

# **Unbundling and Measuring Tunneling**

**Vladimir Atanasov\***  
College of William and Mary

**Bernard Black**  
University of Texas at Austin

**Conrad S. Ciccotello**  
Georgia State University

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\* Corresponding author: Mason School of Business, College of William and Mary, P.O. Box 8795, Williamsburg, VA 23187, [vladimir.atanasov@mason.wm.edu](mailto:vladimir.atanasov@mason.wm.edu), voice: 757-221-2954, fax: 757-221-2937.

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# Unbundling and Measuring Tunneling

## **Abstract:**

Managers and controlling shareholders can extract wealth from firms in many different ways. We develop here a framework for analyzing different types of “tunneling” transactions. We divide tunneling into three broad groups: cash flow, asset, and equity tunneling. We model each type of tunneling as decomposable into a probability of tunneling and a magnitude. We present a simple model of how each type of tunneling affects share prices and financial metrics and provide two detailed case studies -- Gazprom in Russia and Coca-Cola in the United States -- to illustrate how these types of tunneling can occur in both emerging and developed markets. Finally, we explore a number of uses of our decomposition approach -- for empirical research into the nature and extent of tunneling; for asset pricing, especially in high-tunneling-risk environments; for legal regulation of tunneling; and for accounting rules.

## 1. Introduction

In the United States, we often think of poor managerial performance as the principal agency cost problem raised by the separation of ownership and control. But in much of the rest of the world, the dominant agency cost concern is expropriation of firm value by insiders (managers and controlling shareholders), disproportionate to their economic ownership. Johnson, La Porta, Lopez-de-Silanes and Shleifer (2000, p. 22) have given this risk a name -- "tunneling." Empirical research on tunneling has since expanded into several lines of literature spanning accounting, economics, finance, and law. A growing number of papers document tunneling of various sorts, partly in developed markets,<sup>1</sup> but especially in developing markets.<sup>2</sup> Others study how tunneling, often under the polite name of "private benefits of control," indirectly affects market prices, including prices paid for different classes of shares, and control premiums.<sup>3</sup>

The literature on tunneling, though, remains diffuse. Simply listing the variety of transactions or other activities that can involve tunneling is a daunting task. Tunneling is rarely voluntarily disclosed as such, and accounting rules rarely require disclosure sufficient to let investors assess the nature and extent of tunneling. Most empirical research is therefore limited to indirect measures. Moreover, theory has lagged behind the empirical efforts. The available models do not distinguish between forms of tunneling, and model tunneling in a highly stylized

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<sup>1</sup> Papers studying the United States include Bates, Lemmon, and Linck (2006), Ciccotello, Grant and Grant (2004), and Gordon, Henry, and Palia (2004) (U.S.).

<sup>2</sup> Examples include Atanasov (2005), Atanasov, Ciccotello and Gyoshev (2006), and Atanasov, Black, Ciccotello, and Gyoshev (2007) (Bulgaria), Baek, Kang, and Lee (2006) (Korea), Bates, Lemmon, and Linck (2006) (U.S.); Bertrand, Mehta, and Mullainathan (2002) (India), Cheung, Rao, and Stouraitis (2006) (Hong Kong), and Djankov, La Porta, Lopez-de-Silanes and Shleifer (2006) (multi-country). China is a favorite subject of study, see, Berkman, Cole, and Fu (2007), Deng, Gan and He (2007), Jiang, Lee, and Yue (2005), and Ming and Wong (2003).

<sup>3</sup> Examples include Barak and Lauterbach (2007) (Israel), Black (2001a) (Russia), Goetzmann, Spiegel and Ukhov (2003) (Russia) Nenova (2003) (multicountry), Dyck and Zingales (2004) (multicountry);

way where a single parameter captures the extent of tunneling (e.g., Burkart, Gromb, and Panunzi, 1998; Shleifer and Wolfenzon 2002; La Porta, Lopez-de-Silanes, Shleifer and Vishny, 2002).

This paper develops a framework to “unbundle” tunneling by managers and controlling shareholders, and measure the impact of different types of tunneling on share prices and financial metrics.<sup>4</sup> We refine and expand the crude categorization in Johnson et al. (2000). They define “tunneling” as the “transfer of resources out of a company to its controlling shareholder (who is typically also a top manager).” They divide tunneling into two broad categories: (i) “self-dealing” transactions, which include transfer pricing, excessive compensation, taking of corporate opportunities, and asset sales; and (ii) financial transactions that “discriminate against minorities,” such as dilutive equity offerings and minority freeze-outs.

This paper expands the concept of tunneling to include transfers which benefit either managers or controllers, and then “unbundles” tunneling along two principal dimensions. First, we unbundle tunneling based on *what* is being tunneled. We divide tunneling into three basic types: cash flow tunneling, asset tunneling, and equity tunneling. *Cash flow tunneling* removes a portion of current year's cash flow, but does not affect the remaining stock of long-term productive assets, and thus does not directly affect the firm's value to all investors, including the controller. Examples include transfer pricing (sale of outputs to an intermediary controlled by insiders for below-market prices; or purchase of inputs at above-market prices), excessive executive salaries or perquisites, and small-scale sales or purchases of assets, which do not

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<sup>4</sup> The unbundling metaphor is drawn from Acemoglu and Johnson, 2005, who seek to unbundle property rights and contracting institutions.

significantly affect the firm's cash-generating capacity. Cash flow tunneling can repeat year after year, but the fraction of cash flow which is tunneled can change over time.

*Asset tunneling* involves the transfer of major long-term (tangible or intangible) assets from or to the firm. Transfers from the firm will be for less than market value. They are distinct from cash-flow tunneling because of their scale -- the transfer has a permanent effect on the firm's future cash-generating capacity. Transfers to the firm will be for more than market value. Examples include overpriced purchases of assets, or investments in an affiliated firm, on better terms than the affiliate could obtain on its own.

*Equity tunneling* increases the controller's share of the firm's value, at the expense of minority shareholders, but does not directly change the firm's productive assets. Examples of equity tunneling are dilutive offerings, freeze-outs of minority shareholders, loans to insiders (which will not be paid in bad states of the world), equity-based incentive compensation which exceeds a market level, and insider trading.

If one describes a firm as a grove of apple trees, which grow better together than apart, cash flow tunneling can be seen as stealing some of this year's crop of apples, asset tunneling involves either stealing some of the trees (potentially making the remaining trees less valuable) or overpaying for additional trees; and equity tunneling steals claims to ownership of the grove.. Or, to use an example from Russia, insiders at Gazprom have engaged in a combination of cash flow tunneling (selling Gazprom's gas to insider-controlled intermediaries for below-market prices, and purchasing overpriced services from insider-affiliated third parties), asset tunneling "out" (buying Gazprom's gas fields and pipelines for low prices), asset tunneling "in" (buying TV stations and newspapers which had been critical of the government), and equity tunneling (selling Gazprom shares to themselves, or causing the government to do so, for low prices)..

Equity and asset tunneling principally affect items on the balance sheet, and involve the transfer of the *stock of firm value*. In contrast, cash flow tunneling principally affects the income statement and statement of cash flows, and involves captures of the *flow* of firm value.<sup>5</sup> In terms of operational impact, asset tunneling directly affects the company's future operations and profitability, while equity and cash flow tunneling do not.

We also unbundle tunneling along a second dimension, by separating asset and equity tunneling into a probability and a magnitude. We draw here on models of debt default risk.<sup>6</sup> For example, if the controllers are expected to freeze out minority shareholders with probability  $\pi_f$ , and a freezeout, if it occurs, will be at an expected discount to intrinsic value  $d_f$ , one can model the combined ex ante impact of freezeout risk on the value of minority shares as a function of  $\pi_f$  and  $d_f$ . These two parameters can be estimated separately using data on the incidence of freeze-out transactions and the average discounts paid in freeze-outs. Note, however, that  $d_f$  is not directly observable. All three types of tunneling will combine to produce a divergence of observed share prices from intrinsic no-tunneling values; one can have a freezeout or equity offering at a low or even negative discount from market price, yet a large discount from intrinsic value.

We develop a simple equilibrium model which links tunneling propensities and magnitudes to share prices and financial metrics. The key insight here is that different types of tunneling impact different financial metrics in different ways. A simple example: If Gazprom sells gas to an intermediary for half the world price, this will affect earnings, and thus share

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<sup>5</sup> The stock versus flow analogy is adapted from Gilson and Gordon (2003). They argue, using our terminology, that equity tunneling is more damaging to minority shareholders than cash flow tunneling because it extracts the present value of a stream of income, rather than just this year's flow.

<sup>6</sup> Merton (1974).

price, but may leave P/E ratio largely unaffected. In contrast, the risk that Gazprom will sell gas fields to insiders at low prices will affect price, but not current earnings, and thus will directly impact P/E.<sup>7</sup>

The decomposition of tunneling allows us to give content to the crude observation that tunneling risk should affect share prices. Tunneling probabilities and magnitudes can be seen as factors in determining asset values. In the classic present value formula,

$$PV = \sum_t C_t / (1 + r_t)^t$$

conventional asset pricing research takes cash flows as given and focus on how systematic risk affects the denominator. In contrast, we take the denominator as largely given and focus on how both firm-level tunneling affects the numerator.<sup>8</sup> Put differently, in conventional asset pricing, one estimates cash flows and systematic risks, and uses systematic risk to estimate an expected rate of return. Two firms with the same expected cash flows and systematic risks should trade at the same price. Tunneling risk adds a third element -- the likelihood that minority investors will realize their pro rata share of cash flows.

Tunneling is often a larger risk in emerging markets, but is not limited to those markets. We illustrate our unbundling framework with two detailed clinical studies. As an example of tunneling in an emerging market, we study Gazprom, a Russian company. As a developed market example, we study the relationship between Coca-Cola, a United States firm, its bottling subsidiary, Coca-Cola-Enterprises ("Bottling"), and its entertainment affiliate, Tri-Star Pictures. Both firms offer examples of all three forms of tunneling.

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<sup>7</sup> This model expands on the model of two forms of equity tunneling (dilution and freezeout) in Atanasov, Black, Ciccotello, and Gyoshev (2007).

<sup>8</sup> Tunneling risk may well have systematic components as well. Separating its systematic and unsystematic components is beyond the scope of this paper.

There is broad consensus that better law is associated with stronger financial markets, but much less on what laws matter.<sup>9</sup> Once tunneling is unbundled, it becomes possible to more tightly link legal rules to specific forms of tunneling, firms' financial performance. One channel through which law affects finance is through its impact on tunneling.<sup>10</sup> Particular laws often impact specific forms of tunneling. For example, appraisal rules affect the risk of equity tunneling through freezeout, but do nothing to discourage cash flow tunneling. Oversight by tax authorities can discourage cash flow tunneling (Desai, Dyck and Zingales, 2007), but does little to prevent equity tunneling. And so on. Unbundling tunneling allows a more fine-grained assessment of where a country's laws and institutions are succeeding or failing.

