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Internal and External Lending by Nonfinancial Businesses During Crises and During Other Times[1]

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Abstract

We investigated how the large and growing volumes of lending by listed, Japanese, parent companies to their subsidiaries responded to parents' and to subsidiaries' sources and uses of funds during 1984-2014. We found that parents lent more to their subsidiaries when (1) parents' profitability rose relative to that of their subsidiaries and (2) parents' capital expenditures fell relative to those of their subsidiaries.

We also found that the extent of ownership matters. Parents lent more internally when their existing equity investments in their subsidiaries was (1) larger relative to the parents' total equity and (2) larger relative to the subsidiaries' total equity.

Our results also indicated that internal lending rose in response to economic and financial crises in Japan, but not when its commercial banks were at the center of a crisis. Thus, internal lending was boosted by the global financial crisis, when Japanese banks were quite strong, but not during the Japanese banking crisis around 2000.

Keywords: Internal capital markets; parent company; subsidiaries; crises; external lending

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1. Introduction and Overview

Business groups are ubiquitous outside the U.S. and the UK and comprise large portions of the business sectors in many countries (Ghemawat and Khanna, 1998, Khanna and Yafeh, 2007). While business groups in emerging markets have been studied extensively, much less attention has been paid to their roles in developed markets.

Studies have suggested that internal capital markets, and even business groups themselves, arise in emerging markets in particular to reduce the frictions that accompany financial systems that are not as well-developed or efficient. Often these internal capital markets consist of parent companies shifting funds to their subsidiary companies. The funds may take the form of equity or of debt. These shifts may vary either in response to group-specific conditions or in response to external conditions. Analyses of the global financial crisis (GFC) of the late 2000s and its aftermath, however, often concluded that financial frictions can be large and volatile in developed, as well as in emerging, markets. In that regard, developed countries may also benefit from internal capital markets.

We investigated how internal capital markets in a developed country with a well-developed financial system responded to factors generally found to affect internal capital markets in emerging markets. We also estimated whether and how much internal capital markets, in the form of loans between parent and subsidiary companies, i.e., internal lending, responded to economic or financial crises. As our measure of those markets, we used parent companies' loans to their (separately-incorporated) subsidiaries.

We focused on internal capital markets in Japan for several reasons. Business groups in Japan are numerous, range widely in total size and numbers of subsidiaries, and together comprise a very significant portion of the Japanese business sector. In addition, Japan has long had a developed economy with a large commercial-banking sector. Japanese banks have long been the primary source of external funding for Japanese businesses. Japan also had several economic and financial crises during our 1984-2014 sample period.

Another advantage of focusing on Japan was its greater availability of data. Japan requires its public companies to provide both consolidated and unconsolidated financial statements. (The U.S. requires only consolidated statements.) Japan's abiding by International Financial Reporting Standards (IFRS) requires that public companies report,

at least in footnotes to their financial statements, amounts of internal (balance-sheet) transactions if their amounts total 10 percent or more of the parent companies' assets.

But, Japan goes further. It has imposed a lower threshold for reporting transactions between public parents and all of their (separately-incorporated) subsidiary companies: Parents are required to report amounts if they are least one, rather than 10, percent of parent companies' assets. (And we found that many parents reported loans they made to their subsidiaries that totaled less than one percent.) Of course, the lower Japanese threshold and the voluntary reporting considerably boosted reported amounts of internal transactions and presumably reduced measurement errors in internal loans generally. Better data ought to provide better estimates of the effects of various factors on internal lending. Indeed, we found very different results when we restricted our data to internal transactions that crossed the IFRS threshold of 10 percent.

The data show that internal lending in Japan has been large and trending upward for three decades. Our calculations show that parents' loans to their corporate children recently averaged about nine percent of parents' assets and comprised about 20 percent of children's borrowing, with bank loans to children comprising most of the remaining 80 percent. Contributing to the upward trend in internal lending (relative to parents' assets) were that business groups tended to add more subsidiaries over time and that, even for groups that added no subsidiaries, internal lending rose over our 1984-2014 sample period. In addition to its general upsweep, internal lending fluctuated noticeably from year to year. We sought estimates that would account both for the cross-sectional differences and the time-series variation in the lending component of internal capital markets.

Our estimates confirmed some results found in prior research. For example, we found that higher earnings of parents and lower earnings of subsidiaries led to more internal lending (Gopalan, Nanda, and Seru, 2007).

We also have new findings. In contrast to Gopalan, Nanda, and Seru (2007), we found that ownership matters. Our two indicators of ownership, parents' equity investments, both relative subsidiaries' total equity and relative to the parents' own equity, led to more internal lending. Also in contrast, we found that smaller capital expenditures by parents and larger ones by subsidiaries led to more internal lending. And,

while crises generally increased internal lending by parents to their subsidiaries, banking crises did not. Thus, in crises, internal lending tended to rise if banks were then strong enough to provide loans at the same time.

2. Prior Research

A number of empirical analyses found evidence that companies make use of internal capital markets and that they were used more intensively when companies encountered various external shocks. Maksimovic and Phillips (2013) provided a valuable survey of the rationale and evidence for internal capital markets and for corporations choosing to be conglomerates. Recently, Cho (2015), Gopalan and Xie (2011), Kolasinski (2009), Matvos and Seru (2014), and Ozbas and Scharfstein (2010) concluded that internal capital markets re-allocated funds across business units within companies.

Two recent studies of internal capital markets had direct measures of funds transfers between members of related business. In turn, they concluded that parent companies provided financial aid to their subsidiary companies via increased trade credit and via equity purchases. Buchuk, et al. (2014) undertook the arduous task of hand-collecting data that directly measures of the flows of trade credit across the subsidiary companies within business groups. They analyzed net trade credit (i.e., accounts receivable minus accounts receivable) for more than 1000 Chilean companies for the years 1990-2009. They found that, within a business group, companies that received larger net flows of trade credit had larger capital expenditures, more leverage, and higher return on equity.

Using data from years soon before and soon after the Asian financial crisis of the late 1990s, Almeida, et al. (2015) analyzed internal equity flows at over 200 Korean business groups (*chaebols*). They found that companies bought or sold more equity to other companies in their chaebol after the crisis than they did before the crisis. They also concluded that equity was purchased by (expected) low-growth companies from high-growth companies in the same *chaebol*.

In research that employed variables that were somewhat similar to ours, Gopalan, Nanda, and Seru (2007) estimated the effects on lending between companies within business groups. To do so, they used data for Indian companies for 1989-2001.

Like us, they found that companies with lower profits tended to get more internal loans. In contrast to our results below, they detected virtually no effects of capital expenditures or of the extent of ownership on internal lending.

3. Business Groups, Parents, Subsidiaries, and Accounting

As we describe in more detail below, for our purposes, a business group consists of a parent company and the companies that the parent (often wholly) owns or controls enough that the parent is required to report consolidated financial statements, which combine the financial statements of those subsidiary companies into those of their parent company. And, we will refer to loans from a parent to its subsidiary (or related) companies as "internal lending." We refer to loans from a parent company or from its subsidiaries to companies outside their business group as "external lending."

3.1 Business organizations

In response to the wide range of business situations, a wide range of business organizational forms are used to efficiently measure and manage companies. For management purposes, companies that span wide ranges of physical territory or of activities often delineate business lines, divisions, regions, or other units. Although delineating business units within a company may serve internal purposes, such units need not, and typically do not, have any separate legal status. Absent some legal or other formal delineation, individual or collected units seldom are subject to separate reporting requirements, taxation, or regulation.

On the other hand, legally-separate companies may combine with other companies. When companies are combined somehow, their financial reporting requirements often depend upon the extent of ownership or control that one company has over other companies. Below we make use of the data provided by accounting requirements for combinations of Japanese companies.

3.2 Parent and subsidiary companies

A business group consists of one parent company and one or more subsidiary companies that the parent controls.[2] Unlike divisions or other business units that are

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[2] In contrast to a business group, a keiretsu is an alliance of Japanese companies or business groups, that typically have a common main bank, have some common commercial interests, and, though

delineated only for internal purposes, subsidiaries are separately incorporated. Subsidiaries may be wholly, majority, or even minority owned by parents.[3] Typically, control is evidenced by a parent's having purchased sufficient voting equity shares in a subsidiary company. Very often subsidiaries are overwhelmingly or wholly owned by their parents. Like informal business units, the sizes of subsidiaries, as measured by their sales or assets for example, can range from very small to very large, both in absolute terms and relative to the sizes of their own parents.

Rather than being small, unusual, or idiosyncratic, parent companies with consolidated subsidiaries, i.e., business groups, have been the dominant form chosen by Japanese companies for decades. Here, for example, are data for the end of the 2005 fiscal year (FY2005), a date that was about two-thirds of the way through our FY1984 – FY2014 sample period and was before the global financial crisis. We had data for 2,622 listed, nonfinancial companies for that date. Of those 2,622 businesses, 2,261 (or 86 percent) had (consolidated) subsidiaries and filed both unconsolidated and consolidated financial statements. Only 361 of the 2,622 listed, nonfinancial businesses had no subsidiaries.

Of the 2,261 listed companies that had subsidiaries, on average each parent company had about 21 subsidiaries. The minimum number of subsidiaries in FY2005 was one; Sony then had the most: In FY2005, Sony had 936 subsidiaries. Business groups with many and large subsidiaries may also predominate the corporate sectors of other major countries, but it is hard to know. For example, in the case of the U.S., we don't have comprehensive databases of financial statements for parents separately from their consolidated subsidiaries.

Parents often owned overwhelming shares of their subsidiaries: Subsidiaries were very often wholly owned by parents and, on average, parents owned about 85 percent of the total equity of their subsidiaries. (We calculated the parent's percentage of ownership of its subsidiaries as the ratio of unconsolidated (i.e., parents') equity to the sum of unconsolidated equity and minority interest.) A parent's not owning 100 percent

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they may hold some of other members' shares, do not have ownership-based or other formal control over the other business groups in their keiretsu.

[3] Companies that are partially owned by other companies are sometimes listed on stock exchanges, have publicly-traded shares, and are required to disclose their financial statements.

of a subsidiary's equity opened the door to the subsidiary's being listed, having its shares publicly traded, and disclosing financial statements. Whether parents' ownership percentages affected their lending to their subsidiaries is one of the issues that we address and estimate below.

3.3 Accounting for business groups

Beginning with fiscal year 1983, in addition to parent-only (unconsolidated) financial statements that they had been reporting for many years, Japanese companies were required to also report consolidated financial statements. That is why our dataset begins then.

When a parent company's ownership or control of a company is deemed large enough, accounting rules require the parent to report financial statements for the business group that consolidate these subsidiaries with the parent. In Japan, because parents typically have enough ownership or control of their subsidiaries, overwhelmingly subsidiaries are consolidated into the financial statements of their business groups. Indeed, most Japanese subsidiaries are not only controlled, but are wholly-owned, by their parent companies.

While they intend to reflect financial performance and conditions of a business group as a whole, consolidated financial statements also "eliminate" transactions that occur within a business group between the group's parent company and its subsidiary companies. Although they actually take place between separately incorporated companies, we refer to these transactions within a business group as "internal" transactions. In addition, consolidation also eliminates any reporting of transactions between subsidiaries, about which we have no information.

Consolidation of subsidiaries' financials with those of their parents obscures most intra-group transactions, i.e., transactions between parents and their subsidiaries and transactions between subsidiaries. As accounting textbooks phrase it, within-business-group transactions are "eliminated" by consolidations: They do not appear in the income statements or balance sheets of the business group. In their advanced financial accounting textbook, Baker, et al. (2008) cogently summarize the logic and implications of eliminating internal transactions when financial statements are consolidated: "you can't owe yourself money", "you can't sell to yourself", and "you can't own yourself."

Otherwise, for example, together parents and their subsidiaries could raise reported revenues by repeatedly buying and selling the same goods or services back and forth between themselves.

Analysts can reasonably argue that, by eliminating internal transactions, consolidated financial statements are likely to provide more information and less noise about business groups. That so many subsidiaries are wholly owned by their parents and thus don't have publicly traded equity further reduces demand for information about subsidiaries. Below we provide more detailed explanations and numerical examples of unconsolidated and consolidated financial statements.

U.S. accounting rules require (publicly-traded) business groups to report consolidated financials. U.S. rules do not require a business group to provide separate financial statements for the parent company or for subsidiary companies. Not requiring separate financial statements for parents and for subsidiaries may be analogized to not requiring separate financials for informal business units, which are often as integral to a single company as subsidiaries are to a business group. Companies and business groups in the U.S. are free to do so, but rarely do they disclose comprehensive separate financial statements for internal business units or even for subsidiaries. The result is that any loans, trade credit, equity investments, sales, purchases, and other transactions within a business group do not appear in consolidated financial statements.

Fortunately, for some times and places, business groups have been required to report both their consolidated and their unconsolidated statements, the latter of which pertain directly only to the parent company.[4] Japan is one example. In recent decades, Japanese business groups had to report both (parent-only) unconsolidated and (group-wide) consolidated financial statements.[5] We used both sets of financial statements, along with footnotes to the unconsolidated balance sheets, to calculate internal transactions at Japanese business groups.

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[4] Shuto (2009) investigates earnings management both in the unconsolidated earnings and consolidated earnings of Japanese companies. Bonacchi et al. (2014) focused on the relations among consolidated, unconsolidated and subsidiaries financial statements to reveal the earnings management by parent company using Italian companies.

[5] Although Japanese companies can register with the U.S. SEC and then opt to abide by U.S. accounting rules, in recent years only about 30 of the more than 1,400 business groups in our sample each year chose to do so. To remain in our sample, of course, Japanese business groups still had to have reported both consolidated and unconsolidated financial statements.

We focused particularly on calculating annual data for each listed business group for the loans that each parent company had extended to its (consolidated) subsidiaries *in toto*. We also calculated how much each parent and how much its subsidiaries had lent to companies outside their business group. That is, we calculated lending from parents to their "corporate children" and from parents and from children to companies outside the family, but not between "sibling subsidiaries." Below, for Japanese business groups, we show that business lending from parents to children can be substantive, frequent, and volatile.

3.4 Internal and external lending: methods for calculating them

While accounting rules eliminate their being reported in consolidated financial statements, the rules do not, of course, eliminate the actual transactions. It is the footnotes to the unconsolidated statements that provided us with reported amounts of internal lending. Once we had (estimates of) the amounts of internal loans, we subtracted the internal loans from the parents' total loans, which are reported in the unconsolidated statements to get (estimates of) the parents' external loans (i.e., to companies outside the business group). Then, we subtracted the parents' external loans from the total external loans of the entire business group, as reported in their consolidated statements, to get (estimates of) the external loans made by subsidiaries (to companies outside their business groups). As we show below, parents' lending to their corporate children vastly exceeded parents' or their children's loans to companies outside their business groups.

Figure 1 illustrates how consolidation eliminates, not the internal transactions themselves, but their being reported. The business group in the box in Figure 1 shows a parent company that has three (consolidated) subsidiaries. Arrows A and B represent external lending by the parent and by its subsidiaries, i.e., loans they made to companies outside of their business group. Arrow B_3, for example, indicates that Subsidiary 3 made 1 unit of loans externally, perhaps, though not necessarily, to its customers or to suppliers. Here, we refer to loans, but the accounting also pertains to accounts payable and accounts receivable. We have data both for loans and for receivables and for payables. The assets reported on the consolidated balance sheet for this business group would show 5 units of (external) loans were outstanding: A+B = 2 + (0+2+1) = 5.

