  pre-2002 are statistically different from the estimates post-2002. Results are similar if we estimate the regressions separately for the pre-law-change and post-law-change samples.

<sup>7</sup> Eleven firms are state controlled at the end of the year before the offering. We verify from BSE news tapes and Central Depository ownership data that the state sold its controlling stake before the offering and the new controlling shareholder then initiated a dilutive offering.

basically eliminate dilution. The post-2002 estimate of  $(1 - k)$  is consistent with companies issuing shares primarily to raise capital, rather than to dilute minority investors.

The analysis in Table 5 has one data limitation.<sup>8</sup> The ownership stake of the largest shareholder is observed only at year-end and it is not possible to determine whether controllers increased their stake by purchasing shares on the open market or excluding minority investors from participation in equity issues. This data limitation is unlikely to be significant because the average share turnover a year for the sample of firms in the dilution regressions is 5%, while the average increase in number of shares is 400%. Still, to ascertain the validity of our results, we re-estimate the regressions with a more conservative dilution measure which assumes that all traded shares during the year were purchased by the controlling shareholders and subtracts them from their year-end holdings. The results from these unreported regressions are that the coefficient of  $(1 - k)$  pre-law equals 0.6 and is statistically significant. The change in  $(1 - k)$  following the law is -0.85 and is statistically significant, which makes the estimate for  $(1 - k)$  following the law equal to -0.25, which is not significantly different from zero and consistent with the results in Table 5.

## 5.2. Freezeouts

We begin the analysis of freezeouts by examining delistings before the 2002 legal changes. Figure 1 shows that 492 firms are delisted in this period. Almost 80% of the firms (386 out of 492) do not trade in a three-month window before the delisting date. They simply go dark,

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<sup>8</sup> Another possible concern in interpreting Table 5 is that different types of firms issue equity pre-2002 and post-2002. We address this concern by separating firms into three categories: firms that did not issue equity at all, firms that issued equity pre-2002, and firms that issued equity post-2002. We estimate unreported multinomial logit models to determine whether the firms in these categories differ in percent owned by the largest shareholder, percent owned by the state, and market capitalization. We do not find significant pre- versus post-differences in which firms issued shares. In both periods larger firms with less state ownership and larger privately owned control blocks were more likely to issue equity.

with no tender offer. In these firms the pre-2002 market-based rule that the freezeout price should be higher than the three-month weighted average stock price offers no protection to minority shareholders. As discussed in Section 3.1, due to weaknesses in Bulgarian corporate law for private companies, for these firms, the effective freezeout discount  $d_{freeze}$  is likely close to 100%.

Of the 492 delisted firms, 106 firms have at least one trade in a three-month window before their delisting. To delist these companies, the controlling block-holders often engaged in dilutive offerings prior to the freezeout, manipulative block trades with related parties during the three-month price measurement period, or both. Table 6 provides evidence of apparent manipulative trading, in which large block trades reduced the weighted-average stock price in the three months before delisting. Table 6 lists examples of large trades (at least 50 times daily trading volume) in frozen-out companies, during the three months prior to delisting. These large trades occur at an average discount of approximately 81% to the trade-weighted price of other trades during the six months prior to freezeout. The block trades represent an average of 89% of trading volume during the three months preceding delisting. The freezeout price, including the large manipulative trades, will be at an average discount  $d_{freeze}$  of  $0.81 * 0.89 = 72\%$  to the market price excluding these trades (see Appendix A, Equation (A4)), and an even larger discount to intrinsic value. Table 6 provides a rare glimpse of likely market manipulation in connection with a tender offer (Hermalin and Schwartz, 1996). We thus see another interaction between legal rules – the effectiveness of a market price rule for freezeouts depends on legal control of manipulative trades.

We next analyze how the terms of freezeouts change after the 2002 legal changes. The BSE news tapes cover tender offers from 2001. Table 7 provides data for the nine announced

freezeout tender offers completed during 2001, before the law changes, and the 19 offers announced afterwards.<sup>9</sup> We exclude one post-law case where the controlling shareholder offered more than an 800% premium in a revised tender offer. The pre-2002 tender offers premiums are close to zero and are never revised upwards. The post-law change in offer premiums is striking. Even excluding the 800%-premium outlier, the average post-law premium is more than 40% for initial offers and over 60% for final offers. The final offer premium compares favorably with the 56% average premium documented by DeAngelo et al. (1984) for going-private transactions in the United States (U.S.). Half of the offers (10 of 20 post-law change offers, including the outlier) are revised upwards to secure minority shareholder and regulator agreement of the tender offer price. These results are consistent with our empirical prediction that the freezeout discount  $d_{freeze}$  would decline after the legal changes. Indeed, the discount becomes highly negative (a large premium) on average. The value of approval of the freezeout price by the securities regulator is consistent with Pistor and Xu's (2005) study of China.

The increased premium following the law changes *understates* the effect of the law change on minority shareholder outcomes if a freezeout occurs. The premium is computed based on the pre-offer share price. As noted above, pre-law prices were sometimes manipulated downwards, and as we show below, valuation ratios for firms at high risk of freezeout increase dramatically post-law. The premium could also be a poor measure of firm value in an illiquid market. To address these issues we also report in Table 7 the ratios of initial and final offer price/sales in the year before the tender offer. The mean (median) final Offer price/sales ratio increases by more than four times, from 0.16 (0.07) to 0.65 (0.30).

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<sup>9</sup> There are five tender offers that are completed between January and May 2002. During this period, although the law changes were not formally effective yet, the FSC used its approval rights and essentially enforced the upcoming laws. Therefore, we combine the five transitional period offers with the post-law offers.



We next assess the extent to which this increase reflects an overall increase in share prices, or higher freezeout prices controlling for overall prices. The final two rows of Table 7 report average and median values for "Mean-Adjusted Offer Price/Sales" ratios. To compute the mean-adjusted ratio, we divide Offer Price/Sales for each freezeout offer by the mean price/sales of non-frozen-out firms in the freezeout year. The after-minus-before change in Mean-Adjusted Price/Sales ratios can be understood as a difference-in-difference estimate, where the control group is non-frozen-out firms. The increases in average and median ratios for this DiD measure are similar to the raw increases in ratios, and are highly significant.

## **6. Firm Characteristics and After-minus-Before Changes in Equity Valuation**

The previous section established the effect of improved preemptive rights and freezeout price rules in limiting minority shareholder expropriation. We now turn to the valuation effects of reduced financial tunneling risk. An event study is not feasible. As is often the case for legal reforms, it is difficult to pinpoint an exact "event" date (Bhagat and Romano, 2002). Moreover, there were other potentially significant events at about the same time as the events that directly involve the new rules. In addition, most Bulgarian firms trade once a month or less, so we cannot reliably estimate abnormal returns using daily data.

Given these constraints, we implement the two approaches discussed in Section 3.2 to isolate the effect of the law on tunneling risk and thus on post-law minus pre-law changes in share values. First, we use pre-law data to estimate a firm's risk of financial tunneling, and assess whether firms at higher tunneling risk have larger post-law valuation increases. Second, we use difference-in-differences (DiD) estimation.

### *6.1. Tunneling Propensity Results*

Following the discussion in Section 3.2, we use a two-stage model. At the first stage, we estimate logit models of the probability that a firm will face dilution or delisting (either going dark or after a freezeout offer) during 1999-2001, based on the firm's financial and ownership characteristics. To reduce endogeneity issues, we use financial data from 1999, the first post-privatization year for which data is available, and prior to the wave of tunneling which occurred principally during 2000 and 2001. We measure ownership prior to the delisting (dilution) event, or at year-end 2001 if no delisting (dilution) occurs. Table 8 shows results for logit regressions including all firms; we obtain similar results if we limit the sample to non-state-controlled firms. Larger firms are less likely to be delisted, while more profitable firms are more likely to be delisted. While some delistings certainly involve unprofitable firms going out of business, the dominant source of delistings appears to be tunneling at profitable firms. Based on the estimates in Table 8, tunneling propensities vary substantially across firms. For non-state-owned firms, propensity estimates range from 0.04 to 0.97 for freezeout, and from 0.03 to 0.67 for dilution.

At the second estimation stage, we examine the relation between the tunneling propensities estimated in the first stage and three valuation measures: price/earnings (PE) ratio, price/sales ratio, and Tobin's  $q$ . We study PE ratios based on Proposition 4, which states that PE ratios respond directly to financial tunneling and should not be sensitive to cash flow tunneling. PE ratios are computed on a quarterly basis as the ratio of average price per share in a quarter and Net Income per share (EPS) from the last fiscal year-end. We exclude firms with negative Net Income and with EPS less than 0.01 lev to reduce outliers.

