ESSAYS ON FIRMS AND POLITICAL CONNECTIONS IN INDONESIA

by

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Dedication

To Sisilia Wahyuning Astuti, Lintar Angestu Wijanarko Shidiq, and Sekar Alyssa Wijareni Shidiq.

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I would like to thank many friends, relatives, and supporters who made this happen. I am grateful to my adviser Garett Jones, and my PhD committee members, Alex Tabarrok and Carlos Ramirez, for their invaluable help, comments, and discussions at various stages of this work.

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Abstract

ESSAYS ON FIRMS AND POLITICAL CONNECTIONS IN INDONESIA

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In the first chapter, I show evidence of credit-market imperfection in Indonesia: investment spending is sensitive to firm cash flow. These imperfections are stronger for firms that are not politically connected to former president Suharto. This result generally holds for a variety of controls. This result also underscores the importance of political connections in providing firms with preferential access to the external financing commonly found in developing economies. The removal of Suharto from power in 1998 did not substantially reduce the value of a Suharto connection, and may have strengthened the value of such a connection. This highlights the possible durability of political connections in the credit market.

In the second chapter, I estimate the impact of political connections on creative destruction in the Indonesian manufacturing industry between 1991 and 2005. I find that a higher industrial concentration of firms connected to the former president Suharto reduces unconnected firms' ability to efficiently respond to productivity shocks. The presence of politically connected firms pushed unconnected firms against a higher production selection threshold and forced them to forego production activities that would have been feasible to initiate or maintain in a competitive industry. As a result of political-connections-induced

congestion, for each ten-percentage point increase in the share of assets in a three-digit-level industry held by connected firms, the productivity wedge between unconnected and connected firms, as measured by the firms' total factor productivity (TFP) rose by 4 percent. Moreover, the fall of the Suharto regime in 1998 reduced the productivity gap for firms the closer they had been to Suharto, suggesting productivity congestion declined and highlighting the role of political connections in jamming up creative destruction.

In the third chapter, I estimate the impact of business-group membership a firm's performance in the Indonesian manufacturing industry in 1996 and 2006. I find that being a member of a business group positively affected firms' performance. It appears, however, that the business-group membership premium came from providing better access to the market, rather than by having a differential effect on production activities. The result generally holds across estimation strategies. In the main specification using the propensity-score matching, being a member of a business group increased the firms' earnings by 21 percent and labor productivity by 11 percent. Business-group memberships evidently brought firms better access to the markets for imported inputs and highly educated labor, and, to some extent, the export-product market. The effects of business-group membership on firms' production activities were more ambiguous: relative to the standalone firms, the affiliated firms spent more on wages, less on materials, and generally the same amount of investment. This finding provides more evidence for the benefit of business-group membership for firms in developing economies.

Chapter 1:

The Ghost of Suharto: Do Politically Connected Firms Persistently Have Fewer Financing Constraints?

1.1 Introduction

Two salient features of developing countries are their weak contract enforcement mechanism and less-developed financial markets. A corrupt legal system and weak courts make contracts harder to enforce. And having a less-developed financial market limits a firm's options for external financing. Facing these obstacles, firms have to rely on repeat interactions, reputation, and networks instead of contracts (Tirole, 1996). And such firms tend to rely more on internal firm financing (Rajan and Zingales, 1998). Against this backdrop, political connections are likely to matter a great deal.

In the 1980s Indonesia witnessed the rise of ersatz capitalist class with political connections to president Suharto (Kunio, 1988; MacIntyre, 1991; Robison, 1986). This came with a declining influence of state-owned enterprises, but increasing authoritarianism. In the 1990s, Suharto's immediate family, and especially his children, aggressively capitalized on their family name. By 1996, Suharto had become the de facto owner of corporate structures coordinated through a tightly centralized franchise network for distributing rents.

The story is all too familiar by now. The government used financial liberalization, which started in the late 1980s as a sensible macro strategy, to raise capital to replace its diminishing rents from natural-resource ownership. Liberalization did not work as intended, though, in the presence of poor governance under an authoritarian regime. As Pangestu and Habir (2002) argue, what led the economy to crisis in 1998 was poor corporate governance

because of moral hazard in lending, as business groups with strong political connections violated legal lending limits and generated non-performing loans. International investors also contributed to the crisis, as cheap capital inflows attracted by implicit government-guaranteed investment returns financed poorly performing and politically connected firms. Thus, moral hazard among financial intermediaries is the key to understanding how the crisis unfolded (Krugman, 1998; Corsetti et al., 1998).

Eventually, economic and political crises devastated the country in 1997-1998, probably more than any other country in the region. The financial market and banking sector collapsed, output was contracted by 13 percent, and political instability and massive riots ensued. Despite what observers expected after thirty years of high growth and with strong macroeconomics indicators, the crisis revealed massive distortions of assets prices as well as bad corporate governance. It also finally put thirty years of mighty Suharto rule to an end.

This essay provides evidence that Suharto-connected firms were less liquidity constrained than otherwise similar firms, even after the 1998, when political connections to Suharto should have became less valuable. The effect of financial and political crisis on allocative efficiency in the capital market is actually theoretically uncertain, at least in the short run. Financial crisis might force financial intermediaries to approach market price valuation and away from politically connected firms, let alone when the political base for those connections had gone ashtray as in Indonesia when Suharto eventually stepped down during the crisis year. But, crisis might destroy the information networks among lenders and borrowers. Further, credit rationing might take places at the expense of smaller, productive firms. This in turn causes such firms' net worth to fall and credit to contract throughout the economy. Meanwhile, because of their old networks and their relationships with their creditors, previously politically connected firms continue to have better access to the credit market.

I have two objectives. First I attempt to establish whether firm's internal financial structure matters for investment spending. I also investigate quantitatively whether investment of firms with political connections and hence lower information costs within their networks

is less sensitive to their internal financial structure. If so, this would support the claim that capital-market imperfections and frictions were large. Second, I examine whether the twin crises led to a benign destruction of politically connected firms' access to the capital market. Suharto had gone, but did these firms lose all privileged access? To study these questions, I focus on firms in the manufacturing sector, the most important engine of economic growth during the Suharto era.

I find that investment in firms that lacked political connections and preferential access to external financing were more sensitive to cash flow, a proxy for their net worth. This is consistent with the presence of substantial imperfections in the capital markets. Removing Suharto from power reduced unconnected firms cash-flow sensitivity but had no effect on politically connected firms. This highlights the persisting advantage of being politically connected even after a crisis eliminates the political basis for their privileges and despite significant postcrisis credit-market reform.

1.2 Institutional Background

1.2.1 Corporate Governance and Finance under Suharto

In the years leading to the crisis, Indonesian firms invested heavily in fixed assets, financed by excessive borrowing, but had remarkably low profitability (Pomerleano, 1998). This hints at imprudential lending and moral hazard. Moreover, connections to Suharto played the dominant role in the making of such bad lending practices, especially in the 1990s. Pangestu and Habir (2002) show that by December 1996, the top ten private banks owned 68 percent of total bank assets, and all were connected to Suharto. They also point out that both state and private banks were engaged in policy-directed directed lending to firms with connections to Suharto. In addition, government's implicit guarantee to these banks increased moral hazard and made the overall banking sector "too big to fail". Government bailouts for corrupt, state-owned bank Bapindo and private bank Bank Duta in the 1990s provide clear examples of the absence of an exit mechanism for bad banks. The bailouts came because

even though these banks lost massively on currency speculation, they held large deposits of the Suharto family foundations that managed his political funds and contributions.

To its credit, the government since the early '90s acknowledged problems of violating legal lending limits, implicit government guarantees, and politically-directed lending with poor repayment performance in banking sector. These problems were more prevalent in state banks, which had 70 percent market share. As Enoch et al. (2001) report, in 1992-1993, long before the crisis, the government launched a $4 billion recapitalization plan (around 4 percent of GDP), injecting cash to the state banks in the form of subordinate loans. But, in 1997, the World Bank saw the problem as limited to only two state banks (Bank Bumi Daya and Bapindo), which Suharto eventually had agreed to be merged by June 1997.

A more realistic picture than the World Bank's comes from two crisis-related banking sector reviews and audits in October 1997 and March 1998. As part of the IMF's stabilization program, it took a sample of financial data on eighty-five private banks and seven state banks from June 1997, before the crisis. This sample covers 85 percent of total banking assets. The state banks had a 40 percent share. The audit found that thirty-four banks were insolvent, including two state banks. It also found that sixteen banks, including three directly connected to Suharto family, were beyond repair and should be liquidated. The second review, in March 1998, only days after Suharto stepped down, was by international auditors hired by the Indonesian Banking Restructuring Agency (IBRA). It reveals another deep-seated insolvency problems. Each of seven banks taken over by the IBRA and provided liquidity by the central bank had at least 55 percent of assets as non-performing loans, most of them were related lending to firms within the same group as these banks. These troubled banks' assets were about 16 percent of total banking sector assets. Banks not supported by the IBRA fared better, but they, too, were in a mess. The estimated value of the whole banking system insolvency was around 30 percent of GDP.

1.2.2 Suharto's Political Network

As McLeod (2000) aptly notes, Indonesia under Suharto was a special kind of corrupt regime. It had a a highly centralized rent-distribution coalition, with Suharto and his family acting as patrons and practically anyone else as potential clients. Suharto developed a franchise system of protection sales, with substantial rent transfer upward, in a regime in which the military and bureaucracy repressed the people, often violently. After keeping his enormous share of the rents, he distributed some to buy loyalty and support, especially from the military and the bureaucracy, whose official salaries he deliberately kept at a minimum to make them reliant on his rents. This rents distribution he administered in a well-organized patron-client network going down to the village level (Sidel, 1998). Further, Suharto was able, perhaps intuitively, to optimize rent extraction level and discipline his franchisees if they crossed the line. His long presidential tenure aided his ability to optimize long-term rent extraction relative to economic growth. In Olson (1984) terminology, he was a stationary bandit, a notorious one.

McLeod (2000) identifies specific ways by which Suharto's regime extracted rents and developed connections with businesses: it licensed importers and protected businesses from imports; the government and state-owned enterprises awarded contracts without bidding; state and central banks provided access to cheap loans; the regime granted rights to extract natural-resource rents; it designated "firms" as mandatory partners in foreign joint venture; it gave them rights to take over land; and it offered favorable tax treatment and the right to collect taxes. In the 1970s, rent seeking was heavily centered on the dominant state-owned-enterprise sectors and import- substitution industries. In contrast, the 1990s saw more corruption in the private sector, along with the rise of new politically connected businesses, including Suharto's children. Moral hazard and related lending started and developed because these cronies were able to direct funds generated by the newly liberalized financial market to their pet projects without market accountability.

From an extensive rent extracting methods above, it is very likely that the size is enormous, but the exact value of Suharto's distributional network and assets is hard to determine[1]. In his colorful description of Suharto and his cronies' business empire, Backman (1999) says nothing was too small for Suharto to get involved in – from manipulating state-enterprise contracts to pillaging farmers and school children, from special credit facilities for his son's national car project to clove marketing monopoly. Hill (2000) provides another perspective on the size of the network: out of the twenty largest conglomerates in 1993, with total turnover of 70.6 trillion Rupiah (around 21 percent of GDP), three were owned by Suharto's children, and most if not all of them were part of Suharto's network. For example, Liem Sioe Liong, the owner Salim Group, valued at 18 billion Rupiah and the largest Indonesian conglomerate at that time, had been very closely related to Suharto since the 1950s. Moreover, Claessens et al. (1999) calculate that in 1996, Suharto controlled 417 listed and non-listed companies collectively worth 24 billion Rupiah. Including Salim group, he ultimately controlled 16.6 percent of total stock market capitalization.

1.2.3 Financial Crisis and the Collapse of Suharto Regime

In 1998, Indonesia found itself in a massive financial crisis, followed by political turbulence and regime change. The financial crisis, in large part, was due to external factors: the Thai and South Korean crisis triggered massive capital outflows from the entire region. This exogenous financial crisis led to the unexpected fall of Suharto because he was unable to reconcile conflicting interests among his capital-owning supporters.

As late as 1997, even one of the most pessimistic observers, Paul Krugman, famously asserted that Asian economies' growth was more a "perspiration" than "inspiration" type (in other words, with low Total Factor Productivity), did not see the crisis coming. In Indonesia, in particular, available macro indicators showed that the budget deficit was low,

[1]Time magazine (`http://content.time.com/time/world/article/0,8599,2056697,00.html`; accessed: 2014-12-15) and the British Broadcasting Corporation (BBC) (`http://news.bbc.co.uk/2/hi/asia-pacific/864355.stm`; accessed: 2014-12-15) reported that Suharto's assets value in 1990-2000 were estimated at between $15 and $25 billion

economic growth was high, and the unemployment rate was low. The current-account deficit and real exchange-rate appreciation may have been a little high, but this was far from alarming. A little concern came from the high domestic-credit expansion and ratio of short-term debt to reserves. Given these indicators, the Indonesian central bank's initial response to the crisis in Thailand was to assume that this would be a weaker pressure on the Rupiah currency as in the 1994 Mexican Peso crisis episode.

In cross-countries analysis, underlying economic policies and corporate governance status cannot explain why the crisis took places in countries as diverse as South Korea and Indonesia. Studies on predicting banking crisis have concluded that based on macro indicators, the ex ante probability of Asian countries experiencing 1998 crisis was low by standard and could not even justify any self-fulfilling pessimism in their financial sector. Furman et al. (1998), recalculating and extended Frankel and Rose (1996) and Kaminsky et al. (1998) model of currency crisis prediction, and Demirgüç-Kunt and Detragiache (1998) find that Indonesia was less vulnerable to a financial crisis than other affected Asian countries.

Some observers see the crisis as a result of international financial-market fragility (Radelet and Sachs, 1998; Chang and Velasco, 1999; Krugman, 1999), in which self-fulfilling pessimism by international lenders leads to massive capital outflow, which eventually hits domestic firms' balance sheet. Krugman (1998) asserts that the unfolding economic crisis out of a currency crisis in Asia centered on the problems of financial intermediaries whose implicit guarantees led to excessive lending and in turn assets prices distorted by moral hazard. In this setting, self-fulfilling pessimism could fuel financial disintermediation and circularly magnify the loss. Empirically, Pangestu and Habir (2002) and Enoch et al. (2001) confirm this argument, especially for the months before the crisis became systemic.

The Asia crisis originated Thailand, in July 2, 1997, when the exchange rate overvaluation and property-sector bust put the Thai currency was under severe pressure. The Thai crisis spread to Indonesia because international creditors saw that the countries had a high correlation on assets returns, even though trade with each other was low (Kaminsky and

Reinhart, 2000). As Kaminsky and Schmukler (1999) find, stock market returns between 1997 and 1998 fell in response not only to local but also neighboring countries' news and the herd instinct of the international market. Indonesia nevertheless managed to avoid a systemic financial crisis, but only until November 1997, when the South Korean financial system went under and delivered a final blow to the Indonesian credit market.

The collapse of the Suharto network relates closely with the financial crisis. The crisis evolved into a political crisis because it led owners of fixed capital to call for adjustment policies irreconcilable with what owners if mobile capital called for (Pepinsky, 2009). Distinguishing based on capital mobility across the national border, fixed capital represents mainly two groups: the military, who enjoyed off-budget rent distribution in the 1970s; and, starting in the 1980s, non-military *pribumi* (native) Indonesian businesses , including those owned by Suharto's children, connected to the military and bureaucracy. Mobile capital, on the other hand, refers to mainly to the *konglomerat* (conglomerate), the Chinese-Indonesian financiers with physical protection from Suharto's military for doing businesses in Indonesia.

Amid the political process for picking policies to contain the financial crisis, the regime inevitably faced a tradeoff between a market-based adjustment policy with tight fiscal and monetary policy and a policy with more government control on capital flow and an exchange-rate peg. The former would have hurt fixed capital, while the latter would have hurt mobile capital.

By May 1998, it was clear to mobile capital that they had lost the political battle. Popular denouncements by pro-fixed capital elites and the inability of the military to prevent riots against Chinese-Indonesians sent strong signals that mobile capital could not rely on Suharto's political protection any longer. Massive withdrawal of mobile capital in May 1998 ended Suharto's longtime distributional coalition and protection-franchisee network. Losing support from his political network and unable to quickly recruit new allies, Suharto had no option but to exit.

After Suharto had gone, in a massive financial market reform, the government's immediate goal was to save the economy's intermediary function, most notably the banking sector[2]. When the banking crisis became systemic, the government launched a scheme to restructure banks and corporations and provide blanket guarantee on banks' liabilities. At the center of the bank restructuring was the Indonesia Bank Restructuring Agency (IBRA). The job of this super agency was to close, merge, or take over and recapitalize bad banks, including all connected banks, and eventually to sell or privatize them. The IBRA was also tasked to recover the non-performing loan of banks it took over and to manage assets former owners has posted as collateral in the Bank Indonesia's (the central bank) liquidity-support program. In October 1998, IBRA merged four troubled state banks into Bank Mandiri and recapitalized this new bank in October 1999. In March 1999, IBRA closed thirty-eight banks, recapitalized nine, and taken over seven. In May, 1999, IBRA recapitalized another eleven private banks and twelve regional-development banks. In this recapitalization scheme, the government issued bonds, practically alter the cost of banking crisis to taxpayers.

1.3 Identification Strategy

1.3.1 Research Design

In a frictionless external capital-market setting, firm investment demand responds only to investment opportunity, often estimated as expected marginal profitability of capital, the ratio of market value of capital stock to its replacement cost (Tobin, 1969; Hayashi, 1982). Equilibrium is reached when expected marginal profitability of capital, q-value, equals cost of capital, the market interest rate. In this setting, internal financial structure does not affect firms' investment decision.

Yet, when information is asymmetric, a contract between a firm undertaking a project and an external investor includes constraints to reduce the firm's incentive to shirk. In this situation, the actual level of investment depends on firm's net worth and may be

[2]For excellent documentation of the bank bailout scheme, see Enoch et al. (2001)

below level desired in the absence of information costs. A firm's higher net worth, which reflects available resources a firm can allocate for the project, reduces its incentive to cheat. Holding investment opportunities constant, the firm's net worth is positively correlated with investment (Hubbard, 1998).

For any investment above a firm's net worth, there is a portion of uncollateralized lending, on which an external investor needs to be compensated for monitoring or information costs. For uncollateralized loans, the supply of fund is upward sloping against the cost of funds and a higher slope reflects higher marginal information costs for such financing. As a result, an increase of a firm's net worth shifts outward the supply of external financing, and thus increases investment, but the incremental investment increase differs across firms facing different information costs.

The empirical test for capital-market imperfection centers on whether a firm's internal financial structure, its net worth, contributes to its decision to invest. If information costs are the source of capital-market imperfection, investment is more sensitive to changes in cash flow, as the proxy of net worth, in firms with higher information costs. In an imperfect capital market, there would be a significant *difference* in net worth sensitivity to investment between firms with high and low information cost.

There are many ways to separate firms based on their information costs. Fazzari et al. (1988) differentiate among firms by their earning-retention, dividend payout practice. Firms with low dividend payout may signal that they have exhausted all retained earnings in financing their investments and may be subject to more severe adverse selection on the capital market, and thus higher information cost. Hoshi et al. (1991) divide Japanese firms into those with special financial ties with major banks, *keiretsu* firms, for whom the major banks have the lowest monitoring costs for external financing, and independent firms.

In this essay, I classify Indonesian firms by their political ties to Suharto. Politically connected firms had easier access to external financing. First, they had closer financial ties to the banks, which were the main source of external loans. At the same time, these private and state banks were also mostly controlled by same people connected to Suharto

(Enoch et al., 2001). Regarding connected firms[3], external investors faced lower incentive cost in aligning manager behavior with their interest in maximizing investment return since the Suharto government's implicit guarantee to these firms reduced the probability for bad outcome. Indeed, Suharto's implicit guarantee paid off external investors handsomely, at least while he was in power and healthy. To illustrate, in his stock market event study centered on Suharto's periods of illness, Fisman (2001) estimates that as much as 23 percent of most politically connected companies' value would disappear if the regime abruptly ended or Suharto passed away.

Second, connected firms could credibly impose political pressures on external investors and financial intermediaries to direct credit to themselves. Pangestu and Habir (2002) find that state and private banks were under political pressure to direct lending to particular sectors and firms connected to Suharto without properly evaluating them. The stories of preferential lending abound. One blatant example is a special $430 million loan from the state-owned *Bank Pembangunan Indonesia* to then a lesser-known chemical and manufacturing firm that turned out to be related to Suharto's son, Hutomo (Tommy) Mandala Putra (Leuz and Oberholzer-Gee, 2006). Mandala Putra also managed to secure not only special domestic bank loans for his "national" car project, but also even low interest loans directly from the central bank to finance his-clove monopoly scheme.

Adverse exogenous supply shocks should produce different effects on firms: they increase connected firms' information costs and tighten their financial constraints more than unconnected firms. The empirical test is whether the connected firms' investment becomes more sensitive to cash flow after the supply shock relative to the unconnected firms. In my setting, I take the fall of Suharto in mid-1998 as the treatment shock and the unconnected firms as the control group. This control/treatment strategy yields estimates on the value of Suhartos political connection for gaining access to external finance.

For my empirical identification strategy, the removal of Suharto from political power was characteristically exogenous and effective. Suharto resignation cannot be separated from

[3]I refer to "politically connected" and "connected" interchangeably.

the 1997-1998 banking crisis since the crisis fostered conflict among Suharto's capital- owner supporters and eventually crippled his ability to control his network (Pepinsky, 2009). In turn, the banking crisis itself to large degree unfolded due to external factor: the Thai-Baht currency crisis, which triggered self-fulfilling pessimism of international lenders followed by domestic creditors. Another factor that may have accelerated Suharto's political connection network breakdown was the public's serious concern over his health (Soesastro and Basri, 1998). That he was nowhere to be seen at public functions for two weeks in December 1997, and without precedent canceled an important foreign trip at the last minute, fueled speculation on his ability to contain the crisis and prevent a disruptive political succession.

1.3.2 Related Literature

Many studies have been in the same spirit as the seminal Fazzari et al. (1988) work, for example Hoshi et al. (1991) on Japanese firms, Hubbard and Kashyap (1992) on US agricultural firms, and Ramirez (1995) for J.P Morgan-affiliated US industrial, utilities, and railroads companies in the early twentieth century. On Indonesia, Agung (2000) estimates differences in sensitivity of investments to cash flow and leverage across business-group membership, size, leverage and dividend payout of non-financial firms listed in the Jakarta Stock Exchange before the crisis, from 1993 to 1997. He finds financing constraints and agency cost for Indonesian firms seeking external financing. More recently, Blalock et al. (2008), studying the Indonesian manufacturing sector, find that during periods with rapid decline of credit following the 1998 crisis, exporters are able to take advantage of the devalued Rupiah to increase their value added and cash flow and hire more workers. However, only foreign-owned exporters can increase their capital, suggesting severe liquidity constraints for domestically-owned manufacturing firms.

On the value of political connection, Faccio (2006) finds that a firm's value increases when its businesspersons enter political office, although not when politician join its business. On the credit market and lending, Khwaja and Mian (2005) report that in Pakistan, not only were politically connected firms able to borrow 40 percent more despite having 50 percent

higher default rates, but also their rents increased with their related politicians' political power. Ramirez and Tan (2004), however, find that in Singapore, politically connected firms did not get better access to the credit market but were rewarded with financial premium of a higher q-value.

Fisman (2001), in his event study of Indonesian firms listed on the stock market, reveals that a political connection to Suharto was not only high but also highly responsive to the news of Suharto's health. On the market for business licensing in Indonesia, Mobarak and Purbasari (2006) estimate that firms with political connections are three times more likely to obtain exclusive licenses for raw-material imports and commodity sales in the domestic market. As for firms' financing strategy, Leuz and Oberholzer-Gee (2006) report that Indonesian firms with strong political connections are less likely to have publicly traded foreign securities, suggesting that political connections and foreign securities are substitutes. They also find that connected firms financially under-performed for a long time following the fall of Suharto.

On the impact of the financial crisis on lending to politically connected firms, Borensztein and Lee (2002) find that in South Korea after the crisis, the politically connected firms (*chaebol*) no longer had preferential credit access. Credit appears to have been reallocated to more productive firms, which might explain South Korea's relatively quick recovery. In Japan, on the other hand, the adjustment policy for the banking sector after the crisis induced banks to lend to zombie firms (loan evergreening). Persistent bad lending habits were strongly correlated with sluggish productivity after the 1990s crisis and responsible for a lost decade of Japanese economic growth (Caballero et al., 2008).

My essay extends the above analyses to a large number of manufacturing firms, in contrast to only some publicly listed companies. Especially for a developing country with a small stock market, this will help capture the behavior of firms in general more precisely. More substantially, I analyze the role and nature of political connections in less-developed capital markets, particularly how firms' relative cost of external financing responds to the loss of political connections after a political crisis.

1.3.3 Data

My first dataset is the Indonesian Survey of Medium and Large Manufacturing (Survei Tahunan Perusahaan Industri Pengolahan). This panel dataset covers all manufacturing firms with twenty or more workers in Indonesia. It is annually administered by the Indonesian Central Agency of Statistics (Badan Pusat Statistik). With around 160 questions, the survey provides extensive information on Indonesian manufacturing firms production, broadly organized into questions on firm identifiers, output, intermediate goods, labor and employment, changes in capital, and capital stock.

I use data only from 1991 to avoid problems in the back-casting method the Central Agency of Statistic adopted in the 1985-1990 surveys in their attempt to fix issues on the identification of new firms (Aswicahyono, 2009). I stop the survey period to 2005 to capture the effect of Suharto removal in 1998, and exclude the 1996 survey since it does not report investment in fixed assets. I also restrict the observation to firms employing at least one hundred workers to make them more comparable with relatively large connected firms.