Arrows C and D show internal lending: Arrows C1, C2, and C3 show lending by a parent company to its subsidiaries; D shows lending between subsidiaries. The unconsolidated balance sheet, which pertains only to the parent company, directly reports the sum (A+C), i.e., the parent's external plus its internal lending: A+C = 2 + (10+4+6) = 22. Note that the transactions between its subsidiaries do not appear on the parent's or on the business group's balance sheet. They would appear on the balance sheets of these separately-incorporated subsidiary companies, but the great majority of subsidiaries are not listed and thus are not required to publicly disclose their financial statements.

Given the amount of a parent's internal lending, as reported in footnotes to its unconsolidated statement, the sum $C_1+C_2+C_3$ in Figure 1, we can estimate the (unreported) amount that a parent has lent externally, A, by subtracting C from the sum A+C. In Figure 1, we estimated external lending by the parent equaled 2 units. Further, subtracting the amount of the parent's (estimated) external lending, A, from the group's (reported) external lending, A+B, produces an estimate of the aggregate amount of external lending by all of a parent's subsidiaries. As an example, Appendix B shows how we calculated the components of the Nissan business group's lending as of the end of its 2008 fiscal year (FY2008) on March 31, 2009. This example shows that internal lending dwarfed Nissan's external lending by the parent or by the subsidiaries.

3.5 Internal and external lending: estimated amounts

Figure 2 and Figure 3 show that consolidated balance sheets obscure the large, fluctuating lending markets that operated within our sample of large, Japanese business groups. They also show the size and fluctuations of the external lending done by parent and by subsidiary companies. Using the same scale for each fiscal year from 1984 through 2014, Figure 2 and Figure 3 plot Japanese companies' aggregate internal and external lending, as a percent of parent companies' aggregate total assets. Panel A in Figure 2 shows consolidated, or external, lending, which is the sum of parents' and of subsidiaries' lending to companies outside their business group. Through 2002, external lending hovered in the range of two to three percent. External lending then quickly declined to about one percent of parent companies' assets and was below one percent for during FY2010 – FY2014. Unconsolidated lending followed a very different path. Panel

B shows that the sum of parents' internal lending, i.e., lending to their subsidiaries, plus parents' external lending, was noticeably larger, more volatile, and, after 2000, growing.

Figure 3 shows the elements that comprise the consolidated and unconsolidated lending ratios in Figure 2. Panel A in Figure 3 shows the ratio to parents' total assets of loans that parents made to their subsidiary companies. Panel A shows that internal lending was by far the largest component of parents' lending. Parents' loans to their own subsidiaries hovered in the range of three to four percent of parents' assets until the late 1990s. Then parents' internal lending ranged from five to seven percent through FY2007, which ended on March 31, 2008. Internal lending then rose to about eight percent and then exceeded eight percent of parents' assets for FY2012 – FY2014.

Panels B and C separately show parents' and their subsidiaries' external lending. The sum of these two elements equal external lending, which we showed in Panel A of Figure 2. Panel B shows that parents' external lending fairly steadily dwindled over our sample period, before ticking upward slightly in FY2013 and FY2014. Subsidiaries' external lending was quite small throughout FY1984 – FY2014, except for a few years around FY2000, when the Japanese banking industry was severely troubled.

Thus, Figure 3 shows how much internal lending might be obscured by consolidated balance sheets. Figure 2 shows that even parents' total unconsolidated lending could importantly obscure the size and fluctuations of internal lending. As it happened, however, parents' lending to companies outside their business groups was relatively stable and small. Thus, as shown in panel A in Figure 3, parents' internal lending was large, volatile, and growing.

4. Internal and External Lending: instruments and rationales

This section describes some of the instruments companies use to channel funds inside and outside their business groups. In the next subsection, we discuss some of the rationales for companies' making internal and external loans to other companies. Appendix A provides a more formal model of companies' internal and external lending. In the section after this one, we lay out hypotheses that the discussion and model imply, as well as some additional hypotheses.

Financing of companies with internally-delineated business units, or as they are more often called "multi-segment companies," have long attracted analysis. Several hypotheses about the costs and the benefits of companies' specializing or agglomerating have been advanced over the past few decades. Statistical evidence has often been suggestively supportive, if less often been conclusive. Although companies with subsidiaries differ from companies with only business units, the principle issues and answers are likely to be quite similar. Details differ, and so will some implications, but the differences often will be of secondary importance.

What is of primary importance here, however, is that we have been able to recover the amounts of internal loans that parents made to subsidiaries. So far, we do not see or foresee the data becoming available for U.S. companies that would make it feasible to accurately estimate parent loans made to their subsidiaries or any "loans" made by headquarters to internal business units, either one-by-one or *in toto*.

Apparently, neither models, data, nor practice incorporate business units that issue their own external debt or equity. Models of internal capital markets generally assume that the "headquarters unit" is the only business unit that decides the size and timing of any external issues of debt or equity. An assumption that only headquarters raise funds externally fits companies that have internal divisions that are not legally separate (e.g., Buick and Chevrolet within General Motors).

Subsidiary companies in Japan obtain not only (internal) equity funding from their parents; often, they also obtain loans and trade credit from them. In addition to that (internal) lending, subsidiaries very often raise funds externally on their own, albeit with the approval, and typically under the direction, of their parent companies.[6] Subsidiaries almost always have bank loans outstanding; some, but many fewer, subsidiary companies have issued bonds in their own names. Further, it is not uncommon for subsidiaries to have obtained funds by having issued their own publicly-traded equity. For simplicity,

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[6] This is the business-group analogue to the typical assumption in discussions of internal capital markets at individual companies, i.e. that the headquarters unit of an individual company controls allocations of funds across business units, such as divisions, product lines, or locations. Units' operating and capital budgets reflect these internal allocations. The practical effect of transfers of cash into a business unit is that they represent funding via more equity, not more debt, and thus, not internal lending.

below we only consider the most-common practice, whereby a parent owns all of its subsidiary companies' equity.

4.1 Why do parents have subsidiary companies and make loans to them?

Multi-segment companies perforce allocate funds across business units whenever they make choices about operating or capital budgets. These allocations are akin to equity investments. Although not reported publicly, headquarters may make an investment of, say, $125 million in machinery. Companies with consolidated subsidiaries, or business groups, are likely to make decisions and arrangements about allocating funds to subsidiaries that are more formal. For example, parents record their equity investments in their subsidiaries in their financial statements. Purchases and sales of shares of subsidiaries are also recorded legally. Parent companies can also allocate internal funds across their subsidiaries in the form of loans. These loans would be recorded, but then "eliminated", leaving no trace in financial statements, during the process of accounting consolidation.

Why agglomerate? Business groups may be able to borrow more or at lower costs externally due to economies of scale or due to their whole being more diversified than their parts. And, even apart from scale or diversification, parents are likely to be more informed about subsidiaries than banks are. In addition, relative to banks, parents may more quickly and cost-efficiently renegotiate loans or liquidate assets (especially if parents have other, similar businesses).

For companies that have business units but not (separately-incorporated) subsidiaries, headquarters typically serve as the only intake point for external funds. Headquarters can then allocate internal or external funds to their business units, typically via annual budgets. For business groups, parent companies may provide funds to their (separately-incorporated) subsidiaries via more-formal equity or debt transactions.

In practice, headquarters make equity investments. There seem no insuperable barriers to their having some debt-like funding for business units. However, there is scant evidence, even anecdotal, of much funding by headquarters of business units that resembles loans. Parents, however, face explicit decisions about whether to provide

equity or debt financing to their legally-separate subsidiaries. In the case at hand, very many Japanese parents make loans to their corporate children.[7]

Enforced, cash-coupon, debt financing of subsidiaries, and even of business units, could have two of the usual salutary effects asserted for debt. First, paying coupons in cash might have "Jensen effects" on managerial discipline that improve cost efficiencies. Second, effectively allowing managements of units or subsidiaries to lever up by substituting parent-provided debt for parent-provided equity financing might ramp up incentives for management to take risks in much the same way that stock options for senior management are supposed to.

4.2 Why do subsidiaries have external loans?

In the case of listed Japanese business groups, the vast majority of subsidiaries have both internal loans and external debt in the form of bank loans (and, rarely, of bonds). In contrast to business units, subsidiaries typically have internal loans from their parents and simultaneously have ongoing external loans from (commercial) banks.

The presence of bank loans may convey objective and credible signals of subsidiaries' conditions and prospects. The signals can reverberate into lower external equity costs for both the indebted subsidiaries and their parents. The signals may also lead to better evaluations of the subsidiaries by the parents. And, parents may want the extra cost discipline and extra income incentive of subs having substituted debt for equity.

Any of a number of (non-exclusive) conditions may lead subsidiary companies to have both internal and external loans. Just as relatively healthier parents may provide more internal loans, healthier subs may get more external (bank) loans. In that way, when parents' conditions are not strong, subsidiaries' getting external loans may boost the total debt available to a business group. The parent or business group may be weaker than one or more of its subsidiaries, for example, if the parent's own performance or prospects have faltered or if other subsidiaries in the business group have similarly faltered.

Another incentive for subsidiaries to get bank loans is to get objective, external validation about subsidiaries' conditions and prospects. Getting a bank loan can be seen

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[7] In our sample, there are many fewer cases of subsidiaries making loans to their parents. We don't analyze or estimate their amounts or what factors drive such upstream lending.

as providing both *ex post* and *ex ante* monitoring. That monitoring may raise the objectivity of a parent's evaluation of its sub. A sub that cannot get a loan might spur its parent to analyze why a bank rejected the sub.

Such validation may be especially valuable to the minority, likely-diffuse shareholders of a sub that is not completely owned, but is owned and controlled enough by a parent to be consolidated into the parents' financial statements. (Being a public company would require a subsidiary to report audited financials too.) But, another intriguing possibility is that the external validation and funding might increase a parent's lending to its subsidiary.

Given the significantly-asymmetric information between borrowers and lenders, it would not be surprising if subsidiaries as well as their parents faced debt constraints. Such constraints likely vary across subsidiaries within business groups. Constraints at the business-group level likely leave many or all subsidiaries constrained, and perhaps particularly higher-quality subs, which groups might consider better able to borrow from banks directly.

5. Internal and External Lending: Hypotheses

In light of the discussion in the previous section and the associated model in the Appendix A, here we advance several hypotheses about internal and external lending. Our hypotheses relate components of internal and external lending to the conditions of parent companies and of their subsidiary companies. They also relate internal and external lending to broader factors, such as financial and economic crises. In the next section, we provide more details about our variables and estimated specifications.

5.1 Hypotheses about the effects of crises

One question of particular interest was how internal and external lending responded to the financial and economic crises that hit Japan over the three decades covered by our sample. Because the financial frictions associated with crises likely increased more for subsidiaries than for parents, we hypothesized that crises led to more internal lending when external lending to parents was impaired less by conditions in the banking system.

H1:   Parents lend more to their subsidiaries during crises, especially when banks are stronger.

5.2 Hypotheses about the effects of ownership, size, and needs for funds

We also allowed for parents' ownership percentages to affect their lending to their subsidiaries. We allowed for two measures of ownership, one that measured the importance of subsidiaries to their parent and a second that measured the importance of the parent to its subsidiaries. For either measure, more ownership signaled larger benefits from internal loans.

As an indicator of how many funds they were likely to have in the form of cash flows, the profitability of parents relative to that of their subsidiaries also may affect the amount of internal loans. Relatively profitable parents are more likely to be able to fund internal loans and to have subsidiaries who would benefit from the loans.

Capital expenditures require funds one way or another. When parents have larger capital expenditures, they likely have fewer funds available to lend to their subsidiaries. Conversely, parents may provide more internal loans when their subsidiaries have larger capital expenditures.

These considerations led to the following hypotheses:

H2:   Parents lend more internally as either ownership measure increases.

H3:   Parents lend more internally when their subsidiaries are smaller.

H4:   Parents lend less (more) to their subsidiaries when the parents (the subsidiaries) are more profitable.

H5:   Parents lend less internally when they have more capital expenditures or their subsidiaries have fewer capital expenditures.

6. Estimated Specifications

6.1 Baseline specification

To test our hypotheses about how much internal and external factors affected internal and external lending, we applied this specification to our panel of year-business group observations:

(1) $Lending_{i,t} = \alpha + \boldsymbol{\beta} \cdot \boldsymbol{CRISIS} + \boldsymbol{\gamma} \cdot \boldsymbol{Z}_{i,t-1} + \mu_i + e_{i,t}$

where $\boldsymbol{\beta} \cdot \boldsymbol{CRISIS} = \beta_1 \, JABubbleburst$

$$+ \beta_2 \, JABankcrisis$$
$$+ \beta_3 \, TakenakaPlan$$
$$+ \beta_4 \, GFC$$
$$+ \beta_5 \, GEAEarthquake$$

and $\quad \gamma \cdot Z_{i,t-1} \quad = \gamma_1 ParentEqIn_{i,t-1} + \gamma_2 ParentOwn_{i,t-1} + \gamma_3 Subsnumber_{i,t-1}$

$$+ \gamma_4 CapexParent_{i,t} + \gamma_5 CapexSubs_{i,t} + \gamma_6 ProfitGap_{i,t-1}$$

$$+ \gamma_7 GroupSize_{i,t-1} + \gamma_8 Trend$$

Table 1 contains the mnemonics, descriptions, and calculations for the variables in equation (1) above and equation (2) below. Next, we describe the variables we used.

We estimated equation (1) for each of five lending variables, *Lending*$_{i,t}$: *GroupLendAll*, *ParentLendAll*, *ParentLendSubs*, *ParentLendOut*, and *SubsLendOut*. *GroupLendAll* is external lending by the entire business group, i.e., consolidated lending. *ParentLendAll* is the sum of lending by the parent to its subsidiaries (*ParentLendSubs*) and lending by the parent to companies outside the business group (*ParentLendOut*). *ParentLendSubs* is internal lending, i.e. lending by parents to their subsidiaries. *ParentLendOut* and *SubsLendOut* are external lending by parents and by subsidiaries to outside companies. Subscripts *t* refer to the current fiscal year; subscripts *t-1* refer to the fiscal year lagged one year.

All of the financial statement variables were scaled by each parent's unconsolidated total assets as of the end of the immediately-prior fiscal year (t-1). Thus, each of the five lending variables, as well as the capital expenditure and profit variables were scaled this way.

6.2 Variables regarding the effects of crises

To test whether internal or external lending was affected by identifiable financial or economic stresses in Japan, we included five dummy variables in ***CRISIS***, as shown in equation (1) above:

1. *JABubbleburst*   =1 for FY1990 – FY1992; 0 otherwise,
2. *JABankcrisis*   =1 for FY1997 – FY1999; 0 otherwise,
3. *TakenakaPlan*   =1 for FY2001 – FY2003; 0 otherwise,
4. *GFC*   =1 for FY2008 – FY2009; 0 otherwise, and
5. *GEAEarthquake*   =1 for FY2011; 0 otherwise.

The initial conditions and the severities of effects on the Japanese economy and on banks differed across the five events listed above. The first dummy variable covers the period right after the bursting of the Japanese "bubble economy," when Japan's economy was troubled, but its banks less so. On the other hand, the second dummy variable corresponds to the years when Japanese banks were deeply troubled.

Next, following the Japanese "Accounting Big Bang" reform in 2000, the "Takenaka Plan" for financial revival forced banks to take more realistic amounts of write-downs on their non-performing (and sometimes "zombie") loans. As a result, banks' reported lower capital-to-asset ratios, which upped the pressures on banks to either raise capital or to reduce their assets. While the Takenaka Plan might have the effect of banks' reducing their lending, the data for banks' lending attitudes showed only a mild dip during EY2001-FY2003.