As alternate measures to PE, we use price/sales and Tobin's  $q$ . These measures have the advantage of larger sample size, because we do not need to exclude firms with negative earnings,

but the disadvantage of reflecting the impact of both financial and cash flow tunneling. This is of concern because controllers who face limits on financial tunneling may expand their use of cash flow tunneling. Price/sales is calculated as the average price per share divided by Revenue from Operations per share. Similar to the PE ratio, we drop firms with sales per share less than 0.01 lev. We estimate Tobin's  $q$ , similar to Kaplan and Zingales (1997) and others, as  $(\text{book value of assets} + \text{market value of equity} - \text{book value of equity}) / (\text{book value of assets})$ .<sup>10</sup>

We present the results from the second-stage analysis in Table 9. For each valuation ratio, we include firms that have at least one non-missing observation in both the pre-law period (starting with the first quarter of 2000) and the post-law period (through fourth quarter of 2002). We add firm fixed effects to capture firm-level factors, and calendar quarter dummies to capture time variation in prices. The propensities appear only in interacted form because the non-interacted values are constant for each firm and are captured by the firm fixed effects.

The propensity regressions support the predictions of our model. In Panel A, the coefficient on *postlaw* dummy \* freezeout propensity is positive, economically large, and significant or marginally significant for all valuation ratios. The coefficient on *postlaw* dummy \* dilution propensity is positive and economically large for all measures, and significant or marginally significant for PE and Tobin's  $q$ . An F-test confirms the joint significance ( $P < 0.05$ ) of the two interaction terms for all three valuation measures. As Panels B and C show, we obtain

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<sup>10</sup> We have quarterly values for market value of equity, but only annual book values. An alternate definition of Tobin's  $q$ , also commonly used in governance research, is  $q = (\text{market value of equity} + \text{book value of long-term debt}) / (\text{book value of assets})$ . This definition is not appropriate for Bulgaria because long-term debt markets are virtually shut, so firms rely for financing on equity and short-term debt (often accounts payable). Perhaps not coincidentally, since 2002 debt markets have developed at a fast pace.

similar results for the sub-sample of non-state-controlled firms and when extending the sample period to 2003.<sup>11</sup>

To give a sense for economic magnitude, a one-standard-deviation change in freezeout (dilution) propensity predicts a 6.30 (3.75) point post-law increase in PE ratio, a 0.15 (0.10) increase in price/sales ratio, and a 0.05 (0.08) increase in Tobin's  $q$ . A worst-to-best change in freezeout (dilution) propensity predicts an increase of 27 (14) points in PE ratio, 0.66 (0.41) increase in price/sales ratio, and 0.21 (0.32) increase in Tobin's  $q$ . These are all large amounts compared to the pre-law means of 6.6 for PE ratio, 0.45 for price/sales ratio, and 0.56 for Tobin's  $q$  (although the mean values for the valuation multiples seem low by US standards, they are similar if not higher than the same measures for other emerging markets like Russia during the period).

## *6.2. Difference in Difference Estimates*

We next turn to the difference-in-differences (DiD) estimation. For this estimation, we need to identify discrete groups of firms that face different risks of financial tunneling pre-2002 and as a result will be affected by the legal changes differently. Based on the logit estimates in Table 8 and the facts noted in Section 4 that no state-controlled firms initiated dilutive share offerings and only one state controlled firm froze out minority shareholders, we expect that state-controlled firms have a lower probability of financial tunneling than privately controlled firms. In contrast, if a firm has a private majority holder, this holder has the ability, and often the

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<sup>11</sup> To further confirm the robustness of the results in Table 9 we run a variety of alternative specifications. First, we experiment with a variety of specifications for the calculation of propensities. Instead of logit in the first stage we use linear probability (OLS) or probit. We also run the second stage valuation equation with propensities in logs or winsorized at 1% and 5%. Second, we change the definitions of the pre- and post-law estimation windows. The results are largely similar if we use 2001-Q3 or 2001-Q4 as the cutoff dates; or use only 2003 and drop 2002 data. The results remain consistent with the original findings.

incentive, to engage in tunneling; hence these firms should have a high probability of tunneling. The intermediate category is firms without any majority owner.

We report the DiD estimation results in Table 10. We use the same pre and post-law windows and calendar quarter and firm fixed effects as in Table 9. The interaction terms between the *Postlaw* dummy and the private control or no control dummies capture the post-law change in valuation ratios for these firms, relative to the omitted control group of state-controlled firms.<sup>12</sup>

Privately controlled firms show large post-law increases in all three valuation measures. The mean pre-law price/earnings ratio for these firms is about six; the post-law increase is about 14, as captured by the coefficient on *Postlaw\*Privatecontrol*. Thus PE ratios roughly triple for these firms, relative to state-controlled firms. Price-sales ratios for privately controlled firms increase by an estimated 0.55, relative to a pre-law mean of 0.33; and Tobin's q increases by an estimated 0.31, versus a pre-law mean of 0.53. These results are economically large, consistent with the predictions of our model and the propensity-based results in Table 9. For non-majority-controlled firms, the predicted post-law increases are similar to privately controlled firms for price/sales and Tobin's q, and are positive but insignificant for price/earnings ratio.

The DiD results suggest an interesting tradeoff for minority shareholders in a firm with the state as a controlling shareholder. On one hand, state control can lead to high agency costs if the government is a poor monitor. These could include cash-flow tunneling by management, and weakened incentives to maximize profits. On the other hand, cash-flow tunneling under state

control may be no worse than under private control, and state control may reduce the risk of financial tunneling. In the early stages of the Bulgarian market, the benefits of majority state ownership for minority shareholders may well have outweighed the costs. Indeed, a principal risk faced by minority shareholders was that the state would sell its controlling stake to a private owner, who would then engage in financial tunneling. The strong advice given by privatization advisors to Bulgaria and other similar countries, to rapidly sell the state's stake in almost all enterprises, may have been unwise, given Bulgaria's lack of controls on financial tunneling.

### 6.3. *Visual Representation of Valuation Changes*

We next present visually the time series of valuation changes around the 2002 legal changes for groups of firms at different risk of tunneling. Sample size is limited, because we use a balanced panel of firms with non-missing PE, price/sales, or Tobin's q ratios for all eight quarters in the 2001-2002 period. We separate the sample into high tunneling risk versus low risk firms, using the same two approaches as above: (i) based on tunneling propensities computed as in Section 6.1; and (ii) based on ownership, as in the DiD analysis in Section 6.2. In Figure 2, Panel A, we define firms as low risk if they have below-median propensity for both dilution and freezeout propensity, while high-tunneling-risk firms have above-median propensity for dilution, freezeout, or both. In Panel B, we define low risk firms as firms with majority government ownership or no majority shareholder, and high risk firms as those with a private majority

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<sup>12</sup> In robustness checks, we obtain similar results with models treating the fourth quarter of 2001 as post-law (instead of omitted) or as pre-law (instead of omitted). We also obtain similar results if we include firm level variables (ln(sales), operating margin, sales growth, and sales/assets) as additional independent variables, and if we interact these variables with the *post-law* dummy. Last, we compare state-controlled firms to all other firms. Coefficients are similar, but standard errors increase, perhaps because there is variation in tunneling risk within the firms without controlling private owners.

owner.<sup>13</sup> For each group, we compute the mean valuation multiples (PE, price/sales, and Tobin's  $q$ ) for each quarter in 2001 and 2002. We then compute percentage change in these mean multiples for each quarter, using the first quarter of 2001 as the base period. Figure 2 then shows the percentage change in each valuation multiple for high-risk firms, minus the percentage change for low-risk firms.

Using the propensity definition of high vs. low-tunneling-risk firms, in the first quarter of 2002 the mean PE ratio of the high-tunneling-risk group more than doubles relative to the low-risk group. Price/sales and Tobin's  $q$  for high-risk firms rise by around 40-50%, relative to low-risk firms. We obtain similar results with the ownership-based sample division in Panel B. In robustness checks, we obtain similar results if we increase the number of firms in each panel by interpolating missing valuation multiples, use an unbalanced panel, or if we use medians instead of means.

## **7. Summary**

This paper examines how law affects finance through the control of two forms of financial tunneling, dilutive equity offerings and freezeouts; and how financial tunneling risk affects firms' market values. We first develop a model which allows for the separate valuation effects of three types of tunneling – cash flow tunneling, dilution, and freezeout. In the model, investors rationally discount the prices they pay for shares, and may rationally decline to participate in dilutive share offerings if legal protection against a later freezeout is inadequate. We test the model's predictions with data from Bulgaria. A 2002 change in Bulgarian law increases protection against dilutive offerings and freezeouts and thus provides a natural

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<sup>13</sup> In our DiD analysis, we treated government-controlled firms as the low-tunneling-risk control group. In Figure 2, we treat government-controlled firms and firms without a controlling owner, as a combined low-risk group because otherwise we have too few (only two) low-risk firms for a meaningful comparison.

experiment. The law change has a dramatic effect on financial tunneling. Dilutive offerings, which were previously common, basically cease. Below-market freezeouts and going dark transactions also cease; the freezeouts which occur are at premiums to market value, and freezeout prices (measured as offer price/sales) roughly quadruple, controlling for the overall level of share prices.

The law change also has a significant effect on share values. Price/earnings ratios of firms at high risk for financial tunneling more than double, while Tobin's q and price/sales rise by 50%, between the fourth quarter of 2001 and the first quarter of 2002, in each case relative to valuation measures for low-tunneling risk firms..