As Harris et al. (1994) find in datasets covering the 1980s, a large number of firms report zero investment value; I cannot verify whether these firms did not respond to the survey or had no or low investment value. As a result, rather than impute missing data or modify econometric specifications to adjust for these low values, I eliminate firms with non-positive value of fixed-assets investment from the observations. In addition, I exclude extreme points by removing the first percentile of the log form of the main variables: firm investment, cash flow, and sales. I adjust these variables' values based on the Consumer Price Index with a base year of 2000. I deflate investment of fixed assets using the Producer Price Index weighted by the share of industry input to total input for each there-digits code of International Standard Industrial Classification of manufacturing industry, based on the Indonesian Input-Output table for 68 sectors. To allow for a robust regression, I regroup industry-sector classifications to obtain at least three hundred firms in each sector.

My second data set is a list of politically connected firms, provided by Mobarak and

Purbasari (2006)[4]. They designate a firm as politically connected in the following way. First, they identify 285 firms listed in the Jakarta Stock Exchange (JSX) and regress each firm's stock return on the 15 days (out of the 985 market trading days from 1994 to 1997) the news indicated that Suharto was ill, controlling for the aggregate JSX index, average return of the firm's industry, and prevailing exchange and interest rates. They categorize as politically connected twenty-nine firms with a significantly negative stock return in the days when Suharto adverse health news came out. Then, out of the twenty-nine connected firms, they take fifteen manufacturing firms and identify their key personnel from the Indonesian Capital Market Directory for 1998. Next, they identify the business groups to which those key personnel belong, based on the publication *400 Prominent Indonesia Businessmen* (CISI, 1993). From this identified business groups, they generate a list of all subsidiary firms of those groups from *Conglomeration Indonesia* (PDBI, 1997). Third, they identify firms politically connected to Suharto by merging the manufacturing-firm list with the Indonesia Survey of Medium and Large Manufacturing of 1997, matching the variables of firm location, industry code, and size.

I append this list of politically connected firms from the 1997 survey to surveys from other years (1991-2005). I set political connection as a time-invariant variable, since most of the politically connected firms are either based on family relationships or business relationships that had been established back in the 1950s, when Suharto was still a local military officer in Central Java. The procedure in identifying politically connected firms also includes regression that covers abnormal stock return in 1994-1997. I expect that in the postcrisis period, the influence of political connections might decrease, but I continue to

[4]There are at least two studies on firms politically connected to Suharto. First, Fisman (2001) uses the Suharto Dependency Index developed by the consultant Castle Group in 1996. The index is built on a subjective index of how closely related the firms are to Suharto. The sample is rather limited, since it consists of only the twenty-five largest business groups, whose ranking is then assigned to total seventy-nine firms belong to the groups and were listed in Jakarta Stock Exchange. Second, Leuz and Oberholzer-Gee (2006) measure political connections by conducting an event study for 130 publicly listed firms in 1997. For each firm, they compute cumulative stock returns over six health-related events, as in Fisman (2001), to measure its closeness to Suharto. During those events, firms more closely connected to Suharto lost more of their value or stock returns than others. Leuz and Oberholzer-Gee take this closeness value as the main proxy for political connection, in addition to the binary dummy variable of whether the firm is owned by Suharto's family or a state-owned enterprise.

label these firms as connected, which makes it possible to see whether they could maintain their preferential treatment even after the source of privilege had gone.

As a note of caution, some measurement errors may arise. First, the procedure may exclude firms actually connected if the Indonesian Capital Market Directory and the *400 Prominent Indonesia Businessmen* list do not cover all names of relevant politically connected persons; and the *Conglomeration Indonesia* list may not cover all relevant subsidiaries of existing business groups. Second, firms may not always benefit from having politically connected people on board.

1.3.4 Summary Statistics

Table 1.1 presents the summary statistics of variables of interest in the Survey of Manufacturing Industry 1991-2005 for regression analysis. Applying all restrictions and listwise deletion procedures on dependent variable of log real investment and main explanatory variables of log real cash flow, log real sales, log real value added per workers, log number of workers, and firm's age, I end up with unbalanced panel data for 8,295 firms; 246 of them are politically connected. In a cross-sectional unit, this amounts to 32,854 firm-year observations, 1,602 (4.7 percent) of which indicate connections with Suharto.

Panel A in table 1.1 shows that these connected firms are significantly different from the unconnected firms. As seen in the last column of the table, the difference in the log mean value of investment between connected and unconnected firms is 1.45. The differences in the log mean value of cash flow, sales, and value added per worker are 1.67, 1.51, and 1.10. The log mean value of connected firms number of workers is 0.36 higher than of the unconnected firms'. Connected firms' age also tends to be 2.56 years higher than unconnected firms, suggesting better ability to survive, at least prior to 1998 crisis. All of these differences have significant t-statistics.

Table 1.1: Summary statistics

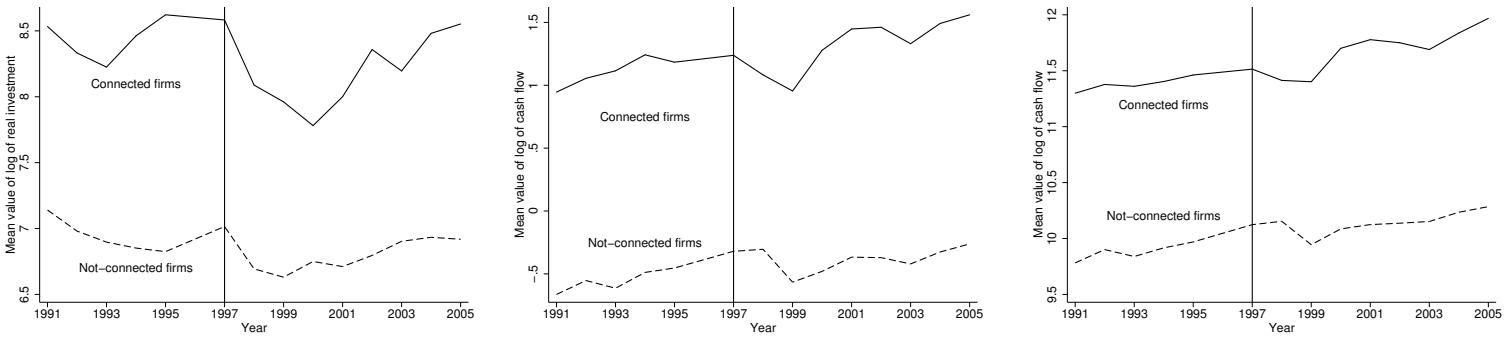
	Unconnected N=32854	Connected N=1602	All N=34456	Difference
Log real investment	6.873	8.324	6.940	-1.451***
	(2.296)	(2.270)	(2.315)	(-24.72)
Log real cash flow	-0.451	1.222	-0.373	-1.673***
	(1.858)	(1.690)	(1.884)	(-35.33)
Log real sales	10.03	11.54	10.10	-1.507***
	(1.599)	(1.489)	(1.625)	(-36.95)
Log real value added per worker	2.983	4.077	3.033	-1.095***
	(1.258)	(1.278)	(1.280)	(-33.98)
Log number of workers	5.904	6.266	5.921	-0.362***
	(0.951)	(0.970)	(0.955)	(-14.86)
Firm's age	14.55	17.12	14.67	-2.563***
	(14.49)	(15.47)	(14.54)	(-6.89)

B.Share of connected firms

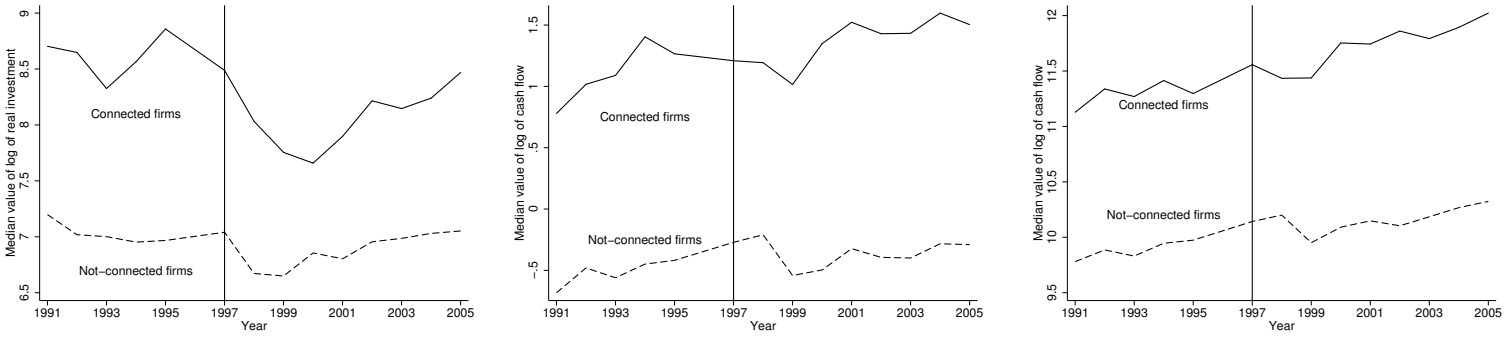
	All	Food & tobacco	Textile & garment	Wood & paper	Chemical & mineral	Parts & electronics
Number of firms	4.65 %	4.86 %	0.89 %	3.01 %	5.18 %	3.45 %
Real investment	20.00 %	29.88 %	2.42 %	9.74 %	31.06 %	12.1 %
Real cash flow	13.96 %	10.75 %	1.89 %	17.83 %	23.53 %	12.62 %
Sales	14.26 %	14.58 %	1.45 %	18.08 %	21.62 %	11.24 %
Number of workers	5.61 %	5.20 %	1.00 %	8.62 %	8.88 %	8.41 %

Mean value. Listwise deletion. Standard deviation in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, excluding 1996 when the survey does not report Investment. Only firms with number of laborers one hundred or more. Base year is 1995. Controls are log of firms number of workers and firm age. Dummy controls are three-digit ISIC manufacturing industry code and province.

Panel B illustrates the share of connected firms of all firms in various measures in the industry. Connected firms constitute only 4.65 percent of total firms. Yet, they have 20.05 percent of total manufacturing-industry investment. Connected firms also contribute to 13.96 and 14.17 percent of total industry cash flow and sales. All these figures suggest that average connected firms are not only much larger than unconnected firms, but major players in the industry. Panel B also suggests that connected firms are more concentrated in chemical and mining-related industries (5.8 percent of all firms) and less in textile and garment industries (0.89 percent).



(a) Log investment - Mean (b) Log cash flow - Mean (c) Log sales - Mean



(d) Log investment - Median (e) Log cash flow - Median (f) Log sales - Median

Figure 1.1: Mean and Median Log Values of Main Variables

Taking the average and median value of the main variables, Figure 1.1 shows that investment declined significantly after the crisis. Although it is not conclusively evident, Figure 1.1a suggests a break from the parallel trend between connected and unconnected firms, as connected firms' investments dropped deeper than unconnected firms in the first two years after 1997. Firms' cash flow and sales did not decrease as much as investments and have recovered to precrisis level quicker than investment.

1.3.5 Estimation Strategy

My first objective in this essay is to estimate how imperfect the Indonesian capital market was. In the neoclassical view of a perfect financial market without informational and incentive problems, firms' investment spending depends only on the market interest rate in a given investment opportunity, and firms' internal financial structure does not affect their investment decision.

To test this proposition, I use the sales-accelerator investment model (Abel and Blanchard, 1989; Fazzari et al., 1988), which combines a cash-flow model with a general-accelerator model, in which past sales also determines investment. This model choice is based on, first, a practical data limitation for identifying a firm's q-value: neither do the existing Indonesian surveys of manufacturing firms report a firm's market value of capital stock, usually defined as market price of firm equity obtained from the stock market, nor can market value of capital stock be linked to stock market price data. In addition, in Indonesia, not only manufacturing firms, but firms in general participate only lightly in the stock market, as is common in less-developed financial markets.

Second, while in principle q-model is more attractive and elegant because it shows the optimal adjustment path for firm's capital stock based on an optimization problem, sales-accelerator models are empirically better at explaining investment demand (Fazzari et al., 1988). Comparing various models on the same firm's data set, Samuel (1998) demonstrates that the q-model performs worst in predicting investment demand, while the cash-flow model performs best in both cross-sectional and firm fixed-effect regression specifications. Samuel

(1996) also highlights the limited value of the q-model in countries with underdeveloped stock markets because of data limitations in constructing the q-ratio there.

I run the following reduced-form specification of a sales-accelerator model:

$$I_{it} = \alpha + \beta_1 CF_{it} + \beta_2 S_{it} + \gamma_1 \mathbf{X}_i + \gamma_2 \mathbf{X}_{it} + u_{it}, \tag{1.1}$$

where the dependent variable I_{it} is firm i's fixed-assets investment in year t and α is the common intercept. CF_{it} is firm i's cash flow, or liquidity, in year t. It is a proxy for firm net worth and defined as firm profit before indirect tax. S_{it} is sales of firm i in year t as a measure for firm investment opportunity. For $\mathbf{X}_i$, a vector of firm-level controls, I introduce dummy variables for location (thirty-three provinces) and industry (fifty-four modified ISIC 3-digit industry codes). The firm's production controls, $\mathbf{X}_{it}$, are its productivity (log real value added per worker), number of workers, and age. The main purpose for including these production controls is to prevent the main explanatory variable, firm cash flow, from picking up the effect of firm productivity and size on investment.

I estimate equation (1.1) by doing, first, a pooled cross-sectional OLS regression. Second, I run panel-data firm fixed-effect regression since, despite applying various controls, a cross-sectional OLS regression likely suffers from omitted-variable bias. There may be unobservables, other firm characteristics, correlated not only with firm liquidity, but also the dependent variable, firm investment. For example, the entrepreneurial skill of a firm's key personnel can help in both creating cash-flow and in maintaining the information network and external sources of finance, thus getting cheaper external finance for investment. Third, following Eberly et al. (2012), I also anticipate if past investment is also an important determinant of current investment by adding a lagged dependent-variable control into an OLS estimator, known as a lagged-dependent-variables specification (Angrist and Pischke, 2008). Adding a lagged dependent variable to the right hand side of the equation explicitly accounts for the possibility that past investment are not time-invariant unobservables

normally captured in the firm-specific fixed-effect, α_i. In this case, past time-variant investment may affect this year's investment, presumably since past investment may indicate potential firm growth. Fourth, taking advantage of my panel dataset structure, I apply a system generalized method of moments (GMM) procedure estimator (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998) to control for random individual firm effects and deal with serially-correlated errors that would lead to parameter inconsistency. The main idea of this estimator is to use both additional lags of dependent-variable levels and first differences as instruments to get consistent estimates to overcome the correlation between the first difference of lagged dependent-variable regressor ΔI_{it-1} and $\Delta\varepsilon_{it}$ (for detail see (Roodman, 2009)).

I estimate equation (1.1) on connected firms and unconnected firms separately. The coefficient of interest is β_1, the sensitivity of firm investment to liquidity. The greater value of β_1 for unconnected firms, who face bigger information problems, provides evidence of credit-market imperfection. Focusing on the difference in β_1 also helps in reducing problems of biased estimates since even if cash flow's effect on investment is biased, if we assume the biases are the same across connected and unconnected firms, the difference in β_1 is not biased (Fazzari et al., 1988).

The second objective of my essay is to discuss more explicitly the role of political connections on firm-financing constraints. To do so, I treat the 1998 political event of Suharto's resignation as an adverse supply shock to firm political connections. In this setting, since the exogenous crisis removed the ability of Suharto to provide firms with a political guarantee for doing business, the connected firms should become more financially constrained and their investment more sensitive to cash flow. On the other hand, the crisis may either have had no effect on unconnected firms' cash-flow sensitivity or lowered sensitivity if in the post-Suharto years unconnected firms' access to credit markets had been improving. Yet, after 1997, higher cash-flow sensitivity shall be more evident for connected firms because of the declining value of political connections in the credit market.

Specifically, in both connected and unconnected firms group, I apply the following specification:

$$I_{it} = \alpha + \beta_1 CF_{it} + \beta_2 (CF_{it} * Post_t) + \beta_3 Post_t + \beta_4 S_{it} + \gamma_1 \mathbf{X}_{it} + u_{it}, \tag{1.2}$$

where $Post_i$ is a dummy variable showing whether the year is 1998 or later, in the post-crisis period when Suharto was no longer in power. I estimate equation (1.2) using the same estimators as equation (1.1): cross-sectional OLS; firm fixed-effect, lagged-dependent-variables OLS; and system GMM. The coefficient of interest is the difference between firms groups in β_2 which is the effect of the removal of political connections after the 1998 political crisis on firms' cash flow-investment sensitivity.

Nevertheless, not all politically connected firms are created equal. The value of political connections differs across firms; and firms closer to the center of Suharto's network should have more credible political power and lower financing constraints. Conversely, the removal of Suharto from power should hit firms closer to him harder. To see whether the effect of Suharto's removal from power on firms differed based on their closeness to Suharto, I estimates equation (1.2) on four groups: unconnected firms, connected firms, firms connected by family ownership, and firms connected by immediate family ownership. Firms closer to Suharto should have a higher cash-flow coefficient after 1997, indicating their tighter financing constraints in comparison to the years when Suharto was still in power.

1.4 Result

1.4.1 Indonesian Capital-Market Imperfection

I find that, in general, a firm's cash flow affects investment, and a firm's investment is more sensitive to cash flow for unconnected firms than for connected firms, albeit not with an ironclad. In all specifications, coefficients for log cash flow are larger and more statistically significant for unconnected firms, although the z-score test fails to reject the hypothesis that

the cash-flow coefficients may be statistically similar for both sets of firms. Higher cash-flow coefficients for firms with higher incentive and information costs in obtaining credit, the unconnected firms, suggests credit-market imperfection in Indonesia.

Row 1 of table 1.2 shows sensitivity of firm's investment to cash-flow across four estimators: pooled ordinary least squares (OLS) regressions (columns 1 and 2); firm fixed-effects regressions (columns 3 and 4); pooled OLS with a lagged dependent variable as one regressor (Column 5 and 6); and Arellano-Bond-Blundell system GMM (columns 7 and 8). Standard errors are adjusted for clusters in each firm panel-data firm's identification number. The odd columns present regression results on the unconnected-firms dataset; the even columns concern connected firms' data. The dependent variable is firms' log of real investment, and the main explanatory variables are firm cash flow, sales, and labor productivity, defined as firm value added per worker. To reduce omitted variable bias, I control for firms' number of workers, age, and year effect. I put additional controls for time-invariant location (province) and three-digit industry code in the pooled and lagged-dependent-variable OLS regressions.

In the cross-sectional pooled-OLS regression, 1 percent growth of firm real cash flow is associated with 0.21 percent growth in investment spending for unconnected firms, but only 0.10 percent for connected firms. By explicitly controlling for firm-specific characteristics for less biased estimates driven by variation over time within each firm, fixed-effects regressions produce smaller investment-cash flow sensitivity than the OLS estimation. For unconnected firms, 1 percent growth of firm cash flow lead to only a 0.05-percent increase in investment, and for the connected, the coefficient is -0.01, but statistically insignificant.

Columns 5 to 8 of table 2 show the OLS with lagged dependent variable and the system GMM regressions. For unconnected firms, the coefficient of log real cash flow is 0.08, while for connected firms, it is only 0.06. Applying the system GMM estimator, a 1-percent cash-flow increase leads to a 0.39-percent increase in investment for unconnected firms, but only 0.08 percent for connected firms.

Table 1.2: How imperfect was the Indonesian capital market?

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.207***	0.103	0.0525*	-0.0130	0.0833***	0.0562	0.390	0.0806
	(0.0256)	(0.0937)	(0.0244)	(0.103)	(0.0206)	(0.0908)	(0.221)	(0.271)
Log real sales	0.311***	0.209	0.250***	0.123	0.253***	0.213	0.473*	0.408
	(0.0288)	(0.138)	(0.0328)	(0.114)	(0.0274)	(0.109)	(0.221)	(0.254)
Log real sales $_{t-1}$	0.0840***	0.00630	0.0334	-0.0509	-0.0696**	-0.146	-0.0493	-0.115
	(0.0178)	(0.0904)	(0.0185)	(0.0823)	(0.0251)	(0.117)	(0.210)	(0.177)
Log real sales $_{t-2}$	0.0392*	0.0897	-0.0121	-0.0269	0.00647	0.00570	-0.0215	0.0148
	(0.0162)	(0.0782)	(0.0167)	(0.0663)	(0.0149)	(0.0668)	(0.0723)	(0.0999)
Log real value added per worker	0.0344	0.0630	-0.0117	0.1000	-0.00389	0.0614	-0.517	-0.0612
	(0.0294)	(0.0988)	(0.0284)	(0.0952)	(0.0250)	(0.109)	(0.264)	(0.276)
Log real investment $_{t-1}$					0.605***	0.491***	0.601***	0.553***
					(0.0102)	(0.0610)	(0.0471)	(0.113)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	No	No	Yes	Yes	No	No
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
GMM	No	No	No	No	No	No	Yes	Yes
Observations	24133	1267	24133	1267	17174	951	17174	951
R-squared	0.368	0.421	0.0528	0.0357	0.591	0.588		

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. In the GMM specification, for the first-difference equation, standard instruments for strictly exogeneous regressors are differences in log value added per worker and log number of workers, and for GMM-type regressors, lagged 1 and 2 of log of real investment, real cash flow, and real sales. For the levels equation, standard instruments for strictly exogeneous regressors are the log of value added per worker and number of workers, and for GMM-type regressors, differences in lag 1 and lag 2 of log of real investment, real cash flow, and real sales. For the validity of instruments in system GMM on unconnected firms, error serial correlation is rejected in order 3 (AR(3) test p=0.310) and moment conditions are correct under the Hansen test for overidentifying restrictions (p=0.190), but not the Sargan test (p=0.010). For connected firms, serial correlation is rejected in order 2 (AR(2) p=0.20) and moments conditions are correct under both the Hansen (p=0.41) and Sargan test (p=0.80).

In determining the statistical significance of the differences in cash-flow coefficients between connected and unconnected firms, I apply the following z-score test:

$$z = \frac{\beta_{1,nc} - \beta_{1,c}}{\sqrt{{SE_{\beta_{1,nc}}}^2 + {SE_{\beta_{1,c}}}^2}}, \tag{1.3}$$

where $\beta_{1,nc}$ and $\beta_{1,c}$ are cash flow coefficients for regressions on unconnected and connected firms data respectively; and $SE_{\beta_{1,nc}}$ and $SE_{\beta_{1,c}}$ are standard errors for each coefficient. The z-scores are 1.07, 0.62, 0.29, and 0.87 for OLS, fixed-effects, OLS lagged-dependent-variables, and system GMM regressions, indicating that despite its economic significance, I cannot reject the hypothesis that the cash-flow coefficient of unconnected firms is statistically different from connected firms at the 95-percent confidence level.

In addition, investment is sensitive to current sales and past-year sales as proxies for anticipated firm investment opportunity. For both types of firm, coefficients of sales are larger than coefficients of cash flow. Unconnected-firms investment, however, tends to be more responsive to investment opportunities. Moreover, in regression results for connected firms, none of the main explanatory variables show statistically significant coefficients, except past-year investment. This statistical insignificance may indicate that firm non-production activities drive the variation in firm investment.

Controlling for Access to Foreign and Government Finance

Adding controls for access to foreign and government finance explicitly, investment in unconnected firms remains more sensitive than in connected firms. In term of magnitude and direction, coefficients on the cash-flow variables also do not change much across all specifications in tables 1.3 and 1.4. These result supports my main finding of capital-market imperfection in Indonesia.

Foreign ownership provides firms with additional external sources of investment finance.

Blalock et al. (2008), in their study on Indonesian firms during crisis, find that foreign-owned exporters fared better in overcoming investment constraints in the depressed domestic credit market and responded to profit opportunity in the global market following the steep depreciation in the rupiah. These foreign-owned firms managed to increase capital during the crisis, thanks presumably to lines of credits available from parent companies abroad.

In addition, access to government finance may also ease firms' liquidity constraint. The ability of government to prop up a firm using transfers, bailouts, or any other means of providing liquidity may ease government-owned companies' investment constraints. In Indonesia, many, if not all, government-owned firms are inefficient, but the government has always been ready to bail out these underperforming firms, especially during the Suharto days. Local government-owned firms depended heavily on local-government on-budget subsidies. And nationally owned firms benefited from a line of special credits from the central bank and government banks (Enoch et al., 2001; Pangestu and Habir, 2002)

These two types of special access to finance may affect firm investment sensitivity to internal cash flow, especially for connected firms. To control for these factors, I add foreign-ownership and government-ownership dummy variables into regressions, as in table 1.2, in separate specifications. I define a firm as foreign owned if foreigners own 50 percent or more of total share value. Similarly, I label a firm as government owned if government owns more than 50 percent of total shares.

The results from regressions with foreign ownership as an additional control are in table 1.3. Row 1 of table 1.3 shows that unconnected firm investment remains more sensitive to cash flow than does connected firm investment, across all specifications. For example, for the OLS specification, controlling for foreign ownership, a 1-percent increase in cash flow is associated with a 0.20-percent increase in investment for connected firms, but only 0.09 percent for connected firms. These figures are close to cash-flow coefficients without controlling for foreign ownership, as in table 1.2.

Table 1.3: Controlling for foreign ownership, how imperfect was the Indonesian credit market?