The GFC dummy covers the two years after the "Lehman Shock," when the Japanese economy suffered a serious downturn, in large part because of reduced worldwide demand for its exports. In contrast to the real economy after the Lehman shock and in contrast to their conditions starting in FY1997, Japanese banks remained relatively healthy following the Lehman Shock. The Great East Asia Earthquake at the very end of FY2010 adversely affected businesses in FY2011 and to some extent after FY2011. But, again, as after the Lehman Shock, after the GEA Earthquake, Japanese banks were damaged much less than the Japanese economy.

Panels A and B in Figure 4 compare aggregate internal lending and external borrowing during the Japanese banking crisis of the late 1990s with that during the global financial crisis of the late 2000s. Figure 4 shows flows for the years just before and just after these two, major, adverse shocks.

Panel A shows that, in the aggregate, external borrowing by parent companies and by their subsidiaries changed little over the years of the Japanese banking crisis. Parents' borrowing (primarily, from banks) even rose a little, while subsidiaries' borrowing, which was about half as large as that of parents, declined negligibly. In contrast, during this banking crisis, parents' loans to their subsidiaries rose 60 percent, from 10 to 16 trillion yen. Thus, panel A suggests that, even if parents or their

subsidiaries could not borrow externally during the banking crisis, parents still substantially increased their lending to their subsidiaries.

Panel B shows a noticeably different pattern of borrowing during the GFC. One difference was that Japanese banks were much healthier when the GFC erupted in the United States than they were during the domestic Japanese banking crisis. Panel B shows that parents' borrowing rose noticeably during the GFC years, while subsidiaries' external borrowing fell by about half as much. At the same time, internal loans increased by a modest amount.

Consistent with banks' reducing lending more during the banking crisis than during the GFC, Figure 5 shows that banks' attitudes toward business lending dropped more and for longer in the late 1990s than they dropped during the GFC. Notable is that the largest and longest decline in banks' willingness to lend to businesses occurred in the early 1990s, in the aftermath of the bursting of Japan's bubble economy.

6.3 Variables regarding the effects of ownership, size, and needs for funds

We are interested in the variables included in the vector $Z_{i,t-1}$ in their own right, as well as for their controlling for otherwise-omitted factors. Each of these variables were lagged one year. We included two variables that measured how important subsidiaries were likely to be. *ParentEqIn* is the parent company's investment (or equity holding) in its subsidiaries. Like the other variables that were based on balance sheet items, this investment was scaled to reflect its size relative to the size of the parent. For this variable, however, we expressed a parent's investment relative to the parent's unconsolidated equity, not to its assets. Thus, this variable served as a measure of the relative importance of the subsidiaries collectively to their parent. In contrast, *ParentOwn* is the parent's same investment in its subsidiaries, but this time scaled by the sum of the parent's equity investment in its subsidiaries and minority interest. This latter ratio stood for the relative importance of the parent to its subsidiaries. In effect, it measured how much of the subsidiaries the parent owned.

Subsnumber is the sum of the numbers of consolidated and of non-consolidated subsidiaries in a business group. The number of its subsidiaries may reflect how large subsidiaries taken together were relative to the size of the entire business group. It may

also indicate how small the average size of the group's subsidiaries was. Either large aggregate size or small average size would be expected to lead to more internal lending.

CapexParent is the parent's own capital expenditures, which we calculated as the sum of the parent's (unconsolidated) depreciation and the first difference of the stock of the parent's (unconsolidated) capital assets. *CapexSubs* is capital expenditures untaken by subsidiaries, which we estimated by the difference between the (consolidated) capital expenditures of the business group and the parent's capital expenditures. As noted above, both capex variables were scaled by the parent's total assets lagged one year.

ProfitGap indicates the relative profitability of the parent to that of its subsidiaries. To begin, we calculated parent profitability as unconsolidated net income minus dividends paid by subsidiaries to parent company. We calculated subsidiaries' profitability as the sum of consolidated net income and minority income, minus the parent's profitability. We next first-differenced the profitability of the parent and of its subsidiaries. Then, we calculated the difference, or gap, between those two first-differences. As other variables, the profit gap was scaled by the parent's total assets lagged one year.

While we scaled financial statement variables by a measure of parents' sizes, we also included a measure of the overall sizes of business groups. We calculated *GroupSize* as the (the natural log of) consolidated total assets lagged one year. Finally, the vector **Z** included a linear trend variable, *Trend*, to control for the effects of any pertinent, ongoing developments that we otherwise had not been able to identify and measure.

6.4 Lending attitudes by size of companies

After Table 4, Table 5 then shows estimates for the same five lending variables and the same control variables, *Lending* and **Z**, when we replace the vector **CRISIS** with two measures of banks' attitudes toward business lending:

(2) $Lending_{i,t} = \alpha + \boldsymbol{\delta} \cdot \boldsymbol{BANKSATT} + \boldsymbol{\gamma} \cdot \boldsymbol{Z}_{i,t-1} + \mu_i + e_{i,t}$

where $\boldsymbol{\delta} \cdot \boldsymbol{BANKSATT} = \delta_1 BanksAttParent_t + \delta_2 BanksAttSubs_t$

BANKSATT in equation (2) contains two measure of banks' lending attitudes. We obtained the net percent of answers "accommodative" bank lending attitudes, calculated as percent of banks' answers "accommodative" minus the percent of their answers "severe" in response to the quarterly TANKAN survey, which was conducted by the

Bank of Japan. Banks reported their attitudes about loans by sizes of businesses. The TANKAN survey asked banks about their attitudes toward businesses categorized as large (more than 1 billion yen), medium-sized (100 million yen to 1 billion yen), or small (20 million yen to 100 million yen), based on the businesses' equity capital.

We included *BanksAttParent* and *BanksAttSubs* simultaneously. For each year-business group observation, we constructed *BanksAttParent* as the net percent of banks that answered that they had "accommodative" lending attitudes toward companies of the (equity capital) size of the business group's parent company.[8] We calculated *BanksAttSubs* in the same way, but used net percent "accommodative" answers for companies of the size of the business group's subsidiaries. We calculated the equity of a business group's subsidiaries as the parent's unconsolidated equity investment in its subsidiaries divided by the percent (in decimal form) of the subsidiaries that the parent owned.

Figure 5 plots the quarterly net percent "accommodative" answers for lending to the three sizes of businesses. Banks' attitudes were most accommodative, or lenient, during the latter 1980s, the years of the "bubble economy." After the bubble burst, the net percent accommodative for large businesses plummeted from about +40 to nearly -40, the largest swing of the entire period. As the economy recovered during the 1990s, so did lending attitudes toward businesses of all sizes, before again plummeting when the banking crisis erupted at the end of the 1990s. Banks' lending attitudes also became a bit less accommodating in the early 2000s when the "Takenaka Plan" forced banks to recognize their loan losses. The global financial crisis (GFC), which began outside Japan and outside Japanese banks, was also associated with more stringent bank lending conditions. The tighter conditions stemmed less from the direct effects of the GFC on Japanese banks than on the harm that the GFC imposed on banks' commercial borrowers, especially those that were large exporters to the U.S. and Europe. In contrast, the Great East Asia Earthquake on March 11, 2011 left little imprint on banks' lending attitudes, despite the toll that the earthquake took on the Japanese economy.

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[8] Because the TANKAN attitudes survey began in June 1983, FY1984 (ending March 31, 1985) was the first year for which we could use the TANKAN variable. That determined the starting date for our sample.

6.5 Sample of listed, nonfinancial, Japanese companies

We obtained financial statements for all listed, non-financial companies in Japan for fiscal years 1984–2014 (FY1983–FY2014). We used the standard source for these data, Astra Manager. After we excluded financial companies (i.e., banking, securities, insurance and other financial businesses), our sample had 89,957 year-business group observations.

Notably, about three-fourths of listed nonfinancial companies had at least one subsidiary. When we next restricted our sample of companies to those that filed both consolidated and unconsolidated financial statements, so that our sample consisted of companies that were business groups, in that they had a parent company and at least one (consolidated) subsidiary, our sample contained 67,408 year-business group observations. Each parent, on average, had 20 or more subsidiaries. When we removed from our sample the listed companies that themselves had parents—so that we kept only top-level parents, we were left with 59,980 observations.

After dropping observations that had some missing data and delaying the start of our sample period until FY1984 to accommodate one-year-lagged data, our final sample had 49,950 year-business group observations. On average, each year in our resulting FY1984 – FY2014 sample had over 1,400 business groups.

Tables 2 and 3 show descriptive statistics and correlations of the variables that we calculated and used. The statistics in Tables 2 and 3, as well as the estimates shown in Tables 4 – 9 below, were based on data that we winsorized at one and 99 percent for each variable for each year. The exceptions were that neither the five dummy variables for crises, the two lending-attitude variables, nor the linear trend were winsorized.

7. Results for Internal and External Lending

Tables 4 and 5 show estimates of equations (1) and (2) for each of the five lending variables. The estimates were based on a common sample of 49,950 year-business group observations for FY1984 – FY2014. Except for the alternative groups of crisis-related variables, the estimates were based on a common set of (baseline) control variables. Each of the estimated specifications included business-group fixed effects.

Statistical significance of each coefficient estimate was based on robust standard errors, which are shown in parentheses under each estimated coefficient.

7.1 Effects of crises

Table 4 shows the estimated effects on the five lending variables of the crisis dummies and the baseline controls. Column 1 presents results for consolidated lending by business groups. Columns 2 – 5 show the estimates for unconsolidated and for internal lending, as well as subsidiaries' lending to companies outside their business groups.

Their significantly negative estimated coefficients in column 1 imply that *JABubbleburst*, *GFC*, and *GEAEarthquake* were associated with reduced consolidated lending. The Takenaka plan, on the other hand, raised it, as did *JABankcrisis*. One notable feature of the estimates of the crisis-related coefficients based on consolidated lending in column 1 is that they generally were not much correlated with the coefficients in columns 2 – 4, though they more closely mimicked the estimates in column 5. But even so, *GFC* and *GEAEathquake* had negative signs in column 1, but positive signs in column 5. Thus, lending based on consolidated data seems to be a poor substitute for the other measures of B2B lending.

We also estimated equation (1) with year fixed-effects replacing the five crisis dummy variables. The replacement had little effect on the coefficient estimates on the control variables in rows 6 – 12. The disadvantage of a specification that included year fixed-effects was that we then couldn't estimate crisis-specific effects. Nor could we then get an estimate of the effect of a linear trend. Given these considerations, we do not report results based on a specification that included year fixed-effects.

Parents acted as if blood were thicker than water. One of the most noticeable patterns in the crisis-related coefficient estimates in Table 4 is that the crises tended to boost lending within the family (i.e., to subsidiaries) and simultaneously reduce parents' lending outside the family (i.e., outside the business group). At the same time, crises tended to boost subsidiaries' external lending. One intriguing possibility is that subs borrowed from their parents in order to lend to the subs' customers or suppliers.

The only crisis that significantly reduced parents' lending was the banking crisis of the late 1990s. Then, parents reduced both internal and external lending. Parents reduced their external lending during each crisis, as shown in column 4. But, they raised

their internal lending during each crisis, except for the late 1990s banking crisis. These results point toward a banking crisis making it more difficult for parents to aid their corporate children. That, in turn, suggests that Japan was fortunate to have a stronger banking system when the other crises erupted.

7.2 Effects of ownership, subsidiaries' sizes, and funds available and needed

Rows 6 and 7 of Table 4 show the estimated effects of the two ownership variables, the first indicating the importance of its subsidiaries to parents and the second indicating the importance of parents to their subsidiaries.

In general, we found significant, positive effects of ownership. Row 6 shows that the larger the share of business group's equity that was invested in its subsidiaries, the more that the parent lend to its subsidiaries. Row 7 shows the effects on lending of *ParentOwn$_{t-1}$*, which measured how much of their subsidiaries parents owned. Again, as shown in column 3, parents lent more when they owned larger percentages of their subsidiaries.

This result recalls debt overhang, though in mirror image: The more that lending to subsidiaries would benefit the other (minority) owners of subsidiaries' equity, the less debt in the form of loans to their subsidiaries that parents would provide. Lending was larger when parents wholly owned their subsidiaries. In that regard, then, these results might be regarded as evidence of "equity overhang." The reasons for higher ownership shares being associated with parents' lending more and subsidiaries lending less to outside companies is not apparent.

Row 12 shows the estimated effects of the size of business groups, as measured by consolidated assets, on lending. Columns 2 and 3 shows that parents' lending shrank (as a percent of their (lagged) assets) as the size of the business group rose. The decline in lending was especially large for parents' internal lending.

Smaller subsidiaries were likely to have less access and less favorable terms for external credit than their business groups as a whole, or even than larger subsidiaries had. Having controlled for the overall size of a business group by including consolidated assets in row 12, the total number of subsidiaries may serve as a proxy for how small a group's subsidiaries were on average, or it may serve as a proxy for how large the group's subsidiaries were when taken together. Regardless of interpretation, the

coefficient in row 8 for parents' internal lending was strongly significant and positive. Again here, the variable that boosted internal lending also reduced parents' external lending, as shown in column 4.

We do not have data for subsidiaries' borrowers, supplies, or customers. Nor do we have data for any loans between subsidiaries. It may well be that the small-size-related constraints on credit applied to subs' customers just as it did to subsidiaries themselves. That would lead smaller subsidiaries to make more loans to smaller companies for the same reasons that the subs borrowed from their parents.

Capital expenditures (capex) require funds. Rows 9 and 10 show the estimated effects on lending of parents' and of subsidiaries' capital expenditures. Across the columns, row 9 shows that parents' capex tended to reduce both their lending to subsidiaries and slightly reduce subsidiaries' external lending. On the other hand, row 10 shows that subsidiaries' capex was associated with more loans from their parents.

Profitability had effects on lending that were consistent with the effects of capital expenditures. Of course, since capex used funds, while profits were a source of funds, the signs in row 11 of Table 4 were opposite of those in row 9. Row 9 shows that the profitability of parents (relative to their subsidiaries), as measured by *ProfitGap*, was associated with more lending by parents to their subsidiaries and to outside companies.

The specification in Table 5 replaced the crisis-related dummy variables in Table 4 with two measures of banks' willingness to lend: (1) to large companies and (2) to smaller companies.

The results in Table 5 are generally quite similar to those in Table 4. In Table 5, Row 2 shows that when banks were more willing to lend to smaller companies, then parents tended to lend less to their subsidiaries, presumably because the conditions were more conducive for the subs to borrow themselves. Similarly, easier bank-credit conditions were associated with decidedly less external lending by subsidiaries, perhaps for the same reason. On the other hand, easier borrowing conditions for parents did not translate into more loans to the subsidiaries, as shown in row 1.

As in Table 4, rows 3 and 4 show that parents tended to lend more internally when more of the parents' equity was in their subsidiaries and when the parents' equity

constituted a larger share of their subsidiaries' equity. Thus, more investments in subsidiaries boosted loans from their parents.

Having controlled for the size of business groups and for the amounts invested in the subsidiaries, row 5 shows that parents lent more internally when they had more subsidiaries. And, as in Table 4, rows 6 and 7 in Table 5 point toward lower parents' capital expenditures and higher subsidiaries' capex leading to more parents' lending to their subsidiaries. Similarly, row 8 shows that, when parents were more profitable (relative to their subsidiaries), they increased their lending to them. And, again, larger business groups made fewer internal loans (relative to parents' assets).