In many countries, including the U.S., financial reporting often does not give investors a fair or timely picture of how much tunneling is occurring. Our unbundling effort helps in this regard, but still relies on existing financial metrics. It points the way, however, to improved disclosure. We offer a number of concrete reform suggestions below.

The article proceeds as follows: Section 2 provides a taxonomy of tunneling types. Section 3 develops our tunneling model, and discusses how each type of tunneling affects share values and financial metrics. Section 4 develops our case studies of Gazprom and Coca-Cola. Section 5 discusses some implications of our analysis for legal rules and accounting disclosure.

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<sup>9</sup> On the finance side of law and finance, see, e.g., La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997, 1998), and the now large related literature, including Beck, Demirguc-Kunt and Levine (2003, 2003a); Demirguc-Kunt and Maksimovic 1998); Glaeser and Shleifer (2002); Glaeser, La Porta, Lopez-de-Silanes and Shleifer (2004); Levine, (1998, 2005). On the law side, see; e.g., Berkowitz, Pistor and Richard (2003), Roe (2007), Spamann, 2006).

<sup>10</sup> There is also empirical research documents that examines the link between tunneling and law in various markets, including Djankov, La Porta, Lopez-de-Silanes and Shleifer (2006, laws against self-dealing); La Porta, Lopez-de-Silanes and Shleifer (2006, securities laws), and Atanasov et al. (2007, equity tunneling before and after a change in law).

Section 6 discusses possible extensions to the framework while Section 7 concludes. We consider here publicly traded firms, but much of our analysis applies to private firms as well.

## **2. Unbundling Tunneling**

This section dissects tunneling into our three main types – cash flow, asset, and equity, summarizes which types of transactions and activities fall within each type, and discusses types which do not cleanly fit our typology.

### *2.1. Cash Flow Tunneling*

Cash flow tunneling can be loosely defined as self-dealing transactions which divert what would otherwise be operating cash flow from the firm to insiders (controlling shareholders, managers, or both). The central stylized attributes of cash flow tunneling are: (1) it can potentially recur indefinitely, but may or may not do so in fact; (2) it leaves the firm's long-term productive assets unchanged; (3) it leaves ownership claims over the firm's assets unchanged; and (4) if limited in extent, it may not significantly affect the firm's long-term cash-generating ability.

Specific examples of cash flow tunneling include transfer pricing arrangements where the controlling shareholder, or a company in which the controller has a large ownership stake (larger than in the "main" firm), sells inputs to the firm at above-market prices or purchases the firm's outputs at below-market prices, above-market current compensation to managers (we treat equity-based compensation as within the equity tunneling bucket), payments to insiders for services at above-market rates, and loans to insiders at below-market rates (we treat the risk of non-repayment as within equity tunneling).

Sales or purchases of replaceable assets, including inventory or receivables, at off-market prices, can also be classified as cash flow tunneling. As the scale of an asset transaction increases, the transaction will at some point slide from cash flow tunneling into asset tunneling.

Transactions between a firm and its controlling shareholders can sometimes benefit the firm -- so-called "propping" (Friedman, Johnson and Mitton (2003); Cheung, Rao, and Stouraitis (2006). We do not directly discuss propping here, nor the argument that tunneling and propping transactions within business groups can sometimes reflect efficient risk-sharing in an inefficient capital market (Morck and Nakamura, 2007). However, our disclosure proposals would capture both tunneling and propping.

While cash flow tunneling does not directly affect the firm's ongoing cash flow, it can have indirect effects, especially if it occurs on a large scale.

Table 1 (Panel A) lists example categories of cash flow tunneling transactions.

## *2.2 Asset Tunneling*

Asset tunneling involves self-dealing transactions which either (i) remove significant, productive assets from the firm for less than fair value, to the benefit of the controlling shareholder and/or manager (tunneling "out"); or (ii) add overpriced assets to the firm (tunneling "in"). Johnson et al. (2000) bundle the first type of asset tunneling with cash flow tunneling into a single category they label "self-dealing transactions," and do not address the second type.

We treat asset tunneling as separate from cash flow tunneling for several main reasons. First, tunneling out of assets diverts all future cash flows associated with the asset in a single transaction. In contrast, diverting cash flows is an ongoing process, which can be modified in the future. Second, to the extent that there is synergy between different aspects of a firm's business, diverting productive assets may reduce the value of the firm's remaining assets and thus

the firm's overall profitability, while diverting firm free cash flow is closer to being purely redistributive -- unless large in scale, it may not affect a firm's future operating performance. Third, as we show below, asset tunneling and cash flow tunneling have very different effects on financial metrics, and need to be addressed through different legal and accounting rules. One can crudely think of asset tunneling as impacting the balance sheet first, and the income statement only indirectly; while cash flow tunneling affects the income statement and statement of cash flows directly, but often only indirectly affects the balance sheet.

Asset tunneling can include both tangible and intangible assets, which can be either on or off the balance sheet. Tangible asset tunneling includes sales (purchases) of significant assets, often falling within the property, plant, and equipment (PPE) or investments lines on the balance sheet, to (from) related parties for less (more) than market value. One common form involves investing in an affiliate on terms the affiliate could not obtain from outside investors (Baek, Kang and Lee, 2006) Intangible asset tunneling can include providing trade secrets or other intellectual property to related parties at a discount (buying them from related parties at a premium); and diverting business opportunities to related parties.

The classification of some transactions will be unclear. Consider a lease of company assets from a related party for more than fair value. If the lease term is short, relative to the life of the asset, the transaction looks like cash flow tunneling. If the lease term is long, relative to asset life, the transaction looks more like asset tunneling. Accounting rules struggle with the distinction between short-term "operating" leases and long-term "capital" leases; our taxonomy will do no better than they do. An assets-for-equity transaction, such as the Coke-Tri-Star transaction discussed in our Coke case study, can involve both asset and equity tunneling.

Table 1 (Panel B) provides examples of asset tunneling transactions.

### *2.3 Equity Tunneling*

The core characteristic of equity tunneling is that it rearranges ownership claims over the firm's assets, to the detriment of minority shareholders, without directly affecting the firm's operations. Three central forms of equity tunneling are offerings of shares (or securities convertible into shares), to insiders for below fair value, going-private transactions (freezeouts), and loans from the firm to insiders (which will not be repaid in bad states of the world). Within business groups, equity investments in or loans to affiliates can involve tunneling from the investing firm, and propping of the investee firms.

Insider trading is also a form of equity tunneling, because it transfers value from uninformed investors to insiders without directly affecting firm value. So are jumbo stock option or restricted stock grants to executives, which exceed a market level of incentive compensation.

Selective repurchases of shares from insiders can also be seen as equity tunneling. A repurchase at fair value might give insiders greater liquidity or lower transaction costs than outside shareholders enjoy. A repurchase for more than fair value dilutes the value of the minority shares.

Loans to insiders have elements of cash-flow tunneling, to the extent that the loan is at a below-market rate, but can also be considered to be a form of equity tunneling. The loan can be understood as granting to the insiders a put option, which they will exercise, by not repaying the loan, in bad states of the world. It thus reduces the expected value of the minority shares.

Sales of control at a premium which reflects the value of future expected tunneling can be understood as a form of equity tunneling.

Table 1 (Panel C) provides examples of equity tunneling transactions.

### 3. Modeling Tunneling and Its Impact on Financial Metrics

We develop in this section a simple equilibrium model of how different types of tunneling affect share prices and financial metrics. For cash flow tunneling, we assume that minority shareholders do not observe the level of tunneling at each firm; they do, however, estimate correctly on average across all firms, based on firm, controller, and market characteristics. For asset and equity tunneling, they do not correctly estimate tunneling probability and magnitude at each firm but again, get these estimates right on average.

We assume an all-equity firm, zero-growth, all earnings are returned to investors as dividends, and ignore taxes. As measures of operating performance, we use return on assets (ROA), defined as earnings before interest and taxes divided by book value of assets (EBIT/Assets), and operating margin, defined as EBIT/Sales. With our assumptions of zero leverage and zero taxes, EBIT equals net income, ROA equals return on equity (ROE), defined as net income divided by book value of equity, and net income equals cash flow from operations. The firm has one share, minority shareholders hold a fraction  $\alpha_0$  at  $t = 0$ , while the controlling shareholder holds  $(1-\alpha_0)$ . At  $t = 0$ , the firm has assets  $A_0$ , return on assets with no tunneling  $ROA_0$ , and cost of capital with no tunneling of  $K_0$ . The firm's "intrinsic" or "no-tunneling" per share value, which will be the same for all shareholders, is:

$$IV_{no-tun} = \frac{ROA_0 * A_0}{K_0} \quad (1)$$

#### 3.1. Cash Flow Tunneling

In this section, we ignore the risk of asset or equity tunneling; we add this complexity in later sections. We explore how cash flow tunneling affects minority share prices and financial metrics.

Assume now that during the period which ends at  $t=0$ , the controller has diverted a fraction  $d_{cf}$  of the firm no-tunneling income, investors expect this fraction to remain constant over time, and cash-flow diversion does not affect the firm's cost of capital. The equilibrium per share market value of minority shares with expected cash flow tunneling at time  $t = 0$  will be:

$$MV_{0,CF\ tun} = \frac{(1 - d_{cf}) * ROA_0 * A_0}{K_0} \quad (2)$$

Under our assumption that the firm pays out all earnings as dividends, cash flow tunneling affects the market price of minority shares, as well as the firm's earnings, profitability, and dividends, but not its balance sheet. To first order, cash flow tunneling may also not have a large effect on cost of capital or sales. If so, then cash flow tunneling will have a similar effect on a variety of financial metrics with share price or profits in the numerator and sales or assets in the denominator -- they will drop by a factor  $(1 - d_{cf})$ . We summarize these effects in Table 2.

In contrast, cash-flow tunneling will not affect P/E, because it has a similar effect on both numerator and denominator. Thus, markers for a firm with significant cash-flow tunneling, relative to its peers, will be suppressed Tobin's  $q$  and ROA, but a normal P/E.

Some forms of cash-flow tunneling, such as transfer pricing, affect cost of good sold (COGS), and thus gross margin  $((\text{revenue}-\text{COGS})/\text{revenue})$ . A firm which engages in transfer pricing will have suppressed gross margin, compared to low-tunneling competitors. For firms which sell commodities, transfer pricing can also be detected by computing revenue per unit of output. For example, an oil company which sells to an intermediary at a discount will have lower revenue per barrel of oil sold than its competitors.

Other forms of cash flow tunneling, such as excess executive compensation, affect SG&A, and thus operating margin, but do not affect gross margin. Although our model assumes

an all equity firm, if we relax this assumption, loans to insiders at a below-market rate affect net income, but not operating margin.

