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ORIGINAL PAPER

The determinants of rent extraction in the parent-subsidiary relation

Klaus Gugler

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Abstract A recurring problem in financial development is to understand which poor quality institutions lead to substantial rent extraction by controllers. When rent extraction is high and its extent difficult to predict, outside investment in firms may decline. Recent work has emphasized the quality of the legal system and the overall quality of political institutions as explaining the degree to which rent extraction can occur. Here we exploit a comprehensive parent-subsidiary data-set to shed light on these questions. Using the relation between parent and subsidiary Tobin's Q to measure the extent of parent companies' rent extraction from partially-owned subsidiaries, the results indicate that governmental quality, legal origin, rules on self-dealing and political stability all predict the degree of rent extraction.

Keywords Corporate governance · Tunneling · Rent extraction · Political stability · Legal systems · Parent-subsidiary relationships · Cross-border investment · Economic and financial development · Investor protection

JEL Classification D21 · G3 · G18 · G28 · G32 · G34 · G38 · K22 · O16 · P3

1 Introduction

A recurring problem in understanding the determinants of financial development is to find which poor quality institutions allow substantial rent extraction by controllers and conversely, of course, which high quality institutions impede that rent extraction. When rent extraction is high and its extent difficult to predict, outside investment in firms, and indeed in entire nations, may decline. Recent work

K. Gugler (✉)
Institute for Quantitative Economics, Vienna University of Economics and Business (WU), Augasse 2-6, 1090 Vienna, Austria
e-mail: klaus.gugler@wu.ac.at

has emphasized the quality of the legal system and the overall quality of political institutions as explaining the degree to which rent extraction can occur (see e.g. La Porta et al. 1997, 1998). Here we use a [previously unexploited] parent-subsidiary data-set to shed light on these questions. Using Tobin's q to measure the (inverse) degree of parent company rent extraction from the subsidiary, the data indicates that governmental quality, rules on self-dealing, legal origin, and political stability all predict the degree of rent extraction.

We use the Tobin's q (of the subsidiary) to proxy for rent extraction, as have predecessors (see e.g. Morck et al. 1988; Gugler et al. 2004, 2008). What is new in our paper is that we estimate the *relation* between the Tobin's q of the parent company and the Tobin's q of the subsidiary to proxy for the rent extracted. The intuition behind this approach is straightforward: if a lower Tobin's q of the subsidiary is systematically related to a larger Tobin's q in the parent firm—holding other influences constant—it is likely that rents are transferred from the subsidiary to the parent company. We further examine what determines the likelihood and magnitude of rent transfers. The main and obvious determinants are ownership concentration, i.e. the tightness of control of the parent over the subsidiary, and country characteristics, such as the quality of the nation's corporate law, its legal origin, the quality of its governmental institutions, and the stability of its political system. Each predicts the extent of rent extraction, with relative political stability best able to explain the differences.

In non-US countries many firms are organized in so called pyramids, where company A has a controlling influence over company B, which itself controls company C. In such structures, obviously, tunneling of resources from e.g. company B and C to the ultimately controlling company A is easier than in flat structures such as is the norm in US companies. The existence and mechanisms of tunneling have been analyzed in e.g. Johnson et al. (2000) and Bertrand et al. (2002): distorted interest rates on within group loans, selling of inputs or purchase of outputs at non market prices, leasing of assets, and guarantees of other firms' borrowings are only a few of the means of tunneling resources. However, the existence and extent of tunneling are difficult to determine, since it is illegal and ultimately controlling owners have an incentive to conceal their deals. While Johnson et al. (2000) document examples of clear tunneling, Bertrand et al. (2002) offer an econometric technique to identify tunneling. They relate presumably exogenous industry shocks (e.g. to cash flows) to the differential reactions of group firms depending on their relative standing in the hierarchy "to map out the flow of resources within a group of firms and to quantify to which extent the marginal dollar is tunnelled". The main results of Bertrand et al. (2002) are that group firms respond less than one-for-one to the shock, with "low" firms responding the least (70% sensitive), and "high" firms responding the most (100% sensitive). While these results are interesting and intuitive, there may be competing explanations such as mismeasurement of industries, differential diversification, co-insurance effects or non-exogeneity of the industry shock.

We propose another more direct technique to measure tunneling: the negative co-movement of the Tobin's q's of the parent firm (the company at the top of the pyramid) and its subsidiaries (the companies lower down the pyramid). Our

approach has a number of advantages. First, we can directly trace origin (subsidiary) and destination (parent) of the flow of value and are not dependent on proper industry classifications or exogeneity assumptions of shocks. Second, by taking Tobin's q as our measure of value we are as comprehensive as possible in measuring negative value effects of tunneling. Thus, we do not focus on accounting variables which may be subject to manipulation by controlling owners and may not measure the full extent of tunneling. Instead, we take a comprehensive measure which also detects more subtle value transfers within the pyramid such as the transfer of investment opportunities from the subsidiary to the parent. Finally, our approach allows us to test for systematic determinants of the extent of tunneling such as the ownership structure and the quality of country governance.

It is worth spelling out what the paper does and what the paper cannot achieve. The paper proposes a new method to estimate rents extracted in a pyramidal ownership structure by emphasizing the negative *relation* between the Tobin's q of the parent company and the Tobin's q of the subsidiary. We think that this approach is innovative and informative in that it captures new aspects of the inner workings of pyramids without suffering from unduly restrictive assumptions on e.g. the exogeneity and classification of industry shocks or identification issues. However, the approach is restrictive in at least two dimensions.

First, both the parent company and the subsidiary must be listed to be able to calculate Tobin's q. Many business groups or pyramids cannot be tackled using our method, and those that can be analyzed can only be partially analyzed, since there are always also unlisted firms belonging to this business group or pyramid. Thus, our approach should be viewed as complementary to the approaches of Bertrand et al. (2002) or Siegel and Choudhury (2012) rather than substitutive.