We thus provide evidence for one important channel through which legal protection of shareholder rights affects financial market outcomes – through control of financial tunneling. We also provide evidence for the importance of financial tunneling risk as a factor in equity pricing in emerging markets. In establishing these links between law and tunneling, and between tunneling risk and market prices, using firm-level data, we complement prior cross-country research on the relationship between legal protections and capital market development.



## Appendix A. Model Proofs and Extensions

### A.1. Proofs

#### A.1.1. Proof of Proposition

The minority shareholders initially hold  $(1-\alpha_0)$  shares. These shares are each worth  $V_{no-fin}$  without financial tunneling. The dilutive issuance causes minority shareholders to lose a proportion  $d_{dilut} \frac{i}{1+i}$  of this per-share value. They also purchase a fraction  $(1-\alpha_0)*k$  of the newly issued shares at the discounted offering price and make a per-share profit on these shares (as a proportion of  $V_{no-fin}$ ) equal to (post-dilution per-share value - price paid), for total gain of:

$$(1 - \alpha_0) k * i \left[ 1 - d_{dilut} \frac{i}{1+i} - (1 - d_{dilut}) \right] = (1 - \alpha_0) k * d_{dilut} \frac{i}{1+i} \quad (A1)$$

The combined effect of the loss on original holdings and gain on newly acquired shares is given by Equation (4).

Q.E.D.

#### A.1.2. Proof of Proposition 2

Prior to the freezeout, the minority shareholders own  $(1 - \alpha_I)$  shares which are worth  $V_{no-freeze}$  each. In the freezeout, the minority shareholders will lose a fraction  $d_{freeze}$  of this value. Proposition 2 follows directly after plugging in the expressions for post dilution ownership  $(1 - \alpha_I)$  and post-dilution minority value  $V_{no-freeze}$  given by Equations (2) and (3) respectively.

Q.E.D.

#### A.1.3. Proof of Equation (18)

Start with Equation (2) for minority ownership after dilution  $(1 - \alpha_I)$ , and divide both sides by  $(1 - \alpha_0)$

$$\frac{(1 - \alpha_1)}{(1 - \alpha_0)} = \frac{[1 + k * i]}{(1 + i)} \quad (A2)$$

Now multiply by -1 and add 1 to both sides to reach:

$$1 - \frac{(1 - \alpha_1)}{(1 - \alpha_0)} = 1 - \frac{[1 + k * i]}{(1 + i)} \quad (A3)$$

Equation (18) is then straightforward to derive after rearranging terms.

Q.E.D.

### *A.2. Discussion of Specific Legal Statutes and their Effect on the Model Parameters*

Preemptive rights regulate  $k$  and seek to ensure that all shareholders can acquire new shares pro rata. These rights are common in many markets and come in a variety of flavors (Atanasov, Durnev, Fauver, and Litvak, 2007). If the legal system provides for effective preemptive rights (preferably rights that are transferable and traded on a exchange in the form of warrants) and restricts freezeouts and other forms of tunneling (so that shareholders who exercise preemptive rights do not risk having their investment appropriated in another way), a significant discount  $d_{dilut}$  will induce essentially complete take-up of shares, thus  $k$  approaches 1 and the fractional wealth loss to minority shareholders  $D_{dilut}$  approaches zero, regardless of the price at which new shares are offered. This, in turn, reduces the controller's incentive to make a dilutive offering.<sup>14</sup>

A legal strategy which seeks to prevent issuance of under-priced shares (thus reduce  $d_{dilut}$ ), can be implemented two ways. One approach is direct regulation of the offer price; another is to require minority shareholder approval of related party transactions, which would

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<sup>14</sup> An alternate strategy is to require minority shareholder approval for an offering made to an insider. Compare New York Stock Exchange Rule 312.03(b) (requiring approval by all shareholders, not limited to minority shareholders).

include a share issuance to the controlling shareholder without preemptive rights. Minimum price statutes are rare, but one example is the Russian corporate law (see Black and Kraakman, 1996).<sup>15</sup> If new shares must be issued at the current market price and this market price reflects intrinsic value, or else minority shareholders have veto rights over new issuances, which they will exercise if the new issuance is significantly below-fair value price, then  $d_1 \approx 0$ . If, in addition, the risk of future tunneling is low, so that  $P_0$  is close to  $V_{no-fin}$ , then  $d_1 \approx d_{dilut}$  and minority shareholders do not suffer a significant wealth loss, regardless of who acquires the shares. However, minimum price rules which rely on market price provide imperfect protection for two reasons. First, if the risk of future tunneling is significant, the market price will reflect this and  $d_{dilut}$  can be large even if  $d_1$  is small or zero. The controller can then dilute minority shareholders' wealth by buying shares at or close to market price. Second, in an illiquid market, the controlling shareholder could manipulate the market price (see Appendix A for a discussion).

No existing law that we are aware of sets numerical limits on the number of newly issued shares in an equity offering. The law usually regulates  $i$  by granting shareholder approval rights when equity issues exceed a certain threshold (e.g. 20% under NYSE Rule 312.03(c)) or requiring supermajority approval to amend the company's charter to increase the total number of shares the company can issue.

One approach to limit  $d_{freeze}$  is to stipulate that the freezeout price cannot be lower than the market price before the freezeout is announced – a “market price rule.” A market price rule can be effective if the company’s shares trade in an efficient and liquid market. Even then, the controlling shareholder can suppress the market price by engaging in cash-flow tunneling or by

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<sup>15</sup> In the United States, the 1940 Investment Company Act regulations for equity offerings of closed-end funds bars unrestricted public offerings below the fund's net asset value.

paying no dividends and freezeout minority shareholders at this suppressed price. When the market is inefficient or illiquid and subject to price manipulation, the “market rule” will provide even weaker protection (see below for discussion of price manipulation).

An alternate way to limit  $d_{freeze}$  is to use liquidation value or discounted cash flow (*DCF*) valuation to compute the “fair value” of minority shares, and require a freezeout to be at a price no lower than fair value. The valuation could be conducted either by the securities agency or by a court through shareholder exercise of appraisal rights. Still, a controlling shareholder can manipulate the minimum price by depressing reported earnings or engaging in cash-flow tunneling or, in some countries, influence the regulator or judge.

Requiring the freezeout price to be the greater of market price or fair value can provide more protection than either rule alone. For the controlling shareholder to freezeout the minority at a discount, she must both manipulate the market price and engage in misreporting or cash-flow tunneling. If the practical limits on cash-flow tunneling are stricter than those on manipulative trading (or vice-versa), minority shareholders are better off than with only a market price rule (only a fair value rule).

A self-enforcement approach (Black and Kraakman, 1996) would require majority-of-minority shareholder approval of the freezeout. Minority shareholders will generally approve a freezeout only if the price offered equals or exceeds the no-freezeout value of their shares. In developed countries with a minority approval rule, minority shareholders will often approve the freezeout only if they receive a premium that provides them with some of the gains they would realize in an arms-length sale to a third party, so  $d_{freeze}$  can be negative. However, shareholders may approve a freezeout at a positive discount when they have limited liquidity for their shares, or fear that if they reject a freezeout offer, the controlling shareholder will find another means to

extract value. An alternate self-enforcement mechanism gives veto power to independent directors. If they are truly independent and satisfy their fiduciary duties, they should bargain with the controlling shareholder and reject a freezeout price that is significantly below the potential sale price in an arms-length sale.

### *A.3. Discussion of Market Manipulation*

Suppose that a country has a rule requiring shares to be issued at market price and minority shareholders do not expect a freezeout for less than the no-freezeout value of their shares, so shares are priced in the market at  $V_{no-freeze}$ .<sup>16</sup> The controlling shareholder can arrange "wash" trades with related parties at a fractional discount  $d_{wash}$  below  $V_{no-freeze}$ . Assume also that the minimum freezeout price  $P_{freeze}$  is calculated as a trade-volume-weighted average price over a specified period (as in Bulgaria before 2002), wash sales represent a fraction  $v_c$  of the total trading volume in the stock over this period, and true sales take place at  $V_{no-freeze}$ . Then the minimum freezeout price will be:

$$P_{freeze} = V_{no-freeze} * (1 - v_c) + V_{no-freeze} (1 - d_{wash}) v_c = V_{no-freeze} (1 - d_{wash} v_c) \quad (A4)$$

If the controlling shareholder can initiate a large volume of manipulative trades, so that  $v_c \rightarrow 1$ , a market price rule will allow the controller to freezeout minority shareholders at a discount approaching  $d_{wash}$ . Thus, for a market price rule for freezeouts to prevent dilutive freezeouts, laws must also limit the amount of manipulative trading  $v_c$ , the discount  $d_{wash}$  at which manipulative trading can be executed, or both, as well as prevent dilutive share offerings.

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<sup>16</sup> If there is a positive probability of a freezeout at a discount or other financial tunneling, the market price  $P_1$ , will already be lower than the no-freezeout value  $V_{no-freeze}$ , which will make a market price rule even less effective at protecting minority shareholders. See Bebchuk and Kahan (2000).