In sum, given sufficient data about the firm's financial metrics, one can potentially isolate which types of cash flow tunneling are occurring. For example, transfer pricing is important in the Gazprom and Coke examples below. In contrast, a major form of tunneling by Chinese parent firms from publicly traded subsidiaries appears to be through loans by the subsidiary to the parent (Jiang, Lee and Yue, 2005; Deng, Gan and He, 2007). Bertrand, Mehta and Mullainathan (2002) report that for firms within Indian business groups, EBITD/assets underresponds to industry shocks, which is consistent with the group moving profits from high-profit firms to low-profit firms. The effect is concentrated in non-operating profits, suggesting that the principal means of tunneling is non-ordinary course of business transactions, rather than, say, transfer pricing.

Some forms of cash flow tunneling will affect revenue; others will not. For example, Gazprom's sales of gas at low prices to intermediaries will suppress both its gross margin and its revenue per unit of gas sold. In contrast, Bottling's potential overpayment to Coke for syrup will reduce Bottling's margins, but will not directly affect revenue.

If cash-flow tunneling is significant in scale, it will also affect the firm's cost of capital. Gazprom's or Bottling's lower profit margins surely affect their cost of borrowing to some degree. If investors expect the future level of cash flow tunneling to have a systematic component, as it well might, the cost of equity capital could rise as well. In either case, equation (2) will understate the effect of cash flow tunneling on minority share prices.

### 3.2. Asset Tunneling

We next put aside cash flow tunneling and equity tunneling, and explore how the expected probability and magnitude of asset tunneling affects minority share prices and financial metrics. We again assume that at  $t = 0$ , the firm has assets  $A_0$ , no-tunneling return on assets  $ROA_0$ , no-tunneling cost of capital  $K_0$ , and thus "no-tunneling" per share value of:

$$IV_{no-tun} = \frac{ROA_0 * A_0}{K_0} \quad (1)$$

Assume that at  $t = 0$ , investors expect the controller to engage in asset tunneling in period 1 with probability  $\pi_{a, pre}$ . We add the "pre" subscript to allow the expected probability of future tunneling to change to a new value  $\pi_{a, post}$  at  $t = 1$ , after the controller does or does not in fact tunnel assets. We assume that if assets are tunneled, they are simply stolen (zero purchase price). Let  $d_a$  be the proportion of the firm's assets which are diverted via asset tunneling, if it occurs. Asset tunneling can affect ROA in two ways. Tunneling of assets out of the firm can reduce synergy and thus reduce the profitability of the firm's remaining assets by a fraction  $d_{syn}$ . This loss of synergy aside, we assume that the tunneled assets earn the same ROA earned by the firm as a whole.

Sale of assets to the firm at inflated prices will inflate assets, and thus reduce ROA, we can again model this as a post-tunneling reduction on profitability by a fraction  $d_{syn}$ .

We assume that to first order, asset tunneling does not affect investors' required rate of return  $K_0$  (In our zero-growth model, the apparent cost of capital is  $K_0 = E/MV$ , but this value appears artificially high, because investors expect to receive less than  $E$  in future earnings, averaged across both tunneling and no-tunneling states of the world.)

The per-share value of minority shares at  $t = 0$ , with anticipated future asset tunneling, will be:

$$MV_{0,asset\ tun} = \frac{(1 - \pi_{a,pre} d_a) * (1 - \pi_{a,pre} d_{syn}) * ROA_0 * A_0}{K_0} \quad (3)$$

At time  $t = 1$ , asset tunneling either has or has not occurred, both for this firm and other firms in the market. Investors will update their expectations about future asset tunneling accordingly, to  $\pi_{a,post}$ . The value of minority shares at  $t = 1$  is:

$$MV_{1,asset\ tun} = \frac{(1 - \pi_{a,post} d'_{syn}) * (1 - \pi_{a,post} d'_a) * ROA_1 * A_1}{K_0} \quad (4)$$

Here  $ROA_1 = ROA_0 * (1 - d_{syn})$  if asset tunneling occurs and  $ROA_0$  otherwise, and  $A_1 = A_0 * (1 - d_a)$  if asset tunneling occurs and  $A_0$  otherwise. Note that if tunneling has occurred, share prices are affected both by the parameters for actual past tunneling  $d_{syn}$  and  $d_a$ , and by the parameters for future expected tunneling  $\pi_{a,post}$ ,  $d'_a$ , and  $d'_{syn}$ .

One can model investor updating of beliefs about tunneling magnitudes as well as probabilities, by attaching "pre" and "post" subscripts to  $d_a$  and  $d_{syn}$ . One can model investor updating of the firm's cost of capital by allowing  $K_0$  to vary with the expected probability and magnitude of asset tunneling.

Expected asset tunneling affects the market price of minority shares, but until it occurs, does not affect the firm's earnings, profitability, dividends, or balance sheet. It will thus have a similar effect on a variety of financial metrics with share price in the numerator and sales or assets in the denominator -- they will drop by a factor  $(1 - \pi_{a,pre} * d_a) * (1 - \pi_{a,pre} * d_{syn})$ . In contrast, it will have no effect on financial metrics which depend only on the income statement, the balance sheet, or both, such as earnings, operating margin, and ROA. We summarize these effects in Table 2.

We thus see a sharp distinction between the effects of cash-flow tunneling and asset tunneling. Ignore second order effects of tunneling on cost of capital:

- Cash flow tunneling will affect ROA and operating margin but not P/E
- Expected future asset tunneling will affect P/E but not ROA or operating margin
- Realized asset tunneling will affect P/E only through its effect on synergy.
- Both forms of tunneling will affect shares prices and thus Tobin's  $q$

Thus, markers for a firm with significant risk of future asset tunneling (or, as we will see in the next section, equity tunneling), relative to its peers, will be suppressed Tobin's  $q$  and P/E, but normal ROA.

Once asset tunneling occurs, depending on its form, it will have varying effects on different financial metrics. In our Coke case study, for example, if Bottling overpays Coke for bottling plants, Bottling's future depreciation and amortization will be artificially inflated, as will its assets. The joint effect (lower numerator, higher denominator) will severely suppress ROA, defined as EBIT/assets. The depreciation or amortization of overpriced assets will suppress EBIT and thus operating margin, defined as EBIT/sales, but less severely than EBIT/assets, since only the numerator will be directly affected. Meanwhile, gross margin (COGS/sales) and EBITDA/sales may not be affected at all.

An interesting implication from our analysis is that if asset tunneling does not reduce ROA (the tunneled assets have no synergies with other assets) and is not expected to be repeated, then asset tunneling will reduce ex ante but not ex post Tobin's  $q$ ; Tobin's  $q$  will *rise*.

### 3.3. Equity Tunneling

We next assume no cash-flow or asset tunneling, and explore how minority share prices value and financial metrics depend on the expected probability (likelihood) and magnitude of equity tunneling. We consider two types of equity tunneling, equity dilution and freezeout. At

the cost of additional complexity, one could also model other types of equity tunneling in which the fractional effect on ownership depends on future states of the world, such as loans to insiders, or stock option grants to insiders.

We again assume that at  $t = 0$ , the firm has assets  $A_0$ , no-tunneling return on assets  $ROA_0$ , no-tunneling cost of capital  $K_0$ , and thus "no-tunneling" per share value of:

$$IV_{no-tun} = \frac{ROA_0 * A_0}{K_0} \quad (1)$$

We capture investor anticipation of potential equity tunneling by assuming that investors expect the controller to engage in equity tunneling in period 1 with probability  $\pi_{eq, pre}$ . As for asset tunneling, we use the "pre" subscript to allow the expected probability of future tunneling to change to a new value  $\pi_{eq, post}$  at  $t = 1$ , after ex post, after the controller does or does not in fact conduct equity tunneling. We capture the degree of equity tunneling, if it occurs, by assuming that equity tunneling will reduce minority shareholders' fractional ownership by a factor  $(1 - d_{eq})$ .

We assume that to first order, equity tunneling does not affect investors' required rate of return  $K_0$ . As for asset tunneling, the apparent cost of capital  $K_0 = E/MV$  will appear artificially high, because investors expect to receive less than  $E$  in future earnings, averaged across both tunneling and no-tunneling states of the world.

The equilibrium per-share value of minority shares at  $t = 0$  with expected equity tunneling is:

$$MV_{0,eq tun} = \frac{(1 - \pi_{eq, pre} d_{eq}) * ROA_0 * A_0}{K_0} \quad (3)$$

At time  $t = 1$ , an equity tunneling transaction either has or has not occurred, for this firm and other firms in the market, and investors will update their expectations accordingly. If a freezeout occurs, minority shareholders receive the freezeout price, at a discount  $d_{eq, realized}$  to the

pre-freezeout market price. The realized discount will differ somewhat from the expected discount to intrinsic value  $d_{eq}$ , because the pre-freezeout market price already reflected anticipation of possible equity tunneling.<sup>11</sup> The minority shareholders will receive in the freezeout, a per-share amount equal to:

$$MV_{post-freezeout} = (1 - d_{eq, realized}) * MV_{0, eq tun} = (1 - d_{eq, realized}) * \frac{(1 - \pi_{eq, pre} d_{eq}) * ROA_0 * A_0}{K} \quad (4)$$

Roughly speaking, the freezeout discount  $(1 - d_{eq})$  appears twice: Minority shareholders receive a discount to an already discounted price.

For equity dilution, the per share value of minority shares at  $t = 1$  if dilution occurs is:

$$MV_{1, tun} = (1 - d_{eq}) \frac{(1 - \pi_{eq, post} d'_{eq}) * ROA_0 * A_0}{K_0} \quad (5)$$

Again, the post-dilution market price is discounted twice, once for the actual dilution which has occurred, and again in anticipation of additional future dilution. If equity dilution does not occur, market value will be given by (6) with updated probabilities and magnitudes.

A central aspect of equity tunneling, which distinguishes it from cash-flow and asset tunneling, is that it operates directly on ownership claims, and largely bypasses the financial statements.<sup>12</sup> It thus does not affect financial-statement-based metrics such as operating margin and ROA.

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<sup>11</sup> For example, ignore equity dilution, and assume an expected discount  $d_{eq} = 0.50$  and freezeout probability  $\pi_{eq, pre} = 0.50$ . The pre-freezeout market price is then 75% of intrinsic value. If a freezeout occurs, it will be at 50% of intrinsic value, or a 1/3 discount to observed market value.

<sup>12</sup> This is only approximately true for an actual equity offering, which brings capital into the firm. It can be made true by assuming that the firm does not need the extra capital, and promptly pays it out as a prorata dividend to all shareholders.