Second, we look only at the "dark side" of pyramids, i.e. on the tunneling or "propping" side (injecting money into failing firms, see Friedman et al. (2003)). Recent research, however, also highlights advantages of such structures. Business groups may well be mutual insurance and risk sharing devices (see e.g., Khanna and Yafeh (2005) for Japan, Korea and Thailand), or transfers may simply reflect efficiency-based rearrangements of resources within a group structure (see Siegel and Choudhury (2012) emphasizing the importance of business strategy). Contrary to expropriation based theories, there is evidence that business groups alleviate financing constraints (Almeida and Wolfenzon 2006a; Masulis et al. 2011), play a positive role in financial distress (Kim (2004)), and more generally substitute for missing labor and financial markets (Khanna and Palepu 1997, 1999). Thus, we do not look at these "bright" sides of pyramids or business groups nor do we take a general equilibrium approach to the effects of business groups (Almeida and Wolfenzon 2006b).

In Part I we present our basic estimating equation and explain the possible outcomes. In Part II we present the data, with the main outcome variable being Tobin's q for the parents and with the primary independent variables being ownership concentration, corporate law quality, legal origin, government institutional quality, and political stability. In Part III we present the results of the regressions, which show governmental quality and political stability to be the most persistent predictors of low rent extraction. In Part IV we consider possible

explanations for the relationship and why the government quality and stability relationship seems to dominate the corporate law quality explanation. We then conclude.

2 Theoretical background and estimating equation

One may estimate the extent to which country characteristics, such as corporate law quality, legal origin, and political stability predict the Tobin's q of the firm. While this equation tells us the strength of association of these country characteristics with Tobin's q, it's interpretation is not straight-forward. Tobin's q may be lower because the firm is less valuable when one of the negative country characteristics is present, or, alternatively, the firm may suffer from rent extraction. Lower Tobin's q is consistent with either rent extraction or a lower value operation.

To distinguish between the two channels to lower Tobin's q, we examine the *relationship* between the firm's Tobin's q and country characteristics, all on the right hand side, and the parent's Tobin's q on the left-hand side. If higher (lower) Q of the subsidiary correlates with lower (higher) Q of the parent, rent extraction of the subsidiary by the parent seems more likely to explain the relationship *if* this relationship is driven by the controlling influence of the parent and by bad governance country institutions. For this inquiry, our main estimating equation is as follows:

$$\begin{aligned} TQ_{p,t} = {} & \alpha + \beta_1 \cdot TQ_{s,t-1} + \beta_2 \cdot TQ_{s,t-1} \cdot PER_{p,s} + \beta_3 \cdot TQ_{s,t-1} \cdot PER_{p,s} \cdot Country_{s,t} \\ & + Controls_{p,t} + \varepsilon_t \end{aligned}$$

This equation first relates parent Tobin's q, $TQ_{p,t}$, to subsidiary Tobin's q, lagged by one period, $TQ_{s,t-1}$. We lag subsidiary Tobin's q by one period to alleviate endogeneity problems such as reverse causality (i.e. the parent q driving subsidiary q e.g. by transferring managerial or other resources to the subsidiary) as well as co-movements driven by omitted factors such as general stock exchange movements in a given year. It also interacts the lagged Tobin's q of the subsidiary with (1) parent ownership stake in the subsidiary, $PER_{p,s}$, and (2) the parent's ownership stake interacted with variables that capture subsidiary country characteristics, $Country_{s,t}$. Country characteristics are assumed to affect the incidence of tunneling, such as whether the subsidiary is in a country with a poor institutional quality overall (as measured by the World Bank Indexes), a country with poor corporate law (as measured by an updated version of the La Porta et al. (1997, 1998), short LLSV, Anti-Director Rights Index, see also Spamann 2009), or a country suffering from a politically unstable environment. $Controls_{p,t}$ include profitability and size measures of the parent firm.

The rationale is as follows: if the parent transfers investment opportunities from the subsidiary (e.g. via tunneling of assets, key personnel, or shifting valuable contracts up to the parent) this tunneling should show up in a *negative* relation between parent Tobin's q and subsidiary Tobin's q, holding everything else constant: if value is taken away from the subsidiary, its Tobin's q falls, and if this fall systematically leads to the parent's Tobin's q rising, this relationship indicates tunneling from the subsidiary to the parent.

Firms' Tobin's q's should correlate positively if share prices of firms move together, which they do. Thus, to control for this "natural" co-movement of share prices and to test our proposition, we include subsidiary Tobin's q as well as an interaction term of subsidiary Tobin's q and parent's percentage ownership of the subsidiary. Tunneling should systematically relate to the strength of the parent's control over the subsidiary.

A positive β_1 thus measures the "natural" co-movement of the Tobin's q's of firms in a parent-subsidiary relation, and a negative β_2 (as well as a negative β_3) should capture tunneling by the parent. The overall relation between parent and subsidiary Tobin's q should become less and less positive the more likely tunneling is. The likelihood of tunneling depends on the possibilities and incentives for tunneling, which in turn can be captured by firm level characteristics (parent percentage ownership) as well as the country characteristics where the subsidiary is located. Thus, for a "bad" country, β_3 should be negative and, in countries with poor governmental institutions or high political instability, tunneling should be more severe.

3 The data

First, firm level data: The sample contains data from the database *Osiris*, provided by Bureau van Dijk electronic publishing. Bureau von Dijk builds its database on firm characteristics, by combining information from several sources, such as company registers, annual reports, and stock exchanges. *Osiris* covers more than 40,000 listed companies from more than 80 countries. It contains balance sheet and profit and loss statements in a panel format from 1996 until 2005. The particular value of the database for us arises from its data on the *structure* of firms—besides the parent firms, the database gives us the parents' subsidiaries by name, by country, and by industry. It also provides the percentage holdings of the parent in the subsidiary. Our sole exclusion criterion is data availability implying that the parent and at least one of its subsidiaries must be listed on a stock exchange to be able to calculate Tobin's q. We end up with 1,106 parent companies controlling 2,107 listed subsidiaries giving rise to 8,117 observations where we have all the necessary data.