#### A.4. Discussion of the Interaction between Dilution and Freezeout

In the analysis in Section 2 we assume that  $k$  and  $d_{freeze}$  are independent. Even so, there is a potential interaction between dilution risk and freezeout risk. Assume that preemptive rights exist and let minority shareholders purchase shares in an equity offering pro-rata, but freezeout rules are weak and let minority shareholders be frozen out at a large discount  $d_{freeze}$ . Assume also that cash flow tunneling is capped at its current level.

If a freezeout were not possible, minority shareholders would participate in the new equity issue, thus preventing dilution of their existing holdings. In contrast, if the risk of a freezeout is high enough and the expected freezeout discount is large enough, minority shareholders will not exercise their preemptive rights, because the near-term gain by buying shares for less than market value will be offset by expected loss in a future freezeout. To participate would “throw good money after bad.” For minority shareholders to rationally exercise preemptive rights, the offering price must be less than the expected share value after the dilutive offering, taking into account the risk of subsequent freezeout (with probability  $\pi_f$ ). A shareholder will participate if:

$$(1 - d_{dilut}) \leq \frac{1 + i(1 - d_{dilut})}{1 + i} (1 - \pi_f d_{freeze}) \quad (A5)$$

If  $d_{freeze}$  and  $\pi_f$  are sufficiently high, preemptive rights will be ineffective at preventing dilution, and hence at limiting the compound effect of dilution followed by freezeout. Thus, protections from equity dilution will work only in conjunction with protections against freezeout. Anti-freezeout statutes thus play a dual role in reducing the effect of financial tunneling. They both directly reduce expropriation in freezeouts and allow minority shareholders to rationally exercise preemptive rights and reduce equity dilution.

## Appendix B. Data Sources and Limitations

In this appendix we provide details on each data source used in the paper, our process of cleaning the data, and the reasons for loss of observations for our main econometric models. We use data from four main sources: 1) Bulgarian Center for Mass Privatization; 2) Bulgarian Central Depository; 3) Bulgarian Financial Supervisions Commission; and 4) the Bulgarian Stock Exchange.

*Center for Mass Privatization.* We obtain the list of the 1,040 Bulgarian state-owned firms, which participated in mass privatization process in 1996-1997, the number of outstanding shares at the beginning of 1998 and the percentage of sales which come from exports in 1996-1997 from the Center for Mass Privatization.

*Central Depository.* We then obtain ownership data from the Bulgarian Central Depository for our sample firms. The Bulgarian Central Depository is an independent company, which was founded with a government decree at the onset of the mass privatization process to record all individual transactions with the shares of the privatization companies. As all shares are all electronic, the Central Depository is the primary record of stock ownership in Bulgaria. Following the listing of all privatized companies on the BSE, the Central Depository assumed the role for a clearing house and maintains the record for all transactions on the BSE. We are able to obtain two data sets from the Central Depository. First, we were provided with the year-end ownership stakes of the largest shareholder for **1,035** of the 1,040-firm universe for the period from 1998 to 2003.

Second, for **1,021** of the 1,035 firms we obtain a second data set, which separates year-end ownership of each company into ownership held by the state, private corporations, individuals, and financial institutions. We match the firms from the Center for Mass Privatization

with the Central Depository data. We use the Central Depository data for the following variables: 1) state ownership stake, 2) largest non-state shareholder stake, and 3) number of outstanding shares in each year.

*SSEC/FSC*. We match the 1,021 firms with ownership and privatization data with the online public registry maintained by the Financial Supervision Commission (formerly the Securities and Stock Exchanges Commission), based on firm name and a 5-letter code from the mass privatization. Of the 1,021 firms, 199 never file any documents with the FSC. This reduces our sample to **822** firms. For each of these firms we obtain the official FSC id number and, use the online registry system to obtain its listing status at year-end 2002 and its delisting date, if the firm is delisted before then.

The FSC provides us with all annual company financial statements. Of the 822 firms in our sample, **738** firms file financial statements in at least one year during 1999-2002; **727** of the 738 firms file financial statements with non-missing sales in 1999, this number declines to only **223** in 2002. The financial statements are individual Excel spreadsheets, one for each company-year. Each Excel file contains separate worksheets for the Balance Sheet, Income Statement, Statement of Cash Flows, State of Shareholder Equity, and a variety of secondary reports. The FSC does not check the spreadsheets for completeness (for example, several companies filed empty spreadsheets), consistency (for example, does the total assets number for 1999 in the 2000 filing equal the number in the 1999 filing), choice of units (raw or thousands), or consistent formatting. In order to process more than 1,500 spreadsheets, we construct a Visual Basic for Applications (VBA) program to extract the necessary data and put it in standard form. We hand examine each firm's results and correct for obvious errors – missing data which can be filled in from the previous year's or next year's report, data entered on the wrong line of the spreadsheet



and so on. We then extract the following variables used in our empirical tests: 1) Total Sales; 2) Operating Expenses; 3) Net Income; 4) Total Assets; 5) Shareholder Equity; 6) Long-term debt. These variables are used to calculate our financial the variables and valuation ratios.

*BSE.* We obtain trading data from the Bulgarian Stock Exchange. Our data set includes all trades from 1998 to 2003 period, but we only use the 2000-2003 trade data in our analysis. The BSE identifies companies by ticker symbol. We manually match our sample companies by name with a listing from the BSE, which includes all tickers. Of the 822 firms with ownership and listing data, 802 firms appear in the BSE trade data. Most of these firms are delisted and by 2002 only **213** firms with trades on the BSE remain. The BSE data has the following variables: price, number of shares traded, date and time of trade. Due to thin trading in most securities (a total of 80,000 trades for the 802 companies), we compute prices on a quarterly basis as the equally-weighted average price for all trades in a calendar quarter.

In addition to obtaining price data from the BSE, we also use its news tapes (available online at [www.bse-sofia.bg](http://www.bse-sofia.bg)) to identify tender offer announcements during 2001-2003. We match the companies in our sample to the announcements using ticker and name. We find a total of 33 tender offer announcements, for which we collect: date of offer, date of offer expiration, first or revised offer, offer price, number of shares owned by controlling shareholder, number of shares sought in the offer.

*Sample Sizes.* We next explain the sample size for the principal empirical tests in Section 6.

#### *Logits of delisting and dilution*

**822** firms with ownership and listings data

- 95 firms with no 1999 financial data or missing sales data

- 73 firms with missing sales for 1998 (hence we cannot compute growth)

= **654** firms in sample for delisting logit

- 7 state-controlled firms (none of which undergo dilution)

= **647** firms in sample for dilution logit

#### *DiD Valuation Tests*

**223** companies which filed financial statements in 2002

- 1 firm with sales per share < 0.01 lev.

- 39 firms with no pre-law trading prices in the pre-law period

- 47 firms with no post-law trading prices

= **136** firms for the Price/Sales DiD valuation analysis

- 16 firms with missing freezeout or dilution propensities (these firms were excluded from the logits due to missing financial data)

= **120** firms for Price/Sales tunneling propensity valuation

Of the **136** firms for the Price/Sales DiD valuation analysis

- 75 firms with negative earnings or earnings per share < 0.01 lev for 2001 (so we cannot compute PE ratios)