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.203***	0.0850	0.0526*	-0.0133	0.0823***	0.0549	0.398	0.0582
	(0.0254)	(0.0951)	(0.0244)	(0.103)	(0.0205)	(0.0912)	(0.219)	(0.257)
Log real sales	0.307***	0.187	0.249***	0.122	0.251***	0.184	0.459*	0.431
	(0.0288)	(0.142)	(0.0328)	(0.112)	(0.0274)	(0.109)	(0.228)	(0.256)
Log real sales $_{t-1}$	0.0785***	0.0187	0.0331	-0.0509	-0.0715**	-0.131	-0.0483	-0.111
	(0.0178)	(0.0930)	(0.0185)	(0.0819)	(0.0251)	(0.117)	(0.209)	(0.175)
Log real sales $_{t-2}$	0.0352*	0.0994	-0.0118	-0.0268	0.00472	0.0193	-0.0184	0.0197
	(0.0162)	(0.0786)	(0.0166)	(0.0663)	(0.0149)	(0.0672)	(0.0738)	(0.104)
Log real value added/worker	0.0269	0.0769	-0.0112	0.100	-0.00709	0.0674	-0.524*	-0.0536
	(0.0292)	(0.0989)	(0.0284)	(0.0963)	(0.0249)	(0.109)	(0.263)	(0.252)
Foreign share >=50% =1	0.338***	0.551*	0.176*	0.0185	0.141***	0.425*	0.135	0.236
	(0.0531)	(0.223)	(0.0875)	(0.351)	(0.0336)	(0.166)	(0.579)	(0.559)
Log real investment $_{t-1}$					0.603***	0.480***	0.600***	0.544***
					(0.0102)	(0.0613)	(0.0475)	(0.113)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	No	No	Yes	Yes	No	No
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
GMM	No	No	No	No	No	No	Yes	Yes
Observations	24133	1267	24133	1267	17174	951	17174	951
R-squared	0.371	0.427	0.0531	0.0357	0.592	0.592		

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. In the GMM specification, for the first-difference equation, standard instruments for strictly exogeneous regressors are differences in log value added per worker and log number of workers, and for GMM-type regressors, lagged 1 and 2 of log of real investment, real cash flow, and real sales. For the levels equation, standard instruments for strictly exogeneous regressors are the log of value added per worker and number of workers, and for GMM-type regressors, differences in lag 1 and lag 2 of log of real investment, real cash flow, and real sales. For system GMM on unconnected firms, serial correlation is rejected in order 3 (AR(3) test p=0.317) and moment conditions are correct under the Hansen test for overidentifying restrictions (p=0.171), but not the Sargan test (p=0.008). For connected firms, serial correlation is rejected in order 2 (AR(2) p=0.213) and moments conditions are correct under both the Hansen (p=0.78) and Sargan test (p=0.37).

In line with Blalock et al. (2008), foreign ownership in Indonesian manufacturing firms is associated with easier financial constraints. Row 7 of table 1.3 confirms that foreign-owned firms have higher investment spending, statistically significant except in the GMM specification, suggesting easier financial constraints. In the OLS specification, columns 1, for example, shows that unconnected foreign firms on average have 34 percent higher investment than unconnected domestic firms.

Moreover, being both connected and foreign owned seems to help greatly in overcoming investment constraints. Not only do connected firms with foreign ownership have higher investment than connected domestic firms, the incremental effect of being foreign owned is also generally higher for connected firms. For example, in the OLS regression, foreign connected firms have 55 percent higher investment than domestic connected firms, in comparison to a 34 percent difference between foreign and domestic unconnected firms.

Table 1.4 confirms that connected firms' investment is less sensitive to cash flow even after controlling for government ownership. The direction and size of the cash-flow coefficients are also close to the results from regressions without controlling for government ownership as well as those controlling for foreign ownership.

Whether government ownership is associated with an easier investment-financial constraint, however, is less conclusive. For unconnected firms, in OLS and OLS with a lagged-dependent-variable regressor, a government-owned firm has 25 and 18 percent higher and statistically significant investment than a non-government-owned firm. Controlling for the firm fixed effect, however, leads to no effect (column 3) or 0.29 percent less (column 7) investment for government-owned unconnected firms. For connected firms, government ownership tends to mean lower investment, indicating that private connections might work better in easing the investment-financial constraints.

Table 1.4: Controlling for government ownership, how imperfect was the Indonesian credit market?

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.210***	0.107	0.0526*	-0.00377	0.0856***	0.0596	0.410	0.0948
	(0.0256)	(0.0955)	(0.0244)	(0.105)	(0.0207)	(0.0922)	(0.221)	(0.265)
Log real sales	0.318***	0.199	0.250***	0.111	0.259***	0.202	0.419	0.394
	(0.0289)	(0.139)	(0.0328)	(0.114)	(0.0274)	(0.111)	(0.223)	(0.253)
Log real sales $_{t-1}$	0.0841***	0.00762	0.0334	-0.0419	-0.0689**	-0.143	-0.0539	-0.122
	(0.0178)	(0.0901)	(0.0185)	(0.0826)	(0.0251)	(0.117)	(0.206)	(0.185)
Log real sales $_{t-2}$	0.0396*	0.0898	-0.0121	-0.0226	0.00704	0.00618	-0.0129	0.0262
	(0.0162)	(0.0784)	(0.0167)	(0.0671)	(0.0149)	(0.0674)	(0.0721)	(0.0999)
Log real value added per worker	0.0231	0.0657	-0.0118	0.103	-0.0129	0.0688	-0.495	-0.0723
	(0.0295)	(0.0996)	(0.0283)	(0.0970)	(0.0252)	(0.110)	(0.270)	(0.270)
Government share >=50 percent =1	0.251**	-0.229	-0.0257	-0.679*	0.184***	-0.288	-0.666	0.280
	(0.0806)	(0.233)	(0.0926)	(0.294)	(0.0484)	(0.194)	(0.563)	(0.395)
Log real investment $_{t-1}$					0.604***	0.490***	0.593***	0.551***
					(0.0102)	(0.0608)	(0.0487)	(0.113)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	No	No	Yes	Yes	No	No
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
GMM	No	No	No	No	No	No	Yes	Yes
Observations	24133	1267	24133	1267	17174	951	17174	951
R-squared	0.369	0.422	0.0528	0.0427	0.592	0.590		

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. In the GMM specification, for the first-difference equation, standard instruments for strictly exogeneous regressors are differences in log value added per worker and log number of workers, and for GMM-type regressors, lagged 1 and 2 of log of real investment, real cash flow, and real sales. For the levels equation, standard instruments for strictly exogeneous regressors are the log of value added per worker and number of workers, and for GMM-type regressors, differences in lag 1 and lag 2 of log of real investment, real cash flow, and real sales. For system GMM on unconnected firms, serial correlation is rejected in order 3 (AR(3) test p=0.297) and moment conditions are correct under the Hansen test for overidentifying restrictions (p=0.218), but not the Sargan test (p=0.008). For connected firms, serial correlation is rejected in order 2 (AR(2) p=0.213) and moments conditions are correct under both the Hansen (p=0.786) and Sargan test (p=0.402).

Regressions with More Balanced Distributions of Variables - Matching Method

I ran an additional robustness check by running regressions on datasets with a more balanced distribution of covariates between connected and unconnected firms. Using matching, more balanced datasets, the differences between connected and unconnected firms' cash-flow sensitivity are even larger than in regressions on the un-matched dataset. Cash-flow coefficients for unconnected firms are generally around three times higher than for connected firms, lending more evidence to credit-market imperfection.

The summary of statistics in table 1.1 suggests connected and unconnected firms are very different in many ways. The Manufacturing Industry Survey is an observational dataset in which political connection is not assigned in a controlled experiment setting. The absence of random assignment potentially produces selection bias, systematic-judgment bias, or a confounding factor for being a politically connected firm (Dehejia and Wahba, 2002). In particular, the sensitivity of investment to cash flow in unconnected firms might be underestimated since these firms are generally smaller in term of size, profit, sales, and productivity than connected firms.

To deal with such bias, I run a matching method, not to estimate the average treatment effect of being politically connected, but as an attempt to reduce imbalance and make distributions of covariates in unconnected firms more similar to connected firms (Iacus et al., 2011a). I apply two matching methods: propensity score matching (PSM) and coarsened exact matching (CEM).

In the PSM procedure, in each firm, the vector of all relevant covariates, $\mathbf{X}_{it}$, is reduced to a scalar propensity score, or probability, for being a politically connected firm. The propensity score is estimated with a standard logistic model based on covariates of firm cash flow, sales, productivity, number of laborers, age, and a dummy for survey year. In the next step, each connected firm's propensity score matches with the nearest unconnected firm's propensity score.

The CEM (Iacus et al., 2011a) follows a different procedure. In the first step, covariates,

$\mathbf{X}$, are temporarily coarsened into strata. The relevant covariates in my CEM stratification are firm cash flow, sales, productivity, number of workers, and age. I use Sturge's rule to set the relevant number of bins, or strata, for each covariate. Second, all firms, based on its covariates, $\mathbf{X}_{it}$, are sorted into strata. Third, firms in strata that do not have both connected and unconnected firms are eliminated. Last, the remaining unconnected firms in each stratum are weighted to make them equally representative against connected firms in the same stratum.

Typically, the causal effect of treatment is established by comparing the mean value of treated and non-treated observations after matching. In my setting, however, matching is more a pruning procedure to make distributions of the relevant vector $\mathbf{X}_{it}$ more similar across connected and unconnected firms. The next step in this process is to estimate cash-flow sensitivity for each connected and unconnected firm in OLS and OLS with lagged dependent variable regressions on the (weighted) matched observation. Firm fixed effect and GMM regressions are not feasible, as PSM and CEM do not produce a homogeneous matching weight for each firm across periods.

Column 1 to 4 of table 1.5 shows results using PSM matched data. In the pooled-OLS regression, columns 1 and 2, a 1-percent increase in cash flow is associated with a 0.31-percent and 0.10-percent investment increase in unconnected and connected firms. Controlling for one-year lagged investment, in columns 3 and 4, coefficients of cash flow are 0.29 and 0.06 for unconnected and connected firms. As for CEM matched data, for each firm group, a 1-percent increase of cash flow leads to a 0.27-percent and 0.10-percent investment increase in the OLS regression in columns 5 and 6 and a 0.14-percent increase and a 0.04 percent, not statistically significant, decrease in the OLS with a lagged-dependent-variable regressor. The differences between connected and unconnected firms' cash-flow sensitivity are more evident on the matching datasets.

Table 1.5: In matched dataset, how imperfect was the Indonesian credit market?

	Dependent variable: Log real investment							
	Propensity Score Matching				Coarsened Exact Matching			
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.309**	0.103	0.294**	0.0562	0.265***	0.104	0.145***	-0.0367
	(0.114)	(0.0937)	(0.103)	(0.0908)	(0.0343)	(0.139)	(0.0334)	(0.139)
Log real sales	0.238*	0.209	0.142	0.213	0.408***	0.346**	0.217***	0.330**
	(0.112)	(0.138)	(0.113)	(0.109)	(0.0309)	(0.122)	(0.0312)	(0.122)
Log real sales $_{t-1}$	0.305**	0.00630	0.234*	-0.146	0.132***	0.0584	0.0115	-0.0677
	(0.107)	(0.0904)	(0.117)	(0.117)	(0.0226)	(0.0937)	(0.0231)	(0.0926)
Log real sales $_{t-2}$	-0.108	0.0897	-0.108	0.00570	0.0199	0.0416	-0.000142	-0.0688
	(0.0775)	(0.0782)	(0.0569)	(0.0668)	(0.0188)	(0.0726)	(0.0183)	(0.0699)
Log real value added per worker	-0.158	0.0630	-0.274**	0.0614	-0.169***	-0.0446	-0.105**	0.0432
	(0.124)	(0.0988)	(0.103)	(0.109)	(0.0361)	(0.140)	(0.0350)	(0.141)
Log real investment $_{t-1}$			0.575***	0.491***			0.589***	0.505***
			(0.0518)	(0.0610)			(0.00792)	(0.0337)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	No	No	No	No	No	No	No	No
Observations	1182	1267	892	951	16002	1095	11881	821
R-squared	0.413	0.421	0.618	0.588	0.349	0.390	0.564	0.561

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. The propensity score is estimated with standard logistic model based on covariates of firm's cash flow, sales, productivity, number of labor, age, and the dummy of survey year. In the coarsened exact matching method, the relevant covariates to coarsen the observations are firm's cash flow, sales, productivity, number of workers, and age. The relevant number of bins, or strata, for each covariate, is set based on the Sturge's rule.

1.4.2 Political Reform and the Politically Connected Firms

Political reform and removal of political connections do not increase connected firms' cash-flow sensitivity, at least not in the medium term -eight years in the case of Indonesian firms. Within about two years after the crisis, connected firms could manage to have even lower cash-flow sensitivity relative to the precrisis year of 1995, when the Suharto regime was at its peak in controlling Indonesian corporate finance. Since political reform was taking place along with the financial crisis, this reduced cash-flow sensitivity for connected firms in the postreform years might indicate that the precrisis years' political connections were even more useful for getting external financing when the agency cost from the asymmetric information between lender and borrower increased due to a crisis that worsened the balance sheets of all firms (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997).

Row 3 in columns 1 to 4 of table 1.6 shows that both connected and unconnected firms, after Suharto stepped down, had lower cash-flow sensitivity than when he was still in power. From 1998 onward, the cash-flow coefficient was generally around 11-15 percent lower than before the crisis, albeit not statistically significantly, for connected firms. These coefficients in row 3 may also imply that there was an improvement in access to financial market after the political crisis, especially for unconnected firms.

Controlling for year-cash flow interactions with the 1995 as base year reveals a more detailed picture. Column 5 and 7 of table 1.7, for example, show that after the crisis, unconnected firms tended to have lower investmentcash flow sensitivity than in 1995. On the other hand, connected firms cash-flow coefficients are statistically not much different for the first two years after the crisis than for 1995. From 2000 to 2003, however, connected firms' investment shows even less sensitivity to cash flow than in 1995.

Table 1.6: Did political reform reduce credit-market imperfections?

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.287***	0.198	0.137***	0.0820	0.128***	0.138	0.468	0.277
	(0.0280)	(0.109)	(0.0286)	(0.115)	(0.0236)	(0.106)	(0.261)	(0.426)
Post-1997=1	-0.209***	-0.0601	-0.576***	-0.635*	-0.0756	0.0651	-0.374*	0.212
	(0.0581)	(0.342)	(0.0729)	(0.263)	(0.0461)	(0.310)	(0.156)	(0.551)
Post-1997 × Log real cash flow	-0.115***	-0.145	-0.112***	-0.137	-0.0586***	-0.113	-0.185	-0.145
	(0.0170)	(0.0781)	(0.0187)	(0.0773)	(0.0135)	(0.0732)	(0.120)	(0.255)
Log real sales	0.312***	0.212	0.257***	0.124	0.254***	0.213	0.543**	0.516
	(0.0286)	(0.137)	(0.0325)	(0.112)	(0.0273)	(0.110)	(0.194)	(0.287)
Log real sales $_{t-1}$	0.0801***	0.00270	0.0333	-0.0491	-0.0713**	-0.147	-0.116	-0.132
	(0.0178)	(0.0898)	(0.0185)	(0.0815)	(0.0251)	(0.117)	(0.172)	(0.172)
Log real sales $_{t-2}$	0.0376*	0.0836	-0.00988	-0.0302	0.00516	0.00210	0.00431	-0.0127
	(0.0162)	(0.0772)	(0.0167)	(0.0669)	(0.0148)	(0.0671)	(0.0635)	(0.0982)
Log real value added per worker	0.0304	0.0637	-0.0175	0.0982	-0.00727	0.0585	-0.490*	-0.206
	(0.0294)	(0.0994)	(0.0283)	(0.0955)	(0.0250)	(0.108)	(0.246)	(0.317)
Log real investment $_{t-1}$					0.604***	0.486***	0.615***	0.540***
					(0.0102)	(0.0606)	(0.0458)	(0.0984)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	No	No	Yes	Yes	No	No
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
GMM	No	No	No	No	No	No	Yes	Yes
Observations	24133	1267	24133	1267	17174	951	17174	951
R-squared	0.370	0.423	0.0562	0.0396	0.592	0.590		

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. For the first difference equation, standard instruments are differences in log value added per worker and log number of workers, and for GMM-type, lagged 1 and 2 of log of real investment, real cash flow, and real sales. For the levels equation, standard instruments are log of value added per worker and number of workers, and for GMM-type, differences in lag 1 and lag 2 of log of real investment, real cash flow, and real sales. For system GMM on unconnected firms, serial correlation is rejected in order 3 (AR(3) test p=0.30) and moment conditions are correct under the Hansen test for overidentifying restrictions (p=0.131), but not the Sargan test (p=0.006). For connected firms, serial correlation is rejected in order 2 (AR(2) p=0.244) and moments conditions are correct under both the Hansen (p=0.885) and Sargan test (p=0.518).

Table 1.7: Did political reform reduce capital-market imperfections (adjusted by year)?

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.318***	0.298*	0.164***	0.213	0.151***	0.187	0.0129	0.199
	(0.0315)	(0.135)	(0.0320)	(0.140)	(0.0271)	(0.148)	(0.0744)	(0.201)
1998 × Log real cash flow	-0.0620*	-0.109	-0.0265	-0.122	-0.00675	0.166	0.0441	0.114
	(0.0291)	(0.170)	(0.0286)	(0.148)	(0.0300)	(0.156)	(0.0361)	(0.228)
1999 × Log real cash flow	-0.144***	-0.0202	-0.130***	-0.0908	-0.103***	-0.158	-0.0814*	-0.0476
	(0.0296)	(0.171)	(0.0294)	(0.159)	(0.0290)	(0.197)	(0.0352)	(0.273)
2000 × Log real cash flow	-0.135***	-0.332	-0.144***	-0.465**	-0.0760**	-0.478*	-0.0406	-0.511*
	(0.0306)	(0.169)	(0.0295)	(0.143)	(0.0295)	(0.184)	(0.0351)	(0.213)
2001 × Log real cash flow	-0.157***	-0.289*	-0.150***	-0.329*	-0.0925**	-0.162	-0.0640	-0.146
	(0.0308)	(0.139)	(0.0304)	(0.135)	(0.0285)	(0.147)	(0.0360)	(0.213)
2002 × Log real cash flow	-0.150***	-0.297*	-0.158***	-0.318*	-0.0801**	-0.242	-0.0832*	-0.243
	(0.0313)	(0.134)	(0.0298)	(0.123)	(0.0266)	(0.138)	(0.0338)	(0.185)
2003 × Log real cash flow	-0.181***	-0.328*	-0.169***	-0.353*	-0.0764**	-0.0886	-0.0698*	-0.136
	(0.0300)	(0.145)	(0.0293)	(0.142)	(0.0264)	(0.154)	(0.0324)	(0.204)
2004 × Log real cash flow	-0.145***	-0.270	-0.140***	-0.269	-0.0786**	-0.186	-0.0643*	-0.218
	(0.0307)	(0.165)	(0.0309)	(0.151)	(0.0253)	(0.142)	(0.0319)	(0.189)
2005 × Log real cash flow	-0.183***	-0.177	-0.187***	-0.163	-0.135***	-0.0767	-0.113***	-0.161
	(0.0305)	(0.190)	(0.0306)	(0.195)	(0.0264)	(0.197)	(0.0308)	(0.224)
Log real sales	0.312***	0.199	0.258***	0.112	0.254***	0.197	0.545**	0.113
	(0.0285)	(0.138)	(0.0323)	(0.112)	(0.0272)	(0.106)	(0.195)	(0.233)
Log real sales $_{t-1}$	0.0813***	0.0208	0.0357	-0.0314	-0.0698**	-0.120	-0.0868	-0.0547
	(0.0178)	(0.0894)	(0.0185)	(0.0818)	(0.0251)	(0.118)	(0.143)	(0.192)
Log real sales $_{t-2}$	0.0383*	0.0765	-0.00706	-0.0501	0.00576	-0.0109	-0.0150	0.0629
	(0.0162)	(0.0783)	(0.0167)	(0.0690)	(0.0149)	(0.0670)	(0.0551)	(0.1000)
Log real value added/worker	0.0258	0.0505	-0.0247	0.0862	-0.0101	0.0390	-0.0921	0.0657
	(0.0294)	(0.0989)	(0.0284)	(0.0978)	(0.0250)	(0.110)	(0.0549)	(0.123)
Log real investment $_{t-1}$					0.603***	0.495***	0.630***	0.589***
					(0.0102)	(0.0601)	(0.0434)	(0.113)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	No	No	Yes	Yes	No	No
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
GMM	No	No	No	No	No	No	Yes	Yes
Observations	24133	1267	24133	1267	17174	951	17174	951
R-squared	0.371	0.429	0.0586	0.0535	0.592	0.600		

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. In the GMM specification, for the first-difference equation, standard instruments for strictly exogeneous regressors are differences in log value added per worker and log number of workers, and for GMM-type regressors, lagged 1 and 2 of log of real investment, real cash flow, and real sales. For the levels equation, standard instruments for strictly exogeneous regressors are the log of value added per worker and number of workers, and for GMM-type regressors, differences in lag 1 and lag 2 of log of real investment, real cash flow, and real sales. For system GMM on unconnected firms, serial correlation is rejected in order 3 (AR(3) test p=0.32) and moment conditions are correct under the Hansen test for overidentifying restrictions (p=0.033), but not the Sargan test (p=0.0006). For connected firms, serial correlation is rejected in order 2 (AR(2) p=0.967) and moments conditions are correct under both the Hansen (p=0.933) and Sargan test (p=0.260).

Lower cash-flow coefficients in the post-Suharto years indicate that political reform, or change in political patronage, does not necessarily strip political privilege from firms

connected to the previous regime in the credit market. In fact, connected firms might be able to gather their information capital and network better than unconnected firms and maintain their privileged access to finance in a crisis that increases overall asymmetric information costs in the credit market. When the dust settled and a new, reformed credit market emerged, as a result of massive banking restructuring led by the Indonesian Bank Recovery Agency in the first two years after the crisis, connected firms were perhaps the most prepared and the first in line in reaping the benefit for being firms with a now even-smaller informational problem.

Impact of Political Reform - Adding Controls for Foreign and Government Ownership

Controlling for foreign and government ownership, table 1.8 shows that the finding on the impact of political reform remains generally robust. Cash-flow sensitivity remains lower in postcrisis years for both types of firm, suggesting a significant improvement in information-cost problems in the credit market regardless of political connection. Row 1 on columns 1 to 8 of table 1.8 also confirms credit-market imperfection. Across all specifications, cash-flow coefficients of more constrained unconnected firms are larger than for connected firms

Row 3 in Column 1 to 4 of table 1.8 shows estimates of cash-flow coefficients in the postcrisis years after controlling for the additional variable of foreign ownership. In the postcrisis years, investment-cash flow sensitivity of unconnected firms was around 11 to 14 percent lower than before the crisis in both the firm-fixed-effects and GMM regressions (columns 1 and 3). Unconnected firms' cash-flow sensitivity was 14 and 8 percent smaller than before the crisis, but not statistically significantly so. In general, controlling for foreign ownership does not alter the coefficients of interaction between postcrisis year and cash flow. Controlling for government ownership (row 3 in columns 5 to 8) produces similar results as controlling for foreign ownership.

Table 1.8: Controlling for government and foreign ownership, did political reform reduce capital-market imperfections?

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.138***	0.0819	0.373	0.208	0.138***	0.0864	0.377	0.268
	(0.0286)	(0.116)	(0.247)	(0.423)	(0.0286)	(0.118)	(0.249)	(0.435)
Post-1997=1	-0.578***	0.154	-0.242*	0.203	-0.576***	0.138	-0.245*	0.262
	(0.0728)	(0.368)	(0.113)	(0.559)	(0.0729)	(0.381)	(0.116)	(0.585)
Post-1997=1 × Log real cash flow	-0.113***	-0.137	-0.137	-0.0839	-0.112***	-0.131	-0.141	-0.100
	(0.0187)	(0.0774)	(0.116)	(0.235)	(0.0187)	(0.0762)	(0.120)	(0.246)
Log real sales	0.255***	0.124	0.581**	0.463	0.257***	0.112	0.581**	0.504
	(0.0326)	(0.110)	(0.194)	(0.293)	(0.0325)	(0.112)	(0.196)	(0.292)
Log real sales $_{t-1}$	0.0330	-0.0490	-0.113	-0.108	0.0333	-0.0404	-0.115	-0.151
	(0.0185)	(0.0810)	(0.168)	(0.161)	(0.0185)	(0.0818)	(0.168)	(0.179)
Log real sales $_{t-1}$	-0.00955	-0.0302	-0.0213	-0.0144	-0.00989	-0.0259	-0.0213	-0.00858
	(0.0166)	(0.0668)	(0.0604)	(0.0976)	(0.0167)	(0.0676)	(0.0600)	(0.0990)
Log real value added per worker	-0.0170	0.0983	-0.436	-0.177	-0.0176	0.101	-0.442	-0.233
	(0.0284)	(0.0966)	(0.242)	(0.328)	(0.0283)	(0.0973)	(0.246)	(0.336)
Log real investment $_{t-1}$			0.621***	0.576***			0.621***	0.567***
			(0.0449)	(0.0867)			(0.0447)	(0.0929)
Foreign share 50% and above=1	0.189*	0.00535	-0.101	0.405				
	(0.0881)	(0.351)	(0.476)	(0.497)				
Government share $\geqslant$ 50% =1					-0.0161	-0.661*	0.00510	0.221
					(0.0918)	(0.294)	(0.460)	(0.381)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	No	No	No	No	No	No	No	No
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GMM	No	No	Yes	Yes	No	No	Yes	Yes
Observations	24133	1267	17174	951	24133	1267	17174	951
R-squared	0.0566	0.0396			0.0562	0.0462		

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. In the GMM specification, for the first-difference equation, standard instruments for strictly exogeneous regressors are differences in log value added per worker and log number of workers, and for GMM-type regressors, lagged 1 and 2 of log of real investment, real cash flow, and real sales. For the levels equation, standard instruments for strictly exogeneous regressors are the log of value added per worker and number of workers, and for GMM-type regressors, differences in lag 1 and lag 2 of log of real investment, real cash flow, and real sales. Controlling for foreign ownership, for system GMM on unconnected firms, serial correlation is rejected in order 3 (AR(3) test p=0.33) and moment conditions are correct under the Hansen test for overidentifying restrictions (p=0.11), but not the Sargan test (p=0.005). For connected firms, serial correlation is rejected in order 2 (AR(2) p=0.20) and moments conditions are correct under both the Hansen (p=0.902) and Sargan test (p=0.432). Controlling for government ownership, for system GMM on unconnected firms, serial correlation is rejected in order 3 (AR(3) test p=0.33) and moment conditions are correct under the Hansen test for overidentifying restrictions (p=0.11), but not the Sargan test (p=0.006). For connected firms, serial correlation is rejected in order 2 (AR(2) p=0.26) and moments conditions are correct under both the Hansen (p=0.902) and Sargan test (p=0.465).