The second independent characteristic we seek to measure is at the country level. We evaluate the quality of a country's institutions using four measures, one of overall institutional quality, one of political stability, and two of corporate law quality. The first measure consists in the overall World Bank Index (WBI) as the average of six indexes: (1) voice and accountability, (2) political stability (PS), (3) government effectiveness, (4) regulatory quality, (5) rule of law, and (6) control of corruption. The indicators are constructed using unobserved components methodology that Kaufmann et al. (2005) describe in detail. The indicators are measured in units ranging from −2.5 to 2.5, with higher values corresponding to better governance. Our second measure is simply the political stability sub-index of the WBI, PS, also ranging from −2.5 to 2.5. Next, we compare our results obtained with these indexes to results obtained using two indexes from Djankov et al. (2008). The anti-director rights index (ADRI) ranges from 0 (worst) to 5 (best) and measures the quality of a nation's corporate law. The anti-self dealing index

(SELF) ranges from 0 (worst) to 1 (best) and measures more directly the legal protection of minority shareholders against expropriation by corporate insiders. See also Bebchuk and Hamdani (2009), Coffee (2001), and Cools (2005) for contributions to these issues. Finally, we test for the effects of the legal systems the firms operate (see La Porta et al. 1997).

Table 1 describes the variables. Table 2 presents summary statistics by subsidiary country, legal systems, and country "good/bad" distinctions. Average Tobin's q of parents is 1.54, while their subsidiaries have slightly lower Tobin's q's at 1.42. Subsidiaries from common law nations (ANGLO, 1.57), countries with good governance (WBI_GOOD, 1.55), from countries with good anti-self-dealing rules (SELF_GOOD, 1.46), and politically stable countries (PS_GOOD, 1.45) have higher average Tobin's q's than the subsidiaries from other categories. Interestingly, subsidiaries from high anti-director rights countries do not have higher Tobin's q's (1.32 vs. 1.54, see Panel B of the table). The average parent is nearly twice as profitable as its subsidiary (average profit to asset ratio is 4.3 vs. 2.6%) and is nine times as large. On average, parents own 35% of their listed subsidiaries. With the possible exception of the ADRI distinction, ownership in the subsidiary is more concentrated in the "bad" categories, consistent with research on ownership structures (see e.g. La Porta et al. 1999 and Franks et al. 2006). Parents from German, French and transition nations hold particularly large stakes in their subsidiaries (between 40 and 50%), while parents from common law nations hold lower stakes (27%).

Panel C of Table 3 provides summary statistics on the ownership structure of the *parent* firm by *parent country* groupings. On average, the largest shareholder controls 25.5% of the equity in the parent. The identities of these largest shareholders are categorized in the following columns, i.e. family, industrial companies and financial institutions (mainly banks and insurance companies), the state and dispersed (largest shareholder holds less than 10% of the shares). More than 36% of parents are owned and controlled by families, nearly 40% of parents do not have a large controlling shareholder (holding more than 10% of the equity), 23% are owned and controlled by another industrial company or a financial institution, and less than 2% are controlled by the state. Thus, the overwhelming part of the parents in our dataset are at the apex of the pyramid (company A, the parent in the sample, controls company B, the subsidiary), that is the controlling owner of this parent A is either a family, the state or there is no large owner at all. We retain, however, the industrial company and financial institution controlled parent sub-sample, since there may also be tunneling from company C to company B (the parent in the sample in this case), that is from lower down the pyramid to one step up in the pyramid. In any case, results are nearly identical when we exclude this sub-sample of B–C pyramidal structures from the estimations.

Table 3 presents a correlation table. While the ADRI and in particular SELF are highly positively correlated with a Common law dummy, the WBI and in particular the PS subindex are not. The French civil law and transition country dummies are negatively correlated with *all* of our indexes measuring the quality of a country's institutions. While the ADRI and SELF are highly positively correlated, the correlation coefficients between them and the WBI and PS are much lower or even negative. The large correlation between WBI and PS in part stems from the fact that PS is a sub-index of WBI.

Table 1 Description of main variables

Variables in regressions	Description	Source
$TQ_{p,t}$	Tobin's q of the parent company in year t; Market value of equity plus book value of net debt divided by book value of total assets	OSIRIS
$TQ_{s,t}$	Tobin's q of the subsidiary company in year t	OSIRIS
$PA_{p,t}$	Profits over total assets of the parent in year t	OSIRIS
$PA_{s,t}$	Profits over total assets of the subsidiary in year t	OSIRIS
$SIZE_{p,t}$	Total assets of the parent in Mio USD in year t	OSIRIS
$SIZE_{s,t}$	Total assets of the subsidiary in Mio USD in year t	OSIRIS
$PER_{p,s}$	Percent of equity owned by the parent in the subsidiary	OSIRIS
$PER_{l,p}$	Percent of equity owned by the largest shareholder in the parent	OSIRIS
$WBI_{c,t}$	World bank index of country *c* in year t; Index of governmental quality, constructed as an average of six sub-indices: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption, ranging from −2.5 (worst) to +2.5 (best)	Kaufmann, Kraay and Mastruzzi (2005)
$WBI\_BAD_{c,t}$	Dummy = 1, if $WBI_{c,t}$ < median $WBI_{c,t}$, 0 else	
$PS_{c,t}$	Political Stability index of country c in year t; Political stability sub-index of WBI measuring perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism	Kaufmann, Kraay and Mastruzzi (2005)
$PS\_BAD_{c,t}$	Dummy = 1, if $PS_{c,t}$ < median $PS_{c,t}$, 0 else	
$ADRI_{c,t}$	Anti-director rights index of country *c* in year t; An index measuring corporate law quality. The index ranges from 0 (worst) to 5 (best)	Djankov et al. (2008)
$ADRI\_BAD_{c,t}$	Dummy = 1, if $ADRI_{c,t}$ < median $ADRI_{c,t}$, 0 else	
$SELF_{c,t}$	Anti-self dealing index of country *c* in year *t*; An index measuring the ease by which controllers can extract rents from their firms	Djankov et al. (2008)
$SELF\_BAD_{c,t}$	Dummy = 1, if $SELF_{c,t}$ < median $SELF_{c,t}$, 0 else	
ANGLO	Dummy = 1, if subsidiary is from the Anglo-Saxon legal system, 0 else	
SCAND	Dummy = 1, if subsidiary is from the Scandinavian legal system, 0 else	
GERMANIC	Dummy = 1, if subsidiary is from the Germanic legal system, 0 else	
FRENCH	Dummy = 1, if subsidiary is from the French legal system, 0 else	
TRANS	Dummy = 1, if subsidiary is from a transition country, 0 else	
SGFT	Dummy = 1, if subsidiary is from a non-Anglo-Saxon legal system, 0 else	