= **61** for firms for the PE DiD valuation analysis

- 5 firms with missing freezeout or dilution propensities

= **56** firms for PE tunneling propensity valuation

Of the **136** firms for the Price/Sales DiD valuation analysis

- 6 firms have assets per share < 0.01 lev so we and cannot compute Tobin's q

= **130** for firms for the Tobin's q after-minus-before DiD valuation analysis

- 15 firms with missing freezeout and dilution propensities

= **115**- firms for Tobin's q tunneling propensity valuation

## References

- Atanasov, Vladimir, 2005, How Much Value Can Blockholders Tunnel? Evidence from the Bulgarian Mass Privatization Auctions, *Journal of Financial Economics*, 76, 191-234.
- Atanasov, Vladimir, Artyom Durnev, Larry Fauver, and Kate Litvak “The Anatomy of Preemptive Rights and Other Anti-Dilution Provisions in Emerging Markets” (working paper, 2007).
- Baek, Jae-Seung, Jun-Koo Kang, and Inmoo Lee, 2006, Business Groups and Tunneling: Evidence from Private Securities Offerings by Korean Chaebols, *Journal of Finance*, 61, 2415-2449.
- Bates, Thomas, Michael Lemmon, and James Linck, 2006, Shareholder Wealth Effects and Bid Negotiation in Freezeout Deals: Are Minority Shareholders Left Out in the Cold?, *Journal of Financial Economics*, 81, 681-708.
- Bebchuk, Lucian Arye, 1999, A Rent-Protection Theory of Corporate Ownership and Control, NBER Working Paper No. 7203
- Bebchuk, Lucian Arye, and Marcel Kahan, 2000, Adverse Selection and Gains to Controllers in Corporate Freezeouts, in Randall K. Morck ed., *Concentrated Corporate Ownership*, 247-261
- Beck, Thorsten, Asli Demirguc-Kunt, and Ross Levine, Law and Firms' Access to Finance, *American Law and Economics Review*, 7, 211-252.
- Bertrand, Marianne, Paras Mehta, and Sendhil Mullainathan, 2002, Ferreting out Tunneling: An Application to Indian Business Groups, *Quarterly Journal of Economics*, 117, 121-148
- Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2004, How much should we trust Differences-in-Differences Estimates?, *Quarterly Journal of Economics*, 119, 249-275
- Bhagat, Sanjai, and Roberta Romano, 2002, Event Studies and the Law: Part I: Technique and Corporate Litigation, *American Law and Economics Review*, 4, 141-168.
- Black, Bernard and Reinier Kraakman, 1996, A Self-Enforcing Model of Corporate Law, *Harvard Law Review*, 109, 1911-1982
- Black, Bernard, Reinier Kraakman, and Anna Tarassova, 2000, Russian Privatization and Corporate Governance: What Went Wrong, *Stanford Law Review*, 52, 1731-1808
- Black, Bernard, 2001, The Legal and Institutional Preconditions for Strong Securities Markets, *UCLA Law Review*, 48, 781-858
- Black, Bernard, 2001a, The Corporate Governance Behavior and Market Value of Russian Firms, *Emerging Markets Review*, 2, 89-108
- Burkart, Mike, Dennis Gromb, and Fausto Panunzi, 1998, Why higher takeover premia protect minority shareholders, *Journal of Political Economy*, 106, 172-204
- Cheung, Yan-Leung, Raghavendra Rau, and Aris Stouraitis, 2006, Tunneling, propping and expropriation evidence from connected party transactions in Hong Kong, *Journal of Financial Economics*, 82, 343-386
- Coase, Ronald, 1960, The Problem of Social Cost, *Journal of Law and Economics*, 3, 1-44

- DeAngelo, Harry, Linda DeAngelo, and Edward Rice, 1984, Going Private: Minority Freezeouts and Stockholder Wealth, *Journal of Law and Economics*, 367-401
- Denis, Diane, and John McConnell, 2003, International Corporate Governance, *Journal of Financial and Quantitative Analysis*, 38, 1-36
- Djankov, Simeon, Raphael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2008, The Law and Economics of Self-Dealing, *Journal of Financial Economics*, forthcoming.
- Durnev, Art, and Han Kim, 2005, To Steal or not to Steal: Firm Attributes, Legal Environment, and Valuation, *Journal of Finance*, 60, 1461-1493
- Fama, Eugene F., and Michael C. Jensen, 1983. Separation of Ownership and Control, *Journal of Law and Economics*, 6, 301-325,
- Gilson, Ronald and Jeffrey Gordon, Controlling Controlling Shareholders, 2003, *University of Pennsylvania Law Review*, 152, 785-850
- Glaeser, Edward, Simon Johnson, and Andrei Shleifer, 2001, Coase versus the Coasians, *Quarterly Journal of Economics*, 116, 853-899
- Hermalin, Benjamin, and Alan Schwartz, 1996, Buyouts in Large Companies, *Journal of Legal Studies*, 25, 351-370
- Johnson, Simon, Peter Boone, Alasdair Breach, and Eric Friedman, 2000, Corporate Governance in the Asian Financial Crisis, *Journal of Financial Economics*, 58, 141-186
- Johnson, Simon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2000, Tunneling, *American Economic Review*, 90, 22-27
- Kang, Jun-Koo and Rene M. Stulz, 1997, "Why Is There a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan," *Journal of Financial Economics*, 46, 3-28.
- Kaplan, Steven, and Luigi Zingales, 1997, "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?", *Quarterly Journal of Economics*, -xxx, 169-215.
- Kirchmaier, Thomas, and Jeremy Grant, 2005, Financial Tunneling and the Revenge of the Insider System: How to Circumvent the New European Corporate Governance Legislation, *London School of Economics Discussion Paper 536*
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1997, Legal Determinants of External Finance, *Journal of Finance*, 52, 1131-1150.
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1998, Law and Finance, *Journal of Political Economy*, 106, 1113-1155
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 2002, Investor Protection and Corporate Valuation, *Journal of Finance*, 57, 1147-1170
- La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2006, What Works in Securities Laws? *Journal of Finance*, 61, 1-32.
- Leuz, Christian, Alexander J. Triantis, and Tracy Yue Wang, 2006, "Why Do Firms Go Dark? Causes and Economic Consequences of Voluntary SEC Deregistrations", working paper, at <http://ssrn.com/abstract=592421>

- Litvak, Kate, 2007, Firm Governance as a Determinant of Capital Lock-In”, at <http://ssrn.com/abstract=915004>
- Marosi, Andras, and Nadia Ziad Massoud, 2004, "Why Do Firms Go Dark?", working paper, at <http://ssrn.com/abstract=570421>
- Miller, Jeffrey, and Stefan Petranov, 2000, The first wave of mass privatization in Bulgaria and its immediate aftermath, *Economics of Transition*, 8, 225-250
- Nenova, Tatiana, 2005, Control Values and Changes in Corporate Law in Brasil, *Latin American Business Review*, 6, 1-37
- Pistor, Katharina, and Chenggang Xu, 2005, Governing Stock Markets in Transition Economies: Lessons from China, *American Law and Economics Review*, 7, 184-210
- Shleifer, Andrei, and Daniel Wolfenzon, 2002, Investor protection and equity markets, *Journal of Financial Economics*, 66, 3-27

Table 1  
Financial Tunneling Methods and Their Implementation in Bulgaria

Tunneling Method	Research Studies	Implementation in Bulgaria
Dilution	Black, Kraakman, and Tarassova (2000) Baek, Kang, and Lee (2006)	Controlling shareholder initiate a share offering at a price well below the current market price, makes it difficult for minority shareholders to participate, and buys all unsubscribed shares.
Freezeout	Nenova (2005) Gilson and Gordon (2003) Bates, Lemmon and Linck. (2006)	Tender offer at three-month weighted-average stock price. This price is sometimes manipulated through large "wash" sales shortly before tender offer, at prices 70%-80% below the value of minority shares. Company is then delisted.
Going dark (delisting without freezeout)	Marosi and Masoud (2004) Leuz, Triantis, and Wang (2006)	Controlling shareholder causes company to delist. Trading ceases, minority shareholders retain illiquid, often worthless or nearly worthless shares.
Transfer of control via merger	Gilson and Gordon (2003)	N/A
Targeted Repurchases	Kirchmaier and Grant (2005)	N/A

Table 2  
Notation for Model and Empirical Tests

Symbol	Description
<b>Model variables</b>	
$C$	Controlling shareholder
$m$	Minority shareholders
$t$	Time period ( $t = 0, 1, \text{ or } 2$ )
$\alpha_t$	Ownership by controlling shareholder at time $t$ . Estimated empirically before and after dilutive offering or freezeout based on year-end data.
$E_{no-tun}$	Intrinsic per share earnings of the firm at $t = 0$ (before cash-flow tunneling)
$E_{obs}$	Earnings per share observed by minority shareholders at $t = 0$ (after cash-flow tunneling)
$r$	Minority shareholders' discount rate
$PE_{no-tun}$	Price/earnings ratio for firm with no tunneling = $1/r$
$PE_{no-fin}$	Price/earnings ratio for firm with cash flow tunneling but no financial tunneling = $1/r$
$PE_{fin}$	Price/earnings ratio for firm with cash flow tunneling but no financial tunneling = $1/r * (1 - d_{fin})$
$P_t$	Stock price at time $t$ ( $t = 0, 1$ )
$P_{dilut}$	Price at which new shares are issued in a dilutive offering
$P_{freeze}$	Price at which minority shares are frozen-out
$\pi_d$	Probability of dilutive offering
$\pi_f$	Probability of freezeout, given that dilution has already occurred
$V_{no-tun}$	Intrinsic value of firm's shares with no tunneling
$V_{no-fin}$	Value of minority shares after cash flow tunneling but without financial tunneling
$V_{no-freeze}$	Value of minority shares after dilution, with no anticipation of a subsequent freezeout or additional dilution
$V_{freeze}$	Value of minority shares after freezeout (= $P_{freeze}$ )
$i$	Fractional number of share issued in a dilutive offering, relative to shares outstanding before the offering. Estimated empirically based on year-end data as $i = (S_{year\_1} - S_{year\_0}) / S_{year\_1}$ , for an offering during year 1
$k$	Fractional participation of minority shareholders in a dilutive offering
$d_{cf}$	Fraction of actual earnings that is diverted via cash flow tunneling
$d_{fin}$	Combined fraction of firm value that is diverted via dilution and freezeout
$d_{dilut}$	Fractional discount at which new shares are issued in a dilutive offering, relative to pre-dilution firm value
$d_{freeze}$	Fractional discount at which minority shares are frozen out, relative to pre-freezeout firm value $V_{no-freeze}$
$d_{wash}$	Discount of "wash sale" price below pre-freezeout value of minority shares $V_{no-freeze}$
$D_{dilut}$	Fractional decrease in value of minority shares $V_{no-tun}$ due to dilutive offering
$D_{freeze}$	Fractional decrease in value of minority shares $V_{no-freeze}$ due to freezeout
$N$	Number of firms in the economy
$n$	Index variable for each firm (generally suppressed in the model)
$S_{n,t}$	Shares of firm $n$ outstanding at time $t$ (assumed in the model to = 1 before dilutive offering).
$v_c$	Ratio of wash sales to total trading volume within the time period for measuring the minimum freezeout price under a market price rule
<b>Empirical variables</b>	
<i>dilution measure equity increase</i>	$1 - (1 - \alpha_0) / (1 - \alpha_1)$ . Converges to 1 for total dilution, to 0 for prorata purchase of shares; negative if firm raises capital by issuing shares primarily to outside investors
	Estimated empirically as $i / (1 + i)$ . Converges to 1 for large dilutive offerings.