However, adding postcrisis-years control makes the effect of foreign ownership and government ownership on firm investment is less conclusive. Row 9 and 10 of table 1.8 shows conflicting directions and large variation on coefficients of foreign and government ownership.

Impact of Political Reform – Matching Method

Running regressions on matching datasets and applying a dummy variable for before and after the crisis produces more or less similar results to regressions on the original unmatched dataset on the cash-flow effect after the crisis. Both connected and unconnected firms had lower cash-flow sensitivity in the postcrisis years, indicating that unconnected firms managed to reduce their high information costs after Suharto left power.

Using propensity score matching data, as seen in Row 3 of table 1.9, except for column 1, OLS regression for unconnected firms, cash-flow sensitivity was lower by around 11-15 percent than in precrisis years, albeit not statistically significantly so. The coefficients on the impact of the crisis and on cash flow-year interactions for unconnected firms are generally larger but less statistically significant than in the unmatched dataset in column 5 of table 1.7. These larger, but less statistically significant, coefficients suggest that connected firms outside the matching data with smaller size and different production characteristics from the connected firms improved their access to the credit market.

In the coarsened exact matching (CEM) dataset regression shown in row 3 of table 1.10 cash-flow sensitivity is around 8-16 percent lower than before the crisis. Coefficients of cash flow-year interactions after 1997 for unconnected firms are generally larger when compared with unmatched data. Cash flow-year interactions after 1997 for connected firms, despite having the same economic magnitudes, are generally not statistically significant. By the CEM procedure, this may imply that only very large connected firms that have no pair in the covariates stratum can maintain their privileged access to credit market after the crisis.

Nevertheless, these cash flow-year interaction coefficients send a similar message: cash-flow sensitivity was lower for both types of firms after the crisis. In addition, row 1 of tables 9 and 10 shows that unconnected firms' investment was more sensitive to cash flow than connected firms. The differences are more evident than in the original specifications, lending more support to credit-market imperfection.

Table 1.9: Did political reform reduce capital-market imperfections? Propensity score matching

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.330**	0.198	0.457*	0.298*	0.389**	0.138	0.433**	0.187
	(0.126)	(0.109)	(0.186)	(0.135)	(0.121)	(0.106)	(0.163)	(0.148)
Post-1997=1	-0.885**	-0.0419			-0.389	0.0651		
	(0.308)	(0.350)			(0.265)	(0.310)		
Post-1997 × Log real cash flow	-0.0333	-0.145			-0.145	-0.113		
	(0.0866)	(0.0781)			(0.0895)	(0.0732)		
Log real sales	0.238*	0.212	0.273*	0.199	0.147	0.213	0.139	0.197
	(0.112)	(0.137)	(0.113)	(0.138)	(0.113)	(0.110)	(0.117)	(0.106)
Log real sales $_{t-1}$	0.304**	0.00270	0.282**	0.0208	0.232*	-0.147	0.227	-0.120
	(0.107)	(0.0898)	(0.101)	(0.0894)	(0.115)	(0.117)	(0.117)	(0.118)
Log real sales $_{t-2}$	-0.108	0.0836	-0.105	0.0765	-0.113*	0.00210	-0.101	-0.0109
	(0.0774)	(0.0772)	(0.0747)	(0.0783)	(0.0564)	(0.0671)	(0.0568)	(0.0670)
Log real value added/worker	-0.157	0.0637	-0.145	0.0505	-0.271**	0.0585	-0.282**	0.0390
	(0.124)	(0.0994)	(0.121)	(0.0989)	(0.104)	(0.108)	(0.101)	(0.110)
1998 × Log real cash flow			0.143	-0.109			0.00472	0.166
			(0.199)	(0.170)			(0.207)	(0.156)
1999 × Log real cash flow			-0.0363	-0.0202			-0.273	-0.158
			(0.210)	(0.171)			(0.185)	(0.197)
2000 × Log real cash flow			-0.182	-0.332			-0.251	-0.478*
			(0.189)	(0.169)			(0.175)	(0.184)
2001 × Log real cash flow			-0.160	-0.289*			-0.134	-0.162
			(0.199)	(0.139)			(0.162)	(0.147)
2002 × Log real cash flow			-0.323	-0.297*			-0.208	-0.242
			(0.193)	(0.134)			(0.163)	(0.138)
2003 × Log real cash flow			-0.575**	-0.328*			-0.333	-0.0886
			(0.200)	(0.145)			(0.216)	(0.154)
2004 × Log real cash flow			-0.368	-0.270			-0.124	-0.186
			(0.212)	(0.165)			(0.182)	(0.142)
2005 × Log real cash flow			-0.159	-0.177			-0.157	-0.0767
			(0.201)	(0.190)			(0.164)	(0.197)
Log real investment $_{t-1}$					0.577***	0.486***	0.569***	0.495***
					(0.0514)	(0.0606)	(0.0532)	(0.0601)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	No	No	No	No	No	No	No	No
Observations	1182	1267	1182	1267	892	951	892	951
R-squared	0.413	0.423	0.428	0.429	0.620	0.590	0.624	0.600

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. The propensity score is estimated with standard logistic model based on covariates of firm's cash flow, sales, productivity, number of labor, age, and the dummy of survey year.

Table 1.10: Did political reform reduce capital market imperfection? Coarsened exact matching

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Unconnected	(4) Connected	(5) Unconnected	(6) Connected	(7) Unconnected	(8) Connected
Log real cash flow	0.344***	0.218	0.458***	0.258	0.201***	0.0722	0.324***	0.187
	(0.0365)	(0.150)	(0.0432)	(0.174)	(0.0359)	(0.152)	(0.0406)	(0.148)
Post-1997=1	-0.272***	0.0222			-0.190**	0.0257		
	(0.0697)	(0.310)			(0.0623)	(0.287)		
Post-1997 × Log real cash flow	-0.121***	-0.159*			-0.0820***	-0.141		
	(0.0197)	(0.0790)			(0.0196)	(0.0804)		
Log real sales	0.401***	0.344**	0.394***	0.325**	0.212***	0.325**	0.209***	0.197
	(0.0309)	(0.122)	(0.0309)	(0.122)	(0.0312)	(0.122)	(0.0312)	(0.106)
Log real sales $_{t-1}$	0.132***	0.0510	0.134***	0.0787	0.0145	-0.0706	0.0168	-0.120
	(0.0226)	(0.0936)	(0.0226)	(0.0946)	(0.0231)	(0.0925)	(0.0231)	(0.118)
Log real sales $_{t-2}$	0.0176	0.0363	0.0201	0.0289	-0.00308	-0.0723	0.00167	-0.0109
	(0.0188)	(0.0725)	(0.0188)	(0.0729)	(0.0183)	(0.0698)	(0.0183)	(0.0670)
Log real value added per worker	-0.161***	-0.0526	-0.158***	-0.0621	-0.101**	0.0375	-0.0914**	0.0390
	(0.0360)	(0.140)	(0.0360)	(0.141)	(0.0350)	(0.141)	(0.0350)	(0.110)
1998 × Log real cash flow			-0.0523	-0.0931			-0.0984*	0.166
			(0.0419)	(0.159)			(0.0397)	(0.156)
1999 × Log real cash flow			-0.124**	0.0803			-0.201***	-0.158
			(0.0441)	(0.197)			(0.0418)	(0.197)
2000 × Log real cash flow			-0.222***	-0.473*			-0.265***	-0.478*
			(0.0429)	(0.186)			(0.0420)	(0.184)
2001 × Log real cash flow			-0.383***	-0.336			-0.385***	-0.162
			(0.0459)	(0.192)			(0.0441)	(0.147)
2002 × Log real cash flow			-0.336***	-0.157			-0.286***	-0.242
			(0.0428)	(0.165)			(0.0391)	(0.138)
2003 × Log real cash flow			-0.301***	-0.240			-0.191***	-0.0886
			(0.0411)	(0.165)			(0.0377)	(0.154)
2004 × Log real cash flow			-0.175***	-0.233			-0.134***	-0.186
			(0.0435)	(0.173)			(0.0383)	(0.142)
2005 × Log real cash flow			-0.303***	-0.0738			-0.202***	-0.0767
			(0.0422)	(0.195)			(0.0386)	(0.197)
Log real investment $_{t-1}$					0.588***	0.500***	0.586***	0.495***
					(0.00792)	(0.0338)	(0.00793)	(0.0601)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	No	No	No	No	No	No	No	No
Observations	16002	1095	16002	1095	11881	821	11881	951
R-squared	0.351	0.392	0.355	0.399	0.565	0.563	0.568	0.600

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with 100 or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. In the coarsened exact matching, the relevant covariates to coarsen the observations are firm's cash flow, sales, productivity, number of workers, and age. The relevant number of bins, or strata, for each covariate, is set based on the Sturge's rule.

Does Crisis Make Investment in Firms Closer to Suharto More Sensitive to Cash Flow?

Does a shock to political connections hit different connected firms differently? In comparison to before the crisis, the closer to a firm connected to Suharto, the larger its cash-flow sensitivity decreases. Firms directly owned by Suharto or his family experience larger decrease of cash-flow sensitivity than unconnected firms and connected firms not directly owned by him. These connected firms seemed able to consolidate, and retain and even improve their information advantage in the credit market after Suharto left, presumably because of their network of relationships built before the crisis.

Table 1.11 shows the impact of crisis on different types of connected firms: firms owned by a member of the extended Suharto family and firms owned by a member of the immediate Suharto family. Row 3 of table 1.11 suggests that among connected firms, firms closer to Suharto have relatively lower coefficients of cash-flow sensitivity after than before the crisis. Connected firms in general had 14 percent lower cash-flow sensitivity after the crisis, whereas connected firms owned by Suharto extended and immediate family member had 32 and 38 percent lower figures.

Furthermore, coefficients of cash flow-year interactions with 1995 as the base year in columns 5 to 8 of table 1.11 are also lower for connected firms closer to Suharto. For example, in comparison to 1995, cash-flow sensitivity coefficients in 2001 are only 33 percent lower for connected firms, but 78 and 69 percent for connected firms owned by family and by immediate family members, respectively.

Interestingly, cash flow-year interactions for connected firms, especially those closer to Suharto, were large and statistically significant only between 2000 and 2002. By 2000, massive Indonesian government-led bank restructuring concluded, resulting in a reformed credit market. Thus, apparently, despite bank takeovers and nationalization, connected firms' access to the financial market unexpectedly improved relative to unconnected firms; and being closely associated with Suharto did not hurt. This might be less surprising when we consider that the financial crisis increased information costs in the immediate period

after capital-market reform so lenders still prefer their old network, which is mainly the connected firms.

Table 1.11: Did political crisis make investment in firms closer to Suharto more sensitive to cash flow?

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Extended-family owned	(4) Immediate-family owned	(5) Unconnected	(6) Connected	(7) Extended-family owned	(8) Immediate-family owned
Log real cash flow	0.137***	0.0820	0.160	0.206	0.164***	0.213	0.210	0.227
	(0.0286)	(0.115)	(0.223)	(0.253)	(0.0320)	(0.140)	(0.245)	(0.273)
Post-1997=1	-0.576***	-0.635*	0.409	-0.679				
	(0.0729)	(0.263)	(0.681)	(0.443)				
Post-1997 × Log real cash flow	-0.112***	-0.137	-0.322	-0.375				
	(0.0187)	(0.0773)	(0.171)	(0.191)				
Log real sales	0.257***	0.124	0.187	0.172	0.258***	0.112	0.199	0.207
	(0.0325)	(0.112)	(0.277)	(0.302)	(0.0323)	(0.112)	(0.297)	(0.323)
Log real sales $_{t-1}$	0.0333	-0.0491	-0.267	-0.376*	0.0357	-0.0314	-0.172	-0.305
	(0.0185)	(0.0815)	(0.155)	(0.163)	(0.0185)	(0.0818)	(0.152)	(0.157)
Log real sales $_{t-2}$	-0.00988	-0.0302	0.452*	0.397	-0.00706	-0.0501	0.389	0.344
	(0.0167)	(0.0669)	(0.215)	(0.239)	(0.0167)	(0.0690)	(0.248)	(0.288)
Log real value added per worker	-0.0175	0.0982	0.0978	0.144	-0.0247	0.0862	0.139	0.170
	(0.0283)	(0.0955)	(0.160)	(0.172)	(0.0284)	(0.0978)	(0.177)	(0.205)
1998 × Log real cash flow					-0.0265	-0.122	0.0330	0.0740
					(0.0286)	(0.148)	(0.188)	(0.236)
1999 × Log real cash flow					-0.130***	-0.0908	-0.380	-0.554
					(0.0294)	(0.159)	(0.285)	(0.315)
2000 × Log real cash flow					-0.144***	-0.465**	-0.740***	-0.722***
					(0.0295)	(0.143)	(0.152)	(0.162)
2001 × Log real cash flow					-0.150***	-0.329*	-0.780**	-0.687*
					(0.0304)	(0.135)	(0.245)	(0.307)
2002 × Log real cash flow					-0.158***	-0.318*	-0.584*	-0.704**
					(0.0298)	(0.123)	(0.283)	(0.250)
2003 × Log real cash flow					-0.169***	-0.353*	-0.286	-0.281
					(0.0293)	(0.142)	(0.244)	(0.263)
2004 × Log real cash flow					-0.140***	-0.269	-0.372	-0.365
					(0.0309)	(0.151)	(0.362)	(0.388)
2005 × Log real cash flow					-0.187***	-0.163	-0.548	-0.525
					(0.0306)	(0.195)	(0.396)	(0.452)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	No	No	No	No	No	No	No	No
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24133	1267	324	276	24133	1267	324	276
R-squared	0.0562	0.0396	0.122	0.121	0.0586	0.0535	0.163	0.161

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province.

This finding, nevertheless, is not very robust. In matching-dataset regressions, changes of cash-flow sensitivity post crisis are more nuanced. Table 1.12 and 1.13 show that in

postcrisis years in general, cash-flow sensitivity of firms closer to Suharto was either similar, and statistically insignificant, across degree of closeness (row 3, table 1.12) or decreased with their degree of closeness to Suharto (row 3, table 1.13). Moreover, unlike in the unmatched dataset, year-by-year interaction with cash-flow sensitivity in both matching methods results in generally lower and statistically insignificant coefficients, except for unconnected firms in regressions using CEM dataset (row 5, table 1.13). The differences in cash flow-year interaction coefficients are also less conclusive than in the unmatched dataset regressions, as in table 1.7.

1.5 Conclusion

In the Indonesian manufacturing sector after the crisis, investment in firms with political connections to Suharto was less sensitive to changes in internal financial structure, and cash flow in particular, than unconnected firms. Since political connection to Suharto was associated with firms' lower information cost in credit markets, this difference in investment-cash flow sensitivity suggests credit-market imperfection in Indonesia. Connected firms' information-cost advantage also tended to persist in the medium term even after the supplier of political protection was removed from political power. These findings underscore the challenges of, and the need to manage expectation for, financial market and political reform in the presence of the large asymmetric-information problem in credit markets and governance issues typically found in developing countries.

Table 1.12: Did political crisis make investment in firms closer to Suharto more sensitive to cash flow? Propensity score matching

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Extended-family owned	(4) Immediate-family owned	(5) Unconnected	(6) Connected	(7) Extended-Family owned	(8) Immediate-family owned
Log real cash flow	0.330**	0.198	0.363	0.462	0.457*	0.298*	0.340	0.416
	(0.126)	(0.109)	(0.243)	(0.298)	(0.186)	(0.135)	(0.252)	(0.320)
Post-1997=1	-0.885**	-0.0419	-0.0474	-0.0474				
	(0.308)	(0.350)	(0.746)	(0.778)				
Post-1997 × Log real cash flow	-0.0333	-0.145	-0.116	-0.122				
	(0.0866)	(0.0781)	(0.173)	(0.183)				
1998 × Log real cash flow					0.143	-0.109	0.230	0.331
					(0.199)	(0.170)	(0.171)	(0.206)
1999 × Log real cash flow					-0.0363	-0.0202	-0.238	-0.350
					(0.210)	(0.171)	(0.304)	(0.340)
2000 × Log real cash flow					-0.182	-0.332	-0.384	-0.340
					(0.189)	(0.169)	(0.225)	(0.259)
2001 × Log real cash flow					-0.160	-0.289*	-0.615	-0.466
					(0.199)	(0.139)	(0.328)	(0.426)
2002 × Log real cash flow					-0.323	-0.297*	-0.275	-0.298
					(0.193)	(0.134)	(0.324)	(0.242)
2003 × Log real cash flow					-0.575**	-0.328*	0.121	0.214
					(0.200)	(0.145)	(0.223)	(0.229)
2004 × Log real cash flow					-0.368	-0.270	-0.0164	-0.0254
					(0.212)	(0.165)	(0.348)	(0.367)
2005 × Log real cash flow					-0.159	-0.177	-0.312	-0.285
					(0.201)	(0.190)	(0.398)	(0.449)
Log real sales	0.238*	0.212	0.521	0.437	0.273*	0.199	0.557	0.489
	(0.112)	(0.137)	(0.270)	(0.343)	(0.113)	(0.138)	(0.283)	(0.350)
Log real sales $_{t-1}$	0.304**	0.00270	-0.316	-0.430*	0.282**	0.0208	-0.261	-0.385
	(0.107)	(0.0898)	(0.181)	(0.209)	(0.101)	(0.0894)	(0.174)	(0.199)
Log real sales $_{t-2}$	-0.108	0.0836	0.504*	0.477	-0.105	0.0765	0.433	0.413
	(0.0774)	(0.0772)	(0.244)	(0.298)	(0.0747)	(0.0783)	(0.255)	(0.320)
Log real value added per worker	-0.157	0.0637	-0.245	-0.252	-0.145	0.0505	-0.206	-0.235
	(0.124)	(0.0994)	(0.254)	(0.287)	(0.121)	(0.0989)	(0.259)	(0.301)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	No	No	No	No	No	No	No	No
Observations	1182	1267	324	276	1182	1267	324	276
R-squared	0.413	0.423	0.550	0.539	0.428	0.429	0.569	0.558

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. The propensity score is estimated with standard logistic model based on covariates of firm's cash flow, sales, productivity, number of labor, age, and the dummy of survey year.

Table 1.13: Did political crisis make investment in firms closer to Suharto more sensitive to cash flow? Coarsened exact matching

	Dependent variable: Log real investment							
	(1) Unconnected	(2) Connected	(3) Extended-family owned	(4) Immediate-family owned	(5) Unconnected	(6) Connected	(7) Extended-family owned	(8) Immediate-family owned
Log real cash flow	0.344***	0.218	0.496	0.590	0.458***	0.258	0.446	0.509
	(0.0365)	(0.150)	(0.346)	(0.386)	(0.0432)	(0.174)	(0.383)	(0.438)
Post-1997=1	-0.272***	0.0222	0.256	0.368				
	(0.0697)	(0.310)	(0.689)	(0.736)				
Post-1997 × Log real cash flow	-0.121***	-0.159*	-0.0782	-0.0789				
	(0.0197)	(0.0790)	(0.148)	(0.171)				
1998 × Log real cash flow					-0.0523	-0.0931	0.345	0.495
					(0.0419)	(0.159)	(0.288)	(0.334)
1999 × Log real cash flow					-0.124**	0.0803	-0.425	-0.447
					(0.0441)	(0.197)	(0.375)	(0.395)
2000 × Log real cash flow					-0.222***	-0.473*	-0.388	-0.344
					(0.0429)	(0.186)	(0.304)	(0.335)
2001 × Log real cash flow					-0.383***	-0.336	-0.638	-0.448
					(0.0459)	(0.192)	(0.354)	(0.399)
2002 × Log real cash flow					-0.336***	-0.157	-0.284	-0.315
					(0.0428)	(0.165)	(0.311)	(0.365)
2003 × Log real cash flow					-0.301***	-0.240	0.175	0.242
					(0.0411)	(0.165)	(0.282)	(0.325)
2004 × Log real cash flow					-0.175***	-0.233	-0.0371	-0.0766
					(0.0435)	(0.173)	(0.282)	(0.322)
2005 × Log real cash flow					-0.303***	-0.0738	-0.0905	-0.0170
					(0.0422)	(0.195)	(0.339)	(0.383)
Log real sales	0.401***	0.344**	0.530*	0.395	0.394***	0.325**	0.617*	0.515
	(0.0309)	(0.122)	(0.263)	(0.295)	(0.0309)	(0.122)	(0.268)	(0.303)
Log real sales $_{t-1}$	0.132***	0.0510	-0.260	-0.355	0.134***	0.0787	-0.242	-0.347
	(0.0226)	(0.0936)	(0.225)	(0.243)	(0.0226)	(0.0946)	(0.231)	(0.255)
Log real sales $_{t-2}$	0.0176	0.0363	0.459*	0.412	0.0201	0.0289	0.367	0.326
	(0.0188)	(0.0725)	(0.193)	(0.215)	(0.0188)	(0.0729)	(0.196)	(0.219)
Log real value added per worker	-0.161***	-0.0526	-0.461	-0.412	-0.158***	-0.0621	-0.401	-0.387
	(0.0360)	(0.140)	(0.337)	(0.374)	(0.0360)	(0.141)	(0.348)	(0.389)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	No	No	No	No	No	No	No	No
Observations	16002	1095	299	255	16002	1095	299	255
R-squared	0.351	0.392	0.550	0.538	0.355	0.399	0.572	0.562

Standard errors in parentheses, adjusted for clusters in firm's panel data ID. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1993 to 2005, except 1996 as the Survey does not report firm investment. Only firms with one hundred or more workers. Controls are log of firm's number of workers and firm age. Dummy controls are three-digit industry code and province. In the coarsened exact matching, the relevant covariates to coarsen the observations are firm's cash flow, sales, productivity, number of workers, and age. The relevant number of bins, or strata, for each covariate, is set based on the Sturge's rule.

Chapter 2:
Do Political Connections Jam Up Creative Destruction?

2.1 Introduction

Since the late 1970s, along with remarkable economic growth and the modernization of economic policy, Indonesia saw the rise of modern firms – as opposed to the state-owned enterprises and small and traditional businesses that had formerly dominated the economy. At the same period, since Suharto was able to consolidate power to establish an authoritarian regime, Indonesia also witnessed the entrenchment of patrimonial state-business relationships. As a result, the rise of modern firms was hardly a sign of the birth of a strong and healthy private sector, but rather a change in the modus operandi of the same old hands in the administration seeking to gain advantage through the state. Suharto's men went from managing, and stealing from, state-owned businesses and extracting rents created by various government regulations, to starting to run their own companies to accumulate private capital and and generate profit. Yet, despite the rise of such a capitalist class, being connected to Suharto was as important as before, if not more so.

In general, political connections, viewed as an element of a type of relation-based system in the corporate structure world, can enhance productivity when contracts are poorly enforced contracts (Rajan and Zingales, 1998; Tirole, 1996). And when capital is scarce and a developed financial market is absent, political connections may also internalize joint surplus by allowing business to take a possible short-run loss for the possibility of long-run gain. Capital scarcity and poor contract enforcement make political connections in businesses more prevalent in developing countries. On the other hand, political connections distort price signals and may dampen the gale of creative destruction, thus reducing efficiency.

In this essay, I study whether political connections do in fact hinder creative destruction process. In particular, I test whether having connections to Suharto protected firms from productivity shocks. More importantly, I look at whether a high incidence of politically induced connections in an industry presented unconnected firms with a higher selection threshold in their decision to start, maintain, or terminate production projects. Heterogeneity in such a threshold across firms produces frictions, or congestion effects, that prevent optimal creative destruction because some otherwise profitable production activities by unconnected firms do not materialize. The industry suffers from productivity congestion as connected firms raise the production threshold at the expense of unconnected firms.

I derive an estimate of the congestion effect from the productivity premium unconnected firms require to compensate them for the higher selection threshold when industry connectedness rises. A higher required productivity premium in a more connected industry suggests a congestion effect on creative destruction for the following reason: As political connections increase the selection threshold, unconnected firms have to let some otherwise-profitable production projects go. As a result the unconnected firms' productivity becomes artificially higher than in the absence of congestion and increases along with the congestion. Furthermore, since this selection rule does not apply to connected firms, higher concentration of connected firms in an industry leads to a bigger wedge between unconnected and connected firms' productivity.

To test the incidence of productivity congestion, I construct a firm-level productivity measure, TFP, based on a standard production function at the three-digit industry-classification level. I minimize the problem of endogeneity between input choice and productivity shocks by following Levinsohn and Petrin (2003) approach. Next, I regress the firms' TFP on industry connectedness, defined as the share of connected firms' assets out of total industry assets. To provide greater credibility to the idea that political connections were responsible for the industry congestion, I also explicitly test whether removing Suharto, the ultimate patron of political connections in Indonesia, from power reduced productivity premium paid by the unconnected firms, thus relieving the congestion. I then

examine whether different degrees of closeness to Suharto drove a differential productivity premium.