Table 2 Summary statistics: means of variables

Country	Obs	TQ_p	TQ_s	$PER_{p,s}$	PA_p	$SIZE_p$	PA_s	$SIZE_s$	WBI	PS	ADRI	SELF
Panel A: By country												
Argentina	37	1.35	0.98	54.89	0.047	35,295	0.018	3,403	−0.25	0.05	2.00	0.34
Austria	65	1.76	1.13	43.03	0.042	5,456	0.035	1,347	1.61	1.24	2.50	0.21
Australia	138	1.70	2.05	14.64	0.034	1,401	−0.012	41	1.60	0.89	4.00	0.76
Belgium	89	1.27	1.57	31.89	0.060	18,381	0.041	2,640	1.35	0.95	3.00	0.54
Brazil	35	1.52	1.68	49.54	0.039	30,454	0.067	2,649	0.05	−0.09	5.00	0.27
Canada	473	1.50	1.48	25.67	0.042	14,890	0.002	1,242	1.66	1.05	4.00	0.64
Switzerland	127	1.45	1.45	38.81	0.041	8,759	0.042	2,835	1.79	1.46	3.00	0.27
Chile	46	1.60	1.72	53.40	0.041	15,431	0.033	3,103	1.10	0.62	4.00	0.63
Czech Republic	39	1.27	0.81	60.60	0.030	34,472	0.043	1,502	0.75	0.78	4.00	0.33
Germany	392	1.38	1.28	55.34	0.027	19,438	0.018	3,203	1.58	1.17	3.50	0.28
Denmark	38	1.40	1.38	57.08	0.061	2,480	0.007	231	1.71	1.19	4.00	0.46
Egypt	12	1.94	1.73	74.84	0.053	46,144	0.086	513	−0.50	−0.84	3.00	0.20
Estonia	150	1.46	1.70	40.39	0.054	20,909	0.065	4,159	1.27	0.55	5.00	0.37
Finland	41	1.20	1.55	28.82	0.034	4,067	0.048	719	1.86	1.48	3.50	0.46
France	500	1.30	1.50	56.47	0.035	14,972	0.033	4,463	1.22	0.84	3.50	0.38
Great Britain	925	1.69	1.42	32.12	0.049	8,009	0.030	1,072	1.61	0.88	5.00	0.95
Greece	103	1.67	1.67	52.15	0.045	12,965	0.043	636	0.79	0.52	2.00	0.22
Hong Kong	120	0.98	1.29	46.48	0.044	4,863	0.043	5,953	1.01	0.80	5.00	0.96
Hungary	20	1.07	1.18	23.18	0.046	9,468	0.084	1,948	0.92	0.83	2.00	0.18
Indonesia	44	1.33	1.63	52.10	0.073	8,455	0.062	714	−0.91	−1.62	4.00	0.65
Ireland	28	1.63	1.24	25.79	0.033	2,671	0.031	439	1.55	1.30	5.00	0.79
Island	82	1.24	1.28	27.80	0.005	6,382	0.001	527	0.60	−0.87	4.00	0.73
India	156	1.80	1.77	44.19	0.061	17,533	0.086	395	−0.19	−0.93	5.00	0.58