Table 3  
Changes in Bulgarian Corporation Law in 2002

The changes in the law were introduced to Parliament by the Bulgarian government on December 14, 2001. The first draft of the law was approved by Parliament on February 14, 2002. The final version of the law was accepted by Parliament on June 6, 2002. It was published in the State Gazette and thus became effective on June 21, 2002. Due to the efforts of the Financial Supervision Commission during the January-May 2002 transitional period, firms were effectively subject to the new freezeout rules from the beginning of 2002.

Statute	Pre-2002	2002
<b>Preemptive Rights</b>	Minority shareholders can participate in new equity offerings. If they do not participate, the controlling shareholder can purchase all unsubscribed shares.	Stock warrants are required to be issued upon every capital increase—one warrant for each share. The preemptive rights of shareholders in public companies can still be extinguished if not exercised within the period determined by a general meeting of shareholders. This period cannot be less than one month from publication of the notice to subscribe shares in the State Gazette. The key difference is that shareholders can sell the warrants to other shareholders or third parties, as opposed to having to exercise their preemptive rights by buying the shares themselves. Majority shareholders are now put in the position of having to purchase the warrants in order to increase proportional ownership, rather than just taking control of unsubscribed shares when the minority did not buy them.
<b>Appraisal Rights</b>	In a going-private transaction, a controlling shareholder should offer at least the weighted-average stock price from the last three months of trading	<ol style="list-style-type: none"> <li>1. A controlling shareholder should extend a mandatory tender offer to remaining shareholders when reaching 50%, 67%, and 90% ownership in the firm. A controlling shareholder can initiate a going-private transaction only when reaching 90%.</li> <li>2. Minority shareholders should receive a fair price for their shares in tender offers and going-private transactions. A fair price is computed using discounted cash flow and comparable company multiples valuation methods and is compared to the average stock price for the last three months, excluding block trades. Minority shareholders should receive the higher of the two prices.</li> <li>3. A majority of minority shareholders has to approve going-private transactions.</li> </ol> <p>The FSC has to evaluate the price in going-private transactions and approve tender offers only if they meet the “fair value” requirements.</p>



Table 4  
Financial Tunneling Events across Time

Number of delistings (number of these involving a freezeout tender offer) and large equity issues (at least 20% year-over-year increase in outstanding shares) by year for the 822 firms with ownership and delisting data. The data for delistings ends in 2002, while the equity issue data includes 2003. Announced tender offers as offers announced on the BSE online news system.

Year	Delistings (Announced Tender Offers)	Equity Issues $\geq$ 20% ( $\geq$ 100%)
1999	4 (n.a.)	72 (63)
2000	358 (n.a.)	36 (31)
2001	130 (11)	20 (15)
2002	45 (18)	9 (6)
2003	n.a. (4)	16 (9)

Table 5  
Dilution and Equity Issuance

Sample includes only firms listed on the BSE. The dependent variable is minority shareholder dilution in offerings which increase the number of outstanding shares by at least 20% year-over-year. We define a minority shareholder dilution measure as  $(1 - (1 - a_t) / (1 - a_0))$ , where  $a_t$  and  $a_0$  are the fractional ownership by the largest owner before and after an equity issuance, respectively. We define the increase in equity capital as  $EquityInc = i/(1+i)$ , where  $i = (S_t - S_0) / S_0$  and  $S_t$  and  $S_0$  are shares outstanding at the end of year  $t$  and year 0, respectively. From Equation (18), the regression coefficient on  $EquityInc$  is our estimate for  $(1 - k)$  pre-2002.  $Law2002$ , equals 1 for post-legal change years (2002 and 2003) and zero otherwise. The coefficient on the interaction term  $EquityInc * law2002$  is our estimate for the post-law change in  $(1 - k)$ . The control variables in Model 2 and 3 are  $\alpha_0$  (pre-offering stake of the largest shareholder),  $stateown$  fraction (fractional state ownership prior to the offering), and  $market\ capitalization$  (number of pre-offering shares times share price at the end of the pre-offering year, in millions of Bulgarian lev). Shareholder stakes and number of shares are measured at year-end. P-values are in parentheses. Significant results, at 10% level or better, are in **boldface**.

	Model 1	Model 2	Model 3
Estimate for $(1 - k)$ pre-2002	<b>1.1039</b> <b>(0.010)</b>	<b>1.1318</b> <b>(0.007)</b>	<b>1.0406</b> <b>(0.055)</b>
Change in $(1 - k)$ post-2002	<b>-1.0514</b> <b>(0.003)</b>	<b>-0.9204</b> <b>(0.008)</b>	<b>-1.0154</b> <b>(0.011)</b>
Resulting estimate for $(1 - k)$ post-2002	0.0525 (0.918)	0.2113 (0.675)	-0.1411 (0.822)
<b>Controls:</b>			
$\alpha_0$		<b>-1.1427</b> <b>(0.003)</b>	<b>-1.5511</b> <b>(0.002)</b>
Stateown fraction		-0.0048 (0.634)	0.0048 (0.415)
Market capitalization			-0.0007 (0.372)
Intercept	<b>-0.4989</b> <b>(0.074)</b>	0.0809 (0.809)	0.3011 (0.518)
Number of Observations	153	153	122
Prob. F-stat	0.001	0.000	0.001
Adjusted R <sup>2</sup>	0.075	0.118	0.130

Table 6  
Examples of Possible Use of Large Wash Trades to Reduce Delisting Price

The examples are identified from the BSE tapes, by finding companies where there are large trades (50+ times daily trading volume) within three months before delisting. The pre-trade price range is taken over the six months before the last trade. The discount  $d_{wash}$  is computed as (weighted average pre-trade price – price of trade)/(weighted average pre trade price). The weight of trade  $v_c$  is computed as (size of trade)/sum(size of all trades during 3 months preceding delisting).

Firm Name	Trade date	Delisting date	Pre-Trade Price Range	Price of large trade	Discount of large trade ( $d_{wash}$ )	Weight of large trade ( $v_c$ )
Plastimo	4 Apr 2000	5 Jul 2000	5.00-8.00	1.00	0.857	0.663
Preslav –AH	19 May 2000	25 May 2000	2.68-3.51	1.05	0.610	0.945
Sintermat	4-6 Oct 2000	29 Nov 2000	11.99-13.00	2.50	0.790	0.952
Ropotamo	9 Nov 2000	10 Jan 2001	13.66-20.70	1.12	0.943	0.971
Loviko Chirpan	15 Mar 2000	8 Jun 2000	10.00-10.00	4.16	0.584	0.981
Himatech	14 Aug 2001	4 Sep 2001	10.00-10.00	1.10	0.890	0.762
General Ganetzki	1 Oct 2001	15 Dec 2001	4.00-4.00	0.12	0.970	0.938
Average:					<b>0.806</b>	<b>0.887</b>

Table 7  
Freezeout Tender Offers Before and After 2002 Law Changes

Tender offers are identified using keyword searches in the BSE news archive. The BSE news archive starts identifying tender offers in 2001. We find 33 announcements in the 2001-2003 period. We exclude two announcements with a missing offer price and two firms with no trades in the three months before the announcement. This reduces the sample to nine freezeout offers during 2001 (pre-law change) and 20 offers post-law. In measuring premium to market and initial offer/sales, we exclude one post-law offer in which the final price is revised upwards by over 800%. Market price is the equally weighted average trading price for the three months before the announcement. Premium is computed as (offer price – market price)/(market price). Offer Price to Sales is computed as (offer price)/(sales in year before tender offer). The mean-adjustment of Offer Price/Sales ratios is calculated as the Offer Price/Sales for each firm divided by the average Price/Sales ratio for non-frozen out firms in the same year as the freezeout. P-values for the hypothesis that the premium is zero are in parentheses. Significant results, at 5% level or better, are in **boldface**.