Anticipated *future* equity tunneling directly affects share price, and thus market-based metrics such as Tobin's  $q$  and P/E. The effect of a *realized* dilutive offering is more complex. If the offering leaves unchanged the probabilities and magnitudes of future tunneling, it will affect share price and thus P/E, but not Tobin's  $q$ , assuming that the firm can reinvest any cash it receives for shares at the same rate of return as the firm's existing assets. Table 2 summarizes these results.

### 3.4. Unified Equation

We now present a simple, unified equation for how equilibrium firm value depends on the expected level of cash flow tunneling, and the expected probability (likelihood) and magnitude of asset and equity tunneling. All terms used in the equations below are defined earlier in this section. The equilibrium per-share value of minority shares with realized cash flow tunneling and expected asset and equity tunneling at time  $t = 0$ :

$$MV_{0,tun} = \frac{(1-d_{cf})(1-\pi_{a,pre}d_{syn})(1-\pi_{a,pre}d_a)(1-\pi_{eq,pre}d_{eq}) * ROA_0 * A_0}{K_0} \quad (6)$$

The central takeaway from unified equation (8), compared to its narrower predecessors, is the compound effect of multiple forms of tunneling on minority share value. Suppose, for example, that each dilution and probability parameter is 0.40. Then minority share value, from Equation (8), will be 44% of intrinsic value.

At time  $t = 1$ , asset and equity tunneling transactions either will or will not have occurred, for this firm and other firms in the market. Investors will update their expectations accordingly. If a freezeout occurs, minority shareholders will receive the freezeout price, at a discount  $d_{eq}$ , *realized* to the pre-freezeout market price. The realized discount will differ from the expected freezeout discount to intrinsic value  $d_{eq}$ , because the pre-freezeout market price already reflects

cash flow tunneling plus anticipation of possible asset and equity tunneling.<sup>13</sup> The minority shareholders will receive in the freezeout, a per-share amount equal to:

$$MV_{post-freezeout} = (1 - d_{eq, realized}) * MV_{0, tun} \quad (7)$$

The realized discount  $d_{eq, realized}$ , comes on top of the pre-freezeout discounts from all three types of tunneling. Indeed, a controller could pay market price in the freezeout ( $d_{eq, realized} = 0$ ), or even a premium, and still freeze out the minority at a large discount to intrinsic value.

In all other cases, the ex-post per share value of minority shares at  $t = 1$  is:

$$MV_{1, tun} = \gamma_1 * \frac{(1 - d_{cf})(1 - \pi_{a, post} d'_{syn})(1 - \pi_{a, post} d'_a)(1 - \pi_{eq, post} d_e) * ROA_1 * A_1}{K_0} \quad (8)$$

Here  $\gamma_1 = (1 - d_{eq})$  if a dilutive equity offering occurs and 1 otherwise,  $ROA_1 = ROA_0 * (1 - d_{syn})$  if asset tunneling occurs and  $ROA_0$  otherwise, and  $A_1 = A_0 * (1 - d_a)$  if asset tunneling occurs and  $A_0$  otherwise.

Note that tunneling, in whatever form, need not result in unfairness to minority shareholders. That depends on the price they paid for their shares. Our equilibrium framework assumes implicitly that diversified shareholders correctly assess tunneling risks, and pay appropriate prices on average.

### 3.5. Tunneling and Financial Metrics

We discuss above selected examples of how different types of tunneling affect financial metrics. Table 3 summarizes these effects. Each of the three main types of tunneling has different effects. Within each main tunneling type, there are additional differences in how

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<sup>13</sup> For example, assume that an expected discount  $d_{eq} = 0.50$  and freezeout probability  $\pi_{eq, pre} = 0.50$ . The pre-freezeout market price is then 75% of intrinsic value. If a freezeout occurs, it will be at 50% of intrinsic value, or a 1/3 discount to observed market value.

subtypes affect particular financial metrics. The examples below summarize some of the implications:

- Cash flow tunneling affects earnings but may have a similar fractional effect on share prices and earnings and thus little first-order effect on assets. It affects accounting ratios and Tobin's  $q$  but has a more limited effect on P/E ratio.
- Cash flow tunneling through transfer pricing will affect gross margin ((sales - cost of good sold)/sales), operating margin (operating income/sales) and ROA; while excessive insider compensation will affect ROA and operating margin, but not gross margin.
- *Expected* future asset tunneling affects share prices (and thus Tobin's  $q$  and P/E), but not metrics based only on the financial statements (gross margin, operating margin, ROA).
- *Realized* asset tunneling *out* may affect financial statement metrics and Tobin's  $q$ , but only indirectly, through loss of potential synergy between the tunneled assets and the remaining assets. Realized asset tunneling *in* will inflate assets and thus depress Tobin's  $q$  and, through a combination of higher depreciation charges and higher assets, ROA, but will only indirectly affect gross margin or EBITDA/sales.
- *Expected* future equity tunneling is similar to expected future asset tunneling: it affects share prices but not current assets or earnings; it thus depresses market price based measures (Tobin's  $q$  and P/E ratios) but not accounting ratios (ROA, operating margin).
- *Realized* equity dilution directly affects share prices but, to first order, will not affect Tobin's  $q$  or financial statement-based metrics.

Tunneling, in whatever form, need not result in unfairness to minority shareholders. That depends on the price they paid for their shares. Our equilibrium framework assumes implicitly that diversified shareholders correctly assess tunneling risks, and pay appropriate prices on average.

#### **4. Case Studies of Tunneling**

Having developed a tunneling taxonomy, we next illustrate how that framework can be used to analyze tunneling, using two detailed case studies, one from an emerging market (Gazprom in Russia) and one from the United States (Coca-Cola and its publicly traded subsidiaries). These examples highlight both the use of different types of tunneling (cash flow, asset, and equity) as well as their different impacts on the financial metrics of the firms involved.

#### 4.1. *Gazprom*<sup>14</sup>

Measured by reserves, Gazprom is the largest oil and gas company in the world, with 2006 reserves of 196 billion barrels of oil and gas equivalents. It was formally created in 1992 to hold all of Russia's natural gas reserves plus many of its gas pipelines, and has since acquired significant oil reserves. Its largest shareholder is the Russian government, which currently owns about 38% of Gazprom shares. Gazprom began to trade on Russian Stock Market in 1996. Examples of specific tunneling transactions are described below.

##### 4.1.1. *Cash Flow Tunneling*

In 2001, Gazprom agreed to deliver gas to the Province of Yamal-Netetsk as payment in kind for \$200M in taxes.<sup>15</sup> The gas was then exported and resold to foreign buyers at market prices, for an estimated value of \$5.7B.<sup>16</sup> In substance, the gas never left Gazprom's wells and pipelines; Gazprom simply sold it for \$5.7B and recorded the sale price at \$200M. Inclusion of this profit would have resulted in Gazprom's operating margin increasing from 28.9% (stated actual) to 52.0% in 2001.

##### 4.1.2. *Asset Tunneling*

Over the period from 1997 through at least 2001, Gazprom engaged in multiple transactions with a private company called Itera, to Itera's great advantage. For example, in 2001, Gazprom sold to Itera a 32% stake in a major gas-producing subsidiary, Purgas, for \$1,200. Public complaints led to Gazprom's auditor (PwC) estimating the value of the stake at \$400M (about one percent of Gazprom's book value in 2001) and determining that the deal was

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<sup>14</sup> Financial information from gazprom.com; and various print media sources.

<sup>15</sup> See Starobin, Paul and Belton, Catherine, "Russia's Enron," *Business Week*, February 18, 2002, pp. 50-51.

<sup>16</sup> Id.

“advantageous to Itera.”<sup>17</sup> Despite numerous other transactions, such as loans, credit guarantees, and services between Gazprom and Itera, PwC announced that it “could not determine if the Gazprom managers were beneficiaries of Itera.”<sup>18</sup> Some sources estimate the total value of gas reserves transferred from Gazprom to Itera to be equal to about two years of Gazprom’s production, with an estimated value of roughly \$30B.<sup>19</sup>

#### 4.1.3. *Equity Tunneling*

In 1994, the partial privatization of Gazprom was structured so that one-third of the shares were bought at closed auction.<sup>20</sup> Russian Prime Minister Viktor Chernomyrdin, a former Gazprom CEO, was rumored but never proven to be a major buyer. In 1995, the partial privatization of Gazprom was structured so that Gazprom had a right of first refusal for any shares to come onto the market, and could refuse to register as a shareholder anyone who bought shares without Gazprom’s approval.<sup>21</sup> The approval and first refusal rights suppressed Gazprom’s market price, enabled it to buy out selling shareholders at depressed prices, and let insiders purchase shares at these depressed prices.

Gazprom engaged in a number of joint ventures with obscure counterparties, likely controlled by insiders. In a number of cases, Gazprom’s stake was later diluted through an equity offering by the joint venture, in which Gazprom did not participate. Hermitage Capital Management estimates that between 1997 and 2001 Gazprom lost 10% of its gas reserves

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<sup>17</sup> *Id.*

<sup>18</sup> See Starobin and Belton (2002), at 51-52.

<sup>19</sup> Craig Mellow, *Putin’s Problem*, INST. INVESTOR, Apr. 2000, at 44, 50.

<sup>20</sup> See Freedman, Michael and Brown, Heidi, “Energy Tsar,” *Forbes*, vol. 178, July 24, 2006, pp. 94-104.

<sup>21</sup> See Fuhrman, Peter, “Robber Baron,” *Forbes*, September 11, 1995, pp. 208-220.

through dilution of its stakes in various joint ventures. This was approximately equal to the entire gas reserves of Exxon-Mobil at the time.<sup>22</sup>

#### 4.1.4. Miller Era Moves

Beginning in 2000, the Russian Government began to crack down on the thefts of the post-privatization era, including appointing a new CEO, Alexei Miller, to replace former CEO Rem Vyakhirev. Miller began an effort to recover lost assets. His efforts included supporting state prosecutors who recovered \$85M in a sale of lost assets. In the aggregate, Miller has reportedly recovered “billions of dollars worth of (Gazprom) assets” and succeeded in “regaining control of subsidiaries.”<sup>23</sup> In the Miller era, however, cash flow tunneling continues, including “inordinately high payments to obscure intermediaries for basic materials.” For example, Ukrainian pipe prices increased by about one percent between 2003 and 2004, but Gazprom reported increased costs of about 35%.<sup>24</sup>

Gazprom's financial ratios improved dramatically over 1999-2006. Based on data from annual reports available at [www.gazprom.com](http://www.gazprom.com) and the 2006 Gazprom Data Book, its market/book ratio increased 18-fold from 0.1 in 1999 to 1.77 in 2006, while P/E ratio doubled from 5 in 2000 to about 10 in 2006. Gazprom's *current* market/book and P/E multiples are in line with the ratios of publicly-traded peers (Exxon-Mobil, Total, BP, Royal Dutch/Shell, Petrobras, and PetroChina) which have M/B between 2 and 3 and P/E between 9 and 15. However, Gazprom's book value is artificially depressed due to the manner of its privatization.