I find evidence of productivity-congestion effects from firms' political connectedness in the Indonesian manufacturing industry. For each ten-percentage-point increase of connected firms' assets share in a three-digit- level industry, unconnected firms' TFP was 4 percent higher than connected firms'. Moreover, the fall of the Suharto regime in 1998 apparently reduced this productivity congestion and firms closer to Suharto experienced a more substantial reduction of their connections' productivity premium.

Most studies on political connections focus on the value of connections or how connected firms get the benefits from political connections. Following Fisman (2001) seminal work estimating the value of being connected to Suharto in Indonesia, a handful of studies exploit exogenous shocks using event studies to measure the value of firms' political connections in different settings and countries - for example Chekir and Diwan (2014) and Acemoglu et al. (2016). Most studies on Indonesia discuss two mechanisms for making connections valuable: trade protection and access to finance.

On trade channels, Basri and Hill (1996) find that in 1991, industries with a strong presence of Suharto cronies enjoyed higher effective rates of protection, indicating that the benefit of connections came from connected firms's ability to influence trade policy to exclude foreign competition. Along the same lines, in their firm-level study, Mobarak and Purbasari (2006) show that firms with political connections were three times more likely than unconnected firms to obtain exclusive import and commodity licenses (monopolies) in Indonesia.

On access to finance channels, Leuz and Oberholzer-Gee (2006) find that getting a political connection to Suharto can substitute for foreign securities as the source of a firm's external finance. Shidiq (2015), which also also appears in this dissertation, shows that politically connected Indonesian firms' investment was less sensitive to their cash flow than unconnected firms'. This insensitivity not only suggests financial-market imperfection in general, but also underlines the importance of special access to finance in creating economic

value out of political connections.

Meanwhile, a considerable number of studies have investigated manufacturing firms' productivity in Indonesia. Yet, instead of directly linking firms' productivity with political connections, most of them focus on the impact of either foreign ownership or trade liberalization. For example, Sjöholm (1999) and Takii (2005) find that foreign ownership creates positive productivity spillovers for Indonesian manufacturing firms. Arnold and Javorcik (2009) further argue that such positive productivity spillovers are mainly driven by firms' restructuring after acquiring a domestic firm, rather than the ability of the foreign entities to selectively pick productive domestic firms to buy. In the context of trade liberalization, Amiti and Konings (2007) find that a ten-percentage point reduction in and industry's input tariffs leads to a twelve-percentage point increase in productivity gains for the firms importing their inputs, which is twice as high as the benefit from reducing industry's final goods tariffs.

Of all of these foreign ownership and trade-related studies, only Arnold and Javorcik (2009) and Amiti and Konings (2007) explicitly estimate and calculate the firm-level TFP, while other studies generally use either labor productivity or output growth as a proxy for firm's productivity. On the other hand, the existing researches specifically on firm-level TFP in Indonesia mostly focuses on estimating the manufacturing industry's TFP growth and the output elasticity of labor supply (Aswicahyono, 1998; Timmer, 1999; Vial, 2006).

In discussing the impact of the 1998 political-economic crisis on the manufacturing sector, Aswicahyono et al. (2010) find that after the crisis, the manufacturing industry experienced lower employment absorption, indifferent export performance, slower entry exit, reduced firm's ability to grow. Meanwhile, Hallward-Driemeier and Rijkers (2013) demonstrate that the 1997 financial crisis did not strengthen the correlation between firms' productivity and survival in the manufacturing industry, thus rejecting the idea of crisis as a "cleansing" process. They also find that the crisis was indiscriminate in selecting whether more or less productive firms exited and entered.

Apart from the work of Diwan et al. (2015) on Egypt, there appears to be very limited number of studies explicitly exploring the effect of political connectedness on creative destruction as mediated by firm productivity. Even a seminal study by Caballero et al. (2008), which provides a theoretical framework for measuring the impact of frictions in creative destruction on firm-level productivity in Japan, does not directly attribute the source of friction, a subsidized borrowing, either to political connection or to affiliation to *keiretsu* (in contrast to Peek and Rosengren (2005), e.g.). Also, in their empirical study on crisis and creative destruction in Indonesia, Hallward-Driemeier and Rijkers (2013) neither use the firm-level TFP nor exploit the breakdown of political connections during the crisis.

2.2 State-Business Relationship in Indonesia

As noted by MacIntyre (1994), the rise of the modern private sector in Indonesia is relatively new, perhaps tracing back pnly to the early 1980s. Earlier, the economy and business had been dominated by state owned enterprises and small-traditional businesses, partly because of interventionist policies since independence and partly because of enormous oil-windfall revenue in the 1970s. The emergence of the modern private sector took places at the same time as Suharto's regime became increasingly authoritarian, marked by suppression of democracy and consolidation of control over the military and bureaucratic apparatus. As a result, the modern sector arose with tight patron-client state-business relationships, with Suharto at its epicenter.

Robison (1986) notes that by the mid 1980s, major players in Indonesian business could be broadly classified into a state-owned corporate sector, military-owned business groups, and a class of indigenous Indonesia and ethnic-Chinese capitalists. Pepinsky (2009) divides Indonesian businesses into fixed and mobile capitals based on their capital mobility across borders. The fixed capital was mostly military-related and indigenous businesses, while the mobile capital was mostly Sino-Indonesian-owned business. Basri and Hill (1996) reports that starting in the 1980s, major business conglomerates were owned by either

Sino-Indonesian families, or well-connected *pribumi* (including Suharto's children), or by an extended state-enterprise network. Regardless of the categories and definitions, these businesses were the by-product of interventionist policy centered and personalized around Suharto. Their successes heavily depended on their ability to get and maintain relationships to Suharto and his administration's key figures in order to secure access to state-allocated rents.

By the 1990s, most major businesses were to some extent related to the Suharto patrimonial network, all the way from the central to the local-government level. Along with what Robison (1986) dubbed the transformation of the politico-bureaucrats into indigenous capitalists, a new most politically powerful class of business owners arose: the Suharto children. To illustrate, in 1993, Suharto's children and two of his close relatives owned four of the thirteen largest indigenous (non-ethnic-Chinese owned) firms in the country. Together with the few ethnic-Chinese businessmen who had been tied to Suharto since the 1950s, the children and relatives formed a core group of cronies in the Suharto's regime (Schwarz, 1994). Loosely speaking, the term "politically connected firms" in this dissertation refers to this group.

The rise of the cronies happened almost at the same time that the country massively deregulated at the end of 1980s in response to the end of the oil boom and the need for new sources of development financing. The market-oriented technocrats in the administration steered the economy toward export-oriented industrialization by promoting competitiveness and liberalizing state companies. According to Perkins (2013), the liberalization went well, but as the funds flowed during the 1990s, rent seekers, including the cronies, came to take advantage of lower financing constraints and external pressures for efficiency. Despite creating a constant tension between his economic technocrats and the rent seekers, apparently Suharto did not lend a hand to stop the rent seekers from exploiting their connections and tapping the surplus from successful deregulation.

This fact also underlines a distinct feature of Indonesian industrialization in comparison to the Northeast Asian models: while both were productivity-enhancing, with a considerable

role for government-intervention policies insulated from interest groups, industrialization in Indonesia was not insulated from the individual rent seekers (MacIntyre, 1994). In addition, Thee (2012) points out that unlike South Korean's *chaebols* for example, the bulk of politically connected firms' output was sold in protected domestic or non-traded sector.

Then the economic and political crisis hit the country in 1997. Studies on publicly listed companies after the 1997 crisis indicates both changes and continuities. In her observation of the years up to 2000, Sato (2004) finds that firms that belonged to established groups, defined as those that started in the 1970s or earlier and ranked in the largest twenty or thirty groups both in the 1980s and in 1996, tended to survive the crisis. On the other hand, firms associated with rapid-growth business groups, those started in the 1980s and ranked among the thirty largest group in 1996 or those below twentieth in the 1980s but top ten in 1996, took the hardest hit in term of sales and asset-value drops.

In their update on the largest corporate ownership structure in Indonesia in 2008, Carney and Hamilton-Hart (2015) show that family-based conglomerates are still as dominant as in the year of 1996 in their share of the largest corporations in the country. But they also highlighted that family-owned big companies have had to undergo major ownership reconfiguration. Meanwhile, by 2008, significant numbers of large family-owned firms in 1996 had either dissolved or fell below the top two hundred. They also identify the rise of newcomers in postcrisis Indonesian corporate structure, the persistence of established groups despite losing their banks, and most importantly the much-reduced presence of Suharto's closest cronies, notably his own children companies.

Perhaps, the main takeaway of this literature review is that despite the rise of newcomers, old cronies have managed to reconsolidate their businesses in the new political environment, except those with very close associations to Suharto. Interestingly, Carney and Hamilton-Hart (2015) also show that the majority of these family-owned conglomerates can still be considered politically connected since they have managed to keep political ties to the administration in their ownership and directorship by current government officials or their close friends and families.

2.3 Identification Strategy

2.3.1 Research Design

To describe how political connections can affect firm-level productivity, I follow a variant of a Schumpeterian creative-destruction model in which there are frictions in a normal competitive adjustment process (Caballero et al., 2008). In Caballero et al. (2008) model setting, a firm is defined as a series of production activities or projects and each project is subject to an idiosyncratic productivity shock in every period. A firm adjusts and decides which projects to retain, start, and terminate, based on a certain selection rule – a productivity threshold – that is the net effect of the shock on the firm's production cost. This net effect is a function of, first, the number of firms in the industry, because more firms in the industry creates more competition and thus higher cost in terms of reduction of profit, and second, the composite productivity shocks on all incumbents and potential projects of all firms in the industry.

In a normal competitive creative-destruction process, when there is a negative industry productivity shock, a firm terminates existing projects whose adverse idiosyncratic productivity shock falls below the selection rule and retains and starts (potential) projects whose idiosyncratic productivity shocks are still less than the threshold. But, within an industry, there is firm heterogeneity in exposure to the industry-productivity shock: some firms are less sensitive to and more insulated from the shock, therefore less subject to selection rules. When a negative productivity shock hits the industry, these insulated firms do not fully adjust the number of their projects to start, retain, or terminate.

The insulated firms produce a congestion in the creative destruction process because their presence increases the selection-rule threshold faced by the non-insulated firms. Within the industry, the non-insulated firms are subject to more competition, and thus a higher cost to staying in the industry. As a result, non-insulated firms experience more destruction and less creation than in a normal competitive process. If the preserved insulated firms are less productive than the non-insulated firms, the industry may suffer from sclerosis and

scrambling effects - some existing firms are less productive than the potential ones that do not enter the industry (Caballero and Hammour, 2001). For non-insulated firms, with a higher selection threshold, the selected projects or production activities are only those with relatively higher productivity. Over time, the average productivity of non-insulated firms is heightened in comparison to a situation where there is no discriminatory protection to other firms against the productivity shocks.

This setup generates two predictions about the impact of non-competitive favorable treatment or protection on the productivity of firms without such privileges. First, with protected firms dampening destruction in the industry, non-insulated firms would need to adjust by creating fewer profitable projects in an otherwise-competitive environment. This effect is more evident in industries with a higher population of insulated firms. Second, non-insulated firms will have to pay a higher productivity premium to remain in an industry with a stronger presence of insulated firms. A higher threshold prevents these firms from materializing projects or production activities that would be profitable were the barriers not there. To test their theory, Caballero et al. (2008) look at Japanese firms and define an insulated firm as an insolvent firm that kept receiving extended subsidized credits from the banks following the 1990s crisis (i.e., zombie loans)

In this essay, I will primarily focus on the second prediction: productivity-premium incidence. To do so, I classify Indonesian firms and their ability to weather productivity shocks by their political connections to Suharto. Connected firms are less exposed to adverse industry-productivity shocks for the following reasons. First, they have special access to finance from their own banks, most of them owned by Suharto's family and cronies, through related lending. They are also able to secures special and politically-motivated direct lending from the state banks (Pangestu and Habir, 2002). Shidiq (2015), also in this dissertation, shows that in the imperfect Indonesian credit market, connected firms were subject to lower financing constraints than the unconnected firms.

Second, connected firms enjoy government guarantees protecting them from competition in the product market. Besides special access to finance, connected firms also benefit from

special contracts in the forms of distribution and supply deals with the government and state-owned enterprises. Moreover, by connecting to Suharto, these firms secure preferential treatment in bidding for government projects and earn various monopoly rents through licensing for exports, imports, and distribution of commodities (Schwarz, 1994; McLeod, 2000). Further, Basri and Hill (2004) show that in the 1990s, there was a proliferation of firm-specific tailor-made trade protection schemes, in contrast to wider industry-level policies, assigned to business owned by cronies, especially Suharto's children.

2.3.2 Estimation Strategy

Total factor productivity

The first step in my estimation strategy is to generate measures of firm-level productivity. My main productivity measure is the total factor productivity (TFP) estimated in the following way. Consider a firm with a standard Cobb-Douglas production function.

$$Y_{it} = A_{it}(\phi) K_{it}^{\beta_K} L_{it}^{\beta_l} M_{it}^{\beta_m}, \tag{2.1}$$

where Y_{it} is firm i's output at time t, which is a function of the capital stock, K_{it}, labor L_{it}, intermediate inputs, M_{it}, and productivity, A_{it}. In my setting, productivity, A_{it}, is a function of political connections, ϕ, which I will explicitly specify in the later estimation step.

The log form of equation 2.1 is the following:

$$y_{it} = \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + e_{it}, \tag{2.2}$$

where y_{it} is the log of a firm's value added, l_{it} the log of labor, k_{it} the log capital stock, and m_{it} the log of material. Furthermore, $e_{it} = \eta_{it} + \omega_{it}$, where η_{it} is a white-noise component

and ω_{it} a (unobservable) productivity shock. Thus

$$y_{it} = \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + \omega_{it} + \eta_{it}, \tag{2.3}$$

I apply Levinsohn and Petrin (2003) method in estimating equation 2.3 to overcome the problem of simultaneity between the unobservable productivity shock, ω_{it}, and input choices as in an ordinary least squares (OLS) regression. The critical step in this strategy is to find an appropriate proxy for the productivity shock. Unlike Olley and Pakes (1996) who use the firm's investment, Levinsohn and Petrin (2003) utilize intermediate inputs as proxy for unobservable productivity shock because a firm's investment tends to be lumpy. Moreover, data-wise, the Levinsohn-Petrin method is also preferable since it does not require non-positive investment data points, which is an enormous advantage in preventing substantial loss of information since the Indonesian manufacturing surveys exhibit a substantial number of zero values of firm investment.

The Levinsohn-Petrin model assumes that the demand for intermediate inputs, in this case the materials, depends on the capital stock, k_{it}, and the unobservable productivity shock, ω_{it}.

$$m_{it} = m(k_{it}, \omega_{it}) \tag{2.4}$$

By taking the inverse of the intermediate-input demand function in equation 2.4,

$$\omega_{it} = \omega(k_{it}, m_{it}) \tag{2.5}$$

and substituting equation 2.5 into equation 2.3, we get

$$y_{it} = \beta_l l_{it} + \phi(k_{it}, m_{it}(mnin2000Rp)) + \eta_{it}, \tag{2.6}$$

where

$$\phi(k_{it}, m_{it}) = \beta_0 + \beta_k k_{it} + \omega(k_{it}, m_{it}) \tag{2.7}$$

Following Petrin et al. (2004), I obtain a consistent coefficient of $\beta_k k_{it}$ by replacing $\omega(k_{it}, m_{it})$ with a third-order polynomial approximation in k_{it} and m_{it} and applying OLS to it:

$$y_{it} = \delta_0 + \beta_1 l_{it} + \sum_{a=0}^{3} \sum_{b=0}^{3-a} \delta_{ab} k_{it}^a m_{it}^b + \eta_{it}, \tag{2.8}$$

In the next step, I estimate β_k by minimizing the sample residual of the production function as follows

$$\min_{\beta_k^*} \sum_t \Big(y_{it} - \hat{\beta}_1 l_{it} - \beta_k^* - E\big[\hat{\omega}_{it}/\hat{\omega}_{t-1}\big] \Big)^2 \tag{2.9}$$

I estimate this production function for each three-digit industry's k. Therefore, the log of TFP of firm i at time t in industry k is

$$tfp_{it}^k = y_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_k k_{it}, \tag{2.10}$$

The estimated capital coefficients, $\hat{\beta}_k$, and labor coefficients, $\hat{\beta}_l$, broken down by three-digit industry from equation 2.10 are reported in table 2.1.

Generally, the result suggests that output elasticities of labor are larger than those of capital. For comparison, I also estimate output elasticities based on a simple OLS production function and find that the OLS-estimated coefficients have more or less the same directions and magnitude as the Levinsohn-Petrin estimation results. The labor coefficients in OLS regression tend to be overestimated relative to Levinsohn-Petrin specifications' result as predicted by the theory. On the other hand, it is not conclusive whether the capital coefficients are over or underestimated under the OLS specifications, suggesting that the correlations between changes in materials inputs and a productivity shock vary across industries.

Figure 2.1 shows that on average, the connected firms' TFP was much higher than the unconnected firms in all years observed. For the precrisis period, between 1991 and 1997,

the mean of unconnected firms' TFP tended to increase, while connected firms' TFP stayed flat, if not slightly decline. In years immediately after the crisis, 1997 to 1999, unconnected firms' TFP declined. For connected firms, however, TFP only contracted between 1998 and 1999, and even then, the figure did not return to precrisis level.

Table 2.1: Coefficients of the production function

	Capital		Labor	
Industry	OLS	LP	OLS	LP
Meat, fish, dairy products	0.192	0.114	0.234	0.221
Grain milled products	0.158	0.088	0.375	0.390
Other food products	0.201	0.115	0.559	0.479
Beverages	0.268	0.165	0.832	0.749
Tobacco	0.116	0.122	0.429	0.428
Textile	0.173	0.107	0.652	0.518
Garment products	0.133	0.087	0.516	0.500
Apparel	0.117	0.107	0.695	0.649
Footwear	0.051	0.031	0.619	0.596
Sawmilling and planing of wood	0.144	0.145	0.543	0.494
Wood products	0.121	0.046	0.509	0.472
Paper products	0.173	0.093	0.454	0.386
Printing and publishing activities	0.225	0.187	0.680	0.624
Basic chemical	0.219	0.140	0.203	0.145
Other chemical and fuel products	0.210	0.242	0.378	0.363
Rubber products	0.110	0.095	0.496	0.457
Plastic products	0.199	0.187	0.379	0.314
Glass, porcelain, clay products	0.147	0.208	0.536	0.508
Cements products	0.238	0.014	0.486	0.443
Other non-metallic mineral products	0.287	0.267	0.650	0.606
Iron and metal products	0.177	0.117	0.497	0.441
Other metal products	0.153	0.155	0.498	0.467
Machinery	0.235	0.236	0.171	0.151
Electrical products	0.148	0.190	0.453	0.397
Motor vehicle products	0.206	0.217	0.748	0.662
Other transport equipment	0.302	0.086	0.361	0.336
Furniture	0.111	0.144	0.528	0.494
Other manufacturing	0.103	0.090	0.643	0.601

Note: LP refers to Levinsohn-Petrin method. OLS specification is $va_{it} = \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + e_{it}$

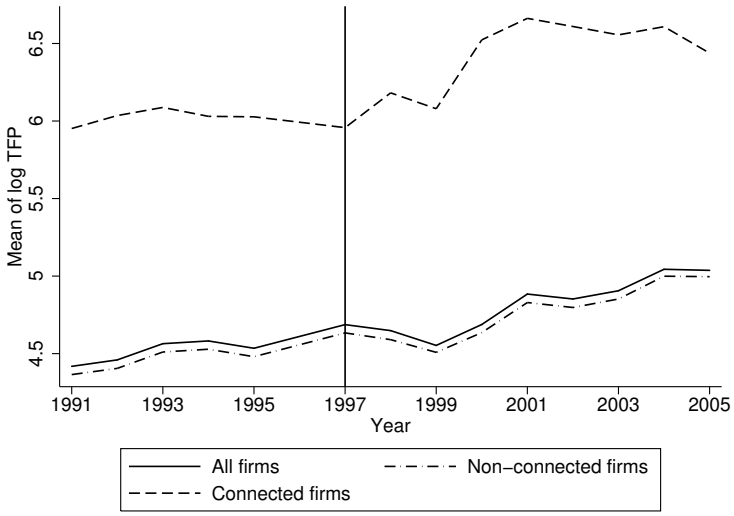


Figure 2.1: Mean of log firm's TFP

Political connections and productivity

In this step, I explicitly link the effects of political connections to a firm-level productivity. In particular, I estimate the reduced form of Caballero et al. (2008) model of creative destruction and congestion where some firms in an industry manage to get political guarantees and protection in responding to productivity shocks. To do so, I run the following specification:

$$tfp_{it}^{k} = \alpha + \delta_1 NC_i + \delta_2 PC_t^k + \delta_3 (NC_i * PC_t^k) + \gamma_1 \mathbf{X}_t + \gamma_2 \mathbf{X}^k + \gamma_3 s_{it} + \varepsilon_{it}, \qquad (2.11)$$

where tfp_{it}^{k} is the firm-level TFP estimated from equation 2.10. NC is a dummy variable indicating whether the firm is unconnected to Suharto. Meanwhile, PC is the prevalence of political connections in industry k in year t, defined as the share of connected firms' asset value out of total industry-k assets in year t. The main variable of interest to show the congestion effects of political connections is δ_3 – the coefficient on the interaction between being a unconnected firms and being in an industry populated with some connected firms.

A potential problem of endogeneity and omitted-variable bias might arise from the possibility that Suharto cronies were able to pick already-productive firms, so that the heterogeneity of the productivity threshold had less to do with the political connections. The political-economy literature on Indonesian state-business relations, however, suggests that the rise of connected firms went hand in hand with the rise of modern sectors in Indonesia. The birth of the modern private sector in the 1980s was marked by the turning of politico-bureaucrats into capitalists (Robison, 1986). In that process, Suharto's political cronies and bureaucrats moved from tapping rents from government regulation to starting their own modern firms and accumulating capital, partnering with the few businessmen already within the Suharto circle since the 1950s.

Nevertheless, to minimize the endogeneity problem in my regression specifications, I run a firm-fixed effect regressions and impose year-effects controls, $\mathbf{X}_t$, industry controls, $\mathbf{X}^k$, and their interactions. In addition, I explicitly separate the effect of business opportunity on the prevalence of connected firms in the industry, and thus the congestion, by adding in firm sales growth, s_{it}.

Furthermore, to develop an even more robust causal inference from industry connectedness to unconnected firms' productivity and industry congestion, I run a quasi-experimental setting of using the difference-in-differences method. I take the political crisis in 1998 that ended the Suharto regime as treatment to both connected and unconnected firms. In industries with more prevalence of Suharto-connected firms, the productivity selection threshold should have been lower following the crisis. Moreover, since the removal of Suharto from power would have exposed connected firms to a similar productivity selection threshold as that faced by unconnected firms, the productivity wedge between those firms should have declined. The difference-in-differences method not only provides evidence on whether the estimates in previous specifications were driven by the declining strength of political connections, but also highlight whether the crisis produced a cleansing or scarring effects on manufacturing productivity, at least in the immediate aftermath. A narrower productivity wedge would suggest that crisis was a cleansing process.

To execute this strategy, I run the following specification:

$$tfp_{it}^{k} = \alpha + \delta_1 NC_i + \delta_2 PC_t^k + \delta_3 (NC_i * PC_t^k) +$$

$$\delta_4 (NC_i * CR_t) + \delta_5 (PC_t^k * CR_t) + \delta_6 (NC_i * PC_t^k * CR_t) + \tag{2.12}$$

$$\gamma_1 \mathbf{X}_t + \gamma_2 \mathbf{X}^k + \gamma_3 s_{it} + \varepsilon_{it},$$

where CR_i is a dummy variable for postyear crisis – that is for 1998 onward. The variable of interest in this specification is δ_6, where a significant negative value of this coefficient indicates a creative destruction and lower congestion after the crisis.

2.3.3 Data

My main data source is the Indonesian Survey of Medium and Large Manufacturing Firms (*Survei Tahunan Perusahaan Industri Pengolahan*) from 1991 to 2005. By developing-country standards, this survey covers unusually detailed questions on various components of firm production (for detail and discussions, see Aswicahyono (2009)). Using a specific identification code for each firm, I am able to construct a panel-data set. I exclude the year 1996 since the survey does not report the value of firms' fixed asset – as proxy of capital stock– and investment for this year[1].

Capital stock is defined as the reported market value of a firm's fixed assets at the beginning of a surveyed year. Labor refers to the total number of laborers, both paid and unpaid, employed by the firms. Material expenditure is the market value of raw material the firm used during the year. For deflators, I use the Consumer Price Index with a base year of 2000 to adjust the value of firms' output, value added, and sales. For the firm's capital stock, I use the Producer Price Index, weighted by the share of each industry's input out of total input for each three-digit ISIC manufacturing industry; and I derive the share

[1]Unlike Amiti and Konings (2007), I do not interpolate the missing values of capital stock and assets in 1996, using 1995 and 1997 data points, because there is no good justification to assume linear growth across those years

of industry input from the sixty-eight-sector Indonesian input-output table for the 2000s.

I remove the extreme points by dropping the first and last percentile of the main covariates: firm log value added, log capital stock, log labor, and log material. I also exclude firms with less than one hundred workers to make connected and unconnected firms more comparable in size. Furthermore, to allow for a robust TFP regression by sector, I regroup the three-digit industry sector classifications by merging sectors that have less than three hundred firms with the nearest and closely similar industry group.