Table 2 continued

Country	Obs	TQ_p	TQ_s	$PER_{p,s}$	PA_p	$SIZE_p$	PA_s	$SIZE_s$	WBI	PS	ADRI	SELF
Italy	93	1.20	1.38	47.83	0.019	18,682	0.011	8,084	0.85	0.70	2.00	0.42
Jordan	6	1.12	2.00	32.43	0.064	10,929	0.101	139	0.02	−0.34	1.00	0.16
Japan	1,327	1.20	1.12	36.98	0.013	42,966	0.015	2,501	1.06	1.09	4.50	0.50
South Korea	260	0.97	0.92	26.71	0.032	8,143	0.019	1,173	0.56	0.12	4.50	0.47
Lxembourg	16	0.99	0.85	37.79	0.027	32,446	0.043	412	1.82	1.54	2.00	0.28
Latvia	7	1.01	1.60	42.65	0.024	86,063	0.100	310	0.49	0.61	4.00	0.32
Mexico	61	2.17	1.24	43.89	0.083	19,910	0.095	4,689	0.01	−0.15	3.00	0.17
Malaysia	222	1.08	1.35	40.97	0.030	4,171	0.044	472	0.34	0.26	5.00	0.95
Netherlands	122	1.34	1.53	49.27	0.025	29,282	0.031	4,886	1.78	1.31	2.50	0.20
Norway	100	1.48	1.21	25.09	0.054	2,841	0.004	429	1.71	1.26	3.50	0.42
Peru	38	1.18	1.47	52.31	0.024	32,292	0.048	530	−0.30	−0.87	3.50	0.45
Philippines	72	1.01	1.06	59.27	0.019	10,949	0.027	803	−0.31	−0.77	4.00	0.22
Pakistan	6	1.40	1.40	75.50	0.032	9,243	−0.053	319	−0.87	−1.09	4.00	0.41
Poland	21	1.21	0.98	47.68	0.014	25,017	0.007	1,679	0.64	0.55	2.00	0.29
Portugal	47	1.32	1.24	36.41	0.022	49,590	0.013	3,966	1.24	1.19	2.50	0.44
Russia	13	1.14	0.85	16.10	0.052	79,542	0.080	42,725	−0.67	−0.72	4.00	0.44
Sweden	258	1.27	1.48	27.86	0.072	10,151	0.039	3,518	1.71	1.28	3.50	0.33
Singapore	5	0.92	0.69	66.69	0.001	2,755	−0.041	79	1.55	1.11	5.00	1.00
Slovakia	6	1.17	0.66	98.41	0.057	5,089	0.052	1,521	0.41	0.68	3.00	0.29
Thailand	189	1.24	1.26	30.20	0.045	5,692	0.067	297	0.23	0.33	4.00	0.81
Turkey	2	1.87	2.80	65.00	−0.020	36,101	−0.073	115	−0.25	−1.01	3.00	0.43
USA	1,448	2.36	1.75	17.16	0.077	14,084	0.008	1,857	1.49	0.94	3.00	0.65
Venezuela	8	1.31	0.80	42.83	0.042	114,000	0.066	3,059	−0.68	−0.54	1.00	0.09
South Africa	130	1.26	1.43	49.69	0.050	13,153	0.068	886	0.34	−0.39	5.00	0.81

Table 2 continued

Country	Obs	TQ_p	TQ_s	$PER_{p,s}$	PA_p	$SIZE_p$	PA_s	$SIZE_s$	WBI	PS	ADRI	SELF
Panel B: By country groups												
ANGLO	3,922	1.82	1.57	27.09	0.056	10,897	0.023	1,372	1.28	0.71	4.04	0.76
GERMANIC	1,465	1.38	1.49	50.30	0.040	20,151	0.040	3,740	0.90	0.52	3.31	0.36
FRENCH	2,187	1.23	1.14	39.34	0.021	31,431	0.018	2,439	1.16	1.02	4.16	0.43
SCAND	437	1.33	1.42	29.86	0.064	7,240	0.029	2,263	1.73	1.29	3.54	0.37
TRANS	106	1.18	0.97	46.47	0.034	35,152	0.052	6,644	0.55	0.54	3.17	0.30
ADRI_GOOD	4,505	1.37	1.32	35.35	0.034	20,116	0.028	1,752	1.04	0.65	4.57	0.66
ADRI_BAD	3,612	1.77	1.54	34.52	0.056	15,854	0.023	2,768	1.38	0.95	3.06	0.36
SELF_GOOD	5,422	1.65	1.46	29.96	0.046	18,888	0.022	1,680	1.21	0.79	4.50	0.69
SELF_BAD	2,695	1.33	1.35	45.08	0.040	16,872	0.034	3,256	1.16	0.79	3.10	0.33
WBI_GOOD	4,265	1.80	1.55	28.53	0.056	12,452	0.018	1,833	1.59	1.03	3.67	0.62
WBI_BAD	3,852	1.26	1.29	42.12	0.030	24,606	0.035	2,614	0.75	0.52	4.15	0.52
PS_GOOD	4,159	1.63	1.45	32.66	0.045	19,505	0.019	2,207	1.44	1.03	3.82	0.57
PS_BAD	3,958	1.29	1.35	42.27	0.041	14,177	0.049	2,192	0.41	0.03	4.15	0.58
All countries	8,117	1.54	1.42	35.20	0.043	18,051	0.026	2,187	1.19	0.79	3.90	0.57

Panel C: Parent company ownership structure

Parent country:	Obs	$PER_{l,p}$		Largest shareholder is:			
		Mean	Median	Family	Ind. Or Fin. company	State	Dispersed
ANGLO	4,025	26.2	14.0	0.303	0.304	0.004	0.389
GERMANIC	1,458	35.7	30.0	0.515	0.213	0.045	0.228
FRENCH	2,283	17.6	9.0	0.300	0.128	0.017	0.555
SCANDINAVIAN	460	27.3	21.0	0.698	0.130	0.028	0.143
TRANSITION	42	16.5	15.0	0.405	0.238	0.000	0.357

Table 2 continued

Panel C: Parent company ownership structure

Parent country:	Obs	$PER_{I,p}$		Largest shareholder is:			
		Mean	Median	Family	Ind. Or Fin. company	State	Dispersed
ADRI_GOOD	4,415	19.2	12.0	0.266	0.275	0.007	0.452
ADRI_BAD	3,760	32.5	20.0	0.468	0.178	0.027	0.328
SELF_GOOD	5,465	21.8	11.0	0.247	0.265	0.006	0.482
SELF_BAD	2,612	32.3	25.0	0.581	0.162	0.039	0.219
WBI_GOOD	4,668	26.3	15.0	0.346	0.271	0.008	0.375
WBI_BAD	3,600	24.5	13.0	0.383	0.175	0.027	0.416
PS_GOOD	6,205	23.1	12.0	0.294	0.240	0.010	0.456
PS_BAD	2,063	32.9	26.0	0.568	0.195	0.035	0.202
All countries	8,268	25.5	15.0	0.362	0.229	0.016	0.393