7.3 Alternative sample splits and specifications

The dependent variable is *ParentLendSubs* for all columns in Tables 6 – 9. Table 6 shows results by average size of subsidiaries. We estimated subsidiaries' size as consolidated total assets minus unconsolidated total assets, plus eliminated items when those are consolidated such as equity investment of parent to its subsidiaries, dividends paid by subsidiaries to their parent, internal receivables and payables, and so on. For each business group and year, we then divided the resulting, estimated assets of subsidiaries by the associated number of subsidiaries.

One notable results was that, during the banking crisis, parents' lending to their subsidiaries declined only for the largest subs. We did not detect reductions in internal lending to medium- or small-sized subsidiaries. And, only for the largest subs were the effects of ownership on internal lending significant. The effects of parent and of subsidiary capital expenditures were similar for subsidiaries of all sizes.

One place where splitting the sample by the average size of a group's subsidiaries produced noticeably different results was the estimated effects of banks' willingness to lend. In Table 5, we detected relatively weak effects of banks' attitudes on internal lending. In contrast, Table 6 shows much larger and more significant effects of attitudes toward large businesses and toward smaller businesses for small and medium-sized subsidiaries. More accommodative lending attitudes toward large businesses clearly boosted parents' lending to small and medium-sized subsidiaries. And, more accommodative lending attitudes toward smaller businesses clearly reduced parents' lending to small and medium-sized subsidiaries. Table 6 also shows that internal lending

at large subsidiaries showed little reaction to either measure of banks' attitudes. The results for rows 10- 15 were quite similar in Table 6 to those in Tables 4 and 5.

Table 7 shows the results of our basic specification for three sample splits: whether a parent had any listed subsidiaries, whether they had any foreign subsidiaries, and whether the parent had positive profits. In general, the estimated effects in Table 7 differed relatively little across each sample split.

One reason that we used these sub-samples was to see if there were indications that internal lending was importantly affected by tax considerations. A priori, for several reasons we did not expect to see appreciable indications that business groups' lending was driven by tax considerations. While income-statement items might be managed to minimize groups' average tax rates, it is much less clear that changes in lending would effectively do so. For example, in the case of India, Gopalan, Nanda, and Seru (2007) reported that about 80 percent of internal loans specified no interest rate at all. Corporate tax rules in Japan have virtually no progressivity. The Japanese tax system has had various rules that were designed to make the corporate tax rate on domestic earnings very close to that on foreign earnings. In addition, tax rules intended to tax earnings similarly, regardless of whether earned by parents or subsidiaries or whether dividends were paid by subsidiaries to parents. Of course, earnings management might try to avoid parents or subsidiaries have losses that would raise the group's average tax rate. To the extent that losses could be carried forward or backward, even that tax motivation would be dampened.

When Table 8 then substitutes the bank attitude variables for the crisis dummies, the results are similar to those in Table 7. And, while there some differences in the estimated responses to some factors, the statistical significance of the responses generally was not very different across each sample split in Tables 7 and 8.

To show additional evidence about the robustness of our results, Table 9 shows the results when we added three financing variables to our baseline specification: trade credit from parents to subs, parents' and subsidiaries' borrowing from outside, primarily banks. The dependent variable for each column in Table 9 is parents' lending to their subsidiaries. If anything, Table 9 has firmer results than Tables 4 and 5.

Since the size and significance of the responses of internal lending were quite similar to those in Tables 4 and 5, the estimated effects of the three additional financing variables on parents' lending to their subsidiaries are of more interest. Columns 1 and 2 of Table 9 added *ParentTCSubs*. Columns 3 and 4 show the results of replacing the trade credit variable with *ParentBorrOut* and *SubsBorrOut*, which are external borrowing of parent and of subsidiaries, each scaled by parents' assets (lagged).

Columns 1 and 2 show that parents' extending more trade credit to their subsidiaries, *ParentTCSubs*, is associated with reduced loans. Columns 3 and 4 add variables for parents' and subsidiaries' external borrowing, while still retaining the crisis and willingness-to-lend variables. Row 17 shows that having more loans from the outside is associated with parents' lending more to their subsidiaries. That result is not very surprising. At same time, columns 3 and 4 show that, when they had more external loans, subs also had more internal loans. One reason for those positive coefficients may be that subsidiaries that needed to borrow outside pursued internal loans at the same time.

We also estimated our basic specification over other sample splits. Since most of the results were quite similar to those in Table 4, we have not included tables with those results. Nonetheless, some deserve brief mention.

First, omitting the year-group observations that had no internal lending at all reduced the sample size by about one-fourth. While the estimates for the company variables were virtually unaffected, those for the dummy variables for crises after 2000 shrank, with that for the Great East Asia Earthquake plummeting to being nowhere near significant. Restricting the sample to exclude year-group observations whose internal lending was less than one percent, the required-reporting threshold in Japan, reduced the sample size by another one-fourth. The resulting estimates were very similar to those based on the sample that excluded only observations that had no internal lending.

The most noticeable change in estimates came when we acted as if we only had the data when internal lending was at least 10 percent of parents' assets, which is the IFRS threshold for reporting. The sample size is then only about one-tenth as large as the complete sample. Not only do the crisis variables dwindle to insignificance, but so too do many of the previously-significant control variables. Examples include the ownership variables, the numbers of subsidiaries, and parents' capital expenditures.

We also split the sample into groups that did or did not have any commercial connections, as measured by sales (in either direction) between parents and subsidiaries. The three-fourths of year-group observations with some within group sales delivered estimates that were similar to the full-sample results, and perhaps a bit stronger. The estimated effects of the control variables were not much different than those for the full sample. The biggest difference was that the more-recent crises had much larger positive effects. In contrast, the estimated crisis effects on internal lending was much weaker when the sample had observations for groups that had no commercial connections between parents and subsidiaries. These results suggest that parents based their internal lending on ownership factors, but also on commercial connections with their subsidiaries.

8. Summary and Implications

We analyzed whether and how much loans from parent companies to their separately-incorporated subsidiaries responded to ordinary and extraordinary conditions.

Parent-specific and subsidiaries-specific conditions significantly affected internal lending. Larger capital expenditures by parents were associated with less lending to their subsidiaries. And, conversely, larger capital expenditures by subsidiaries were associated with more loans from their parents. Consistent with the effects of capital expenditures' using funds, as a source of additional funds, greater profitability of parents relative to that of their subsidiaries was associated with more internal lending to subsidiaries.

We also detected strong ownership effects. The more of its subsidiaries that it owned, the more that parents tended to lend to them. And, separately, the larger the fractions of the parents' equity that was invested in their subsidiaries, the more that parents lent to them.

We found that parents' internal lending to their subsidiaries rose during the crises that erupted after 2000, when Japanese banks were stronger. However, we detected no rise in internal lending when Japanese banks were at the center of a crisis. When crises did raise parents' internal lending, their external lending tended to decline by roughly similar amounts. We also found that, while they were getting more loans from their parents at these times, subsidiaries were simultaneously increasing their lending to

companies outside their business groups, presumably to subsidiaries' customers or suppliers.

Thus, we found similar, and in some ways stronger, responses of internal lending in a developed economy with a well-developed banking system than have been found in emerging economies. While we might have expected the opposite, we found that, when banks were also in better condition to lend, parents lent more internally. Future work then might fruitfully investigate to what extent parents' lending to subsidiaries is a substitute for bank lending or, instead, just a conduit for bank lending.

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Figure 1.   Internal and External Lending by a Parent and by Its Subsidiaries
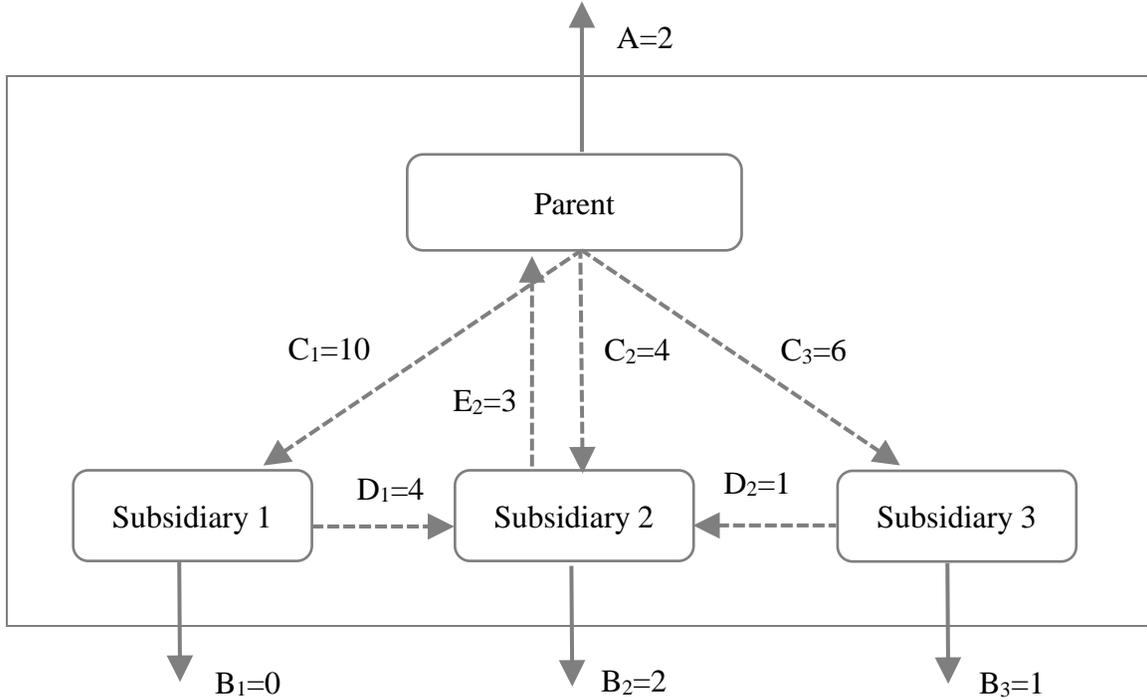
A: Loans from the parent company to outside companies
B: Loans from subsidiaries to outside companies
C: Loans from the parent company to its subsidiaries
D: Loans between subsidiaries
E: Loans from subsidiaries to the parent company

Notes: The arrows show examples of loans outstanding to and from a parent company, to and from its subsidiaries, and to companies outside the business group, which is delineated by the box. The unconsolidated balance sheet reports as assets $A+C = 22$, consisting of the loans that the parent company made to outside companies ($A=2$) plus the loans that it made to its subsidiaries ($C_1 + C_2 + C_3 = 20$). The business group's consolidated balance sheet reports as assets $A+B = 5$, consisting of the sum of the loans that the parent and that its subsidiaries made to outside companies ($B_1 + B_2 + B_3 = 3$). Loans made between subsidiaries are shown as D_1 and D_2. Loans that the subsidiaries made to parent company are shown by E_2. Data for loans made between subsidiaries, D, do not appear in consolidated or unconsolidated balance sheets or in their footnotes.

Figure 2.   Consolidated and Unconsolidated Lending

Panel A. Loans made by parents and by their subsidiaries to outside companies

Panel B. Loans made by parents to their subsidiaries and to outside companies
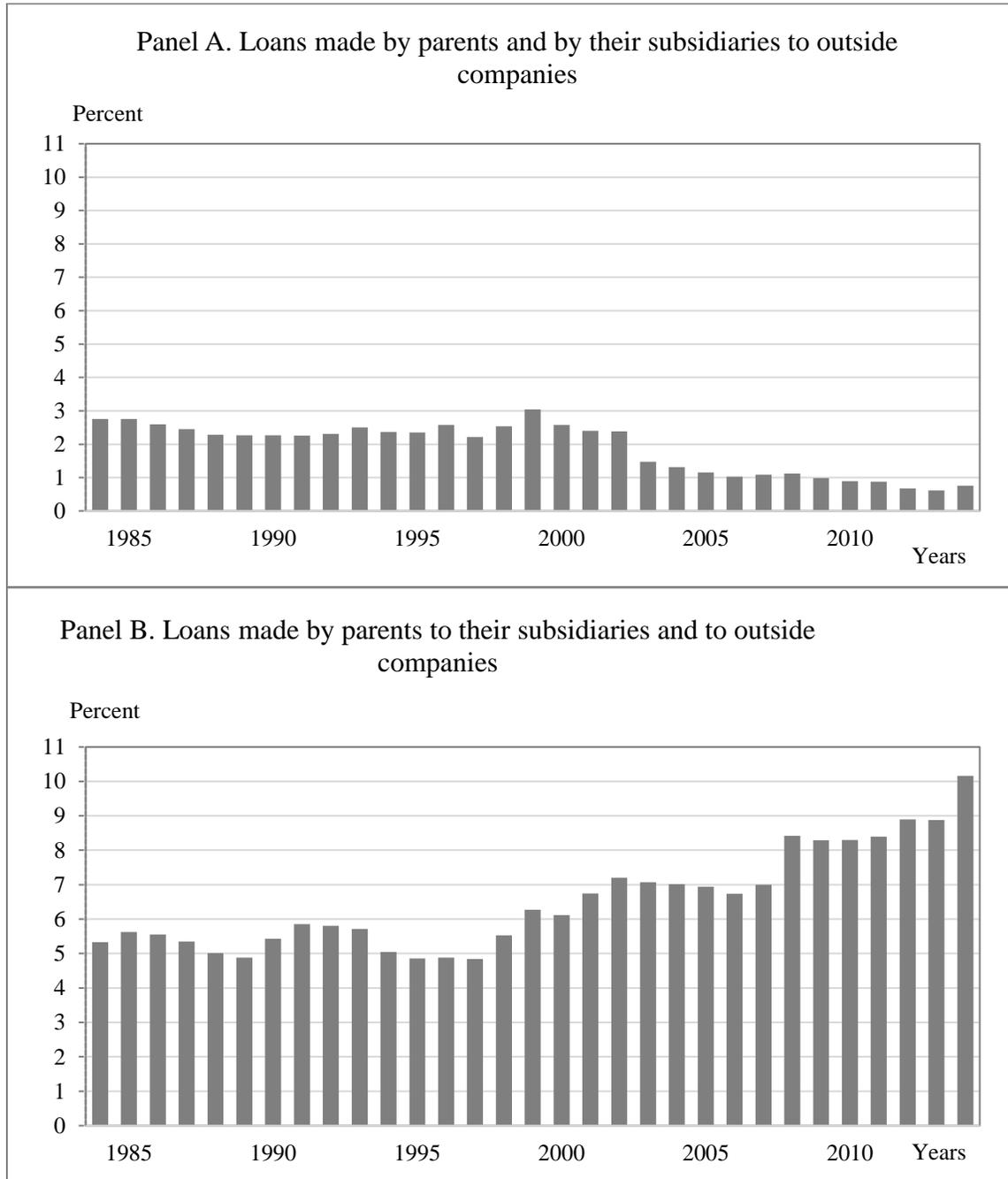
Notes: This Figure shows aggregate loans outstanding, as a percent of parent companies' (i.e., unconsolidated) assets, for FY1984 - FY2014 for listed, nonfinancial Japanese companies that had consolidated and unconsolidated data and that reported internal transactions in footnotes to unconsolidated financial statements. Panel A shows external lending by parents and their subsidiaries. Panel B shows the sum of parents' internal (i.e., to their subsidiaries) and parents' external (i.e., to outside companies) lending.