Price per barrel of oil equivalent (BOE), a common valuation metric for oil and gas companies, experienced the most significant increase. Gazprom's value per BOE increased more

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<sup>22</sup> See Freedman and Brown, “Energy Tsar,” *Forbes*, July 24, 2006, pp. 94-104.

<sup>23</sup> *Id.*

than 50 times, from \$0.026 in 1999 to \$1.39 in 2006. Yet, by this measure Gazprom remains well below the respective multiple for the peer companies, which range from \$5.40 for Petrobras (an emerging market peer) to \$11-23 for Western peers (for example, 23 for Exxon-Mobil). The large discount in the market value of Gazprom's reserves but not its earnings is consistent with ongoing cash flow tunneling, as well as investors having priced in some asset and equity tunneling risk.

#### 4.2. *Coca Cola*

A variety of transactions between 1986 and the present between Coca Cola (Coke) and its partially owned, publicly traded subsidiary, Coca-Cola Enterprises (Bottling), illustrate cash flow and asset tunneling by a parent company from a subsidiary.<sup>25</sup> Bottling's principal business is to bottle and distribute Coke products. Coke initially owned 100% of Bottling, but sold 51% to the public through an IPO in late 1986. Coke chose to hold just under 50% of Bottling so that it could retain control yet would not be required to include Bottling in its consolidated financial statements.<sup>26</sup> Coke claimed not to control Bottling, in order to deconsolidate its results from Coke's consolidated financial statements. But this was a thin pretense, even apart from Coke's near-majority stake. A majority of Bottling's directors are Coke or Bottling executives, large investors in Coke, or consultants to Coke (Meyer, et al 1999).

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<sup>24</sup> Id.

<sup>25</sup> This case study draws in part on a detailed analyst report on Coke's transactions with Bottling by Meyer, Owsen, and Brozovsky (1998). For allegations of continued tunneling, see *In re Coca-Cola Enterprises, Inc. Shareholders Litigation*, 2007 Del. Ch. 147. For more general discussion of tunneling between U.S. parents and their subsidiaries, see Atanasov, Boone, and Haushalter (2007).

<sup>26</sup> Under Statement of Financial Accounting Standards 94 (1987) and Accounting Principles Board Opinion No. 18 (1971), if one company (parent) owns between 20% and 50% of a second company (sub), parent can account for sub using the equity method, unless parent controls sub. Consolidation is required if parent owns 50% or more of sub. Even if parent owns less than 50% of sub, consolidation is required if parent controls sub. Coke claimed that it no longer controlled Bottling.

Once the spin-off had occurred, Coke's managers had incentives to shift profits from Bottling (in which Parent held 49%) to Coke, thus boosting Coke's performance at Bottling's expense. Improved performance by Coke would presumably, in turn, benefit Coke's managers, perhaps through incentive compensation. Coke wasted little time in doing so.

#### *4.2.1. Cash Flow Tunneling*

Coca-Cola sells syrup to Bottling. In 1993 (the year of Bottling's first electronically available proxy statement), these purchases accounted for \$1.2 Billion or 40% of Bottling's cost of good sold (COGS).<sup>27</sup> While there is no directly comparable market price for Coke syrup, we can evaluate Bottling's profit margins, relative both to its peers and to the pre-IPO reported in the IPO prospectus, for indications of cash flow tunneling.

#### *4.2.2. Asset Tunneling*

Coca-Cola also engaged in the sale of fixed tangible (bottling plants) and non-tangible (franchise rights) assets to CCE. The asset tunneling question is whether Bottling overpaid for these assets. By 1997, almost two thirds of Bottling's assets were intangible franchise rights purchased from Coca-Cola in connection with Bottling's purchase of bottling plants from Coke (Meyer, et al., 1999). Overpriced sales of assets to CCE would reduce both its net income (via amortization expenses) and increase its asset base.

Table 3 presents a comparison of CCE financial metrics relative to a peer group of bottling firms. The table shows that CCE actually has a higher gross margin than its peers, but its operating margin and ROA are lower. This pattern is consistent with CCE's purchase of bottling plants from Coke for greater than fair market value (asset tunneling in). The pattern is not consistent with extensive transfer pricing through purchases of overpriced syrup (cash flow

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<sup>27</sup> Coca Cola Enterprises, Annual proxy statement, March 8, 1994.

tunneling) relative to peers. It is interesting to observe, however, that three of CCE's peers are actually bottling subsidiaries of Pepsi.

There are other interesting comparisons in Table 3 that cannot be easily explained without unbundling tunneling. CCE has a low Tobin's q ratio (relative to peers) *and* a high P/E ratio relative to peers. This is explained by asset tunneling. Tobin's q is depressed by purchasing of Coca-Cola assets at above market values, which inflates CCE's assets and reduces its future earnings through depreciation and amortization. The P/E ratio, on the other hand, is not affected to the same degree as the asset tunneling reduces both price per share and earnings per share. If CCE had been at high risk for equity tunneling, both Tobin's q and P/E would have been depressed, similar to Gazprom.

#### 4.2.3. *Equity Tunneling*<sup>28</sup>

The transactions between Coca Cola and CCE are good examples of asset tunneling. Coca Cola engaged in a transaction with another affiliate, Tri-Star Pictures, which combined equity and asset tunneling. Tri-Star Pictures was a joint venture between Coke (which owned Columbia Pictures), CBS, and Time Inc. (owner of HBO). CBS and Time put up most of the film production costs in exchange for exclusive showing rights, but Coca-Cola was the Tri-Star's largest shareholder with 37% of its common shares; CBS owned 7%. ; Time owned 9%, and the public owned the remaining 47%.

In 1987, Coke and Tri-Star agreed that Tri-Star would acquire Columbia Pictures and Coke's other entertainment assets (which had a book value of \$745 million), in exchange for 75

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<sup>28</sup> The following discussion of the Tri-Star Pictures case is based on the judicial opinion by the Delaware Supreme Court (Delaware Supreme Court, 1992).

million shares of newly issued Tri-Star common shares (with a market value when issued of \$950 million). The transaction increased Coca-Cola's stake in Tri-Star from 37% to 80%. In Coke's financial statements the transaction was treated as a purchase of Tri-Star by Coke for \$291 million.

Six months later, Coca-Cola and Tri-Star jointly wrote down the book value of the assets which Coke had just sold to Tri-Star, by \$200 million. Unless this writedown reflected new events, not anticipatable at the time of the sale, Coke sold assets worth \$550 million to Tri-Star for almost twice this amount.

#### *4.3. Tunneling and Delaware Law*

Coke's tunneling from Bottling has provoked a number of lawsuits by Bottling shareholders. As a result of these transactions, several minority shareholders of CCE initiated lawsuits. One such lawsuit involved the merger of CCE with the Johnston Coca-Cola Group mentioned in the 1992 annual statement of CCE was filed by Three Bridges on December 11, 1991 in the Delaware Court of Chancery.<sup>29</sup> In its complaint Three Bridges alleged that "... The Coca-Cola Company breached its fiduciary duties by exerting improper influence over the Company in connection with the Johnston Acquisition in order to maximize its financial interests at the expense of the Company and the Company's public share owners."<sup>30</sup>

A few disgruntled shareholders filed a lawsuit against the Entertainment Business Sector of Coca-Cola at The Supreme Court of Delaware. The individual defendants in this case were Victor A. Kaufman, Michael J. Fuchs, David A. Matalon, E. Thayer Bigelow, Jr., Joseph J. Collins, Patrick M. Williamson, Judd A. Weinberg, Ira C. Herbert, Dan W. Lufkin and Francis T.

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<sup>29</sup> See also "Coca-Cola is Sued by Group of Holders of Its Largest Bottler," *Wall Street Journal -Europe*, 23 March 1992.

<sup>30</sup> Source: the CCE proxy from 1992.

Vincent, Jr., all members of Tri-Star's board of directors at the time of the Coca-Cola taking up 80% share in Tri-Star. Of this group, Herbert, Vincent, and Williamson were senior executives of Coca-Cola or a Coca-Cola affiliate and substantial owners of Coca-Cola stock.

Other parties in the deal also had conflict of interest. Coke hired Allen and Company as their investment advisor for this transfer agreement which the minority shareholders also question in this lawsuit. The relationships of Allen and Coca-Cola are inextricably tied. Herbert A. Allen, president, chief executive officer, and a director of Allen, was the beneficial owner of over 1.1 million shares of Coca-Cola stock. He was also a director of both Coca-Cola and Columbia Pictures Industries, Inc. He was chairman of the board of directors of Columbia before its acquisition by Coca-Cola in June 1982. He apparently took \$5million for signing this deal.

Plaintiffs in a revised complaint accused Coca-Cola of not showing loyalty as a controlling stockholder to its minority shareholders, not disclosing proper information before and after Tri-Star's acquisition of Coke's entertainment sector, manipulating control to benefit coca-cola and conspiring to aid and abet Tri-Star directors in their performance of duty. Coca-Cola's dominated the board with four of Tri-Star's directors, who were also senior executives of Coca-Cola or a Coca-Cola affiliate and three other directors owned substantial shares of Coca-Cola stock. Coca-Cola took newly issued shares in exchange for fraudulently inflated property of a far lesser value, the cash-out value of the minority stockholders' interest therefore declined appreciably after execution of the agreement. As a result of Coca-Cola's receipt of over 75 million shares of Tri-Star, the minority stockholders' position went from 63.4% to less than 20% without any fair compensation.

The Chancery Court of Delaware dismissed the claims of the plaintiffs. The plaintiffs then appealed to the Supreme Court of Delaware to get the judgment of the Chancery Court

reversed. The appellate judge finally did reverse the original judgment and argued that minority shareholders were hurt by Coca-Cola's legal but unethical dealings. A settlement agreement for an undisclosed amount was reached between the Tri-Star minority shareholders and Coca-Cola in March 1995.

## **5. Regulatory Implications of Unbundling Tunneling**

The unbundling of tunneling offers insight, and perhaps guidance, on how to craft rules that directly protect minority shareholders against tunneling, or at least ensure that it is disclosed. This section provides a brief introduction to these large topics.

### *5.1 Tunneling as the Link between Law and Finance*

The research in law and finance demonstrates that countries with “better” law (measured in the aggregate) tend to have “better” financial finance (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998, 2002). The next step is to link more specific legal protections with more specific financial metrics. Building on Atanasov, Black, Ciccotello, and Gyoshev, 2007), who show how changes in expectations for *equity* tunneling impact valuation metrics in Bulgaria, we demonstrate how three different types of tunneling affect different financial metrics.