The definition of politically connected firms follows Mobarak and Purbasari (2006)[2]. They conduct an event study by regressing stock returns on fifteen days between 1994 and 1997 when the press reported Suharto ill. Out of twenty-nine firms with a significant negative return, Mobarak and Purbasari (2006) identify the names of key personnel, track their associations with other firms through directories of business groups and subsidiary firms, and map them into the Indonesian Manufacturing Survey in 1997. I assume firms' political connection to Suharto are time invariant, especially before the crisis, which plausible since methodologically, Mobarak and Purbasari (2006) identify politically connected firms by regressing firms abnormal stock returns from 1994 to 1997, and given the stable setting of Suharto's network, it is unlikely that firms' political- connection status differed across years while he was in power.

2.3.4 Descriptive Statistics

Table 2.2 reports the summary statistics of variables of interest in the Survey of Manufacturing Industry 1991-2005 for the regression analysis. After imposing data restrictions discussed in the data section above, the unbalanced panel-data set consists of 13,138 unique firms. The total number of firm-year units is around 63,000 list-wise. A considerable number of observations are dropped due to missing data points, especially on the capital stock.

[2] Amiti and Konings (2007) and Hallward-Driemeier and Rijkers (2013) also utilize Mobarak and Purbasari (2006) dataset to define firms' political connection status in their studies.

Unlike other studies on Indonesian manufacturing firms, I do not further apply any imputation procedure, such as interpolation or other more sophisticated econometric estimation, to deal with the missing data, mainly because I do not find a reasonable justification to evaluate whether there is a systematic pattern to explain those missing data or it is simply measurement errors.

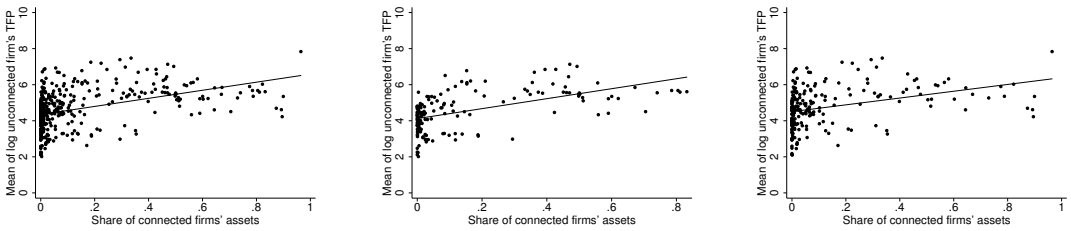
Out of the firm-year panel data observations, 3.4 percent are defined as connected to Suharto. On average connected firms contributed to 10 percent of total assets by three-digits industry classification. The distribution of connected assets concentration, however, was highly skewed to the left, as seen by the median value of only 1.7 percent. A large concentration of connected firms, therefore, was clustered in a few industries. Moreover, the mean of the Herfindahl index was 0.04, indicating that industry sales were relatively unconcentrated. The mean of firm's age was 14.4 years.

Table 2.2: Summary of statistics

	Mean	Standard Deviation	Median
Log TFP_{LP}	4.696	1.593	4.564
Log value added	8.464	1.684	8.357
Log capital stock	8.624	1.971	8.572
Log number of laborers	5.748	0.913	5.533
Log material spending	8.978	1.913	8.994
Share of connected firms' (PC) assets	0.104	0.187	0.018
Connected firm =1	0.033	0.178	0
Suharto-family firm =1	0.008	0.091	0
Connected non-Suharto family firm =1	0.024	0.154	0
Log investment	6.872	2.318	6.950
Log sales	9.612	1.693	9.548
Herfindahl index	0.041	0.059	0.019
Firm's age	14.43	13.97	11
Log TFP_{OLS}	0.035	0.956	-0.006
Log value added per labor	2.716	1.316	2.624
Log capital per labor	2.876	1.715	2.879
Observations	63646		

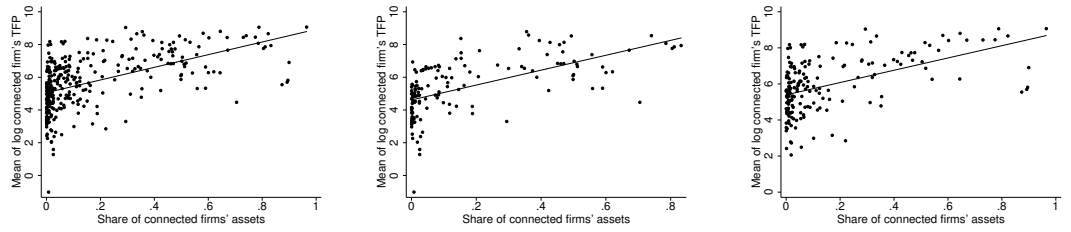
Mean value. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more laborers.

At the year-industry level, descriptive scatter plots in figures 2.2 and 2.3 indicate that the mean of both connected and unconnected firms' TFP increased along with the level of political connectedness of an industry, although this simple linear relationship does not seem very robust. For this essay's model specification, the more relevant description is figure 2.4 that shows within year-industry dyad, the difference between connected and unconnected firms' TFP tended to increase as the percentage of connected firms' assets in the industry rose. The positive correlations held both before and after the 1998 crisis year. While a simple linear relationship certainly has many limitations, the direction of correlation at least provides an early indication that a higher concentration of connected firms in an industry was associated with a higher productivity gap between connected and unconnected firms and a higher productivity threshold faced by unconnected firms.



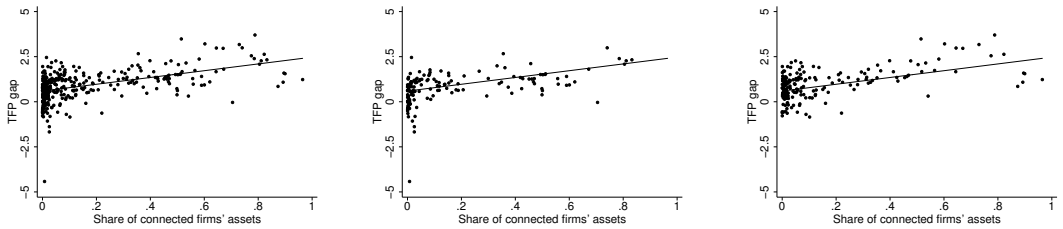
(a) All years (b) Before crisis years (c) After crisis years

Figure 2.2: Mean of unconnected firms' log TFP and share of connected firms' assets by industry-year



(a) All years (b) Before crisis years (c) After crisis years

Figure 2.3: Mean of connected firms' log TFP and share of connected firms' assets by industry-year



(a) All years (b) Before crisis years (c) After crisis years

Figure 2.4: TFP gap (mean of connected firms' log TFP - mean of unconnected firms' log TFP) and share of connected firms' assets by industry-year

2.4 Results

2.4.1 Congestion Effect of Political Connections

My main finding is that the presence of politically connected firms in the Indonesian manufacturing industry created congestion effects. Higher concentration of connected firms' assets led to a higher productivity premium unconnected firms had to pay, relative to connected firms, to survive the same productivity shocks. In particular, table 2.3 shows economically and statistically significant positive coefficients on the effect on a firm's TFP of the interaction interaction between being a unconnected firm and the share of connected firms' assets in the industry. These positive coefficients suggest that unconnected firms in a more politically connected industry were subject to a higher productivity threshold than connected firms, detering some of their production activities that would still have been profitable in the absence of connected firms. In other words, the rise of politically connected firms created industry-congestion effects.

Table 2.3: Did political connection produce productivity congestion?

	Log Total Factor Productivity					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	-0.0270	0.244	-0.0335	0.201	-0.0430	-0.0161
	(0.198)	(0.254)	(0.198)	(0.254)	(0.199)	(0.198)
(Unconnected=1)×Share of PC assets	0.399*	0.331*	0.407*	0.334*	0.406*	0.403*
	(0.203)	(0.154)	(0.203)	(0.154)	(0.203)	(0.203)
Firm's age			-0.000975	-0.000612	-0.000960	-0.00105
			(0.000866)	(0.000811)	(0.000867)	(0.000865)
Log number of laborers			0.218***	0.208***	0.218***	0.216***
			(0.0185)	(0.0175)	(0.0185)	(0.0184)
Herfindahl index					0.347**	0.144
					(0.122)	(0.322)
Year×Herfindahl index	No	No	No	No	No	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Year×Industry	No	Yes	No	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63644	63644	63621	63621	63621	63621
R-squared	0.0311	0.153	0.0383	0.159	0.0386	0.0399

Estimated coefficients in row 2 indicate the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers.

I report the coefficients of interest in the second row of table 2.3 as empirical evidence that supports the main finding on the effects of political connections on firms' productivity and on creative destruction. In the most basic fixed effects regression specification (column 1), a ten-percentage-point increase of the share of connected firms' assets in the industry led to a 4 percent increase in unconnected firms' TFP relative to connected firms'.

The remaining specifications of table 2.3 (in columns 2 to 6) control for other channels besides political connections that possibly also contributed to the observed differences between connected and unconnected firms' productivity along connected firms assets concentration in the industry. First, a firm may have experienced an industry-specific shock in a particular year, and the heterogeneity of shocks across years and industries may account

for a significant part of the differences in firms' TFP. If unconnected firms were concentrated in industries with larger adverse shocks in a certain year, failing to control for the interaction of year and industry would make the effects of the industry's political connections on productivity wedge overestimated. To test this proposition, I run regressions with year-industry interaction variables as controls. As reported in column 2 of table 2.3, the productivity-premium coefficient decreases from 4 to 0.33. Although unconnected firms in a given year and industry tend to have experienced more adverse productivity shocks, these shocks do not invalidate the finding of congestion effects of political connections because the coefficients related to industry congestion effects remain economically and statistically significant.

As a second possible confounding variable, economies of scale might also have been responsible for a firm's productivity. If connected firms were more likely to enjoy the economies of scales, that alone would set a higher productivity threshold for unconnected firms. To check this possible channel, I control for a firm's age and size as measures of the effect economies of scale in the specifications in columns 5 and 6. Economies of scale turn out to have had quite significant effects: a 10 percent increase in a firm's size, as measured by employment, was associated with an increase in TFP of around 20 percent. Nevertheless, the coefficients for the congestion effect hardly change in comparison to columns 1 and 2's specifications, suggesting that the economies of scales affects firms connected and unconnected firms productivity equally and did not affect industry congestion.

The estimated TFP may also pick up the effects of industry competitiveness, efficiency, and technological advancement. More competition puts more pressure on firm to increase its efficiency, but less competition may also provide better incentives for an incumbent to take risk for innovation. Moreover, industry concentration may reflect a firm's ability to mark up its output price. In estimating a firm's productivity using the Levinsohn-Petrin method, the dependent variable value added is measured by the subtracting the firm's input values from its output values. The output values might be biased upward in firms with a better ability to mark up their output prices. As a result, the differences

between connected and unconnected firms' productivity may just reflect the differences in their ability to mark-up the prices (Amiti and Konings, 2007). While not specifically testing the determinants of industry concentration effects on firm's productivity, I find that firms operating in an industry with higher concentration have higher TFP. After controlling for the year-concentration effects, however, the coefficients become smaller and statistically insignificant, suggesting a high sensitivity of the concentration effect to year-specific shocks, especially large industry productivity shocks in postcrisis years.Setting that aside, the more important finding is that even after taking the effect of industry concentration into account, the coefficients concerning the effect of congestion effect remain robust.

Additionally, row 1 of table 2.3 shows mixed results on the association between an industry's concentration of connected firms' assets and connected firms' productivity in an industry. In the odd columns of table 2.3, industry connectedness seems to have no effect on firms' productivity. However, by controlling for the interaction of year and industry in columns 2 and 4, the coefficients for effect of the share of connected firms' assets in the industry on firms' productivity turn into at least economically sizable values of 0.24 and 0.20, suggesting that some year-and-industry-specific shocks might be responsible for the underestimated coefficients in columns 1 and 3. Moreover, as seen from columns 5 and 6, a significant part of the effect of year-industry interaction is actually driven by the level of industry concentration, measured by the Herfindahl index: controlling for industry concentration leaves the effects of industry connectedness on firm's productivity small and insignificant.

Theory gives reasons to expect either positive or negative correlations between industry concentration and connected firms' productivity. For example, Aghion et al. (2009) argue that connected firms in an industry under the threats of productive competitors' entry, would decide whether to pursue innovation depending on the industry's position relative to the technological frontier. If the payoff for innovation is because connected firms are close to the industry's technological frontier, connected firms would invest in higher productivity activities. In this essay, I am not able to directly test that hypothesis because, by design, a

fixed-effects regression omits the firm's political connection status, it being a time-invariant variable. Nevertheless, the descriptive statistics in table 2.1 strongly suggest that, on average, connected firms had much higher TFP than unconnected firms. So it is plausible to interpret the coefficient for unconnected firms productivity premium as a decrease in the productivity gap between connected and unconnected firms.

Table 2.4: Did political connection produce productivity congestion? – Alternative productivity measures

	Log VA/Labor			ln TFP_{OLS}		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	-0.0416	-0.0424	-0.316*	-0.733**	-0.706**	-0.371*
	(0.256)	(0.256)	(0.148)	(0.236)	(0.236)	(0.146)
(Unconnected=1)×Share of PC assets	0.356*	0.358*	0.365*	0.403**	0.401**	0.410**
	(0.152)	(0.153)	(0.152)	(0.149)	(0.149)	(0.149)
Firm's age		-0.000647	-0.000685		-0.000266	-0.000398
		(0.000830)	(0.000829)		(0.000765)	(0.000773)
Log number of laborers					-0.128***	-0.126***
					(0.0147)	(0.0147)
Log capital per labor	0.0936***	0.0935***	0.0944***			
	(0.00623)	(0.00623)	(0.00622)			
Year×Herfindahl index	No	No	Yes	No	No	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Year×Industry	Yes	Yes	No	Yes	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63644	63621	63621	62085	62065	62065
R-squared	0.0505	0.0505	0.0329	0.0488	0.0519	0.0334

Estimated coefficients in row 2 indicate the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers.

For a further robustness check, I run specifications with alternative firm-productivity measures. Instead of estimating TFP using the Levinsohn-Petri approach, the first three columns of table 2.4 use labor productivity, defined as log of value added per worker, as a dependent variable. As with the main specifications in table 2.3, I control not only for the possibility that economies of scales and industry concentration may confound the differences

in TFP across firms' connectedness status but also for capital productivity, defined as the log of capital per worker. The results confirm the main finding: for each ten-percentage point increase in connected firms' asset concentration, unconnected firms' labor productivity increased to 3.6 percentage points higher than connected firms'.

In last three columns of table 2.4, I use another alternative productivity measure: log of TFP estimated using an OLS regression of a firm's production function. Estimating the firm's TFP using this OLS regression is inferior to the Levinsohn-Petrin method I used for the main results since the OLS specification does not explicitly control for endogeneity between input choices and a firm's productivity shock. Nevertheless, the results from using the OLS-estimated TFP are more or less similar to the main finding: unconnected firms face a 4 percent productivity premium, relative to connected firms, for each 10 percent increase in the share of connected firms' assets in the industry.

Controlling for the economies of scale and industry competitiveness hardly changes the coefficients of interests in row 2 of table 2.4. In addition, unlike in table 2.3, in these specifications using alternative productivity measures, a higher share of connected firms' assets in the industry is more evidently associated with lower firm's productivity. Row 1 of table 2.4 shows that all six coefficients show negative signs, and four of them are not only sizable in magnitude but also statistically significant.

So far, the main indicator on congestion effects has been the increasing productivity wedge between connected and unconnected firms. Yet, as additional evidence for industry-congestion effects, the creative destruction model of Caballero et al. (2008) predicts more-immediate discriminating effects of a negative shock: unconnected firms experience more destruction, less creation, and more reduction of production activities in the presence of connected firms in the industry. Accordingly, unconnected firms have to go through a larger adjustment process as the concentration of connected firms in the industry increases.

Table 2.5: Did political connection lead unconnected firms to contract?

	Log investment			Log employment		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	0.114	0.0175	0.306	0.201	0.201	0.0661
	(0.533)	(0.539)	(0.369)	(0.111)	(0.111)	(0.0477)
(Unconnected=1)×Share of PC assets	-0.235	-0.195	-0.222	-0.0436	-0.0441	-0.0618
	(0.382)	(0.380)	(0.377)	(0.0506)	(0.0506)	(0.0509)
Firm's age		-0.00434*	-0.00416		0.000348	0.000350
		(0.00219)	(0.00222)		(0.000583)	(0.000580)
Log number of laborers		0.398***	0.423***			
		(0.0467)	(0.0478)			
Herfindahl index			0.203			
			(0.278)			
Log sales$_t$	0.340***	0.287***	0.308***	0.127***	0.127***	0.128***
	(0.0238)	(0.0239)	(0.0238)	(0.00449)	(0.00449)	(0.00446)
Log sales$_{t-1}$	0.0161	-0.00857	-0.00482	0.0596***	0.0596***	0.0606***
	(0.0165)	(0.0165)	(0.0166)	(0.00298)	(0.00298)	(0.00297)
Year×Herfindahl index	No	No	Yes	No	No	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Year×Industry	Yes	Yes	No	Yes	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	28551	28551	28551	53833	53832	53832
R-squared	0.0756	0.0828	0.0509	0.134	0.134	0.119

Estimated coefficients in row 2 indicate the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers.

Table 2.5 shows mixed results on whether unconnected firms contract more in the presence of connected firms. In these specifications, I estimate changes in firms' log investment and log employment to measure a firm's production-activities contraction. Negative investment and employment growth suggests more destruction than creation. The increasing gap in the investment or employment growth between connected and unconnected firms for each increase of connected firms connection indicates the differential adverse effects of political connections among firms.

Using log of investment as a dependent variable, row 2 in columns 1 to 3 of table

2.5 shows that for every 10 percent increase in industry connectedness, investment growth in unconnected firms was 2 to 2.4 percent lower than in connected firms, controlling for economies of scale, industry concentration, and firms' business prospects as indicated by the log of current and previous years' sales. Despite the absence of statistical significance, these figures indicate an economically significant effect of political connections on investment growth. However, the asset concentration of connected firms in an industry had hardly any effects on firm's employment growth across firms connectedness status, as shown in row 2 in columns 4 to 6 of table 2.5. This practically negligible effects may indicate that both connected and unconnected firms were subject to the same labor-market rigidity.

2.4.2 The Effects of Political Crisis on Congestion

There is a good reason why the political crisis may have had a positive effect on creative destruction. As an exogenous shock, a crisis may hit the sources of political connections and destroy the credibility of political connections in providing connected firms with effective protection against productivity shocks. The crisis may thereby significantly reduce the heterogeneity of the productivity selection threshold between connected and unconnected firms. The congestion effect of political connections is eliminated as the differential threshold becomes irrelevant.

In the absence of a time-variant direct firm-connectedness variable, interacting a variable of interest (i.e., firm's connectedness status and industry's connectedness) with crisis also provides additional evidence that political connection affects firms' productivity. In a proxy for a difference-in-differences setting, the effect of a political crisis as a kind of quasi-treatment common shock would different between connected and unconnected firms. If political connections mattered, after controlling for other covariates, political crisis would negatively affect only the connected firms' productivity premium. A political crisis would make both connected and unconnected firms indifferent in term of exposures to political guarantee or special protections. By characterizing the fall of Suharto in 1998 as a shock that removed the value of political connections on connected firms, I find some evidence for

lower politically induced congestion in the observed postcrisis years.

Row 3 of table 2.6 shows considerable reductions in the productivity gap between connected and unconnected firms as industry connectedness increased. For example, in column 1, connected firms' productivity premium, measured as TFP, declined by almost 2 percent for every ten-percentage-point increase of connected firms' asset concentration in an industry in the years after Suharto's removal from power. In column 2, after controlling for year-industry interactions, I find that connected firms' productivity premium decreased by 3.3 percent. In columns 3 and 4, taking firms' economies of scale into account, the crisis reduced the premium by 1.5 percent, and controlling for year-industry interaction, it reduced the premium by 2.8 percent. With year and industry-concentration control, the figures become 1.4 and 1.3 percent respectively. Note, however, these reductions of connected firms' productivity premium have low p-values and lack standard statistical significance.

The more important finding is that without controlling for being in a postcrisis year and related interactions with political connections and share of connected firms' asset in the industry, as in the table 2.3, the congestion effects are underestimated. By comparing row 2 of table 2.6 with the same row in the main table (table 2.3), the coefficients of unconnected firms' productivity premium are actually around 10 percent higher - from around 0.4 in table 2.3 to around 0.5 in table 2.6. In other words, the 1998 political crisis substantially cleansed productivity congestion and drove down the overall politically- induced congestion for the entire period of observation of 1995 to 2005.

Furthermore, the coefficients on postcrisis-related variables in rows 4 to 6 of table 2.6 show that firms were generally more productive after the crisis. Moreover, controlling for specific shocks in the industry in a particular year shows that, first, most of the postcrisis productivity improvement came from productivity surges in some selected industries after the crisis. Second, this major improvement came from the increasing productivity of firms in industries with a high concentration of connected firms.

Table 2.6: Did political crisis reduce political-connection-induced productivity congestion?

	Log Total Factor Productivity					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	-0.0367	-0.769	-0.0238	-0.787	-0.0377	0.0301
	(0.231)	(0.433)	(0.231)	(0.433)	(0.232)	(0.232)
(Unconnected=1) × Share of PC assets	0.502*	0.514*	0.477*	0.488*	0.470*	0.460
	(0.239)	(0.215)	(0.239)	(0.215)	(0.239)	(0.239)
(Unconnected=1) × (Post 1997=1) × Share of PC assets	-0.199	-0.329	-0.151	-0.284	-0.142	-0.127
	(0.283)	(0.268)	(0.279)	(0.263)	(0.279)	(0.279)
Post 1997=1	0.112	0.00432	0.133	0.00629	0.124	0.127
	(0.108)	(0.153)	(0.107)	(0.152)	(0.107)	(0.107)
(Unconnected=1) × (Post 1997=1)	-0.0726	0.00648	-0.0926	-0.0131	-0.0914	-0.0964
	(0.108)	(0.104)	(0.106)	(0.102)	(0.106)	(0.106)
(Post 1997=1)× Share of PC assets	0.0542	1.132*	0.0263	1.093*	0.0345	-0.0300
	(0.276)	(0.465)	(0.272)	(0.461)	(0.272)	(0.272)
Firm's age			-0.000993	-0.000633	-0.000979	-0.00108
			(0.000865)	(0.000811)	(0.000866)	(0.000864)
Log number of laborers			0.218***	0.208***	0.217***	0.216***
			(0.0185)	(0.0175)	(0.0185)	(0.0185)
Herfindahl index					0.320**	0.0448
					(0.124)	(0.323)
Year effects×Herfindahl	No	No	No	No	No	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Year×Industry	No	Yes	No	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63644	63644	63621	63621	63621	63621
R-squared	0.0313	0.153	0.0386	0.159	0.0388	0.0402

Estimated coefficients in row 2 indicate the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Estimated coefficients in row 3 indicate the effect of the political crisis on the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers.

Consider some possible explanations for why connected firms can did as well as, or even better than, unconnected firms in gaining in productivity in some industries in the years after the political crisis. As political crisis turned into an accompanying systemic economic crisis in Indonesia, lenders became highly uncertain about the real health of firms' balance sheets, and at the time when credit is crucially needed, lenders could not properly assess the borrowers' ability to repay their loans. As a result, they severely cut and rationed credits to firms to go only to selected firms not based on their potential productivity but

on their presence in the same information network as the lenders in the financial market (Agung et al., 2000). Moreover, the effect of the rationing might also have been exacerbated by the major bank restructuring and government takeover. Due to heterogeneity in firms' information cost based on the strength of their network, in some industries, old networks linking connected firms and the remaining banks, government officers, or other financing sources may have still been useful even after the political crisis and may have put connected firms in a better position to access finance and so to increase productivity. Testing this hypothesis, however, is beyond the scope of this essay.

I also test whether the observed effect of the crisis in relieving congestion is driven only by temporary effects of the collapse of the Suharto regime. In the immediate years after the crisis, negative public and market sentiments turned against the fallen Suharto regime and may have been be highly effective in eliminating congestion from former political connections. Yet, the political shocks might also have disproportionately hit connected firms regardless of their true productivity, resulting in an overestimated cleansing effect of the political crisis. On the other hand, this effect may not have lasted and connected firms may have been able to re-insulate themselves from productivity shock and perhaps even recreate industry congestion at the cost of lower productivity of unconnected firms. To see if the cleansing effects of the crisis were persistent, I run regression specifications that break down changes in congestion effects for each postcrisis year in comparison to precrisis years.

As seen from table 2.7, the reduction of congestion in postcrisis years tended have persisted. In most of the postcrisis years, the productivity premium for each increase of an industry's political-connection concentration was lower than precrisis, especially after controlling for year-industry interaction. Although they show no statistical significance, rows 3 to 10 of table 2.7 show an economically substantial reduction in congestion. The largest cleansing effects indeed took places in the immediate years after the crisis, 1999 to 2001, but the reduction of connected firms' productivity premium generally persisted into the subsequent years.