Figure 3. Internal and External Lending by Parents and by Their Subsidiaries

Panel A. Loans made by parents to their subsidiaries

Panel B. Loans made by parents to outside companies

Panel C. Loans made by subsidiaries to outside companies
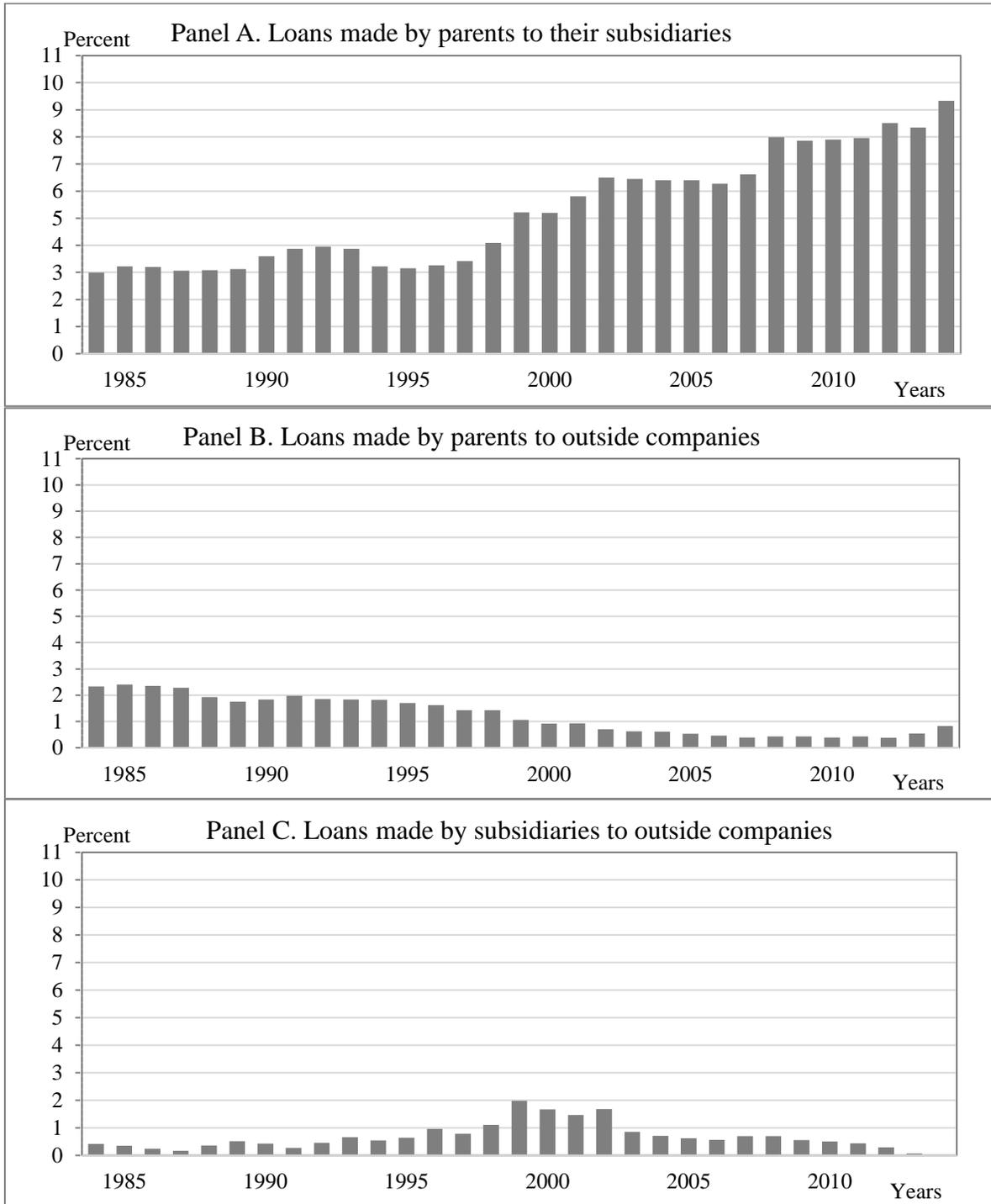
Figure 4. Lending by Parents to Their Subsidiaries During the Japanese Banking Crisis and During the Global Financial Crisis

Panel A. Japanese Banking Crisis

- - - - ▸ FY1996: Fiscal year before the Japanese banking crisis
———▸ FY1999: Fiscal year after the Japanese banking crisis

External borrowing by parents
128
130

Parents

Internal loans from parents to subsidiaries
10   16

Subsidiaries

67
66
External borrowing by subsidiaries

Panel B. Global Financial Crisis

- - - - ▸ FY2007: Fiscal year before the global financial crisis
———▸ FY2009: Fiscal year after the global financial crisis

External borrowing by parents
105
118

Parents

Internal loans from parents to subsidiaries
20   23

Subsidiaries

45
39
External borrowing by subsidiaries

Notes: Loans outstanding in trillions of yen. Panel A contains data for the same 1,480 business groups for both FY1996 and FY1999. Panel B contains data for the same 1,598 business groups for both FY2007 and FY2009.

Figure 5.   Banks' Lending Attitudes toward Large, Medium, and Small Businesses
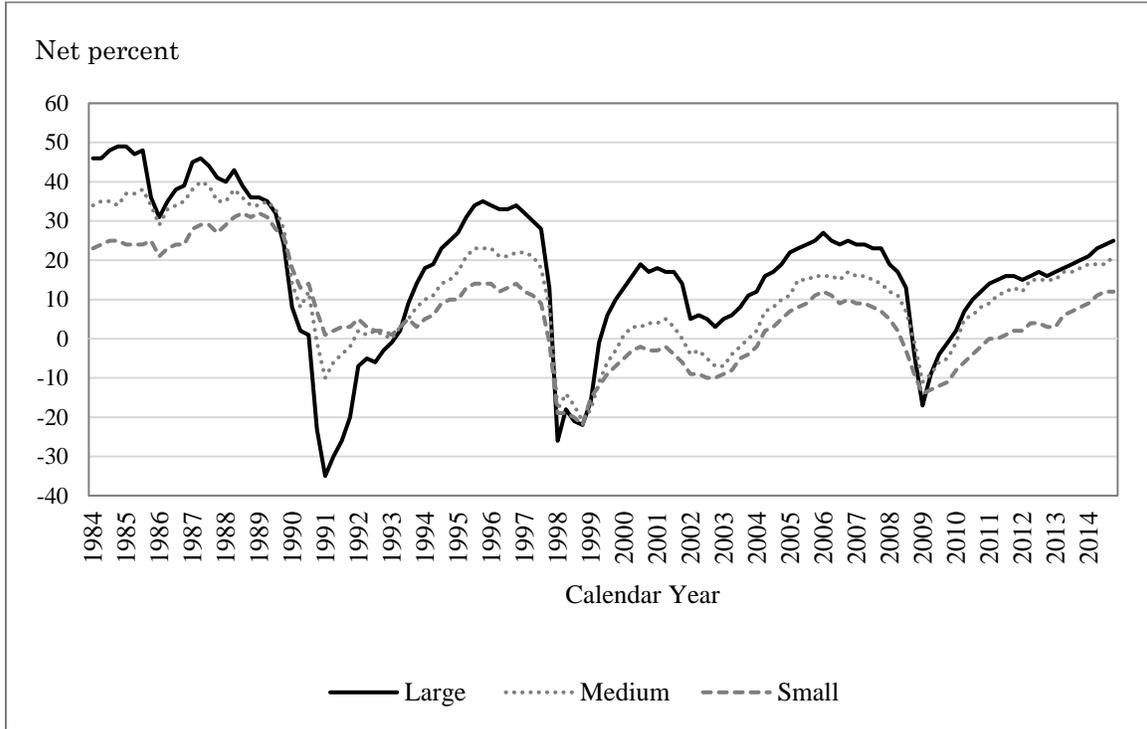
Notes: This Figure shows quarterly data for 1984Q1 – 2014Q4 for the net percent of commercial banks that reported accommodative attitudes toward business lending in the TANKAN quarterly survey. For each of three sizes of businesses, the net percent was calculated as the percent of banks that reported "accommodative" minus the percent of banks that reported "severe" attitudes. Businesses were categorized as being large (more than 1 billion yen of book equity), medium-sized (100 million yen to 1 billion yen), or small (20 million yen to 100 million yen). Source: Bank of Japan.

Table 1. Variables' Mnemonics, Descriptions, and Calculations

Mnemonics	Descriptions	Calculations
Panel A. Loans and trade credit		
1. *GroupLendAll*	Total lending by the business group to outside companies	consolidated lending / A^{UN}_{t-1}
2. *ParentLendAll*	Total lending by the parent to its subsidiaries and outside companies	unconsolidated lending / A^{UN}_{t-1}
3. *ParentLendSubs*	Total lending by the parent to its subsidiaries	lending by the parent to subsidiaries / A^{UN}_{t-1}
4. *ParentLendOut*	Total lending by the parent to outside companies	(unconsolidated lending – lending by the parent to subsidiaries) / A^{UN}_{t-1}
5. *SubsLendOut*	Total lending by subsidiaries to outside companies	(consolidated lending – (unconsolidated lending – lending by the parent to subsidiaries)) / one-year-lagged consolidated total assets)
Panel B. Crisis variables		
6. *JABubbleburst*	Aftermath of "bubble economy"	= 1 for FY1990 - FY1992; = 0 otherwise
7. *JABankcrisis*	Japanese banking crisis	= 1 for FY1997 - FY1999; = 0 otherwise
8. *TakenakaPlan*	Regulators forced banks to write-off non-performing loans	= 1 for FY2001 – FY2003; = 0 otherwise
9. *GFC*	Global financial crisis	= 1 for FY2008 – FY2009; = 0 otherwise
10. *GEAEarthquake*	Great East Japan earthquake	= 1 for FY2011; =0 otherwise
Panel C. Bank attitude toward business lending variables		
11. *BanksAttParent*	Banks' lending attitudes toward companies of the parent's size	Net percent of banks reporting "accommodative" lending attitude toward companies of the same size as parent companies, as measured by equity capital
12. *BanksAttSubs*	Banks' lending attitudes toward companies of the subsidiaries' size	Net percent of banks reporting "accommodative" lending attitude toward companies of the same size as subsidiary companies, as measured by equity capital

Notes: A^{UN}_{t-1} in the denominators refers to the one-year-lagged value of a business group's unconsolidated (i.e., the parent's) total assets. Ratios in Panel A were multiplied by 100 to convert them percentage points.

(continued) Table 1.   Variables' Mnemonics, Descriptions, and Calculations

	Mnemonics	Descriptions	Calculations
Panel D. Parent and subsidiary specific variables			
13.	*ParentEqIn*	Equity investment by the parent in its consolidated and non-consolidated subsidiaries	unconsolidated investment in consolidated and non-consolidated subsidiaries / unconsolidated equity
14.	*ParentOwn*	Parent's ownership share of its consolidated and non-consolidated subsidiaries	unconsolidated investment in consolidated and non-consolidated subsidiaries / (unconsolidated investment in consolidated and non-consolidated subsidiaries + minority interest)
15.	*SubsNumber*	Total number of subsidiaries	Sum of the numbers of consolidated and non-consolidated subsidiaries
16.	*CapexParent*	Capital expenditures by the parent	(first difference of unconsolidated capital assets) + unconsolidated depreciation) / A^{UN}_{t-1}
17.	*CapexSubs*	Capital expenditures by the subsidiaries	(first difference of consolidated capital assets) + consolidated depreciation) – ((first difference of unconsolidated capital assets) + unconsolidated depreciation) / A^{UN}_{t-1}
18.	*ProfitGap*	Profit difference between parent and subsidiaries	first difference of (unconsolidated net income – dividend by subsidiaries to parent) – ((consolidated net income + minority income) – first difference of (unconsolidated net income – dividend by subsidiaries to parent)) / A^{UN}_{t-1}
19.	*GroupSize*	Size of the business group	Natural log of consolidated total assets
20.	*Trend*	Linear trend	Linear trend

Notes: A^{UN}_{t-1} in the denominators refers to the one-year-lagged value of a business group's unconsolidated (i.e., the parent's) total assets. Ratios in Panel A were multiplied by 100 to convert them percentage points.

Table 2.   Sample Descriptive Statistics

		mean	sd	min	p25	p50	p75	max
1.	*GroupLendAll*	0.93	2.24	0.00	0.00	0.16	2.29	15.38
2.	*ParentLendAll*	4.96	7.64	0.01	0.14	2.23	12.39	46.26
3.	*ParentLendSubs*	3.93	6.87	0.00	0.00	1.42	10.34	42.54
4.	*ParentLendOut*	0.90	2.18	0.00	0.00	0.14	2.27	14.57
5.	*SubsLendOut*	0.03	1.56	-7.92	-0.45	0.00	0.69	7.54
6.	*JABubbleburst*	0.13	0.17	-0.35	-0.16	0.16	0.33	0.49
7.	*JABankcrisis*	0.07	0.14	-0.35	-0.11	0.09	0.25	0.49
8.	*TakenakaPlan*	0.07	0.25	0.00	0.00	0.00	0.00	1.00
9.	*GFC*	0.11	0.32	0.00	0.00	0.00	1.00	1.00
10.	*GEAEarthquake*	0.12	0.33	0.00	0.00	0.00	1.00	1.00
11.	*BanksAttParent*	0.09	0.28	0.00	0.00	0.00	0.00	1.00
12.	*BanksAttSubs*	0.04	0.20	0.00	0.00	0.00	0.00	1.00
13.	*ParentEqIn*	17.91	29.48	0.05	0.81	7.40	45.07	183.54
14.	*ParentOwn*	85.29	20.52	13.84	54.41	95.09	100.00	100.00
15.	*SubsNumber*	20	40	1	2	8	44	274
16.	*CapexParent*	3.24	4.28	-7.46	0.05	2.15	8.20	22.34
17.	*CapexSubs*	1.88	4.11	-6.91	-0.22	0.55	5.72	24.19
18.	*ProfitGap*	0.07	5.69	-22.86	-4.25	0.03	4.25	25.54
19.	*GroupSize*	10.99	1.50	7.88	9.21	10.81	13.09	15.21
20.	*Trend*	19	8	1	7	19	29	31

Notes: This Table shows the means, standard deviations (sd), minimums (min), maximums (max), medians (p50), and the lower and upper ten percent quantiles (p10 and p90) for variables described in Table 1. The descriptive statistics were calculated from data for 45,950 business group-year observations of end-of-fiscal year values for FY1984 – FY2014 for listed, nonfinancial, Japanese business groups. For descriptions and calculations of variables, see Table 1.