Characteristics	Before 2002 Law	After 2002 Law	P-value (post-law - pre-law difference)
<b><i>Summary Statistics of Tender Offers</i></b>			
Number of tender offers	9	20	
Average premium to market price for initial tender offers	0.1363 (0.233)	<b>0.4059</b> <b>(0.003)</b>	0.162
Median premium to market price for initial offers	0.0382 (0.120)	<b>0.2014</b> <b>(0.003)</b>	0.312
Number of offer prices that are revised upwards	0	10	
Average increase of tender price of revised offers	n.a.	<b>0.4330</b> <b>(0.024)</b>	
Average premium for final offers	0.1363 (0.233)	<b>0.6291</b> <b>(0.000)</b>	<b>0.039</b>
Median premium for final offers	0.0382 (0.120)	<b>0.4526</b> <b>(0.000)</b>	<b>0.030</b>
<b><i>Raw Offer Price to Sales Ratios</i></b>			
Average (median) Offer Price/Sales	0.1557 (0.0670)	0.5346 (0.2223)	<b>0.092</b> <b>(0.025)</b>
Average (median) Final Offer Price/Sales	0.1557 (0.0670)	0.6466 (0.2965)	<b>0.097</b> <b>(0.017)</b>
<b><i>Mean Adjusted Estimates</i></b>			
Average (median) Mean-Adjusted Offer Price/Sales	0.3767 (0.2031)	1.2025 (0.4747)	0.114 <b>(0.032)</b>
Average (median) Mean-Adjusted Final Offer Price/Sales	0.3767 (0.2031)	1.4680 (0.6331)	0.118 <b>(0.017)</b>

Table 8  
Pre-Law Propensity to Dilute and De-List

The dependent variable in the freezeout model equals 1 if a firm gets delisted from the BSE before 2002, and zero otherwise. The dependent variable in the dilution model equals 1 if a firm issues more than 20% new equity before 2002, zero otherwise. State control (minority stake) dummy equals 1 if the state owns a majority (minority) stake; 0 otherwise. The state control dummy is dropped from the estimation of the dilution logit, because no state controlled firms issue more than 20% equity before 2002. Private Control dummy equals 1 if a non-state shareholder owns a majority stake; 0 otherwise. Ownership is measured prior to delisting (dilution), or at year-end 2001 if no delisting (dilution) occurs. Positive net income dummy equals 1 if company reports positive net income in 1999; 0 otherwise. Operating margin is defined as EBIT (earnings before interest and taxes)/Sales in 1999. Sales growth is fractional sales growth from 1998 to 1999. Export/Sales is the fraction of sales which are made outside of Bulgaria. This information is available only for 1996 from the Center for Mass Privatization. P-values are in parenthesis. Significant results, at 5% level or better, are in **boldface**.

	(1)	(2)
Tunneling event	Freezeout	Dilution
Ln(Sales) in 1999	<b>-0.4526</b> <b>(0.000)</b>	0.1073 (0.218)
State control dummy	<b>-2.5166</b> <b>(0.028)</b>	n.a. n.a.
State minority stake dummy	<b>0.8154</b> <b>(0.000)</b>	-0.3348 (0.199)
Private Control dummy	<b>0.6373</b> <b>(0.014)</b>	-0.2496 (0.465)
Ownership of largest private shareholder	<b>-3.0424</b> <b>(0.000)</b>	<b>4.0735</b> <b>(0.000)</b>
Positive net income in 1999 dummy	<b>0.6588</b> <b>(0.003)</b>	-0.3864 (0.166)
Operating margin in 1999	<b>1.3083</b> <b>(0.002)</b>	0.6072 (0.334)
Sales growth	0.0891 (0.609)	-0.0702 (0.757)
Exports/Sales	-0.2628 (0.465)	-0.3885 (0.402)
Constant	<b>4.5591</b> <b>(0.000)</b>	<b>-3.9842</b> <b>(0.000)</b>
Industry dummies	yes	yes
Pseudo R <sup>2</sup>	0.19	0.11
Firms undergoing freezeout or dilution	400	95
Firms in sample	654	647

Table 9  
Tunneling Propensities and After-minus-Before Changes in Valuation Ratios

Firm fixed effects regressions of after-minus-before changes in valuation ratios. Dependent variables are quarterly Price/Earnings ratio (average stock price for the quarter/earnings per share for prior year), Price/Sales ratio (average stock price for the quarter/sales per share for prior year), and Tobin's q (estimated as book value of assets + market value of equity - book value of equity)/(book value of assets), where market value of equity is measured quarterly and book values are observed yearly. Observations with earnings per share, sales per shares, or book value of assets per share < 0.01 Bulgarian lev are dropped. Only firms with at least one non-missing valuation ratio both before and after the law change are kept. *Postlaw* dummy equals one for calendar quarters during 2002 (2002-2003 for Panels B and C) and zero for quarters from January 2000 through September 2001. Freezeout and dilution propensities are estimated using the logit models in Table 8. We set dilution propensity = 0 for state-controlled firms, which were dropped from the dilution logit regression due to lack of dilutive offerings by these firms. P-values are in parentheses. Significant results, at 5% level or better, are in **boldface**. Marginally significant results ( $P < .10$ ) are indicated with *italics* and \*.

*Panel A. All firms, 2000-2002 Period*

Dependent variable	Price/Earnings	Price/Sales	Tobin's q
Postlaw* freezeout propensity	<b>31.6231</b> ( <b>0.001</b> )	<b>0.7110</b> ( <b>0.015</b> )	0.2265 (0.086)*
Postlaw* dilution propensity	24.0718 (0.052)*	0.6552 (0.120)	<b>0.5076</b> ( <b>0.007</b> )
Postlaw dummy	-10.7528 (0.101)	<b>-0.5470</b> ( <b>0.009</b> )	<b>-0.2217</b> ( <b>0.022</b> )
Average pre-law valuation ratio	6.64	0.45	0.56
Number of firm fixed effects	56	120	115
Number of Observations	374	763	728

*Panel B. All firms, 2000-2003 Period*

Dependent variable	Price/Earnings	Price/Sales	Tobin's q
Postlaw* freezeout propensity	<b>23.5981</b> ( <b>0.0138</b> )	<b>0.8910</b> ( <b>0.0012</b> )	<b>0.2253</b> ( <b>0.045</b> )
Postlaw* dilution propensity	20.6699 (0.120)	<b>0.9168</b> ( <b>0.022</b> )	<b>0.6545</b> ( <b>0.000</b> )
Postlaw dummy	-12.2267 (0.104)	<b>-0.6282</b> ( <b>0.003</b> )	<b>-0.2589</b> ( <b>0.003</b> )
Average pre-law valuation ratio	9.22	0.40	0.56
Number of firm fixed effects	64	130	124
Number of Observations	491	1166	1120

*Panel C. Non-state-controlled firms, 2000-2003 Period*

Dependent variable	Price/Earnings	Price/Sales	Tobin's q
Postlaw* freezeout propensity	23.7867 (0.056)*	<b>0.9051</b> ( <b>0.003</b> )	<b>0.3099</b> ( <b>0.005</b> )
Postlaw* dilution propensity	20.4220 (0.250)	0.7987 (0.070)*	<b>0.6887</b> ( <b>0.000</b> )
Postlaw dummy	-11.3822 (0.240)	<b>-0.5508</b> ( <b>0.017</b> )	<b>-0.2313</b> ( <b>0.007</b> )
Average pre-law valuation ratio	9.17	0.30	0.51
Number of firm fixed effects	61	125	120
Number of Observations	461	1112	1073

Table 10  
DiD Regressions: After-minus-Before Changes in Valuation Ratios

Firm fixed effects regressions of after-minus-before changes in valuation ratios. Dependent variables are quarterly Price/Earnings ratio, Price/Sales ratio, and Tobin's q, defined as in Table 9. Observations with earnings per share, sales per shares, or book value of assets per share < 0.01 Bulgarian lev are dropped in regressions (1)-(3) respectively. Only firms with at least one non-missing valuation ratio both before and after the law change are kept. *Postlaw* dummy equals one for calendar quarters during 2002 and zero for quarters from January 2000 through September 2001. We interact *Postlaw* dummy with a *Privatecontrol* dummy (= 1 for firms with a non-state majority owner) and a *Nocontrol* dummy (= 1 for firms with no majority owner). The omitted control group is firms with majority government ownership. P-values are in parentheses. Significant results, at 5% level or better, are in **boldface**.