Table 2.7: Did political crisis reduce political-connection-induced productivity congestion? – Year effects

	Log Total Factor Productivity					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	-0.0280	-0.488*	-0.00485	-0.459*	-0.0163	0.0621
	(0.240)	(0.215)	(0.240)	(0.214)	(0.240)	(0.241)
(Unconnected=1) × Share of PC assets	0.505*	0.490*	0.473	0.459*	0.469	0.452
	(0.248)	(0.222)	(0.248)	(0.221)	(0.248)	(0.249)
(Unconnected=1) × (Year=1998) × Share of PC assets	-0.148	-0.335	-0.0821	-0.297	-0.0784	-0.0905
	(0.540)	(0.514)	(0.543)	(0.516)	(0.543)	(0.541)
(Unconnected=1) × (Year=1999) × Share of PC assets	-0.756	-0.767	-0.737	-0.751	-0.732	-0.716
	(0.527)	(0.460)	(0.524)	(0.456)	(0.524)	(0.524)
(Unconnected=1) × (Year=200) × Share of PC assets	-0.607	-0.876	-0.501	-0.775	-0.495	-0.528
	(0.639)	(0.561)	(0.637)	(0.559)	(0.636)	(0.640)
(Unconnected=1) × (Year=2001) × Share of PC assets	-0.427	-1.221**	-0.351	-1.154**	-0.348	-0.320
	(0.454)	(0.392)	(0.454)	(0.395)	(0.454)	(0.453)
(Unconnected=1) × (Year=2002) × Share of PC assets	0.273	-0.320	0.323	-0.281	0.330	0.326
	(0.636)	(0.577)	(0.633)	(0.577)	(0.631)	(0.638)
(Unconnected=1) × (Year=2003) × Share of PC assets	0.0372	-0.116	0.118	-0.0321	0.123	0.164
	(0.395)	(0.391)	(0.393)	(0.388)	(0.394)	(0.395)
Unconnected=1) × (Year=2004) × Share of PC assets	-0.298	-0.500	-0.229	-0.427	-0.223	-0.168
	(0.419)	(0.390)	(0.410)	(0.383)	(0.409)	(0.405)
(Unconnected=1) × (Year=2005) × Share of PC assets	-0.290	-0.358	-0.246	-0.318	-0.241	-0.215
	(0.373)	(0.353)	(0.365)	(0.346)	(0.365)	(0.365)
Firm's age			0.000706	0.000731	0.000748	0.000561
			(0.000848)	(0.000791)	(0.000850)	(0.000850)
Log number of laborers			0.228***	0.219***	0.228***	0.227***
			(0.0186)	(0.0176)	(0.0186)	(0.0185)
Herfindahl index					0.191	-0.262
					(0.119)	(0.163)
Year effects×Herfindahl index	No	No	No	No	No	Yes
Year effects	Yes	Yes	Yes	Yes	No	Yes
Year×Industry	No	Yes	No	Yes	No	No
Year×Share of PC	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63644	63644	63621	63621	63621	63621
R-squared	0.0294	0.146	0.0374	0.154	0.0374	0.0390

Estimated coefficients in row 2 indicate the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Estimated coefficients in rows 3 to 8 indicate the effect of the political crisis by year on the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers. For postcrisis effects on productivity gap, base year is 1991-1997 period.

In a more detailed observation, without controlling for year-industry effects in columns 1, 3, and 5, 2002 and 2003 witnessed increases in productivity congestion. However, once I

insert controls for year-industry effects, the increases disappear, suggesting that the rise in the productivity threshold between unconnected and connected firms in those years might have been driven by some industry-specific productivity shocks that disproportinately hit unconnected firms.

Note that the largest cleansing effect came between 1998 and 2001 and coincided with a massive banking restructuring and recapitalization scheme. In the Indonesian bank-restructuring program, which aimed to bail out the country's banking system, the government took over distressed banks, many of them formerly owned by and linked to politically connected firms. Subsequently, the government recapitalized and regrouped those distressed banks into a few new consolidated major banks. To recover the state funds it invested in the scheme, the government tried to sell and privatized the recapitalized banks. Such a comprehensive and sweeping government policy very likely affected connected firms' access to finance. For example, Poczter (2016) finds that in the postcrisis period, the recapitalized banks formerly connected to Suharto did not lend significantly more than unconnected banks, but were more risk averse in lending to potentially insolvent borrowers, relative to the precrisis period. These formerly connected banks adopted a more conservative lending policy, suggesting they relied less on politically motivated lending. As a result, the ongoing massive bank restructuring and recapitalization process may have been responsible for the reduction of productivity congestion.

I also test the effect of the political crisis on alternative measures of firms' productivity using the log of value added per unit of labor and log TFP estimated with a simple OLS. I find that the finding of a productivity- congestion effects remains robust. Row 2 of table 2.8 shows that generally unconnected firms still had to pay a productivity premium around 4.4 to 3.3 percent higher than unconnected firms in each ten-percentage points increase of connected firms' asset concentration, which is more or less in line with results on the main productivity measure of TFP – that based on the Levinsohn-Petrin approach.

Table 2.8: Did political crisis reduce political-connection-induced productivity congestion? – Alternative productivity measures

	Log VA/Labor			ln TFP_{OLS}		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	-0.273	-0.278	-0.302	0.154	0.123	-0.314
	(0.433)	(0.433)	(0.205)	(0.460)	(0.459)	(0.203)
(Unconnected=1) × Share of PC assets	0.438*	0.440*	0.396	0.374	0.393	0.333
	(0.214)	(0.214)	(0.211)	(0.212)	(0.212)	(0.208)
(Unconnected=1) × (Post 1997=1) × Share of PC assets	-0.173	-0.175	-0.0842	0.0175	-0.0165	0.0898
	(0.257)	(0.257)	(0.255)	(0.260)	(0.261)	(0.256)
(Post 1997=1)	0.0760	0.0780	0.0903	0.337*	0.334*	0.241**
	(0.153)	(0.153)	(0.101)	(0.143)	(0.143)	(0.0924)
(Unconnected=1) × (Post 1997=1)	-0.0606	-0.0607	-0.0840	-0.0764	-0.0644	-0.1000
	(0.101)	(0.101)	(0.100)	(0.0926)	(0.0929)	(0.0911)
(Post 1997=1) × Share of PC assets	0.301	0.306	0.0156	-0.883	-0.814	-0.0609
	(0.455)	(0.455)	(0.248)	(0.475)	(0.476)	(0.250)
Firm's age		-0.000667	-0.000706		-0.000276	-0.000404
		(0.000830)	(0.000828)		(0.000765)	(0.000774)
Log number of laborers					-0.128***	-0.125***
					(0.0147)	(0.0147)
Log capital per labor	0.0934***	0.0934***	0.0942***			
	(0.00623)	(0.00623)	(0.00622)			
Herfindahl index			-0.500			-0.425
			(0.304)			(0.289)
Year×Herfindahl	No	No	Yes	No	No	Yes
Year effects	Yes	Yes	Yes	Yes	No	Yes
Year×Industry	Yes	Yes	No	Yes	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63644	63621	63621	62085	62065	62065
R-squared	0.0506	0.0506	0.0330	0.0488	0.0519	0.0335

Estimated coefficients in row 2 indicate the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Estimated coefficients in row 3 indicate the effect of the political crisis on the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers.

However, I find mixed results on the impact of the crisis using these alternative measures. Specifications with the log of value added per unit of labor indicate that the crisis reduced the effect of congestion on creative destruction process. As shown in row 3 of columns 1 and 2 of table 2.8, the 1998 crisis reduced the productivity gap, measured by value-added per unit of labor, between connected and unconnected firms by 1.7 and 1.8 percent for each ten-percentage point increase in connected firms' assets concentration. After controlling for

the interaction of year and industry concentration, these figures fall to only 0.08 percent.

Yet, the results differ in specifications that use TFP as estimated in simple OLS regressions. Columns 4 and 6 in row 3 of table 2.8 show positive coefficients of 0.02 and 0.09, while column 5 shows a negative but very small figure of 0.02. A caveat for this alternative productivity measure is that regressions of production function using OLS do not control for the endogeneity between input usage and productivity shocks. Following a negative productivity shock such as a political crisis, the marginal product of capital tends to be overestimated, and, consequently, the resulting firms' TFP tends to be underestimated. It appears that unconnected firms' TFP is less underestimated relative to the connected firms' after the 1998 crisis, which drives the observed higher productivity for each increase of connected firms' assets concentration in an industry. This relative difference, set against a political crisis, possibly explain the wider productivity gap despite the fall of Suharto.

2.4.3 Closeness to Suharto

If the political connections really were the link between the firms' productivity and the share of connected firms' assets in an industry, the productivity threshold and congestion effects firms experienced would have varied with their political strength. Since the network of political connections centered around the personal figure of Suharto, firms with closer ties to him should have had stronger political backup and enjoyed a lower productivity threshold relative to those with fewer or no ties. In Suharto's patron-client network and with weak legal enforcement, such personal ties were perhaps the only way to get protection, especially since Suharto was the sole supplier in the Indonesian market for protection. In practice, being personally closer to Suharto would also have supplied firms with better access to input and output markets, more credible political guarantees, and more effective protection against competitive market pressures. In many ways, being closer to Suharto also provided firms with an ability to undercut administrative regulations and divert public resources to themselves.

To test the heterogeneity of the productivity threshold as it relates to closeness to

Suharto in the network, I classify manufacturing firms into three categories: connected directly to the Suharto family, connected but not through family relationships, and unconnected firms. Mobarak and Purbasari (2006), in constructing firms' politically connected status that I use in this essay, are able to identify which connected firms had direct links to the Suharto family either by ownership or by membership on a board of directors. The Suharto family's firms are identified by the presence of a member of Suharto extended family, including in-laws, on their board of management.

These firms belonged to the most privileged group in the Suharto network, especially in the 1990s when Suharto's own children started to exploit their family name and become the most powerful business owners in the country. The other group of connected firms did not have direct links to the Suharto family. Their status as politically connected firms came from being part of powerful well-connected groups that were often involved in joint ventures with Suharto family firms or connected to publicly listed companies whose market values were very sensitive to Suharto's ability and prospect of remaining in power, as identified by Jakarta Stock Exchange event studies. The last category, the unconnected firms, were the manufacturing firms operating outside the regime's business-protection network.

Table 2.9 presents the estimated productivity threshold across the categories of firms' closeness. In these regression specifications, I set Suharto-family-connected firms, those closest to Suharto, as the base for estimating the TFP gap. Connected non-Suharto-family firms seem to have faced a lower productivity threshold than Suharto-family-firms, while unconnected firms appear to have experienced slightly higher productivity barriers than the same group of firms.

In the most basic specification with firm-fixed effects and year effects as in row 3 of column 1 of table 2.9, there is hardly any observed productivity gap between unconnected firms and Suharto-family firms' TFP as industry connectedness rises. Applying various controls for firms' economies of scale, industry concentration, and year-industry effects, the estimated productivity gaps between these two types of connected firm remain very low. Yet, the productivity gap between unconnected firms and connected non-Suharto

family firms measures between 4 and 5 percent. The F-test shows a statistically significant difference between coefficients in rows 3 and 2 of table 2.9 at 5 percent level [3]. These productivity gaps are more or less in line with results in row 2 of table 2.6, suggesting that most of the estimated productivity gap between unconnected and connected firms comes from the gap with connected non-Suharto-family firms. Row 2 of table 2.9, however, shows that the TFP of connected non-Suharto family firms was around 3 to 5 percent lower than Suharto-family-connected firms' TFP for each ten-percentage point increase of connected firms' asset share in the industry, although the coefficient is not statistically significant.

Table 2.9: Did closeness to Suharto reduce productivity congestion?

	Log Total Factor Productivity					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	0.369	0.491	0.356	0.448	0.349	0.359
	(0.335)	(0.359)	(0.335)	(0.359)	(0.334)	(0.331)
(Connected non-Suharto-family firms=1) × Share of PC assets	-0.490	-0.319	-0.483	-0.318	-0.487	-0.466
	(0.407)	(0.335)	(0.407)	(0.335)	(0.406)	(0.404)
(Unconnected firms=1) × Share of PC assets	0.00379	0.0734	0.0171	0.0772	0.0140	0.0273
	(0.338)	(0.293)	(0.338)	(0.292)	(0.337)	(0.334)
Firm's age			-0.000980	-0.000616	-0.000964	-0.00105
			(0.000866)	(0.000811)	(0.000867)	(0.000865)
Log number of laborers			0.218***	0.208***	0.218***	0.216***
			(0.0185)	(0.0175)	(0.0185)	(0.0184)
Herfindahl index					0.348**	0.146
					(0.122)	(0.322)
Year × Herfindahl index	No	No	No	No	No	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Year × Industry	No	Yes	No	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63644	63644	63621	63621	63621	63621
R-squared	0.0311	0.153	0.0384	0.159	0.0386	0.0400

Estimated coefficients in rows 2 and 3 indicate the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry, relative to the Suharto-family firms. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers.

One possible explanation is that Suharto-family firms were able to utilize their political privilege partly to increase their productivity, and their ability was positively associated with

[3] In detail, the p-values of the F-test for equations 1 to 6 of Table 2.9 are 0.036, 0.025, 0.034, 0.024, 0.034, and 0.036

higher industry connectedness, perhaps because connectedness provided better incentives for risk-taking by innovating. Investigating this hypothesis is, however, beyond the scope of this essay. Productivity congestion was probably also biased against the Suharto-family firms, especially after the fall of the Suharto regime. Obviously, by having strongest political connections, Suharto-family firms were in the most advantageous position for getting special protection against productivity shocks in a competitive market, and were, therefore the main beneficiaries in the otherwise-congested creative destruction. But, when the regime collapsed, Suharto-family firms may have found themselves in the worst situation. Rather than helping to secure protection, their strong association with the former regime became their biggest liability. Since the political crisis, they may have gone through a substantial correction for their formerly protected status and perhaps even seen a net increase of their productivity threshold relative to other types of firms. The remainder of this section tests whether the estimated Suharto-family productivity premium is driven by such a postcrisis adjustment.

Table 2.10 suggests that Suharto-family firms experienced major changes in their exposure to productivity shocks in postcrisis years. For example, row 4 in column 1 of table 2.10 shows that in the postcrisis years, the productivity gap between connected non-Suharto family relative to Suharto-family-connected firms decreased by 58 percent in comparison to the years before the crisis. Unconnected firms' productivity gap relative to Suharto-family firms also decreases substantially by 63 percent. This pattern holds with various controls applied in the specifications of columns 2 to 6, indicating that Suharto-family firms lost much of their productivity premium relative to other groups of firms.

Moreover, comparing row 2 in table 2.10 and table 2.9 shows that by taking into account the crisis effects, the estimated productivity gap in each ten-percentage-point decrease of connected firms' asset concentration decreases from between 3 an 5 percent to between 1 and 2 percent. These smaller but still negative figures suggest that there may have been a positive correlation between being connected in a more connected industry and firm's productivity. At the same time, row 3 of table 2.10 suggests that controlling for the political

crisis substantially increases the unconnected firms' estimated productivity-gap coefficient from negligible figures in table 2.9 to around 0.3 or 0.4. Putting this effect together with the sharp decrease of the Suharto-family firms' productivity premium after the crisis, the cleansing effects of the political crisis mostly came from the significant reduction of the productivity premium Suharto-family firms enjoyed before the crisis.

Table 2.10: Did political crisis reduce the effects of being close to Suharto?

	Log Total Factor Productivity					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	0.0929	-0.661	0.136	-0.649	0.126	0.156
	(0.478)	(0.587)	(0.485)	(0.590)	(0.495)	(0.485)
(Connected-non-Suharto family firms=1) × Share of PC assets	-0.132	-0.111	-0.172	-0.151	-0.195	-0.129
	(0.544)	(0.491)	(0.550)	(0.494)	(0.560)	(0.550)
(Unconnected firms=1) × Share of PC assets	0.372	0.410	0.317	0.354	0.289	0.335
	(0.482)	(0.440)	(0.489)	(0.443)	(0.499)	(0.489)
(Connected non-Suharto family firms=1) × (Post 1997=1) × Share of PC assets	-0.575	-0.354	-0.487	-0.277	-0.458	-0.525
	(0.686)	(0.641)	(0.683)	(0.637)	(0.686)	(0.687)
(Unconnected firms=1) × (Post 1997=1) × Share of PC assets	-0.631	-0.597	-0.516	-0.493	-0.517	-0.520
	(0.619)	(0.585)	(0.618)	(0.584)	(0.621)	(0.622)
Post 1997=1	-0.0638	-0.0984	-0.0368	-0.0908	0.124	-0.0467
	(0.232)	(0.263)	(0.232)	(0.261)	(0.233)	(0.231)
(Connected non-Suharto family firms=1) × Post 1997=1	0.239	0.139	0.232	0.131	0.222	0.238
	(0.260)	(0.260)	(0.259)	(0.257)	(0.261)	(0.258)
(Unconnected firms=1) × Post 1997=1	0.103	0.108	0.0776	0.0831	0.0736	0.0779
	(0.232)	(0.236)	(0.231)	(0.235)	(0.234)	(0.230)
(Post 1997=1) × Share of PC assets	0.486	1.379*	0.391	1.283	0.434	0.363
	(0.615)	(0.686)	(0.614)	(0.684)	(0.617)	(0.618)
Firm's age			-0.000996	-0.000636	0.00448***	-0.00108
			(0.000866)	(0.000811)	(0.000871)	(0.000865)
Log number of laborers			0.218***	0.208***	0.233***	0.216***
			(0.0185)	(0.0175)	(0.0187)	(0.0185)
Herfindahl index					0.232	0.0443
					(0.124)	(0.324)
Year×Herfindahl index	No	No	No	No	No	Yes
Year effects	Yes	Yes	Yes	Yes	No	Yes
Year×Industry	No	Yes	No	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63644	63644	63621	63621	63621	63621
R-squared	0.0314	0.153	0.0387	0.159	0.0256	0.0403

Estimated coefficients in rows 4 and 5 indicate the effect of political crisis on the productivity (TFP) premium unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry, relative to the Suharto-family firms. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers.

Furthermore, examining the postcrisis period year by year shows that connected non-Suharto family firms generally experienced increasing productivity congestion relative to

Suharto-family firms until 2002. However, in 1999 as well as from 2003 to 2005, the productivity gap declined significantly between those two groups of connected firms as industry connectedness increased. These were bad years for Suharto-family firms because they saw a massive increase of productivity congestion. Having Suharto family on board became a liability because it meant having to pay a higher productivity premium to stay in a connected industry. Such an adjustment during these years was responsible for practically eliminating the productivity gap between these two groups of connected firms, as seen in row 2 of table 2.11.

For unconnected firms, however, the productivity gap relative to Suharto-family groups in postcrisis years tended to decreases consistently. The exceptions are the year immediately after the crisis, 1998, when Suharto-family firms appeared to be unaffected by the crisis, and 2002. The largest decline came in 1999, when the productivity gap of unconnected firms relative Suharto-family firms for each increase of industry connectedness fell by about half. The next-largest productivity-gap reduction between was from 2004 to 2005.

In general, controlling for closeness to Suharto reinforces the conclusion that political connection was associated with productivity congestion, particularly as shown by the estimated productivity gap between connected and unconnected firms. However, among connected firms, Suharto-family firms seem to have taken a harder hit than connected non-Suharto-family firms in the postcrisis years. The heterogeneity of the productivity gap across firms' closeness to Suharto and its interaction with postcrisis years provides additional evidence that the Suharto factor was indeed responsible for the manufacturing industry's productivity congestion.

Table 2.11: Did political crisis reduce the effects of being close to Suharto? - Postcrisis years

	Log Total Factor Productivity					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of PC assets	0.00673	3.910***	0.0622	-0.364	0.0561	0.0998
	(0.497)	(0.641)	(0.503)	(0.460)	(0.503)	(0.502)
(Connected non-Suharto-family firms=1) × Share of PC assets	-0.0160	-0.0584	-0.0583	-0.0956	-0.0652	-0.0216
	(0.565)	(0.508)	(0.570)	(0.515)	(0.570)	(0.570)
(Unconnected firms=1) × Share of PC assets	0.470	0.393	0.406	0.363	0.397	0.415
	(0.501)	(0.455)	(0.507)	(0.463)	(0.507)	(0.506)
(Connected non-Suharto-family firms=1) × (Year=1998) × Share of PC assets	0.639	0.261	0.650	0.321	0.651	0.661
	(1.256)	(1.180)	(1.265)	(1.188)	(1.264)	(1.260)
(Connected non-Suharto-family firms=1)× (Year=1999) × Share of PC assets	-1.581	-1.429	-1.489	-1.315	-1.477	-1.560
	(1.160)	(1.062)	(1.178)	(1.074)	(1.178)	(1.179)
(Connected non-Suharto-family firms=1) × (Year=2000) × Share of PC assets	0.693	0.137	0.734	0.189	0.743	0.737
	(1.121)	(0.994)	(1.118)	(0.993)	(1.118)	(1.123)
(Connected non-Suharto-family firms=1) × (Year=2001) × Share of PC assets	0.148	-0.0296	0.252	0.0872	0.255	0.196
	(0.833)	(0.796)	(0.837)	(0.802)	(0.836)	(0.838)
(Connected non-Suharto-family firms=1) × (Year=2002) × Share of PC assets	0.368	1.091	0.442	1.189	0.457	0.414
	(1.320)	(1.263)	(1.330)	(1.264)	(1.328)	(1.350)
(Connected non-Suharto-family firms=1) × (Year=2003) × Share of PC assets	-0.630	-0.0772	-0.588	-0.0322	-0.576	-0.608
	(0.909)	(0.896)	(0.908)	(0.894)	(0.909)	(0.910)
(Connected non-Suharto-family firms=1) × (Year=2004) × Share of PC assets	-0.922	-0.572	-0.835	-0.493	-0.815	-0.786
	(1.549)	(1.387)	(1.519)	(1.363)	(1.512)	(1.480)
(Connected non-Suharto-family firms=1) × (Year=2005) × Share of PC assets	-1.331	-1.105	-1.222	-1.007	-1.214	-1.241
	(0.839)	(0.794)	(0.829)	(0.787)	(0.829)	(0.829)
(Unconnected firms=1) × (Year=1998) × Share of PC assets	0.291	-0.117	0.367	-0.0794	0.371	0.367
	(1.134)	(1.052)	(1.142)	(1.062)	(1.142)	(1.140)
(Unconnected firms=1) × (Year=1999) × Share of PC assets	-2.102*	-1.950*	-2.007	-1.862	-1.993	-2.046*
	(1.015)	(0.946)	(1.038)	(0.962)	(1.038)	(1.039)
(Unconnected firms=1) × (Year=2000) × Share of PC assets	-0.177	-0.811	-0.0349	-0.699	-0.0222	-0.0582
	(0.776)	(0.742)	(0.775)	(0.742)	(0.774)	(0.776)
(Unconnected firms=1) × (Year=2001) × Share of PC assets	-0.310	-1.226	-0.155	-1.098	-0.150	-0.167
	(0.674)	(0.684)	(0.679)	(0.690)	(0.678)	(0.681)
(Unconnected firms=1) × (Year=2002) × Share of PC assets	0.409	0.376	0.519	0.457	0.536	0.500
	(1.116)	(1.114)	(1.137)	(1.122)	(1.136)	(1.156)
(Unconnected firms=1) × (Year=2003) × Share of PC assets	-0.419	-0.136	-0.307	-0.0425	-0.293	-0.275
	(0.805)	(0.806)	(0.806)	(0.807)	(0.806)	(0.807)
(Unconnected firms=1) × (Year=2004) × Share of PC assets	-1.057	-0.927	-0.915	-0.816	-0.892	-0.812
	(1.494)	(1.336)	(1.465)	(1.314)	(1.459)	(1.426)
(Unconnected firms=1) × (Year=2005) × Share of PC assets	-1.254	-1.127	-1.128	-1.040	-1.117	-1.113
	(0.737)	(0.704)	(0.731)	(0.701)	(0.730)	(0.731)
Firm's age			0.000697	0.000725	0.000738	0.000553
			(0.000849)	(0.000792)	(0.000851)	(0.000850)
Log number of laborers			0.228***	0.218***	0.228***	0.227***
			(0.0186)	(0.0176)	(0.0186)	(0.0185)
Herfindahl index					0.190	-0.264
					(0.119)	(0.163)
Year×Herfindahl index	No	No	No	No	No	Yes
Year×Share of PC assets	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	No	Yes
Year×Industry	No	Yes	No	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63644	63644	63621	63621	63621	63621
R-squared	0.0298	0.154	0.0379	0.154	0.0379	0.0395

Estimated coefficients in rows 4 and 11 indicate the effect of political crisis on the productivity (TFP) premium the connected non-Suharto-family firms had to compensate for each increase of the share of connected firms' assets in the industry, relative to the Suharto-family's firms, by year. Estimated coefficients in rows 5 and 19 indicate the effect of political crisis on the productivity (TFP) premium the unconnected firms had to compensate for each increase of the share of connected firms' assets in the industry, relative to the Suharto-family's firms, by year. Standard errors in parentheses, adjusted for clusters in firm's panel-data identification. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Period 1991 to 2005, except 1996 as the Survey does not report capital stock. Only firms with one hundred or more workers. For postcrisis effects on productivity gap, base year is 1991-1997 period.

2.5 Conclusion

To sum up, I found, first, that the existence of firms politically connected to Suharto led to productivity congestion affecting creative destruction in the Indonesian manufacturing industry. Political connections generated an artificial selection threshold for unconnected firms and hampered their adjustment to productivity shocks, as reflected in the rise of the productivity gap between connected and unconnected firms for each increase of connected firms' asset concentration in the industry. Second, the change in political regime and the removal of Suharto from power in 1998 produced a cleansing effects that reduced the productivity congestion. Third, the heterogeneity of the productivity gaps between connected and unconnected firms and among connected-firms highlights both the ability of Suharto connections to protect firms against productivity shock and their limitations when the regime changed. The last two findings, based on a deliberate identification strategy to account for different degrees of political connectedness, underline the efficacy of political connections as the determinant of productivity congestion. Overall, this essay empirically shows that political connections can adversely affect firms' productivity by jamming up creative destruction in an industry.

Chapter 3:
Do Business-Group Affiliations Affect Firms' Performance?