Table 3.   Correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.	*GroupLendAll*	1.00																			
2.	*ParentLendAll*	0.38	1.00																		
3.	*ParentLendSubs*	0.18	0.91	1.00																	
4.	*ParentLendOut*	0.61	0.37	0.00	1.00																
5.	*SubsLendOut*	0.45	0.04	0.20	-0.40	1.00															
6.	*JABubbleburst*	0.00	0.00	-0.01	0.05	-0.05	1.00														
7.	*JABankcrisis*	0.01	0.03	0.01	0.08	-0.09	0.87	1.00													
8.	*TakenakaPlan*	0.00	-0.03	-0.05	0.03	-0.05	-0.41	-0.21	1.00												
9.	*GFC*	0.01	-0.05	-0.05	-0.01	0.02	-0.42	-0.44	-0.10	1.00											
10.	*GEAEarthquake*	0.03	-0.02	-0.01	-0.03	0.08	-0.12	-0.26	-0.10	-0.13	1.00										
11.	*BanksAttParent*	-0.02	0.04	0.06	-0.05	0.03	-0.34	-0.30	-0.08	-0.11	-0.11	1.00									
12.	*BanksAttSubs*	-0.02	0.03	0.05	-0.04	0.02	0.02	0.04	-0.06	-0.08	-0.08	-0.07	1.00								
13.	*ParentEqIn*	0.11	0.27	0.26	0.06	0.07	-0.01	0.07	-0.05	-0.03	-0.01	0.05	0.05	1.00							
14.	*ParentOwn*	-0.01	0.07	0.06	0.02	-0.04	0.00	-0.02	0.00	0.01	-0.05	0.01	0.02	0.12	1.00						
15.	*SubsNumber*	0.09	0.12	0.12	0.04	0.08	-0.01	0.06	-0.03	0.00	0.00	0.02	0.02	0.32	-0.06	1.00					
16.	*CapexParent*	-0.04	-0.11	-0.11	-0.02	-0.04	-0.01	0.05	0.14	0.02	-0.07	-0.05	-0.03	-0.11	-0.03	-0.04	1.00				
17.	*CapexSubs*	0.03	0.26	0.27	0.03	0.01	0.05	0.11	-0.01	-0.03	-0.05	-0.03	0.01	0.16	-0.05	0.21	-0.01	1.00			
18.	*ProfitGap*	0.01	0.01	0.01	0.01	-0.01	0.04	0.04	-0.02	-0.03	0.01	-0.01	0.00	0.00	-0.01	0.00	0.01	0.00	1.00		
19.	*GroupSize*	0.06	0.02	0.01	0.04	0.02	-0.01	0.13	0.07	0.02	-0.02	-0.03	-0.02	0.20	-0.13	0.62	0.03	0.16	-0.01	1.00	
20.	*Trend*	-0.05	0.12	0.15	-0.07	0.03	-0.05	-0.13	-0.35	-0.16	0.02	0.26	0.25	0.14	0.04	0.06	-0.21	0.08	0.03	-0.12	1.00

Notes: This Table shows the correlation between each pair of variables described in Table 1. The simple correlations were calculated from data for 45,950 business group-year observations of end-of-fiscal year values for FY1984 – FY2014 for listed, nonfinancial, Japanese business groups. Column numbers refer to variables with the same row numbers. For descriptions and calculations of variables, see Table 1.

Table 4.   Lending by Parents and by Their Subsidiaries:
Dummy Variables for Banking, Financial, and Economic Crises

	GroupLendAll	ParentLendAll	ParentLendSubs	ParentLendOut	SubsLendOut
	(1)	(2)	(3)	(4)	(5)
1. *JABubbleburst*	-0.16 ***	0.07	0.05	-0.01	-0.11 ***
	(-5.07)	(0.73)	(0.61)	(-0.37)	(-4.08)
2. *JABankcrisis*	0.06 **	-0.25 ***	-0.14 **	-0.14 ***	0.18 ***
	(2.31)	(-3.57)	(-2.19)	(-6.05)	(8.47)
3. *TakenakaPlan*	0.24 ***	0.02	0.30 ***	-0.22 ***	0.40 ***
	(9.69)	(0.24)	(4.51)	(-9.68)	(22.68)
4. *GFC*	-0.05* *	0.35 ***	0.76 ***	-0.32 ***	0.22 ***
	(-1.68)	(3.70)	(8.36)	(-11.40)	(10.88)
5. *GEAEarthquake*	-0.07 **	0.04	0.55 ***	-0.40 ***	0.25 ***
	(-2.06)	(0.29)	(4.33)	(-11.34)	(9.74)
6. *ParentEqIn*	0.00 **	0.02 ***	0.02 ***	0.00 **	0.00
	(2.23)	(11.60)	(10.72)	(2.35)	(1.38)
7. *ParentOwn*	0.00	0.01 ***	0.01 ***	0.00 ***	-0.00 ***
	(0.13)	(5.02)	(3.27)	(4.50)	(-6.60)
8. *SubsNumber*	0.00 **	0.01 ***	0.01 ***	-0.00 ***	0.00 ***
	(2.35)	(5.75)	(7.42)	(-4.20)	(6.74)
9. *CapexParent*	-0.00	-0.05 ***	-0.06 ***	0.00	-0.01 ***
	(-1.00)	(-6.55)	(-7.24)	(1.21)	(-2.98)
10. *CapexSubs*	0.01 **	0.22 ***	0.20 ***	0.01 ***	-0.00
	(2.56)	(17.68)	(16.55)	(3.64)	(-0.18)
11. *ProfitGap*	0.01 ***	0.02 ***	0.01 **	0.01 ***	-0.00
	(2.64)	(3.12)	(2.03)	(4.06)	(-1.19)
12. *GroupSize*	0.10 **	-0.28 **	-0.41 ***	0.08 *	-0.02
	(2.41)	(-2.15)	(-3.37)	(1.94)	(-0.63)
13. *Trend*	-0.01 ***	0.06 ***	0.06 ***	-0.01 ***	-0.00 ***
	(-8.22)	(12.16)	(12.90)	(-2.68)	(-3.07)
Constant	0.03	5.05 ***	5.74 ***	-0.08	0.48
	(0.06)	(3.60)	(4.44)	(-0.18)	(1.45)
Number of	3,444	3,444	3,444	3,444	3,444
Number of	825,250	825,250	825,250	825,250	825,250
Observations	45,950	45,950	45,950	45,950	45,950
Adjusted R^2	0.519	0.604	0.578	0.402	0.286

Notes: This Table shows the estimated effects on internal and external lending by business groups, by parent companies, and by subsidiary companies based on 45,950 observations for FY1984 – FY2014. Dummy variables were included for the aftermath of the bursting of the Japanese "bubble economy", the Japanese banking crisis, the Takenaka bank plan, the global financial crisis, and the Great East Asia Earthquake. The controls shown in rows 6-13 and parent-company fixed effects were included. The columns show the estimated effects on external and internal lending by business groups, by parent companies, and by subsidiaries of parent companies. ∗∗∗, ∗∗, and ∗ indicate statistical significance at lower than 1%, 5%, and 10%. The ratios to their robust standard errors are shown in parentheses below estimated coefficients. For descriptions and calculations of variables, see Table 1.

Table 5. **Lending by Parents and by Their Subsidiaries:**
Banks' Business Lending Attitudes as Measures of Banking, Financial,
and Economic Conditions

	GroupLendAll (1)	ParentLendAll (2)	ParentLendSubs (3)	ParentLendOut (4)	SubsLendOut (5)
1. *BanksAttParent*	0.97 ***	-1.06 ***	-0.19	-0.68 ***	1.40 ***
	(9.69)	(-3.70)	(-0.72)	(-6.21)	(16.10)
2. *BanksAttSubs*	-1.24 ***	1.42 ***	-0.73 **	1.76 ***	-2.54 ***
	(-9.49)	(3.69)	(-2.09)	(12.09)	(-21.36)
3. *ParentEqIn*	0.00 ***	0.02 ***	0.02 ***	0.00	0.00 ***
	(2.75)	(11.48)	(10.88)	(1.54)	(2.83)
4. *ParentOwn*	-0.00	0.01 ***	0.01 ***	0.00 ***	-0.00 ***
	(-0.26)	(4.86)	(3.11)	(4.38)	(-6.95)
5. *SubsNumber*	0.00 ***	0.01 ***	0.01 ***	-0.00 ***	0.00 ***
	(2.77)	(5.88)	(7.42)	(-3.93)	(6.92)
6. *CapexParent*	-0.00	-0.06 ***	-0.06 ***	0.00	-0.01 ***
	(-1.36)	(-6.75)	(-7.49)	(1.25)	(-3.41)
7. *CapexSubs*	0.01 ***	0.22 ***	0.20 ***	0.01 ***	0.00
	(2.66)	(17.45)	(16.35)	(3.41)	(0.20)
8. *ProfitGap*	0.01 ***	0.02 ***	0.01 **	0.01 ***	-0.00
	(2.71)	(3.10)	(2.04)	(3.98)	(-0.99)
9. *GroupSize*	0.09 **	-0.30 **	-0.50 ***	0.14 ***	-0.07 **
	(2.22)	(-2.28)	(-4.17)	(3.37)	(-2.44)
10. *Trend*	-0.01 ***	0.07 ***	0.07 ***	-0.01 ***	-0.00 ***
	(-9.64)	(14.60)	(16.57)	(-4.46)	(-2.81)
Constant	0.13	5.22 ***	6.83 ***	-0.81 *	1.16 ***
	(0.29)	(3.69)	(5.25)	(-1.78)	(3.50)
Number of parent firms	3,444	3,444	3,444	3,444	3,444
Number of subsidiaries	825,250	825,250	825,250	825,250	825,250
Observations	45,950	45,950	45,950	45,950	45,950
Adjusted R^2	0.519	0.604	0.577	0.404	0.290

Notes: This Table shows the estimated effects of commercial banks' attitudes toward business lending based on 45,950 observations for FY1984 – FY2014. Controls shown in rows 3-10 and parent-company fixed effects were included. *BanksAttParent* and *BanksAttSubs* refer to banks' attitudes reported in the TANKAN survey about loans to business of the sizes of each business group's parent company and its subsidiaries. The survey categorized companies by their equity. The survey reports the net percent of banks' that answered "accommodative" minus the percent of banks that answered "severe." The columns show the estimated effects on external and internal lending by business groups, by parent companies, and by subsidiaries of parent companies. ∗∗∗, ∗∗, and ∗ indicate statistical significance at lower than 1%, 5%, and 10%. The ratios to their robust standard errors are shown in parentheses below estimated coefficients. For descriptions and calculations of variables, see Table 1.

Table 6.　Lending by Parents to Their Subsidiaries, by Size of Subsidiaries

Dependent Variables: ParentLendSubs	Small-sized		Medium-sized		Large-sized	
	(1)	(2)	(3)	(4)	(5)	(6)
1. JABubbleburst	0.04		0.05		0.14	
	(0.26)		(0.40)		(1.20)	
2. JABankcrisis	-0.01		0.19 *		-0.32 **	
	(-0.11)		(1.74)		(-2.49)	
3. TakenakaPlan	0.24 ***		0.42 ***		0.64 ***	
	(3.17)		(3.82)		(3.93)	
4. GFC	0.47 ***		0.50 ***		1.22 ***	
	(4.21)		(4.08)		(5.47)	
5. GEAEarthquake	0.45 ***		0.14		0.84 ***	
	(2.69)		(0.81)		(2.92)	
6. BanksAttParent		0.84 **		2.31 ***		0.04
		(2.38)		(5.15)		(0.07)
7. BanksAttSubs		-2.71 ***		-4.74 ***		-0.98
		(-4.92)		(-7.14)		(-1.41)
8. ParentEqIn	0.00	0.00	0.01 ***	0.01 ***	0.03 ***	0.03 ***
	(0.95)	(1.08)	(3.02)	(3.13)	(8.44)	(8.53)
9. ParentOwn	0.00	0.00	-0.00	0.00	0.02 ***	0.02 ***
	(1.36)	(1.32)	(-0.01)	(0.18)	(4.76)	(4.76)
10. SubsNumber	0.10 ***	0.10 ***	0.05 ***	0.05 ***	0.00	0.00
	(8.51)	(8.52)	(6.47)	(6.49)	(1.34)	(1.59)
11. CapexParent	-0.01	-0.01	-0.05 ***	-0.04 ***	-0.09 ***	-0.10 ***
	(-1.16)	(-0.98)	(-3.83)	(-3.46)	(-5.76)	(-6.20)
12. CapexSubs	0.20 ***	0.20 ***	0.12 ***	0.12 ***	0.15 ***	0.14 ***
	(6.11)	(6.16)	(6.14)	(6.17)	(9.01)	(8.68)
13. ProfitGap	0.00	0.01	0.03 **	0.03 **	0.01	0.01
	(0.50)	(0.56)	(2.45)	(2.48)	(0.37)	(0.43)
14. GroupSize	-1.83 ***	-1.91 ***	-1.68 ***	-1.84 ***	-1.18 ***	-1.36 ***
	(-9.25)	(-9.63)	(-6.29)	(-6.92)	(-5.18)	(-6.00)
15. Trend	0.03 ***	0.04 ***	0.08 ***	0.08 ***	0.12 ***	0.13 ***
	(4.86)	(6.68)	(8.33)	(9.43)	(11.08)	(13.17)
Constant	18.64 ***	19.33 ***	19.70 ***	21.56 ***	14.84 ***	17.19 ***
	(9.73)	(10.03)	(6.97)	(7.58)	(5.50)	(6.31)
Number of parent firms	2,148	2,148	1,982	1,982	1,455	1,455
Number of subsidiaries	105,858	105,858	208,419	208,419	505,158	505,158
Observations	15,301	15,301	15,302	15,302	15,302	15,302
Adjusted R^2	0.644	0.644	0.696	0.698	0.612	0.610

Notes: This Table shows the estimated effects of commercial banks' attitudes toward business lending based on 45,950 observations for FY1984 – FY2014. Controls shown in rows 8-15 and parent-company fixed effects were included. The columns show the estimated effects on external and internal lending by parent companies. ∗∗∗, ∗∗, and ∗ indicate statistical significance at lower than 1%, 5%, and 10%. The ratios to their robust standard errors are shown in parentheses below estimated coefficients. For descriptions and calculations of variables, see Table 1.

Table 7.   Lending by Parents to Their Subsidiaries, by Listed Subsidiaries, by Foreign Subsidiaries, by Parent Profits

Dependent Variables: ParentLendSubs	Listed subs (1)	No Listed Subs (2)	Foreign Subs (3)	No Foreign Subs (4)	Parent Profit (5)	Parent Loss (6)
1. JABubbleburst	0.11	0.06		0.13 *	-0.01	0.15
	(0.37)	(0.79)		(1.93)	(-0.09)	(0.46)
2. JABankcrisis	-0.94 ***	-0.06	-2.63 ***	-0.10	-0.20 ***	-0.04
	(-3.38)	(-0.95)	(-4.36)	(-1.54)	(-2.90)	(-0.21)
3. TakenakaPlan	0.82 **	0.26 ***	-0.10	-0.02	0.16 **	0.50 ***
	(2.51)	(3.84)	(-0.92)	(-0.23)	(2.11)	(2.84)
4. GFC	1.52 ***	0.68 ***	0.81 ***	0.47 ***	0.65 ***	0.51 **
	(4.55)	(7.38)	(7.90)	(3.17)	(6.23)	(2.20)
5. GEAEarthquake	1.10 **	0.50 ***	0.81 ***	0.38 *	0.57 ***	0.36
	(2.47)	(3.90)	(5.79)	(1.78)	(4.28)	(1.10)
6. ParentEqIn	0.01 *	0.02 ***	0.02 ***	0.02 ***	0.02 ***	0.00
	(1.66)	(9.93)	(4.82)	(8.14)	(9.64)	(1.14)
7. ParentOwn	0.05 ***	0.00 *	0.01 **	0.00	0.00 **	0.02 ***
	(4.67)	(1.68)	(2.57)	(1.19)	(2.47)	(2.62)
8. SubsNumber	0.01 ***	0.01 ***	0.02 ***	-0.00	0.01 ***	0.02 ***
	(3.15)	(3.64)	(3.64)	(-0.68)	(4.89)	(3.36)
9. CapexParent	-0.08 **	-0.05 ***	-0.03 *	-0.04 ***	-0.07 ***	-0.00
	(-2.11)	(-7.01)	(-1.95)	(-5.16)	(-7.88)	(-0.24)
10. CapexSubs	0.13 ***	0.20 ***	0.16 ***	0.16 ***	0.21 ***	0.14 ***
	(3.96)	(15.34)	(8.92)	(10.40)	(15.43)	(5.02)
11. ProfitGap	0.01	0.01 **	0.03 ***	-0.00	0.06 ***	-0.00
	(0.45)	(2.01)	(3.42)	(-0.51)	(6.02)	(-0.28)
12. GroupSize	-0.30	-0.36 ***	0.11	-0.40 **	-0.21	-0.97 **
	(-0.57)	(-2.84)	(0.38)	(-2.53)	(-1.63)	(-2.49)
13. Trend	0.03	0.06 ***	-0.05 ***	0.09 ***	0.03 ***	0.18 ***
	(1.21)	(12.91)	(-3.55)	(12.53)	(6.67)	(9.85)
Constant	3.35	5.43 ***	2.17	5.73 ***	3.95 ***	9.88 **
	(0.49)	(4.10)	(0.65)	(3.41)	(2.88)	(2.29)
Number of parent firms	401	3.408	2.126	2.943	3.304	2.421
Number of subsidiaries	281,997	543,253	513,800	311,450	592,177	233,073
Observations	3,529	42,421	17,334	28,616	36,347	9,603
Adjusted R^2	0.674	0.519	0.656	0.633	0.585	0.616

Notes: This Table shows the estimated effects of commercial banks' attitudes toward business lending based on 45,950 observations for FY1984 – FY2014. Controls shown in rows 6-13 and parent-company fixed effects were included. The columns show the estimated effects on external and internal lending parent companies. ∗∗∗, ∗∗, and ∗ indicate statistical significance at lower than 1%, 5%, and 10%. The ratios to their robust standard errors are shown in parentheses below estimated coefficients. For descriptions and calculations of variables, see Table 1.