Table 3 Correlation matrix

	Governmental quality (WBI)	Political stability (PS)	Corporate law (ADRI)	Anti-self dealing (SELF)
Political stability (PS)	0.830			
	0.000			
Corporate law (ADRI)	0.136	−0.175		
	0.000	0.000		
Anti-self dealing (SELF)	0.227	−0.086	0.657	
	0.000	0.000	0.000	
Common law (ANGLO)	0.251	−0.077	0.488	0.892
	0.000	0.000	0.000	0.000
Scandinavian (SCAND)	0.301	0.342	−0.056	−0.190
	0.000	0.000	0.000	0.000
German civil law (GERMANIC)	−0.006	0.167	0.005	−0.263
	0.116	0.000	0.201	0.000
French civil law (FRENCH)	−0.247	−0.159	−0.361	−0.493
	0.000	0.000	0.000	0.000
Transition nations (TRANS)	−0.400	−0.186	−0.206	−0.214
	0.000	0.000	0.000	0.000

p values below correlation coefficients

4 Results

Table 4 presents the primary results. Panel A provides OLS results, panel B firm fixed effects estimates. The first regression includes subsidiary Tobin's q and its interaction with parent ownership stake. From panel A, the Tobin's q of the subsidiary is significantly positively related to the Tobin's q of the parent ($\beta_1 = 0.2$; t = 20.3). However the relationship becomes weaker, the larger the parent ownership stake in the subsidiary ($\beta_2 = -0.15$; t = −5.5). Thus, according to our estimates the sensitivity of the Tobin's q's of parent and subsidiary if the parent holds a 90% stake is only half the sensitivity if the parent holds 20%. This is the first indication of rent extraction, because a higher ownership stake—by giving the parent more control over the subsidiary—allows for greater rent extraction. (Below, we discuss alternative explanations for this result.)

Panel B of Table 4 estimates the same regressions as panel A controlling for unobserved firm heterogeneity via firm fixed effects. While the adjusted R^2 increases dramatically from 28 to 84%, the main results stay roughly the same both qualitatively and quantitatively. Again, there is a significantly negative relation between the two Tobin's qs, a relation which becomes more negative the worse the system is the subsidiary operates in. In the following tables, thus, we revert again to OLS estimates.

Tables 5 and 6 combine information on the legal systems with the overall governmental quality index, WBI (Table 5), the Political Stability sub-index, PS (Table 5), the corporate law quality index, ADRI (Table 6), and the anti-self dealing index, SELF (Table 6).

Table 4 Country governance, corporate law quality, and legal system's association with Tobin's q

Dependent variable: $TQ_{p.t}$	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Coeff	t value	Coeff	t value	Coeff	t value	Coeff	t value	Coeff	t value	Coeff	t value	Coeff	t value
Panel A: OLS estimates														
$PA_{p,t}$	6.609	46.3	6.602	46.3	6.647	46.6	6.679	46.8	6.616	46.4	6.573	46.0	6.591	46.1
$SIZE_{p,t}$	−0.036	−7.9	−0.031	−6.9	−0.035	−7.7	−0.039	−8.6	−0.037	−8.4	−0.033	−7.3	−0.034	−7.4
$TQ_{s,t-1}$	0.199	20.3	0.193	19.6	0.198	20.2	0.172	19.6	0.183	21.7	0.191	19.2	0.192	19.3
$TQ_{s,t-1}$ * $PER_{p,s}$	−0.150	−5.5	−0.010	−0.3	−0.010	−0.9	−0.140	−2.2	−0.101	−0.1	−0.012	−0.6	−0.030	−0.5
$TQ_{s,t-1}$ * $PER_{p,s}$ interacted with:														
WBI_BAD			−0.190	−5.9										
PS_BAD					−0.195	−5.2								
ADRI_BAD							−0.101	−1.1						
SELF_BAD									−0.171	−6.2				
SGFT											−0.183	−6.7		
SCAND													−0.095	−1.6
GERMANIC													−0.170	−2.0
FRENCH													−0.231	−4.8
TRANS													−0.290	−2.6
Constant	1.546	22.1	1.487	21.1	1.531	21.9	1.585	22.8	1.571	22.6	1.513	21.6	1.523	21.6
Nobs	8,117		8,117		8,117		8,117		8,117		8,117		8,117	
Adj R^2	0.280		0.284		0.283		0.278		0.281		0.282		0.282	
Panel B: Firm fixed effects estimates														
$PA_{p,t}$	4.511	12.30	4.321	10.32	4.122	9.44	4.210	10.88	4.110	8.46	4.230	10.55	4.102	9.74
$SIZE_{p,t}$	−0.026	−4.80	−0.022	−4.20	−0.024	−4.40	−0.025	−4.30	−0.027	−4.40	−0.023	−3.99	−0.025	−4.65
$TQ_{s,t-1}$	0.164	11.40	0.151	9.87	0.155	10.03	0.154	9.67	0.160	10.43	0.150	9.90	0.149	9.68
$TQ_{s,t-1}$ * $PER_{p,s}$	−0.101	−5.50	−0.010	−0.31	−0.010	−0.12	−0.050	−1.45	−0.010	−0.34	−0.010	−0.18	−0.070	−0.53

Table 4 continued

Dependent variable: $TQ_{p,t}$	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Coeff	t value	Coeff	t value	Coeff	t value	Coeff	t value	Coeff	t value	Coeff	t value	Coeff	t value
$TQ_{s,t-1}$ * $PER_{p,s}$ interacted with:														
WBI_BAD			−0.170	−2.77										
PS_BAD					−0.181	−3.25								
ADRI_BAD							−0.080	−1.00						
SELF_BAD									−0.165	−3.21				
SGFT											−0.175	−3.37		
SCAND													−0.067	−1.43
GERMANIC													−0.155	−1.87
FRENCH													−0.221	−2.82
TRANS													−0.278	−2.68
Constant	1.580	3.91	1.521	2.10	1.540	3.22	1.551	3,32	1.568	3.34	1.498	2.85	1.511	3.13
Nobs	8,117		8,117		8,117		8,117		8,117		8,117		8,117	
Adj R^2	0.811		0.837		0.837		0.833		0.836		0.837		0.837	