Given the more refined link between tunneling and finance, next consider that legal rules can affect tunneling. To take a simple example, if corporate law provides preemptive rights for offerings of shares, but not for offerings of convertible bonds, insiders can engage in equity dilution by buying under-priced convertible bonds from the firm, instead of under-priced shares. This loophole may seem too obvious for lawmakers to miss, but Korean legislators missed it, and for a substantial period, convertible bond issuances became the favorite way for controlling

families to convey ownership rights to the next generation of family members (Woochan, citation to come)).

The Korean example suggests that specific laws (or changes in them) can affect specific choices insiders make about tunneling methods. To evaluate the ultimate valuation impact of a change in law thus requires establishing: (1) a link between law and tunneling, and (2) a link between tunneling and financial metrics. Granular measurement of either relationship is not possible when law is aggregated into an index at the country level and financial performance metrics are considered to be uniform across the range of tunneling methods available to the insider or manager. Unbundling tunneling improves the analytical potential for the law-tunneling and tunneling-finance relationships.

## 5.2 Disclosure and Accounting Rule Implications of Unbundled Tunneling

For investors to recognize the benefits of unbundling and measuring tunneling, we argue that uniformity in accounting treatment of transactions and in disclosure is necessary. In particular, our tunneling analysis reveals the importance of uniformity in two areas: (1) accounting treatment of transactions between related parties and (2) disclosure requirements of those transactions. Our arguments for uniformity of regulation complement those made in favor of international accounting standards by Ashbaugh and Pincus (2001) and by Covrig, Defond, and Hung (2006).

Without such uniformity, an outside investor has no ability to assess types of tunneling using the financial metrics as shown in Table 2. To the extent that either disclosure or accounting treatments differ across non-consolidated (international) subsidiaries, insiders have the opportunity to take advantage of reporting (disclosure) choices among the venues where they

operate.<sup>31</sup> In the context of tunneling between related parties, standard treatment offers insiders fewer choices along this dimension. This argument is consistent with research by Ashbaugh and Pincus (2003), who find that a “convergence in firms’ accounting policies brought about by adopting international accounting standards is positively associated with the reduction in analyst forecast errors.” The argument is also in line with research by Covrig, Defond, and Hung (2006), who show that voluntary international accounting standards adopters in poorer information environments attract higher levels of foreign investment.

More specifically related to disclosures, one policy implication of our framework is to require real time disclosure of related-party asset sales and purchases. Real time disclosure would allow the minority investor to better estimate the impact of the transaction itself, rather than perform an analysis of *ex post* blended disclosure of overall profitability of related party purchases and sales. Real-time disclosures of related-party transactions could help to close the gap between investors *ex ante* and *ex post* expectations of discounts, especially those involving asset or equity tunneling.

Current disclosure rules are also quite vague. Our framework suggests that related-party asset purchases and sales should be treated similarly to the pro forma accounting for a merger. The disclosures should provide the investor with enough information to compute the valuation metrics in Table 2.

Even if disclosures and accounting rules were uniform, valuations could differ across markets due to differences in corporate law. Some jurisdictions, for example, might place a higher degree of preference for corporate flexibility (or business judgment) at the expense of

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<sup>31</sup> One choice insiders can make to greatly decrease disclosure is to “go dark.” See Leuz, Triantis, and Wang (2007) and Marosi and Massoud (2007).

minority shareholder protection. For example, jurisdictions may offer varying degrees of substantive protection for related-party transactions. Required approvals for such transactions exist in some markets (e.g., majority of minority approval for significant related party transactions in Russia, see Black and Kraakman (1996); accountant attestation to fairness (id.)).

The unbundled tunneling framework can help to illustrate those tradeoffs, assuming a uniform set of accounting treatments and disclosure rules. If uniformity in accounting rules and disclosure would be beneficial to minority investors, then uniformity of enforcement of those rules would be valuable as well. This is especially so in an emerging market, where alternative enforcement mechanisms such as private lawsuits or liquid markets are less likely. As Jiang, Lee, Yue (2005) observe in China, *'absent effective regulatory enforcement action, unclean audit opinions alone seem insufficient to deter tunneling behavior.'*

Thus, in order to support uniform accounting rules and effective disclosure, a strong central securities regulator is necessary in an emerging market (Jiang, Lee, and Yue, 2005; Glaeser, Johnson, and Shleifer, 2001). While developed market tends to have complementary enforcement mechanisms such as more liquid markets and private lawsuits, the level of tunneling sophistication of insiders in developed markets is also higher, suggesting that a strong central securities regulator is still needed in those markets as well.

Improved disclosure of cash flow tunneling can produce efficiency gains as well. We assumed above that small scale tunneling will not affect the firm's future profitability. In the real world, it well might. A standard business adage is that "you manage what you measure." Cash flow tunneling produces mis-measurement, and thus mis-management. A firm might theoretically compensate for this by keeping two sets of books, one using the prices that should have been paid in a transfer pricing transaction, say, and the other using actual prices, for public

consumption. Indeed, some Russian companies reportedly keep two sets, one for a handful of insiders, the second for the public, and perhaps a third for the tax inspectors (Black, Kraakman, and Tarassova, 2000). But this has its own set of costs, including legal risk if the dual books are disclosed among them. Closer to home, it's likely that part of what drove Enron into bankruptcy is likely its many shenanigans fooled the insiders, too, about Enron's true profitability (Black, 2006).

## 6. Modeling Extensions

### 6.1 Infinite Horizon

In Section 3 we consider the ex ante and ex post valuation effects of a single equity or asset tunneling transaction, yet a corporation is potentially infinitely-lived and faces the risk of equity and asset tunneling on an annual basis. In this sub-section we extend the model to an infinite horizon. To simplify the resulting valuation equation, we assume constant cash flow tunneling discount  $d_{cf}$ , and constant equity and asset tunneling discounts and annual probabilities. Given these assumptions, the following expression is straightforward application of discount cash flow valuation:

$$MV_0 = \sum_{t=1}^{\infty} (1 - d_{cf}) \frac{ROA_0 A_0}{(1 + K_0)^t} (1 - \pi_{eq} d_{eq})^t (1 - \pi_a d_a)^t \quad (6)$$

After rearranging terms and using the expression for the sum of an infinite geometric progression, we get the following expression for firm market value:

$$MV_0 = (1 - d_{cf}) \frac{ROA_0 * A_0}{K_0 + \delta_{eq} + \delta_a - \delta_{eq} \delta_a} \quad (7)$$

where  $\delta_e$  and  $\delta_a$  are equal to  $\pi_e d_e$  and  $\pi_a d_a$  respectively. Note the different impact on firm value of cash flow tunneling on one hand, and asset and equity tunneling on the other.

The static valuation Equation (7) is an extended version of the Gordon model. Building on the classic work of Campbell and Schiller (1988) one can derive a dynamic version which allows for time varying tunneling discounts, and ROA. This dynamic equation can be used in manner similar to Campbell (1991) and more recent works like Vuolteenaho (2002) which decompose variation of observed equity returns into variation due to news about cash flows and one due to news about expected returns/discount rates. In addition to these two factors, our unbundling frameworks suggest that there are three more factors which explain the time series and cross-sectional variation of equity values: 1) news about cash flow tunneling discounts  $d_{cf}$ ; 2) news about the probability and magnitude of equity tunneling  $\delta_e$ ; and 3) news about the probability and magnitude of asset tunneling  $\delta_a$

## *6.2 Tunneling Choices by the Insider*

Although we do not model the interactions among the various types of tunneling in this paper nor the optimal choice of tunneling methods by insiders, it is important to recognize that such interactions and choices exist. At first thought, one might expect that tunneling mechanisms would tend to be substitutes. If the law made cash flow tunneling more difficult, for example, then the controller would rationally switch to asset or equity tunneling.

This need not be the case, however. Consider that equity and cash flow tunneling may be complements and a statute which limits equity tunneling may have the additional effect of limiting cash flow tunneling. Suppose that an insider wants to achieve a given level of annual cash flow. The insider can do so either by cash flow tunneling, or by ceasing tunneling and annually selling a fraction of his shares. In this case, laws that limit equity tunneling will raise market valuations, and make the latter approach more attractive.

Asset tunneling also represents an interesting choice for the controlling shareholder and corporate law. While recurring theft of petty cash flow might be the typical *modus operandi* of the employee-manager, asset tunneling appears to be more likely in the context of the parent-subsidary situation (like Coca-Cola and CCE). In this context, agency issues are less clear; managers owe fiduciary duties to all shareholders but majority (large) shareholders (such as Coca-Cola in the CCE case) generally owe no duty to minority (small) shareholders.

Capturing ownership is the touchstone of equity tunneling, and clear examples (such as Gazprom) exist where equity tunneling has been bluntly employed in emerging markets by controlling shareholder/manager to the detriment of minority shareholders. But equity tunneling also presents a challenge to the agency triangle involving managers, large shareholders, and small shareholders, similar to asset tunneling. Our analysis of Coca-Cola and Tri-Star illustrates the issue in the parent-subsidary context.

### *6.3 A More Complex Model of Tunneling*

Our modeling effort can help prompt further development of theoretical models of tunneling, including the interaction among the various types of tunneling from the perspective of the controlling shareholder. Only a few tunneling models have been developed (e.g., Burkart, Gromb and Panunzi (1998), Shleifer and Wolfenzon (2002), Durnev and Kim (2005)). These are two-period models, in which the different types of tunneling cannot be separately examined; one needs a multi-period model for that.

A richer model, beyond the scope of this paper, would introduce several dynamic elements. First, assuming that tunneling is costly, and that this cost depends on the controller's ownership stake  $\alpha_0$ , controllers will endogenously choose both ownership and cash-flow

tunneling levels (as in the model in Shleifer and Wolfenzon, 2002), as well as whether and to what extent to engage in asset or equity tunneling.

Second, different types of tunneling can be either complements or substitutes. One's first reaction is that different types are likely to be substitutes. If legal rules restrict one form, another will become more prevalent. But this need not be the case. Suppose, for example, that freezeouts are limited by legal rules and a company with a high freezeout probability makes a dilutive equity offering. Outside shareholders will be reluctant to invest, lest they be frozen out later, and end up having thrown good money after bad. Reduced freezeout risk could make it easier for investors to buy their prorata share of an equity offering, leading to less of this form of equity tunneling as well. Suppose too that a controller is choosing between engaging in cash-flow tunneling or selling some shares, thus capturing the present value of a future earnings flow. A high risk of asset or equity tunneling will cause investors to assign a low P/E multiple to the firm's earnings, and make the second "sale" option less attractive. If this risk can be brought down, P/E ratios will rise, controllers can sell shares for a higher multiple of non-tunneled earnings, and they might engage in less cash flow tunneling.

Third, if sanctions against tunneling are weak, bad (high tunneling) owners can drive out good (low tunneling) ones, because controlling shares are worth more to bad owners (Bebchuk, 1999). This makes dispersed ownership unstable.