Table 8. Lending by Parents to Their Subsidiaries, by Listed Subsidiaries, by Foreign Subsidiaries, by Parent Profits

Depar: ParentLendSubs	Listed subs	No Listed Subs	Foreign Subs	No Foreign Subs	Parent Profit	Parent Loss
	(1)	(2)	(3)	(4)	(5)	(6)
1. BanksAttParent	-1.65	-0.06	-2.01 **	-0.77 ***	-0.17	0.38
	(-0.89)	(-0.24)	(-2.29)	(-2.78)	(-0.64)	(0.38)
2. BanksAttSubs	0.62	-0.93 ***	-0.66	0.83 **	-0.34	-1.73
	(0.31)	(-2.60)	(-0.58)	(2.05)	(-0.95)	(-1.29)
3. ParentEqIn	0.01 *	0.02 ***	0.02 ***	0.02 ***	0.02 ***	0.00
	(1.76)	(10.06)	(4.57)	(8.14)	(9.76)	(1.21)
4. ParentOwn	0.05 ***	0.00	0.01 **	0.00	0.00 **	0.02 **
	(4.76)	(1.58)	(2.42)	(1.24)	(2.40)	(2.58)
5. SubsNumber	0.02 ***	0.01 ***	0.02 ***	-0.00	0.01 ***	0.02 ***
	(3.30)	(3.58)	(4.03)	(-0.95)	(4.84)	(3.22)
6. CapexParent	-0.09 **	-0.05 ***	-0.03 **	-0.04 ***	-0.07 ***	-0.01
	(-2.38)	(-7.15)	(-2.00)	(-5.19)	(-8.06)	(-0.28)
7. CapexSubs	0.11 ***	0.20 ***	0.16 ***	0.16 ***	0.21 ***	0.14 ***
	(3.42)	(15.25)	(8.86)	(10.36)	(15.31)	(4.96)
8. ProfitGap	0.01	0.01 **	0.03 ***	-0.00	0.06 ***	-0.00
	(0.54)	(2.02)	(3.36)	(-0.52)	(6.06)	(-0.17)
9. GroupSize	-0.62	-0.45 ***	0.05	-0.43 ***	-0.29 **	-1.01 ***
	(-1.17)	(-3.57)	(0.16)	(-2.70)	(-2.29)	(-2.58)
10. Trend	0.05 **	0.07 ***	0.00	0.10 ***	0.04 ***	0.19 ***
	(2.18)	(16.03)	(0.20)	(14.02)	(9.23)	(11.58)
Constant	7.43	6.46 ***	2.18	5.98 ***	4.84 ***	10.37 **
	(1.07)	(4.85)	(0.65)	(3.53)	(3.50)	(2.39)
Number of parent firms	401	3,408	2,126	2,943	3,304	2,421
Number of subsidiaries	281,997	543,253	513,800	311,450	592,177	233,073
Observations	3,529	42,421	17,334	28,616	36,347	9,603
Adjusted R^2	0.659	0.587	0.654	0.632	0.584	0.616

Notes: This Table shows the estimated effects of commercial banks' attitudes toward business lending based on 45,950 observations for FY1984 – FY2014. Controls shown in rows 3-14 and parent-company fixed effects were included. The columns show the estimated effects on external and internal lending by parent companies. ***, **, and * indicate statistical significance at lower than 1%, 5%, and 10%. The ratios to their robust standard errors are shown in parentheses below estimated coefficients. For descriptions and calculations of variables, see Table 1.

Table 9.   Internal Lending with Controls for External Borrowing and Trade Credit

	ParentLendSubs (1)	ParentLendSubs (2)	ParentLendSubs (3)	ParentLendSubs (4)
1. *JABubbleburst*	0.05		0.09	
	(0.64)		(1.04)	
2. *JABankcrisis*	-0.13 **		-0.21 ***	
	(-2.08)		(-3.09)	
3. *TakenakaPlan*	0.31 ***		0.27 ***	
	(4.61)		(3.67)	
4. *GFC*	0.76 ***		0.78 ***	
	(8.36)		(7.74)	
5. *GEAEarthquake*	0.55 ***		0.58 ***	
	(4.35)		(4.14)	
6. *BanksAttParent*		-0.16		-0.49 *
		(-0.62)		(-1.78)
7. *BanksAttSubs*		-0.79 **		-0.27
		(-2.25)		(-0.70)
8. *ParentEqIn*	0.02 ***	0.02 ***	0.02 ***	0.02 ***
	(10.63)	(10.79)	(7.89)	(7.97)
9. *ParentOwn*	0.01 ***	0.01 ***	0.01 ***	0.01 ***
	(3.19)	(3.02)	(5.19)	(4.96)
10. *SubsNumber*	0.01 ***	0.01 ***	0.01 ***	0.02 ***
	(7.35)	(7.34)	(7.12)	(7.15)
11. *CapexParent*	-0.06 ***	-0.06 ***	-0.06 ***	-0.06 ***
	(-7.24)	(-7.49)	(-6.73)	(-6.94)
12. *CapexSubs*	0.20 ***	0.20 ***	0.21 ***	0.20 ***
	(16.51)	(16.32)	(16.26)	(16.06)
13. *ProfitGap*	0.01 **	0.01 **	0.01	0.01
	(1.99)	(2.00)	(-0.73)	(0.76)
14. *GroupSize*	-0.40 ***	-0.49 ***	-0.50 ***	-0.59 ***
	(-3.30)	(-4.11)	(-3.87)	(-4.58)
15. *Trend*	0.06 ***	0.07 ***	0.07 ***	0.08 ***
	(12.94)	(16.59)	(13.86)	(17.30)
16. *ParentTCSubs*	-0.05 ***	-0.05 ***		
	(-4.62)	(-4.76)		
17. *ParentBorrOut*			0.03 ***	0.03 ***
			(7.11)	(7.29)
18. *SubsBorrOut*			0.04 ***	0.04 ***
			(6.29)	(6.04)
Constant	5.71 ***	6.81 ***	5.37 ***	6.41 ***
	(4.42)	(5.24)	(3.84)	(4.55)
Number of parents	3,444	3,444	3,165	3,165
Number of	825,250	825,250	748,398	748,398
Observations	45,950	45,950	39,691	39,691
Adjusted R²	0.578	0.577	0.590	0.589

Notes: This Table shows the estimated effects of commercial banks' attitudes toward business lending based on 45,950 observations for FY1984 – FY2014. Controls shown in rows 3-14 and parent-company fixed effects were included. *ParentTCSubs* trade credit (receivables – payables) by parent to subsidiaries, *ParentBorrOut* is borrowing by parent from outside (mainly banks), and *SubsBorrOut* is borrowing by subsidiaries from outside. The columns show the estimated effects on external and internal lending by parent companies. ∗∗∗, ∗∗, and ∗ indicate statistical significance at lower than 1%, 5%, and 10%. The ratios to their robust standard errors are shown in parentheses below estimated coefficients. For descriptions and calculations of variables, see Table 1.

Appendix A. How Much Do Firms Lend Internally?

A1. A Model of Loans within Business Groups

In this appendix, we show the formal model of our empirical analyses. The business group is not typically controlled a family, and is different from keiretsu (keiretsu literally means "a line of affiliation") that historically traces back to *zaibatsu* in the sense that keiretsu are business groups across consolidated firms that are also not family-controlled. They are historically manager-dominated inter-corporate groups. Here, we use the term of business group as a group of firms that belong to the same consolidated firm.

Our model of intrafirm lending builds upon the underlying frameworks in the model of internal capital market of Stein (1997) and of Almeida, et al. (2015). Our model adds debt and debt costs that vary over firms and over time, D and r_D.[9] P denotes the parent company and S denotes the subsidiaries in a business group, G. For simplicity, we omit subscripts for individual firms.

The consolidated assets of business groups are larger than those of the (unconsolidated) parent company and larger than those of the groups' subsidiaries. Here, we assume that parents have more assets than their subs:

(A1) $\qquad A_G > A_P \geq A_S$

Business groups, parents, and subs are each financed with equity, E, and with debt, D, which may include loans and bonds:

(A2) $\qquad A = E + D$

Each firm produces output, $f(A)$, where A is the firm's stock of productive assets, such as property, plant, and equipment. Each firm maximizes (expected) profit by choosing D, given its equity E:

(A3) $\qquad \max_{D} \Pi \equiv \theta(1+k)f(A) - r_D D$

$\qquad\qquad s.t. \, D \leq hA$

where $\theta > 0$ is a firm-specific productivity indicator and k is a common productivity indicator. hA is the maximum amount that a firm can borrow given its assets, A. The "haircut", $0 \leq h \leq 1$, reflects that, for many reasons, firms are unlikely to be able to borrow as much as the total value

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of their assets. If the borrowing constraint is binding, then parents' providing/lending/etc. funds to their subs might be valuable.

A2. Why Form Business Groups and Borrow from Parents?

Business groups or families have advantages in debt markets over their own parent companies and the parents' subsidiaries in debt markets. Two important advantages are the business groups' larger sizes and greater diversification than their parent and subsidiary firms. A family need not always be less risky than its parent or its individual subsidiaries. To capture the economies of scale in information and production costs of debt, as well as the risk reductions from families being more diversified than their parents and subs, we take the (risk-adjusted) productivity of a family to be larger than that of its parent company and of is subs:

Assumption 1: $\theta_P > \theta_S$

And, in turn, we take the costs of debt to reflect those cost and diversification benefits:

Assumption 2: $r_{DG} < r_{DP} \leq r_{DS} = r_{DB}$

where r_{DG} is the cost of debts under conforming a business group, which is the lowest compared with the cost of debts of a standalone parent r_{DP}. Here, we define the gap of debt cost between a parent and its sub is $\Delta r^D \equiv r_{DS} - r_{DG}$. This reflects reduced monitoring costs due to lower asymmetric information: Stein (1997), etc. The cost of debts of subs r_{DS} is not less than the parent cost of debt r_{DP}, which we presume that standalone subs can only borrow from a bank loans r_{DB}.

A2.1. Standalone Companies

To begin, we consider firms without families. Absent its debt constraint, equation 0 gives the first-order condition for a firm given by (A4):

(A4) $f'(D) = \dfrac{1 + r_D}{\theta(1 + k)}$

Equation (A4) implies the optimal, unconstrained value of *D*, denoted D^{FB}. According to equation (A4), D^{FB} falls as r_D rises. Equation (A4) also implies that D^{FB} falls as k or θ declines. If D is constrained by borrowing limit hA, then it falls short of D^{FB}.

A2.2. Business groups

We consider a business group that consists of a parent company, P, and subsidiaries, S. Assuming that parents, in turn, provide funds at cost r_{DG} to their subsidiaries, the parent and the sub each pay, and thus optimize debt and asset size based on, the lower-per-unit, family cost, r_{DG}, on the debt used to fund both the parent and the subsidiary:

$$\text{(A5)} \qquad \max_{D_i} \Pi_i^G = \theta_i(1+k)f(A_i) - r_{DG}D_i \qquad \text{for} \quad i = P, S$$

That is, the cost of debt is the same for both the parent and its subs as it is for the entire business group. A_i is defined as $A_i = E + D_i$. For simplicity, we treat E as constant below. For a parent company, we assume that the following assumption holds:

Assumption 3 (Parent financial no constraint): $D_P^{FB} = \min\left(D_P^{FB}, hA_P\right) = D_P^{FB}$

That is, there is no binding of financial constraints for a parent company.

On the contrary, we define the cap of potential transfer T from P to Subs:

Assumption 4 (Cap of transfer to subsidiaries): $T \equiv hA_P - D_P^{FB} > 0$

Since the group's debt cost is lower than the debt cost for either the parent or the subs, the group borrows enough for lending to their subs. We assume that parent borrows via loans and bonds on behalf of consolidated firm. Thus, parent can lend to subs.

To consider the cost and benefits of forming a business group such as a conglomerate, we explicitly consider the ownership relation between a parent and its subs. The parameter $\alpha(\underline{\alpha} \leq \alpha \leq 1)$ reflects the agency costs between them, which is a factor that reduces the profits of subsidiaries because of some conflicts between them such as small incentives of subs' manager for making efforts for the entire business group.

$$\text{(A6)} \qquad \Pi_S^\alpha = \alpha\theta_S(1+k)f\left(A_S^\alpha\right) - r_{DS}D_S^\alpha$$

Another interpretation is that subs are forced by their parent to sell their products to parent company at discounted prices. This generally reduce subs' revenues and thus lower their profits. We also add two additional assumptions as follows:

Assumption 5 (No constraint from parent loans): $D_S^{\alpha=1} < T$

The simplifying Assumption 5 is relaxed later.

Assumption 6 (No negligible agency costs): $T < \Pi_S^{\alpha=1} - \Pi_S^{\alpha=\underline{\alpha}}$

The maximum amounts of loans from parent to its subs (i.e., Transfer from the parent to children) are smaller than the maximum agency costs of forming a business group.

Based on these assumptions, we define the profits of the subs that have partially owned by a parent as follows:

(A7) $\qquad \Pi_S^G(\alpha) = \alpha \theta_S (1+k) f\left(A_S^\alpha\right) - r_{DG} D_S^\alpha$

where the second term reflects the borrowing from the parent and thus the cost of debt is at $r_{DG} < r_{DS}$. Note that the subs' total amounts of borrowing come only from their parent because of assumption 5 at this point.

Under the above setting, the maximization problem as a business group is as follows:

(A8) $\qquad \max\limits_{\left\{D_P, D_S^\alpha\right\}} \Pi_P^G + \alpha \Pi_S^G(\alpha)$

$\qquad\qquad s.t. \, D_P + D_S^\alpha < h\left(A_P + A_S^\alpha\right)$

Note that all of the profit of subsidiaries are included in the same group as a consolidated firm regardless of ownership ratio by their parent company[10].

Result 1 There is a threshold α^* where the total profits for subs by forming a business group are higher for all $\alpha > \alpha^*$.