Tobin's q of the parent company is the dependent variable. Model 1 examines its relation with ownership stake and subsidiary Tobin's q, controlling for the size of the parent firm and its profitability. In models 2 through 7, we add a measure for government quality (interacted with the subsidiary's q, the parent's ownership in the subsidiary, and the variable of interest). The variable of interest in Model 2 is governmental quality, in 3 political stability, in 4 corporate law quality via ADRI, in 5 corporate law quality via the anti-self-dealing index, in 6 non-common law origin, and in 7 it is the specific legal origin

Table 5 Within legal systems' effects of country governance

Dependent variable: $TQ_{p,t}$	Model 1		Model 2		Model 3		Model 4	
	Coeff WBI	t value WBI	Coeff WBI	t value WBI	Coeff PS	t value PS	Coeff PS	t value PS
$PA_{p,t}$	6.595	46.26	6.608	46.28	6.607	46.32	6.608	46.40
$SIZE_{p,t}$	−0.031	−6.77	−0.031	−6.66	−0.031	−6.86	−0.033	−7.30
$TQ_{s,t-1}$	0.184	18.47	0.185	18.54	0.185	18.53	0.182	18.32
$TQ_{s,t-1}$ * $PER_{p,s}$ interacted with:								
ANGLO	0.092	3.06	0.092	3.04	0.093	3.02	0.091	2.87
SGFT	−0.080	−1.47			−0.062	−0.52		
SCAND			−0.083	−1.75			−0.081	−1.86
GERMANIC			−0.022	−0.57			−0.055	−0.86
FRENCH			−0.201	−3.71			−0.143	−5.34
TRANS			n.a.				n.a.	
ANGLO * GOV_BAD	−0.274	−6.53	−0.274	−6.53	−0.154	−5.00	−0.158	−6.51
SGFT * GOV_BAD	−0.233	−4.75			−0.254	−6.04		
SCAND * GOV_BAD			n.a.				n.a.	
GERMANIC * GOV_BAD			−0.092	−2.71			−0.113	−1.73
FRENCH * GOV_BAD			−0.074	−1.21			−0.120	−3.09
TRANS * GOV_BAD			−0.304	−2.75			−0.330	−2.65
Constant	1.484	21.07	1.481	20.80	1.486	21.22	1.530	21.71
Nobs	8,117		8,117		8,117		8,117	
Adj R^2	0.288		0.289		0.288		0.291	

In this table, we run a set of interactions similar to those in Table 4, but this time focusing on the interaction between legal origin and governmental quality (WBI, models 1 and 2) and political stability (PS, models 3 and 4), where GOV stands for WBI or PS, respectively

Table 6 Within legal systems' effects of corporate law quality

Dependent variable: $TQ_{p,t}$	Model 1		Model 2		Model 3		Model 4	
	Coeff ADRI	t value ADRI	Coeff ADRI	t value ADRI	Coeff SELF	t value SELF	Coeff SELF	t value SELF
$PA_{p,t}$	6.553	46.05	6.571	46.10	6.573	46.00	6.601	46.09
$SIZE_{p,t}$	−0.035	−7.62	−0.035	−7.64	−0.033	−7.26	−0.034	−7.36
$TQ_{s,t-1}$	0.175	17.34	0.176	17.39	0.191	19.19	0.191	19.24
$TQ_{s,t-1}$ * PER_p interacted with:								
ANGLO	0.080	0.90	0.081	0.89	−0.010	−0.47	−0.010	−0.46
SGFT	−0.020	−1.10			−0.022	−0.99		
SCAND			−0.040	−1.76			−0.001	−0.90
GERMANIC			−0.092	−2.51			−0.073	−0.89
FRENCH			−0.163	−3.45			−0.141	−1.16
TRANS			−0.193	−0.87			−0.294	−2.70
ANGLO * COR_BAD	−0.124	−1.67	−0.121	−1.66	−0.154	−3.15	−0.153	−3.05
SGFT * COR_BAD	−0.212	−1.62			−0.230	−4.47		
SCAND * COR_BAD			n.a.				n.a.	
GERMANIC * COR_BAD			−0.084	−1.53			−0.022	−2.38
FRENCH * COR_BAD			−0.043	−0.76			−0.101	−2.76
TRANS * COR_BAD			−0.224	−0.64			−0.094	−0.70
Constant	1.551	21.95	1.553	21.81	1.517	21.39	1.525	21.34
Number of observations	8,117		8,117		8,117		8,117	
Adj R^2	0.288		0.289		0.282		0.283	

In this table, we interact legal origin with corporate law quality measured by ADRI (models 1 and 2) and SELF (models 3 and 4), where COR stands for ADRI or SELF, respectively

In the first two models of Table 5, we interact legal origin differentiated between Anglo-Saxon countries (ANGLO) and non-Anglo-Saxon countries (SGFT, model 1) and individual non-Anglo-Saxon groups (SCAND, GERMANIC, FRENCH and TRANS, model 2) with "bad" governmental quality (WBI < median WBI), respectively. Thus, the models estimate the effects of country governance *within* legal systems. Results are very robust. The WBI is able to identify countries where rent transfers are more likely *in addition* to controlling for the effects of legal systems. Model 1 shows that the WBI is a consistent discriminator: "good" common law countries do not show any sign of rent transfers, whereas "bad" Anglo-Saxon countries do. All non-common law countries display rent transfers, "bad" non-Anglo Saxon countries significantly more. Model 2 again disentangles all legal systems, two interactions are dropped since there are no "bad" Scandinavian countries and no "good" transition countries on the basis of the overall WBI. Parents extract significantly more rents from their subsidiaries in "bad" common and civil law countries.