Fourth, if one firm engages in unexpected tunneling, investors will update their expectations for other firms in the same market. Thus, the controllers of any one firm will not capture the full benefits (costs) of engaging in less (more) tunneling than expected.

## 7. Conclusion

This paper first unbundles tunneling by focusing on what is being taken: cash flow, assets, or equity. Then, the impact of tunneling is examined through the lens of its likelihood and magnitude. The result is a more granular understanding of how insiders extract wealth from firms, and how laws and regulations might affect insiders' choices. We thus argue that one way that law and regulation affect finance is by affecting tunneling -- the channel is law to tunneling to finance. By unbundling tunneling, this paper serves to illuminate both connections. Djankov et al. (2006) and La Porta et al. (2006) connect laws that affect tunneling to finance, but do not show a direct link between law and tunneling. Atanasov et al. (2007) connect law to tunneling and tunneling to finance, but this is one study, in a small, out-of-equilibrium market. There have been a few efforts by researchers to understand the effects of legal statutes on different types of tunneling, but these efforts have been hampered by the absence of an analytic framework. Examples include Gilson and Gordon (2003) and Black (2000, 2001).

Our unbundling framework assists the development of the law and tunneling literature by allowing researchers to classify different rules, regulations, and statutes based on their expected impact on different types of tunneling, and to then study how these statutes affect financial metrics, either in cross-country analysis or single-country time-series studies. We illustrate the potential of such analysis in this paper through clinical study of two cases, Gazprom and Coca-Cola. Our framework also permits researchers who study the private benefits of control (e.g., Dyck and Zingales (2004); Nenova (2003); Barak and Lauterbach (2007)) to refine their statements about the nature of the tunneling that underlies the observed private benefits.

Our framework illustrates how law affects finance through its impact on insiders' choices of tunneling mechanisms. From a policy perspective, we argue that the benefits of unbundled

tunneling require increased uniformity in some of the laws that protect minority investors.

Especially in an increasingly global corporate environment, the transparency necessary to detect and measure tunneling is dependent upon uniform accounting treatment and disclosure requirements.

Our decomposition of tunneling has a number of uses, including: (i) facilitating empirical study of the extent different forms of tunneling; (ii) facilitating the creation of tunneling metrics, and empirical study of how tunneling levels inform asset prices. It illustrates the types of accounting disclosures that investors would need -- and today often lack -- to assess tunneling levels. It also shows how different forms of regulation can affect different forms of tunneling, and can operate on probabilities, magnitudes, or both. It allows study of the interaction between different forms of tunneling. Depending on other background factors, different types of tunneling can be either substitutes or complements

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**Table 1. Unbundling Tunneling: Transaction Types**

This table provides a non-exhaustive list of examples of cash flow, asset, and equity tunneling.

*Panel A: Cash Flow Tunneling*

Transaction Type	Variations
Transfer Pricing	- Overcharging for inputs - Undercharging for outputs
Executive compensation	- Excessive cash compensation - Excessive “perks”
Other payments to insiders	- Excessive payments for services - Loans at below market interest rates
Small scale asset purchases and sales	

*Panel B: Asset Tunneling*

Transaction Type	Variations
Transactions involving tangible assets (often within property, plant, and equipment (PPE))	- Sales of assets to related parties at discount - Granting use of PPE to related party at reduced rent/lease - Selling long-term assets to company at inflated prices
Transactions involving intangible assets	- Providing trade secrets and other intellectual property to related parties for below fair value - Acquiring intellectual property from related parties for more than fair value.
Investments in affiliates	- Equity investments in affiliates - Loans to affiliates
Diverting business opportunities to related parties	

*Panel C: Equity Tunneling*

Transaction Type	Variations
Equity dilution	- Issuance of shares (securities convertible into shares) for less than fair value - Repurchases of shares for more than fair value - Excessive equity-based executive compensation
Freezeouts	- reezeout of minority shareholders for less than fair value - Going dark/delisting
Insider trading	- Insider buyss (sells) shares in market for less (more) than a hypothetical fully informed market price -
Sales of control	- Sales of control at preferential terms for controlling shareholders - Excessive golden parachutes

**Table 2. Impact of Types of Tunneling on Valuation Metrics**

The following are definitions and assumptions. Unprimed (primed) amounts reflect expected discounts and probabilities before (after) an initial asset or equity tunneling event:  $d_{cf}$  = fraction of net income expropriated through cash flow tunneling (expected to recur).  $d_a$  ( $d'_a$ ) = fraction of assets subject to asset tunneling.  $d_{syn}$  ( $d'_{syn}$ ) = expected effect of future asset tunneling on Return on Assets (Operating Margin).  $d_{eq}$  ( $d'_{eq}$ ) = fraction of minority equity which is tunneled via equity tunneling transactions (equity dilution or freeze-out). We denote pre-tunneling probability of asset and equity tunneling by  $\pi_{a,pre}$  and  $\pi_{e,pre}$  respectively, and the corresponding measures of future probability, following an initial tunneling event, as  $\pi_{a,post}$  and  $\pi_{eq,post}$  respectively.

	<b>Gross Margin (COGS/sales)</b>	<b>Operating Margin (EBIT/Sales)</b>	<b>Return on Assets (EBIT/Assets)</b>	<b>EBITDA/Assets</b>	<b>Tobin's q</b>	<b>P/E ratio</b>
<b>Cash flow tunneling</b>						
transfer pricing	Decrease proportional to $f(d_{cf})$	Decrease proportional to $d_{cf}$	Decrease proportional to $d_{cf}$	Decrease proportional to $d_{cf}$	Decrease proportional to $d_{cf}$	No effect to first order
excess insider compensation	No effect	Decrease proportional to $d_{cf}$	Decrease proportional to $d_{cf}$	Decrease proportional to $d_{cf}$	Decrease proportional to $d_{cf}$	No effect to first order
<b>Asset tunneling</b>						
Ex Ante (risk of future event)	No effect	No effect	No effect	No effect	Decrease proportional to $f(\pi_{a,pre}, d_a, d_{syn})$	Decrease proportional to $f(\pi_{a,pre}, d_a, d_{syn})$
Ex-post effect of cheap sale of assets	Decrease proportional to $f(d_{syn})$	Decrease proportional to $d_{syn}$	Decrease proportional to $d_{syn}$	Decrease proportional to $d_{syn}$	Decrease proportional to $f(\pi_{a,post}, d'_a, d_{syn}, d'_{syn})$	Decrease proportional to $f(\pi_{a,post}, d'_a, d'_{syn})$
Ex-post effect of overpriced purchase of assets	Decrease proportional to $d_{syn}$	Decrease proportional to $d_{syn}$	Decrease proportional to $d_{syn}$	No effect	Decrease proportional to $f(\pi_{a,post}, d'_a, d_{syn}, d'_{syn})$	Decrease proportional to $f(\pi_{a,post}, d'_a, d'_{syn})$
<b>Equity tunneling</b>						
Ex Ante (risk of future event)	No effect	No effect	No effect	No effect	Decrease proportional to $f(\pi_{eq,pre}, d_{eq})$	Decrease proportional to $f(\pi_{eq,pre}, d_{eq})$
Ex-post effect of equity dilution	No effect	No effect	No effect	No effect	Decrease proportional to $f(\pi_{eq,post}, d'_{eq})$	Decrease proportional to $f(\pi_{eq,post}, d_{eq}, d'_{eq})$
Ex-post effect of freezeout	No effect	No effect	No effect	No effect	Not meaningful	Not meaningful

**Table 3. Valuation Metrics for Coca Cola Enterprises and Peers**

Means and median valuation ratios for Coca-Cola Enterprises and peers (Pepsi Bottling Group, Pepsiamericas, Cott Corporation of Quebec, and Pepsi Gemex SA) for 1987-1996. EBIT/assets (EBITDA/assets) are amounts for the year before extraordinary items/(assets at end of prior year). Price/earnings ratio is year-end share price/(fully diluted earnings per share for the year). Tobin's q = (MV of Equity + BV Total Liabilities)/(Total Assets).

	<b>Bottling</b>	<b>Peers</b>		<b>Bottling</b>	<b>Peers</b>	
	Mean	Mean	Prob. (equal means)	Median	Median	Prob. (equal medians)
Gross Margin	0.463	0.372	<b>0.006</b>	0.463	0.394	<b>0.073</b>
(D&A)/sales	0.069	0.044	<b>0.000</b>	0.063	0.042	<b>0.000</b>
Operating Margin (EBIT/sales)	0.075	0.090	<b>0.040</b>	0.076	0.097	<b>0.002</b>
EBITDA/assets	0.101	0.139	<b>0.000</b>	0.100	0.134	<b>0.000</b>
ROA (EBIT/assets)	0.053	0.095	<b>0.007</b>	0.050	0.089	<b>0.000</b>
Tobin's q	1.248	1.642	0.274	1.185	1.458	<b>0.024</b>
Price/Earnings	44.503	29.206	<b>0.080</b>	32.970	21.310	<b>0.061</b>

**Table 4. Performance Metrics for Coca Cola Enterprises and Coca Cola Over Time**

Valuation metrics for Coca-Cola Enterprises and Coca-Cola over 1985-1997. Price/sales is year-end market capitalization/sales. Other metrics are defined in Table 3.