	(1)	(2)	(3)
<b>Dependent variable</b>	<b>Price/Earnings</b>	<b>Price/Sales</b>	<b>Tobin's q</b>
Postlaw*Privatecontrol	<b>14.1510</b> <b>(0.048)</b>	<b>0.5473</b> <b>(0.021)</b>	<b>0.3148</b> <b>(0.002)</b>
Postlaw*Nocontrol	5.1378 (0.482)	<b>0.6191</b> <b>(0.009)</b>	<b>0.2788</b> <b>(0.007)</b>
Postlaw dummy	-4.7165 (0.539)	<b>-0.7145</b> <b>(0.005)</b>	<b>-0.3179</b> <b>(0.003)</b>
Average pre-law valuation ratio			
All firms	7.30	0.42	0.56
Privately controlled firms	6.27	0.33	0.53
No control firms	8.09	0.25	0.49
State controlled firms	9.73	3.27	1.55
Number of firm fixed effects			
Privately-controlled firms	35	72	69
No-control firms	20	58	55
State-controlled firms	5	6	6
Calendar quarter dummies	10	10	10
Number of Observations	402	863	817

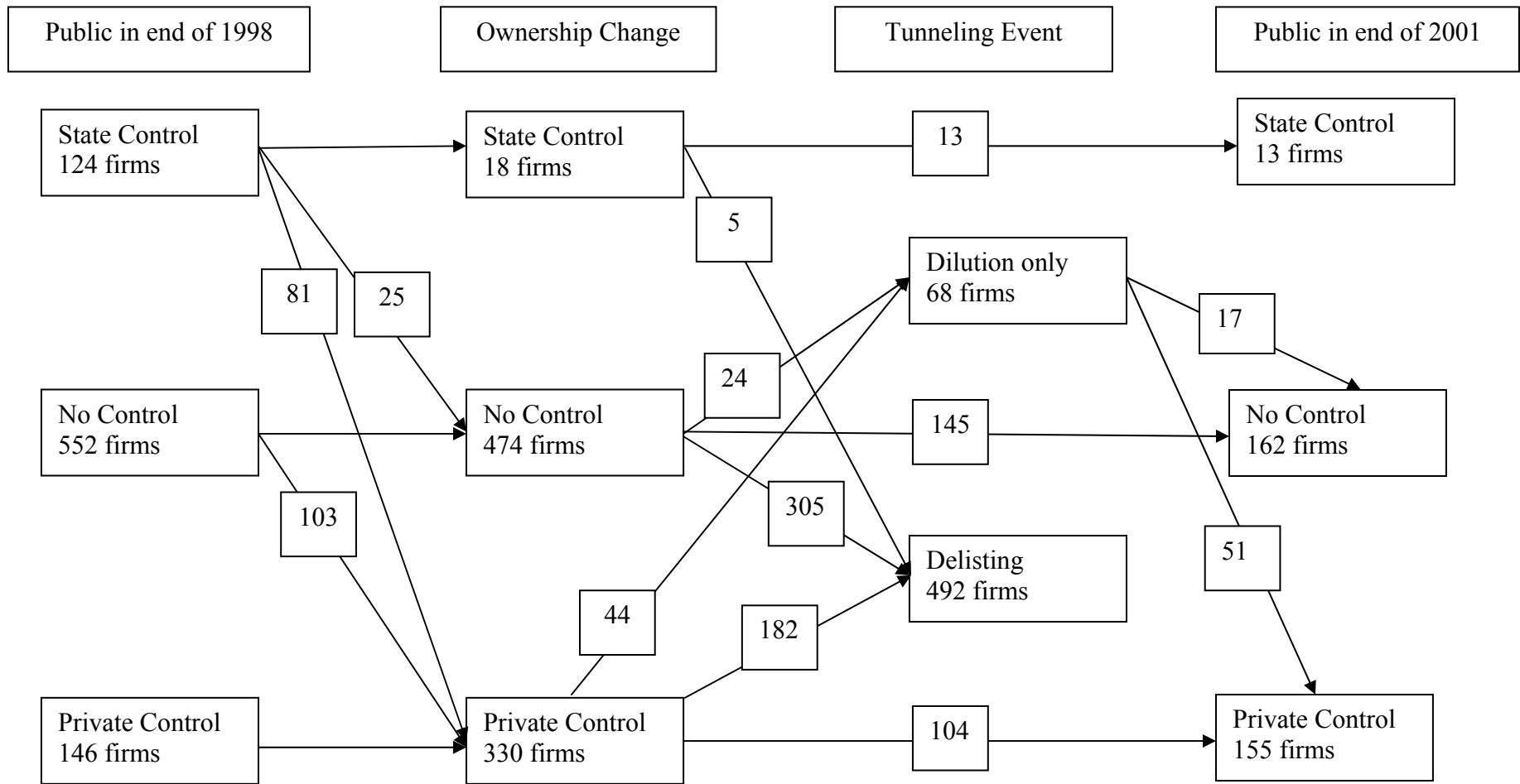


Figure 1. Ownership Changes and Tunneling Events



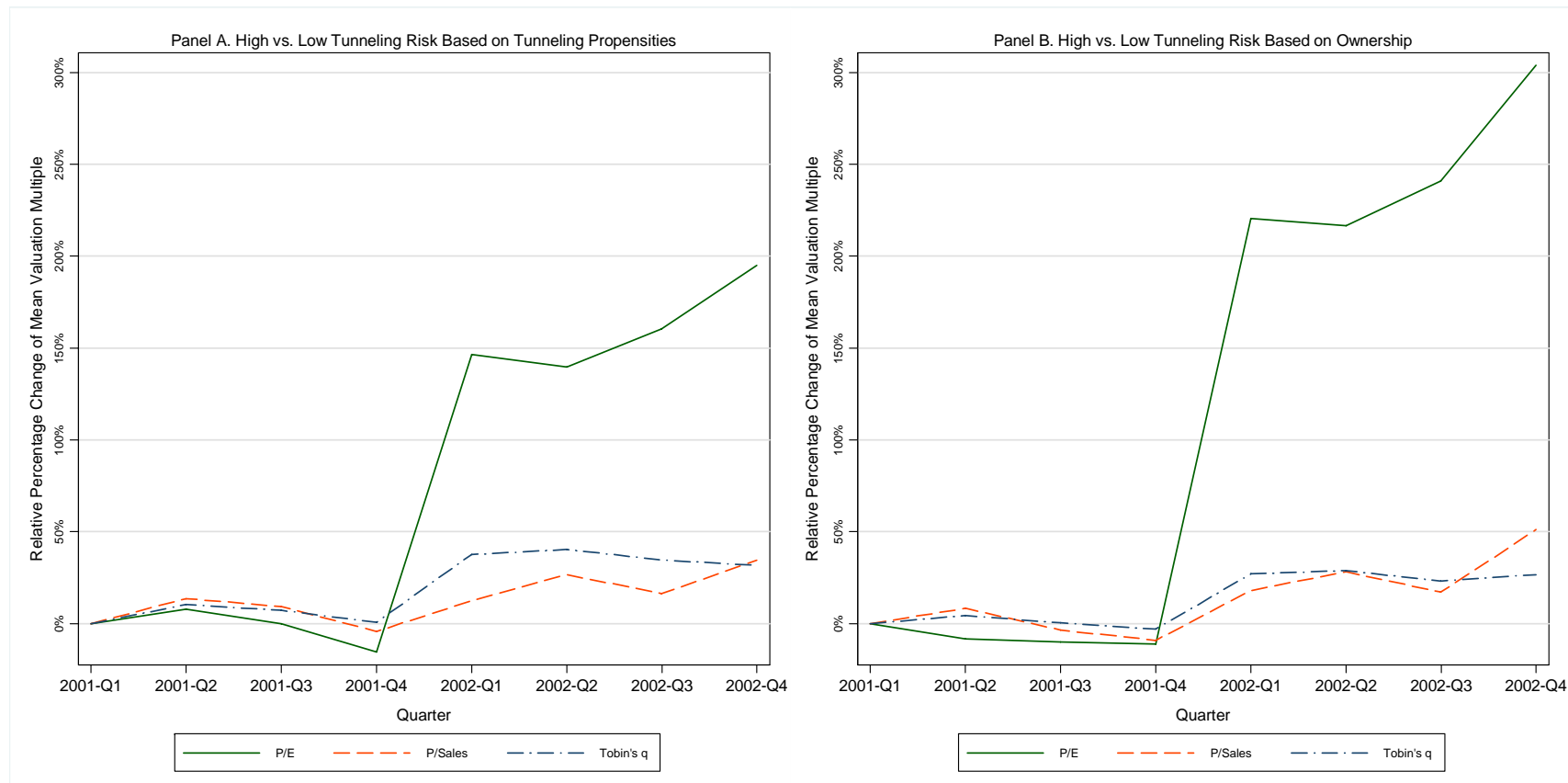


Figure 2. Percentage Change in Valuation Multiples for High Tunneling Risk Firms Relative to Low Risk Firms

The graphs show the percentage change in mean valuation multiples (PE, price/sales, and Tobin's q), with the first quarter of 2001 as the base quarter, for of firms at high tunneling risk minus the percentage change in these multiples for low-tunneling-risk firms. Panel A: Low-tunneling-risk firms are firms which have below-median propensity for both dilution and freezeout, estimated using the logit models in Table 8. High- risk firms have above median dilution propensity, above median freezeout propensity, or both. Panel B: Low-tunneling-risk firms are firms with majority government ownership or no majority shareholder. High- risk firms have a private majority shareholder. P/E ratio, price/sales ratio, and Tobin's q are defined as in Table 9. The graphs use a balanced panel of firms with non-missing valuation multiples for all eight quarters of 2001-2002. Sample sizes for Panel A are for PE – 5 low and 12 high-risk firms; for price/sales – 6 low and 17 high risk firms; for Tobin's q – 6 low and 17 high risk firms. Sample sizes for Panel B are for PE – 9 low and 10 high risk firms; for price/sales – 12 low and 16 high risk firms; and for Tobin's q – 11 low and 16 high risk firms.