Models 3 and 4 in Table 5 replace the WBI with its political stability sub-index, PS. Results with political instability are generally similar to those using the overall WBI. That is, political instability discriminates between countries where rent extraction of parents is more or less likely, even when controlling for legal origin types. In model 4 again two interactions are dropped on the same gounds as above. Very strong results are obtained with model 4, showing that subsidiaries in politically unstable nations suffer significantly more rent extraction than subsidiaries in politically stable nations; this is true even after controlling for legal origin.

Table 6 has the same structure as Table 5, but we replace the WBI and PS with our corporate law quality indicators ADRI and SELF (Djankov et al. (2008)). Again, the corporate law index ADRI is not a satisfactory discriminator. While the results indicate that there are substantially more rent transfers between subsidiaries and their parents going on in all non-common-law systems, the results are not significant. Thus, legal systems matter but the ADRI is not helpful in identifying countries where rent transfers are more likely.

Models 3 and 4 replace the ADRI with the Anti-Self-Dealing Index in Djankov et al. (2008), SELF. While the ADRI index is the best-known measure of corporate law quality in the academic finance literature, its authors recognize its ad hoc, a-theoretic nature and, accordingly, constructed a subsequent index, the Anti-Self-Dealing Index in Djankov et al. (2008). That index more tightly measures legal characteristics that would allow, or bar, self-dealing transactions between a controller and the firm. Hence, in models 3 and 4 of Table 6 we re-run our principle regressions, substituting the Self-Dealing Index for ADRI. Indeed, the targeted index does better at explaining Tobin's Q of the subsidiaries than ADRI.

5 Discussion

Overall, the data points to host-nation government quality, political instability, and our self-dealing index as significantly associated with rent extraction. The data does not point to corporate law quality as measured by the anti-director rights index as

being a significant indicator of rent extraction. Legal origin's association with rent extraction is mixed. The only country group where we do not detect rent transfers in the parent-subsidiary relation is in Anglo-Saxon countries with good quality indicators.

5.1 Multicollinearity?

One possibility is that origin and government quality, in particular stability, are correlated, which would make the results harder to interpret. The United Kingdom and the United States have been more politically stable in recent centuries than their non-common-law homologues on the European continent (whose equal stability is a matter of recent decades, not recent centuries). However, the former colonies do not appear to show that pattern repeating: common law African nations are no more stable than civil law African nations. The correlation matrix in Table 3 indicates little mapping of instability onto origin: the correlation coefficient between stability and common law origin is actually negative and the coefficient for the German, French, and transition nations ranges from −0.19 to 0.17. The same can be said about the overall government quality index, WBI, and legal origin, although common law and Scandinavian countries generally also have better government indicators.

5.2 Alternative explanations for the failure of the corporate law index

The most straight-forward explanation for the failure of the corporate law quality index, ADRI, to discriminate well between high-rent-extraction nations and low ones is that corporate law quality is not as important as overall governmental institutions and political stability in lowering rent extraction. Multiple mechanisms control rent extraction beyond corporate law—reputational effects, contract, stock exchange listing agreements, to mention a few, see DeLong (1991), Mahoney (1997), Mayer (2008), Miwa and Ramseyer (2002). These mechanisms may work well in high quality government systems and stable environments and poorly in less efficient government systems and unstable environments. Alternatively, rules that legally protect more directly the minority shareholders against expropriation by corporate insiders, as subsumed in the anti-self dealing index of Djankov et al. (2008), do discriminate well between high-rent-extraction nations and low ones.

5.3 Rent extraction versus alignment of incentives

Since the q sensitivity declines as the parent company ownership level rises, the parent's greater control could facilitate more rent extraction when control over the subsidiary tightens. An alternate explanation for parent q's decline as its control in the subsidiary rises is that the controller's incentives align better with the minority stockholders. More of any efficiency costs in the rent extraction come out of the controller's investment (see Edwards and Weichenrieder 2004; Morck et al. 1988).

Prior studies suffer from this potential interpretive ambiguity. But the results here present a cleaner interpretation. Because lower q in the subsidiary is associated with

higher q in the parent, the most plausible interpretation is that the relationship is one of rent being extracted from the lowered q firm and flowing into the heightened q firms. The parent's high q should indicate an umbrella of good management or monitoring over the subsidiaries, which would be transferred most strongly to firms in which it had a stronger, larger stake. But if that were so, then the subsidiaries should evince higher q when parent ownership rose, instead of the lower q that we do observe.

6 Conclusion

We propose a technique to measure tunneling that more directly than predecessors can identify its sources. The negative co-movement of the Tobin's q's of the parent firm and its subsidiaries directly traces origin and destination of the flow of value. Moreover, Tobin's q is a comprehensive measure which also detects subtle value transfers within a corporate pyramid such as a transfer of investment opportunities from the subsidiary to the parent.

Rents are extracted from subsidiaries to parents. By lagging Tobin's q of the subsidiaries to that of the parents and interacting it with governmental quality and ownership of the parent in the subsidiary, we are able to assess the national qualities most closely associated with higher rent extraction. The tighter the parent controls the subsidiary the easier it is for the parent to tunnel rents to itself. Surprisingly, the widely used ADRI index does not nicely predict rent extraction, while the anti-self dealing index does. A country's overall governmental quality as well as political stability of the subsidiary's country best predict the extent of rent extraction. Our results on legal systems are mixed: it is not enough to stem from an Anglo-Saxon country to guarantee absence of rent extraction, proper institution building is at least as important.

We only looked at a particular but nevertheless important aspect of pyramids, i.e. on tunneling. The positive aspects of pyramids notwithstanding, our results may allow for a better understanding of the relative importance of institutions and may help in formulating policies for better financial development.

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