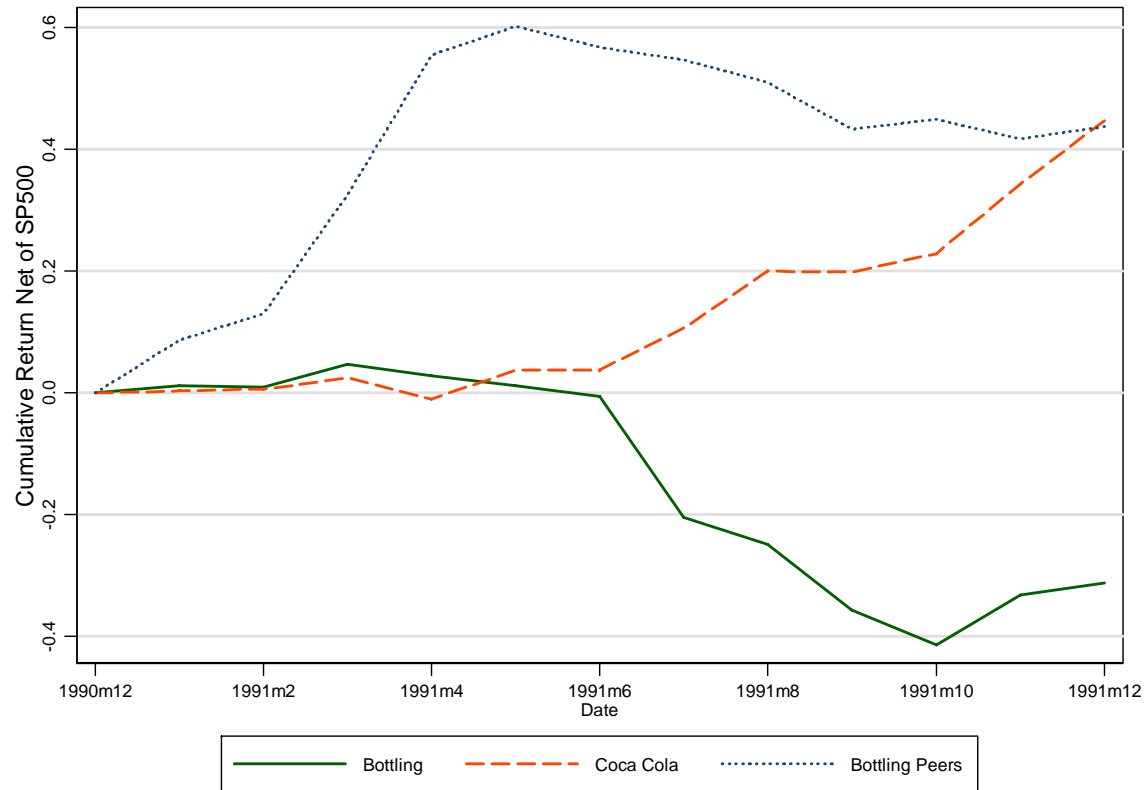
Panel A. Coca Cola Enterprises

Year	Gross Margin	Operating Margin	D&A/ assets	ROA	EBITDA /assets	Tobin's q	P/Sales	P/E
1985	0.42	0.07	0.04	0.11	0.18	n.a.	n.a.	n.a.
1986	0.46	0.09	0.05	0.04	0.07	1.14	0.56	39.58
1987	0.48	0.10	0.06	0.08	0.12	1.11	0.60	22.62
1988	0.47	0.10	0.06	0.08	0.13	1.04	0.54	14.56
1989	0.46	0.08	0.06	0.07	0.11	1.06	0.53	39.02
1990	0.47	0.09	0.06	0.07	0.12	1.03	0.46	23.85
1991	0.47	0.07	0.06	0.04	0.08	1.08	0.44	n.a.
1992	0.45	0.06	0.08	0.04	0.09	1.04	0.31	n.a.
1993	0.46	0.07	0.08	0.04	0.09	1.08	0.36	n.a.
1994	0.46	0.07	0.08	0.05	0.10	1.11	0.39	34.62
1995	0.45	0.07	0.08	0.05	0.11	1.22	0.51	43.35
1996	0.46	0.07	0.08	0.05	0.10	1.4	0.77	57.06
1997	0.45	0.06	0.08	0.04	0.10	1.68	1.21	80.82
1998	0.46	0.06	0.08	0.04	0.09	1.56	1.05	99.31
1999	0.47	0.07	0.09	0.04	0.10	1.24	0.59	154.81
2000	0.47	0.08	0.09	0.05	0.11	1.23	0.54	33.93
2001	0.47	0.04	0.09	0.03	0.09	1.24	0.52	n.a.
2002	0.44	0.08	0.06	0.06	0.10	1.26	0.58	19.93
2003	0.48	0.09	0.06	0.06	0.10	1.22	0.57	14.78
2004	0.47	0.08	0.06	0.05	0.10	1.17	0.53	16.29
2005	0.46	0.08	0.06	0.06	0.10	1.14	0.48	17.59
2006	0.45	0.08	0.05	0.06	0.11	1.23	0.49	n.a.
Mean	0.46	0.08	0.07	0.06	0.10	1.20	0.57	44.51
Median	0.46	0.08	0.06	0.05	0.10	1.17	0.53	34.28

**Table 4. (Cont.)**

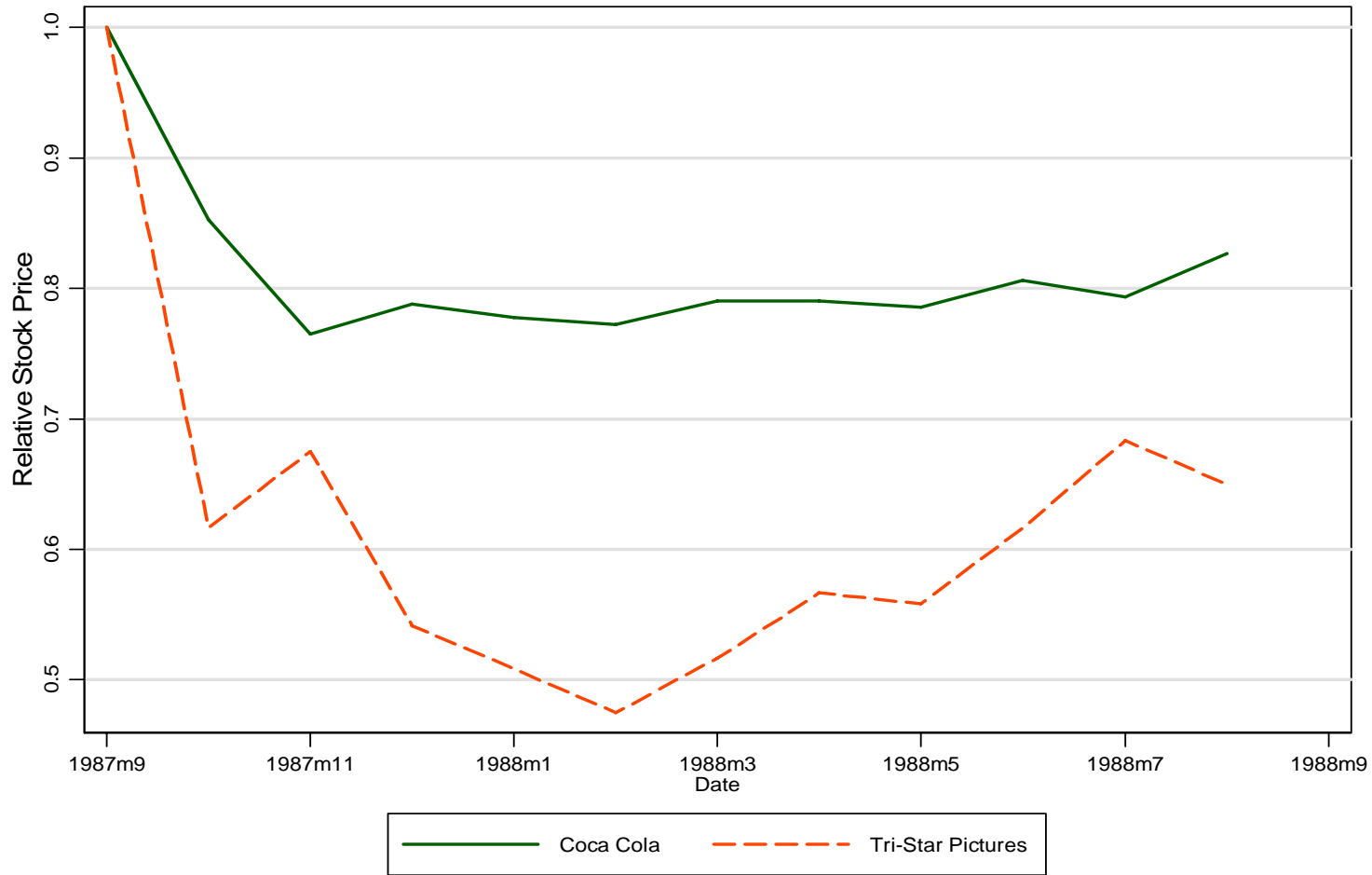
Panel B. Coca -Cola

Year	Gross Margin	Operating Margin	D&A/ assets	ROA	EBITDA/ assets	Tobin's q	P/Sales	P/E
1985	0.51	0.13	0.04	0.15	0.20	2.14	1.40	15.34
1986	0.51	0.15	0.05	0.16	0.21	2.32	1.68	15.60
1987	0.55	0.18	0.02	0.16	0.18	2.31	1.88	15.69
1988	0.58	0.19	0.02	0.21	0.24	2.68	1.95	15.66
1989	0.59	0.19	0.02	0.21	0.23	3.72	2.98	15.70
1990	0.61	0.20	0.02	0.22	0.24	3.93	3.04	22.79
1991	0.62	0.20	0.02	0.23	0.25	5.78	4.62	33.02
1992	0.64	0.21	0.02	0.25	0.28	5.6	4.22	33.23
1993	0.65	0.23	0.02	0.26	0.29	5.44	4.16	26.72
1994	0.64	0.23	0.02	0.27	0.29	5.36	4.11	26.01
1995	0.64	0.23	0.02	0.28	0.31	6.82	5.2	31.33
1996	0.66	0.23	0.02	0.27	0.29	8.7	7.08	37.59
1997	0.7	0.27	0.02	0.30	0.32	10.29	8.75	39.93
1998	0.72	0.27	0.02	0.26	0.28	9.19	8.79	46.85
1999	0.72	0.24	0.02	0.22	0.24	7.22	7.26	59.44
2000	0.72	0.25	0.02	0.25	0.27	7.82	7.38	69.25
2001	0.72	0.28	0.02	0.25	0.27	5.72	5.84	29.47
2002	0.67	0.28	0.03	0.22	0.25	4.94	5.55	35.64
2003	0.66	0.27	0.03	0.21	0.23	5.02	5.93	28.67
2004	0.69	0.28	0.03	0.20	0.22	3.69	4.6	20.82
2005	0.68	0.27	0.03	0.21	0.24	3.69	4.17	19.76
2006	0.69	0.27	0.03	0.22	0.25	4.17	4.7	22.34
Mean	0.64	0.23	0.02	0.23	0.25	5.30	4.79	30.04
Median	0.66	0.23	0.02	0.22	0.25	5.19	4.61	27.70



**Figure 1. Buy-and-Hold Abnormal Returns of Coca-Cola (KO), Coca-Cola Enterprises (Bottling), and Bottling Peers during 1991**

The variable shown on the Y axis is the Buy-and-Hold Abnormal Returns of KO and CCE and four peer companies of CCE. BH abnormal returns are calculated for each period as the buy-and-hold return from January 1, 1991 to the respective date minus the buy-and-hold return for Sp500 index (including distributions). Bottling's peer companies include Pepsi Bottling Group, Pepsiamericas, Cott Corporation of Quebec, and Pepsi Gemex SA.



**Figure 2. Time Series of the Relative Prices of Coca-Cola (KO) and Tri-Star Pictures.**

The variable shown on the Y axis is the relative price of KO and Tri-Star Pictures, where relative price is computed as the ratio of the stock price of each company adjusted for stock splits and dividends at time  $t$  and the stock price on August 31, 1987.