This result rationalizes for forming a business group from the view of subs by taking advantage of benefits of debt cost reduction by borrowing from a parent, not from banks. If the relationship of $\alpha < \alpha^*$ holds, then the profit from sub's businesses as a standing alone company is higher than that of the case of forming a business group. One interpretation of small α might indicate that a parent has only a small portion of equity stakes in its subs, and thus their subs do not make efforts for their entire business group[11]. On the contrary, if a parent has enough equity stakes and control of its subs for the entire business group, then the forming a business group is beneficial even if we explicitly consider agency costs between a parent and its subs.

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[10] Note that it is not true that we ignore the fact of partial ownership by a parent. We consider the effect of partial ownership as agency problems between a parent and its subs. We explicitly include this agency costs in the part of revenue reduction of subs in equation 0.

[11] Another interpretation is that subs are forced to sell their products to their parent at discounted prices. This reduce subs' revenues and thus lower their profits.

Overall, if this interpretation is plausible, then having enough ownership for subs by its parent is advantageous for a business group, and thus there is an economic rationality for forming a 100% ownership of subs by their parent from social welfare viewpoints.

A3. Why do subs also borrow externally?

One simple explanation is that the loan demands by subs are greater than the cap of parent loans. This violates the assumption 5. That is,

Assumption 5': $D_S^\alpha > T$

The cap of parent lending is smaller than the amounts of funds that children want. In this case, children cannot fully borrow from the parent, and thus borrow partially from banks.

To explain why subs still borrow form external loans such as bank borrowing even if the assumption 5 still holds, we extend our basic set up to include the benefits of using external loans. Here we include the parameter of benefits of reduction of agency costs (between subs manager and their parent as shareholders) by outside monitor such as a bank by β (Cline et al., 2014).

Now, the maximization problem of external loans for subs (the second term of 0) is defined as follows:

$$(A9) \qquad \max_{D_{BS}} \Pi_S^G \equiv \alpha\theta(1+k)f(A_S) - r_{DG}D_S - r_{DB}D_{BS} + \beta D_{BS}$$

$$s.t.\ E + D_S + D_{BS} = A_S$$

The last two terms reflect the cost and benefit from external loans such as bank loans. The first order condition of 0is as follows:

$$(A10) \qquad \frac{d\Pi_S^G}{dD_{BS}} = \alpha\theta(1+k)f'(A_S) + \beta - \Delta r^D$$

If the bank benefit parameter β is low enough, then subs might borrow all the money from their parent as much as possible (i.e., $D_{BS}^* = 0$). On the contrary, if the condition of β is high enough (e.g., $\beta > \Delta r^D$), then there might be some rationality for subs to borrow externally (i.e., $D_{BS}^* > 0$). Qualitatively speaking, we expect that the more benefits from the reduction of agency costs by outside monitoring by banks and/or the more differences between a bank interest rate and a parent interest rate, the more internal lending is.

Appendix B. Examples of Internal and External Lending

B1. Example of internal and external lending by Nissan

To demonstrate how we calculated components of a business group's lending, we used data as of the end of its 2008 fiscal year (FY2008) on March 31, 2009 for Nissan. Figure B1 shows that Nissan's parent did vastly more internal than external lending.

We estimated the lending amounts in Figure B1 as follows. Its consolidated balance sheet reported that the Nissan business group was owed 23.0 billion yen for loans it had made externally. Its (unconsolidated) balance sheet for the parent company of the Nissan business group reported that it was owed 711.0 billion yen on loans it had made to other companies. Footnotes to the unconsolidated balance sheet reported that internal lending, i.e. by the parent to its subsidiaries totaled 710.4 billion yen at Nissan. That implied that the parent had lent less than 1 (more accurately, 0.6 = 711.0 - 710.4) billion yen externally. Since only 0.6 billion yen of the 23.0 billion yen of the business group's consolidated lending was made by the parent to companies outside Nissan's business group, the remaining 22.4 (=23.0-0.4) billion yen of the Nissan business group's loans were made by Nissan's subsidiaries to companies that were outside the Nissan business group. Thus, while the subsidiaries made the great majority of external loans at Nissan, the parent made loans almost exclusively to its own subsidiaries.

B2. Example of an internal loan made by Daifuku to its subsidiary

Here is a concrete example of a Japanese parent company's making a loan to one of its subsidiaries.

During its fiscal year 2007, which ended on March 31, 2008, Daifuku Corporation, Ltd. reported consolidated sales of 231 billion yen. Daifuku was the parent company of Contec Corporation, Ltd. Contec seems to have been the largest of Daifuku's 49 consolidated subsidiaries. (In our sample of companies, parents averaged about 20 subsidiaries each.) Daifuku and Contec were listed on the first and sections, respectively, of the Tokyo Stock Exchange (TSE). Unlike unlisted companies, Contec was required to disclose its financial statements and report material obligations that it incurred, such as additional loans. In Contec's public disclosures, we found information about one of its loans.

In May 2009, after its FY2008 had ended on March 31, 2009, Contec filed a debt disclosure document with the TSE to report that it recently received a loan from its parent, Daifuku. Contec stated that it intended to use the proceeds of that loan for working capital.

It is easy to understand why Contec might have needed more loans during FY2008 and afterward. The adversities unleashed by the global financial crisis were in full swing in Japan during the Spring of 2009, about two quarters after the Lehman shock. Like the U.S., Japan then was in a national recession. International trade had slumped dramatically. Contec's sales for its FY2008 fell to 16.2 billion yen, a full 25 percent lower than they were during FY2007 (21.6 billion yen).[12] Over FY2008, Contec's cash holdings declined by more than 20 percent, from 2.8 to 2.2 billion yen. In addition to the huge decline in its sales, Contec increased the (net) trade credit (i.e., accounts receivable minus accounts payable) that it extended: By the end of FY2008, Contec's trade credit had risen by half, from 400 million yen to 600 million yen. Over the year ending March 31, 2009, Contec added 600 million yen of short-term (defined to have original maturities of less than one year) loans to the 3.4 billion yen of total loans that it owed as of March 31, 2008. We cannot determine whom those creditors were.

In May 2009, Contec's parent, Daifuku, loaned one billion yen to Contec. Presumably so that it would be recorded as a short-term, rather than a long-term, loan, the original maturity of the loan was for one day shy of a one full year: The origination date of the loan was May 25, 2009; its maturity date was May 24, 2010. This was a large loan for Contec: One billion yen was about six percent of Contec's sales during all of FY2008 and boosted its loans owned by about 30 percent and its total liabilities by about 14 percent.

B3. How large and volatile is internal lending?

Tables A1 and A2 permit us to compare the average size and the volatility of internal and external lending with other balance sheet items, including accounts payable and receivable. The means in Table A1 show average funding sources. The volatilities in Table A2 show how much the sources of funding changed from year to year. Taken together, these Tables show which funding sources were disproportionately volatile.

Table A1 shows annual averages over FY1984 – FY2014 in trillions of yen. Though not as dramatic as the Nissan example above, rows 3 and 4 show that, for our sample of companies

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[12] The yen averaged about 98 per US$1.00 during March 2009.

and years, parents made more loans to their subsidiaries (11.9) than to outside companies (3.3). Row 12 of column 2 shows that subsidiaries, in turn, also made small average amounts of loans to their parents: The 1.0 trillion yen was less than one tenth of the amounts that parents lent on average to their subsidiaries.

Parents also extended considerably more loans than trade credit to their subsidiaries. While subs owed their parents 10.2 trillion yen (row 7 of the second column), parents owed their subs 7.5 trillion (row 16), leaving only 2.7 trillion of (net) trade credit from parents to their subsidiary companies.

Row 14 of column 3 shows that subsidiaries' outside borrowing (49.8 trillion yen) was nearly as much as their parents' outside borrowing (53.7 trillion yen in row 11). Thus, while their internal borrowing was considerable, on average subsidiaries funded themselves much more by external borrowing.

As we would expect, subsidiaries did not importantly rely on issuing bonds. Row 19 of column 2 shows that parents had bonds outstanding that averaged 17 percent of their total liabilities. Subsidiaries apparently issued relatively few bonds. In fact, the 28.5 trillion in row 19 of column 1 suggests that subsidiaries owned more of their parent companies' bonds than the subsidiaries themselves had outstanding.

Table A2 shows how much various balance sheet items fluctuated from year to year. Table A2 shows the averages (across all the year-business group observation in our sample) of the absolute values of the first-differences of each item's ratio to the parent companies' (unconsolidated) assets. Thus, the volatilities can be compared across items. Table A2, however, does not indicate how the changes in an item either accentuated or offset some other changes in balance sheets.

Row 3 shows that parents' loans to their subs were much more volatile (1.0 percent of parents' assets, on average) than parents' or subs' loans to outside companies. These internal loans were also more volatile than trade credit from parents to subs. Row 14 shows that volatility of subsidiaries' external borrowing was 0.7 percent of parents' assets, which was lower than for internal borrowing, despite Table 1's showing that average external borrowing was four times as large as internal borrowing. This hints that the marginal source of funds for subsidiaries, despite their large external borrowing, was internal lending.

Figure B1. Internal and External Lending by Nissan
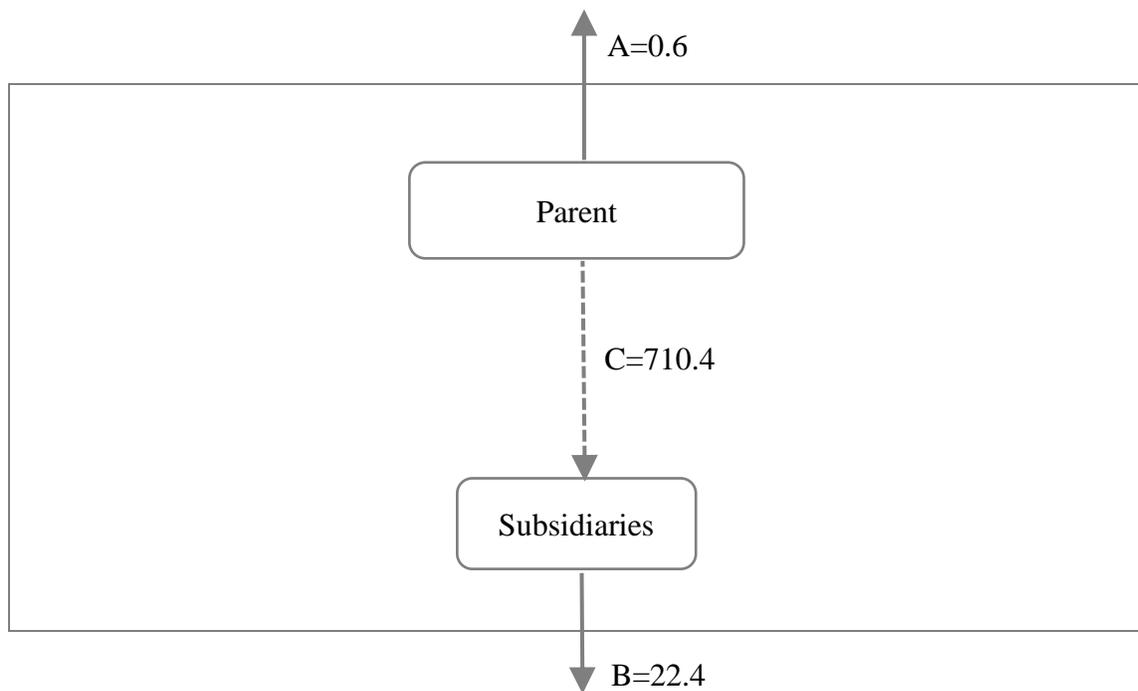
A=0.6

Parent

C=710.4

Subsidiaries

B=22.4

A: Loans from the parent company to outside companies
B: Loans from subsidiaries to outside companies
C: Loans from the parent company to its subsidiaries

Notes: The arrows show loans outstanding (in billions of yen) as of March 31, 2009 from the parent company and its subsidiaries in the Nissan business group to companies outside the business group and from the parent to its subsidiaries. The unconsolidated balance sheet reports, as one item of its assets, the sum A+C = 711.0, consisting of the loans that the parent company made to outside companies (A=0.6) plus the loans that it made to its subsidiaries (C=710.4). The business group's consolidated balance sheet reports as loans A+B = 23.0, consisting of the sum of the loans that the parent and that its subsidiaries made to outside companies. Item C was reported in a footnote to the unconsolidated financial statement.

Table A1.   Amounts of Balance Sheet Items

	Business Group (1)	Parents (2)	Subsidiaries (3)
1. Total assets	367.8	265.4	
2. Loans	4.4	15.2	
3. Loans made by parent to subsidiaries		11.9	
4. Loans made by parent to outside companies		3.3	
5. Loans made by subsidiaries to outside companies			1.1
6. Receivables	64.4	47.1	
7. Receivables owed by subsidiaries to parent		10.2	
8. Receivables owed by outside companies to parent		36.9	
9. Receivables owed by outside companies to subsidiaries			27.5
10. Total liabilities	246.3	166.9	
11. Borrowings	93.5	53.7	
12. Borrowings by parent from subsidiaries		1.0	
13. Borrowings by parent from outside companies		52.7	
14. Borrowings by subsidiaries from outside companies			40.8
15. Payables	47.9	36.2	
16. Payables owed by parent to subsidiaries		7.5	
17. Payables owed by parent to outside companies		28.7	
18. Payables owed by subsidiaries to outside companies			19.2
19. Bonds	28.5	29.2	
20. Total equity	121.5	98.5	
21. (Net) Trade credit	16.5	10.9	
22. (Net) Trade credit from parent to subsidiaries		2.7	
23. (Net) Trade credit from parent to outside companies		8.2	
24. (Net) Trade credit from subsidiaries to outside companies			8.3

Notes: The data are the end-of-fiscal-year amounts, in trillions of yen, averaged over FY1984 - FY2014. The FY1984-2014 sample averaged 1,380 business groups and 32,720 consolidated subsidiary companies per year.

Table A2.   Volatilities of Balance Sheet Items

	Business Group (1)	Parents (2)	Subsidiaries (3)
1. Volatility of total assets	8.9	7.3	
2. Volatility of loans	0.3	1.2	
3. Volatility of loans made by parent to subsidiaries		1.0	
4. Volatility of loans made by parent to outside companies		0.4	
5. Volatility of loans made by subsidiaries to outside companies			0.4
6. Volatility of receivables	3.0	2.7	
7. Volatility of receivables owed by subsidiaries to parent		0.7	
8. Volatility of receivables owed by outside companies to parent		2.5	
9. Volatility of receivables owed by outside companies to subsidiaries			1.3
10. Volatility of total liabilities	6.8	5.6	
11. Volatility of borrowings	4.0	3.4	
12. Volatility of borrowings by parent from subsidiaries		0.1	
13. Volatility of borrowings by parent from outside companies		3.4	
14. Volatility of borrowings by subsidiaries from outside companies			1.6
15. Volatility of payables	2.4	2.1	
16. Volatility of payables owed by parent to subsidiaries		0.5	
17. Volatility of payables owed by parent to outside companies		1.9	
18. Volatility of payables owed by subsidiaries to outside companies			1.0
19. Volatility of bonds	2.4	2.4	
20. Volatility of total equity	4.1	3.5	
21. Volatility of (net) Trade credit	2.2	2.0	
22. Volatility of (net) Trade credit from parent to subsidiaries		0.9	
23. Volatility of (net) Trade credit from parent to outside companies		2.1	
24. Volatility of (net) Trade credit from subsidiaries to outside companies			1.2

Notes: The data are the end-of-fiscal-year amounts, in trillions of yen, averaged over FY1984 - FY2014. The FY1984-2014 sample averaged 1,380 business groups and 32,720 consolidated subsidiary companies per year.