3.1 Introduction

In their literature survey, Khanna and Yafeh (2007) ask whether business groups in emerging countries are "paragons" or "parasites." They come up with a rather inconclusive answer: it depends on economic and historical conditions where the business groups operate. Theoretically, the firms belonging to a business group may perform worse than the standalone firms since the affiliated firms are subject to larger agency and coordination problems inside the group. In government-sponsored business groups, the firms' inefficiency may also come from rent seeking by the politically connected groups' managers who enjoy an implicit government guarantee and have different objectives besides profit maximization. On the other hand, a business-group affiliation could enhance a firm's performance by pooling resources and internalizing the market of inputs –capital or skilled-labor– especially when market imperfections and lack of legal protection in the economy are substantial.

Analysis of the empirical evidence on whether being affiliated with a business group leads to better firm performance also shows mixed results. Khanna and Palepu (2000b) find that in India, being part of a business group did not improve the firms' value except in a highly diversified group. Yet, the same authors find long-run performance boost from business-group affiliation in Chile (Khanna and Palepu, 2000a). Claessens et al. (2006) show that in East Asia from 1994 to 1996, a business-group affiliation per se did not increase a firm's market-to-book ratio. The benefit appeared only for the financially constrained mature and slow-growing firms for which the ultimate owner's control and cash-flow right diverged greatly. A series of studies on South Korean business groups (or chaebols: e.g. Chang and

Hong (2002) and Ferris et al. (2003)) also present a variety of results on the impact of group affiliation on firms' performance. In their analysis of Chinese state-owned companies, Yu et al. (2009) argue that the group-affiliated state-owned companies performed better than the non-group state-owned firms.

My contribution to the current literature is as follows. First, I not only estimate the performance effects of business affiliation but also look at the channels through which they come. Specifically, since business affiliation may internalize input markets to overcome external market imperfections, I investigate whether the affiliated firms have higher and more expansive material spending, wage-bill spending, and investment as a percentage of a firm's fixed assets. I also test whether business affiliation provides the firms with better access to international markets – for exported product and imported inputs– and the market for highly educated labor. Second, I carefully constrain the potential problems of selection bias and measurement errors in standard regression analysis found in most studies on the performance effect of business-group membership. To minimize such endogeneity problems, I use the matching method as my main estimation strategy, complemented by the standard regression analysis. Third, rather than using the limited number of publicly listed firms, I extend my unit observations and use the Survey of Manufacturing Industry, which covers the medium and large manufacturing firms in Indonesia regardless of whether they are listed on the stock exchange. The business-group membership status was drawn from the special module in the Survey of Manufacturing Industry in 1996 and 2006, where firms identified themselves whether they belonged to any business group. This data set is arguably more representative and better suited to make generalized arguments on firms and corporate sectors in a country with a less developed capital market such as Indonesia.

In this essay, I find that being affiliated with a business group positively affected firms' performance in the Indonesian manufacturing industry in 1996 and 2006. Applying the propensity-score matching (PSM) method and validating the results with ordinary-least-square (OLS) and fixed-effect regressions and the coarsened-exact-matching (CEM) method, I find that the benefit of business-group affiliation was channeled through better access to

markets, rather than an improvement in the firms' production activities.

3.2 Business Groups in Indonesia

Business groups are an important feature in the Indonesian corporate sector. Most of the country's business groups were connected to former president Suharto, and they were essential for the birth and the rise of modern firms in Indonesia (Robison, 1986). Sato (2003) credits the Indonesian business groups for their role in stimulating investment in the manufacturing industry, developing a new class of business managers, and to some extent nurturing the formation of domestic capital through interfirm linkages with some small and medium-sized firms. Nevertheless, she also notes that business groups were an integral part of the corrupt Suharto regime's patron-client network and a blatant example of crony capitalism in Indonesia (see also (Schwarz, 1994)).

To get a better perspective on the importance of business groups in Indonesia, as reported by Khanna and Yafeh (2005), two-thirds of Indonesian listed firms between 1993 and 1995 were part of business groups. In their survey of 178 firms, with 89 percent of the Jakarta stock market's capitalization in 1996, Claessens et al. (2000) find that 70 percent of firms with ultimate owners who retained at least 20 percent control were engaged in a pyramid structure [1]. These figures illustrate the significance of business groups at least among publicly listed corporations. In addition, Claessens et al. (2000) find that 71 percent of ultimate owners with 20 percent or more in voting rights were families. At the same time, the market value of top-15 families in Indonesia collectively was equal to 22 percent of the country's GDP in 1996.

Carney and Hamilton-Hart (2015) estimate that top ten multisector family-owned conglomerates controlled 29 percent of the 178 largest firms in 1996. In 2008, the percentage of conglomerates' control slightly decreased to 26.5 percent, and the financial and political crisis in 1997 brought some changes in the identities of group owners. Sato (2004) notes

[1] Pyramid structure is a chain of firm ownership, where the owner has a majority of the stock of a company that in turn has a majority ownership stake in other companies, and so on.

that out of the top hundred listed firms in Indonesia, fifty-eight were group affiliated in 1996 and the number declined to forty-four in 2000. Moreover, by comparing simple mean values of the debt-equity ratio, return on assets, and return on equity between group-affiliated and non-group-affiliated firms, Sato (2004) reports that in 1996, the affiliated firms performed better. However, in 2000, soon after the 1997 crisis, non-group-affiliated firms appeared to have a better performance relative to the affiliated firms.

As a part of a cross-country study of fourteen emerging countries, Khanna and Rivkin (2001) find that group affiliation in Indonesia was associated with higher accounting profits. In a similar vein, as a part of a study on nine East Asian countries, Claessens et al. (2003) suggest that affiliated firms in Indonesia, being in lower middle-income country, enjoyed a diversification premium in their profitability and market valuation, particularly from the industry-complementarity effect. Mursitama (2006), using a rather limited samples of Indonesian manufacturing firms by dropping firms that were not members of business groups and firms without a research-and-development unit, finds that group affiliation reduce productivity overall, after controlling for its effect on human capital and managerial capabilities.

To my knowledge, no one has produced a detailed study on the effects of business-group affiliation on the firms' performance in Indonesia that covers non-publicly listed firms, except perhaps Mursitama (2006). On top of that, there has been no study on Indonesian firms that explicitly links business-group membership to firms' production. This essay is an attempt to fill the gap.

3.3 Identification Strategy

3.3.1 Research Design

How does an affiliation to a business group increase a firm's performance? The formation of business groups can be seen as an economically rational response to market imperfections and weak contract-enforcement institutions. Morck et al. (2005) note that the positive

effect of being a member of a business group comes from the ability of the business group to internalize factor markets (capital, managerial talents, and intangibles) within the group. Internalizing factor markets reduces the risk and uncertainty in dealing with imperfect external markets, so the affiliated firms can perform their operations and production better than the standalone firms.

A business group can create an internal capital market that allocates capital more efficiently among firms within the group, relative to the external market or banks (Stein, 1997). Unlike a bank, in Stein's model, a business group's headquarters can optimize the use of capital by reallocating a limited pool of capital based on its ability to identify the losers and the winners within the group. This benefit of business-group membership in fostering efficiency of firms within the group is more evident when external credit is expensive due to capital scarcity and substantial information and agency problems between lenders and borrowers in the external credit market.

Beside credit market imperfection, Khanna and Yafeh (2007) identify two benefits of a business group. First, a business group could act as a provider of public goods for the members when there is a market failure for skilled labor and managers and credible contract enforcement and rule of law are absent. Following the theoretical preposition of Shleifer and Vishny (1997) on the ability of being large to control managerial behavior in the absence of legal protection for investors, a business group may provide better incentives to control managers to maximize return. Second, a business group may help foster entrepreneurship by lending its reputation to new firms or projects, especially in the environment where the risk and uncertainties are high.

On the other hand, membership in a business group may decrease a firm's performance. The first line of argument comes from the agency problems among the managers of the business group's member firms. Rajan et al. (2000) argue that diversity in resources and profit opportunity may lead a manager to invest too little, from the group perspective, if her unit does not get equal compensation in return for sharing the financial return of her optimal investment. Scharfstein and Stein (2000) note that in a business group, when a member

firm's manager can credibly raise her bargaining position for getting compensation from the headquarters manager (the CEO) by shirking and the CEO cannot raise the manager's wage due to monitoring by external investors, the CEO may opt for a less efficient preferential capital allocation among member firms. This preferential capital allocation may offset the benefit of the business group's internal capital market.

Morck et al. (2005) point out that a wedge between shareholder control and cash-flow rights, linked to a pyramid structure often found in business groups, leads to another agency problem between the owner of the controlling unit and other shareholders of a business group. In firms where the owner of the controlling unit has a small cash-flow claim, their investment would be inefficient, or non-value maximizing, because they can get only a small part of the investment return, while at the same time they could embezzle the firm for their personal benefit or tunneling the firms' resources to the controlling unit, where they have a larger cash-flow right. These firms have higher cost of capital due to the possibility of embezzlement (Shleifer and Wolfenzon, 2002). Morck et al. (2005) also posit that a business group may control a significant part of the market's productive resources, retain considerable market power, and potentially distort the market. Problems of agency costs and market distortion are more pronounced when the owners of controlling units are politically connected.

Given these conflicting plausible theoretical predictions, I investigate whether business-group membership in Indonesia, where conditions for positive and negative outcomes exist, increases a firm's performance. I also look at the channels for a possible performance advantage by examining whether the benefit from group membership comes from greater firm's ability to enhance production process and better access to the market relative to standalone firms.

3.3.2 Estimation Strategy

As a baseline, I run the following regression specification to identify the effect of business-group affiliation on firms' performance:

$$y_{it} = \alpha + \beta_1 Group_{it} + \beta_2 \mathbf{X}_i + \beta_3 \mathbf{X}_{it} + \epsilon_{it}, \tag{3.1}$$

where y_{it} is the firm i's performance indicator at time t; $Group_{it}$ is a dummy variable indicating whether the firm is a member of a business group; and $\mathbf{X}_i$ and $\mathbf{X}_{it}$ are time-invariant and time-variant vectors of firm-level controls. The coefficient of interest is β_1, where a positive and statistically significant β_1 suggests a positive performance effect of being a member of a business group. I run an ordinary least square (OLS) regression and, as an attempt to reduce the omitted-variable bias and to take advantage of my panel-data set structure, a firm fixed-effects regression.

To measure a firm's performance, y_{it}, I use the firm's return on assets (ROA), log earnings before interest and income (EBIT), and labor productivity (log value added per worker). The main firm-level time-variant controls, $\mathbf{X_{it}}$, are the firm's log sales, log employment, log total assets, firm's age, log capital per workers, and industry sales concentration (Herfindahl index). The firm-level time-invariant controls, $\mathbf{X_i}$, are the dummy variable on whether a firm is located in Java (the most economically advanced region in the country) and, especially for OLS, the dummy variable for being in an industry (by four-digit-ISIC industry classification).

My main strategy, however, is to adopt the "treatment effects" methodology for observational data to control for confounding variables and establish a better causal relationship between business-group membership and a firm's performance. The confounding variables, in the form of selection bias and measurement errors, are potentially prevalent given substantial differences between the affiliated and standalone firms' characteristics. In this setup, I assign the affiliated firms to a treated group and the standalone firms to a control group; and I estimate the average treatment effect on the treated group (ATT), properly controlling for selection bias due to different characteristics between the two groups.

Empirically, I estimate the following:

$$ATT = \frac{1}{n_1} \sum_{i \in \{D=1\}} \left[y_{1,i} - \sum_j w(i,j) y_{0,j} \right], \tag{3.2}$$

where ATT is the average treatment effect on the treated group, which is essentially the average of the difference between the outcome of each treated observation (affiliated firm) $y_{1,i}$ and the outcome of its control (standalone firms) $y_{0,j}$, weighted by $w(i,j)$ to make the two groups comparable.

To match the treatment and control observations, I apply two methods: the propensity-score matching method, PSM (Rosenbaum and Rubin, 1983; Abadie and Imbens, 2016) and the coarsened-exact-matching (CEM) method (Iacus et al., 2011a). In PSM, I preprocess the data by estimating a probabilistic model (probit) of a firm being affiliated with a business group as follows:

$$Pr(D_i = 1 \mid X_i) = \Phi \left\{ h(X_i) \right\}, \tag{3.3}$$

where D_i indicates whether a firm is affiliated with a business group, Φ is the normal cumulative probability density, and $h(X_i)$ specifies a vector of a firm's observable characteristics. The predicted probability from equation 3.3 determines the distance or similarity between treated and control groups. Each treated unit is then matched with its nearest control unit, also known as one-nearest neighbor matching.

Unlike PSM, which runs probit regressions, in CEM, to reduce imbalance between the treated group (affiliated firms) and the control group (standalone firms), the data are non-parametrically preprocessed by coarsening covariate by cutpoints, or binning algorithm, to create a stratum of covariates. For consistency, the relevant covariates to coarsen are the same as the variables I use in the probit model in the data-preprocessing stage of PSM. Each observation is assigned into a stratum. Observations in a stratum that does not have both treated and control observations are dropped, or pruned.

To ensure a balance between treated and control units in each stratum, the remaining observations are weighted in the following way. Weights in CEM are defined as $W = 1$ for

treated units and $(m_c/m_t) * Ws$ for control units – where m_c and m_t are the numbers of control and treated units in the sample, and m_t^s and m_c^s are the number of treated and control units in stratum s, and $Ws = (m_t^s)/(m_c^s)$ (see King (2012)). I estimate the ATT by running a simple OLS regression of firms' performance outcome on a dummy variable of treatment status.

I extend the analysis by exploring possible channels for the effect of business-group membership on a firm's performance. First, I estimate the business-affiliation effects on the firm's operation. For this operation-effect channel, the variables of interests, y_{it}, are the firm's log value added, log wage payment, and ratio of investment to total assets. A positive coefficient of business-group membership on these indicators would suggest that the membership leads to more production activity. Second, the business-group membership premium may come from better access to markets. I investigate this channel by estimating the effect of business-group affiliation on the firm's share of the value of exported product to the total product, the share of the value of imported input out of total inputs, and the share of the number of highly educated workers out of the number of workers a firm employs.

The estimation strategy for measuring the market-access effects and the effect of business-group affiliation on firms' operation remains the same as the strategy for estimating the effects on the firms' performance. I run regressions and the PSM and CEM matching methods of the firms' operation and market-access-related dependent variables on the same set of independent variables and covariates as in the estimation for the firm's performance effect.

In interpreting the findings, I start with the estimation results from propensity-score matching. Given the problem of selection bias and measurement errors, I use the OLS regression results mostly as a baseline estimate. The CEM estimation provides an additional robustness test for the main PSM results. I take the fixed-effects regression results with a grain of salt since eliminating individual firm effects may make the selection bias worse, leading to smaller estimates than in levels estimation (Angrist and Krueger, 1999), and negate the sizable explanatory power of important time-invariant factors on the firms' performance, production, and market-access measures.

3.3.3 Data

I use the Indonesian Survey of Manufacturing Industry (SI) 1996 and 2006. This is a panel data set annually collected by the Indonesian Statistics Agency (BPS). The survey has around 160 questions designed for eliciting information on production and the use of factors of production of firms with more than twenty workers in the manufacturing industry in Indonesia. I take advantage of the level of detail of questions in the survey to calculate not only the firms' characteristics but also the firms' performance measures. I also make use of the survey's panel-data structure to run firm-level fixed-effects regressions for the baseline estimates beside the pooled ordinary-least-square regressions.

I generated the data for firms' affiliation status from a special module on firms' business constraints and prospects, a module only available in the 1996 and 2006 surveys. In particular, a firm is considered an affiliated firm if it answers yes in a specific question in that special module on whether the firm belongs to any business group. Therefore, unlike in most studies on business groups using publicly listed firms where the affiliation status is defined by tracing back the identities of the shareholders, in my essay business-group membership is self-declared by the firm. Additionally, I also use the 1996 and 2006 surveys' special module on a simple firm-level balance-sheet – which provides information on the value of firms' current and fixed assets, current and long-term liabilities, and equity– to construct firms' asset-related variables.

Earnings before interest and tax (EBIT) is the difference between a firm's earnings (gross income minus total expense) and its interest and indirect tax payment. The firm's return on assets (ROA) is the ratio of the firm's EBIT to total asset value at the beginning of the survey year. The proxy for the firm's productivity is the firm's value added per worker. The firm's wage payment is the total wage payment to all workers in the firm. Investment is the difference between the value of the firm's total fixed assets at the end of the year and the value of total fixed assets at the beginning of the survey year. Capital per workers is the firm's total assets in the beginning of the survey year divided by the

number of workers. A highly educated worker is a worker who earned at least a bachelor's degree. Herfindahl index[2] is an indicator for industry sales concentration, calculated at a three-digit industry-year level.

To remove prices-inflation effects, I adjust the value of the firm's EBIT, value added, sales, and wage payment using the Consumer Prices Index deflator with a base year of 2000. For the value of the firm's total and fixed assets, I use the Producer Prices Index, weighted by the share of each industry's input out of total output in the relevant three-digit industry-year, while the share of inputs is generated from the sixty-eight-sector Indonesian input-output table for the 2000s. I remove the first and last percentile of the real values of firms' total assets, return on assets, EBIT, investment, and cash flow (gross income minus expenses).

3.3.4 Summary Statistics

Table 3.1 shows the summary statistics of variables I use in my regression and matching specifications. Applying data restrictions and removing from two waves of surveys –in 1996 and 2006– the extreme points as described in the data section above, 26,402 unique firms remain in my unbalanced panel-data set. The total number of firm-year units is 30,150. Out of these 30,150 firm-year units, 5.2 percent concern business-group members.

The affiliated firms appear to have different characteristics from the standalone firms. On average, the affiliated firms have a higher value for their performance indicators. The mean value of the affiliated firms' return on assets (ROA) is six percentage points higher than the standalone firms'. The mean value of the log of affiliated firms' earnings before interest and tax (EBIT) is 14.3, and only 11.8 for the standalone firms. The mean values of the log of value added per worker are 9.7 and 8.8 for affiliated and standalone firms respectively.

[2] $H = \sum_{i=1}^{N} s_i^2$, where s_i is the the market share (in term of sales) of firm i, and N is the number of firms in a three-digit industry-year.

Table 3.1: Summary of statistics

	Standalone		Group-affiliated		All firms		Difference
	Mean	Obs.	Mean	Obs.	Mean	Obs.	
A. Mean values of variables							
ROA	0.392	28570	0.447	1580	0.395	30150	-0.0551*
	(0.992)		(1.069)		(0.996)		(-2.14)
Log EBIT	11.84	27337	14.28	1501	11.97	28838	-2.434***
	(2.034)		(2.306)		(2.119)		(-44.81)
Log value added per worker	8.819	28570	9.863	1580	8.874	30150	-1.044***
	(1.123)		(1.318)		(1.157)		(-35.64)
Log material	13.07	27628	15.20	1523	13.18	29151	-2.135
	(2.056)		(2.513)		(2.136)		(-38.95)
Log wage payment	11.86	28559	13.53	1579	11.95	30138	-1.671***
	(1.423)		(1.614)		(1.482)		(-45.06)
Investment to total assets (%)	9.222	28570	9.701	1580	9.247	30150	-0.479
	(33.67)		(42.33)		(34.18)		(-0.54)
Exported products (%)	12.25	28570	28.80	1580	13.11	30150	-16.55***
	(30.31)		(39.98)		(31.11)		(-20.74)
Imported inputs (%)	5.296	27627	15.11	1523	5.809	29150	-9.812***
	(18.92)		(30.05)		(19.78)		(-18.96)
Share of highly educated workers (%)	1.294	28570	4.688	1580	1.472	30150	-3.394***
	(3.901)		(9.428)		(4.432)		(-30.07)
Log sales	13.77	26827	15.93	1508	13.89	28335	-2.158***
	(1.799)		(2.197)		(1.886)		(-44.74)
Log number of workers	3.913	28570	5.012	1580	3.971	30150	-1.099***
	(0.958)		(1.298)		(1.009)		(-43.42)
Log number of workers, squared	16.23	28570	26.80	1580	16.79	30150	-10.57***
	(9.025)		(13.77)		(9.626)		(-43.82)
Log total assets	15.39	28570	17.22	1580	15.48	30150	-1.835***
	(3.462)		(2.937)		(3.461)		(-20.66)
Age	12.14	28570	13.15	1580	12.19	30150	-1.010***
	(10.70)		(13.28)		(10.86)		(-3.60)
Firm's age, squared	261.8	28570	349.2	1580	266.4	30150	-87.35***
	(557.7)		(931.3)		(583.5)		(-5.80)
Log capital per worker	10.71	28570	11.25	1580	10.74	30150	-0.537***
	(3.301)		(2.864)		(3.281)		(-6.34)
Export=1	0.169	28570	0.434	1580	0.183	30150	-0.264***
	(0.375)		(0.496)		(0.387)		(-26.75)
Herfindahl index	0.0439	28570	0.0465	1580	0.0440	30150	-0.00265
	(0.0577)		(0.0640)		(0.0580)		(-1.77)
Located in Java=1	0.811	28570	0.642	1580	0.802	30150	0.169***
	(0.391)		(0.479)		(0.398)		(16.48)
Year 2006=1	0.516	28570	0.461	1580	0.513	30150	0.0552***
	(0.500)		(0.499)		(0.500)		(4.27)

B. The share of business-group firms in the industry	1996 & 2006	1996	2006
Number of affiliated firms	5.2%	5.8%	4.7%
Real total assets	10.8%	11.3%	10.8%
Real sales	26.6%	24.6%	29%
Real value added	24.1%	23.4%	24%
Number of workers	16.1%	16.7%	15.4%
Number of highly educated workers	23.6%	22.4%	24.4%

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The affiliated firm also tend to have higher values for their production indicators. For example, the mean of affiliated firms' log of material expenditure is 15.2, while the mean of standalone firms' log of value added is just 13.07. We can also observe a similar gap between affiliated and unaffiliated firms for the firms' wage payment and investment, although the difference between affiliated and standalone firms' ratio of investment to fixed assets is not statistically significant. Moreover, relative to unaffiliated firms, the affiliated firms tend to be not only more export oriented, but also use relatively more imported inputs in their production. Not surprisingly, the affiliated firms are, on average, larger than the standalone firms.

Panel B of table 3.1 highlights the fact that the presence of business groups is pronounced in the manufacturing industry. Affiliated firms are just 5.2 percent of the total number of firms in the industry. However, the shares of the affiliated firms' assets, sales, value added, and number of workers were far above the affiliated firms' share out of the number of firms. The affiliated firms' sales, for instance, reached 25 percent of the total industry sales in 1996 and increased to 29 percent in 2006. The affiliated firms also employed 24 percent of workers with a bachelor's degree or above.

Figure 3.1 illustrates Indonesian manufacturing firm's performance by business-group membership status and year of survey. In 1996, the affiliated firms' ROA, weighted by each firm's total assets, was higher than the standalone firms'. In 2006, however, the asset-weighted ROAs for both types of firms were not only much smaller relative to the 1996 figures, but also almost indistinguishable from each other. The other two indicators of firms' performance, log of EBIT and log of labor productivity, did not show a drastic decline between 1996 and 2002 figures but the gaps between affiliated and standalone firms' log EBIT and log labor productivity were narrower in 2006.

Figure 3.2 exhibits the firms' production indicators. The asset-weighted log of materials used by the affiliated firms tended to decline, while the log of wage payment did not show a sizable change. In these measures, the gap between affiliated and standalone firms' production measures tended to be much smaller in 2006.

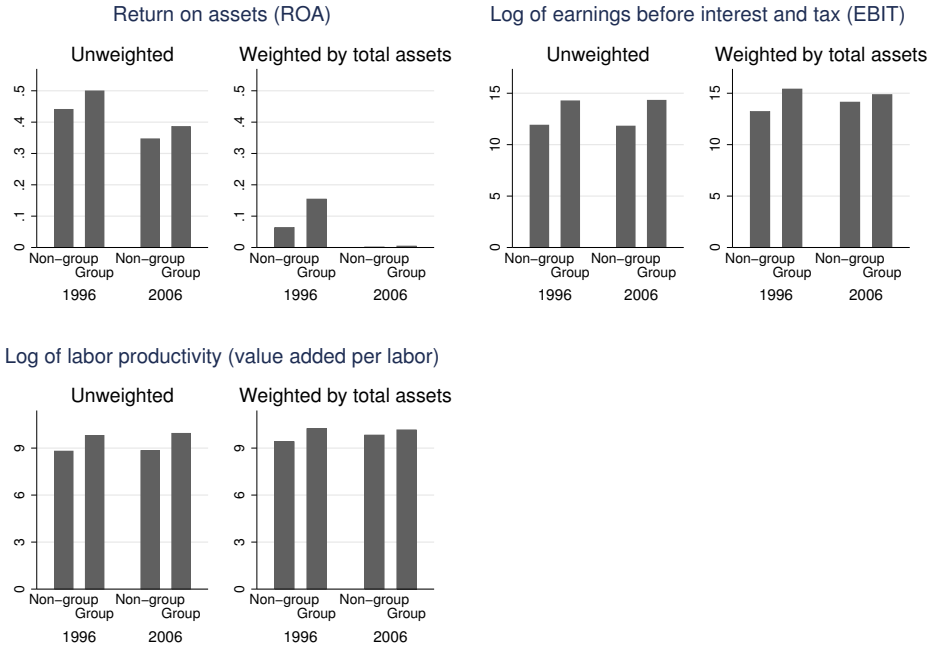


Figure 3.1: Firm performance – mean value

On the other hand, the affiliated firms' ratio of investment to total assets, weighted by each firm's total assets, was substantially higher relative to the standalone firms' in 1996. Yet, the affiliated firms' ratio of investment to total asset significantly declined and even became notably smaller than the figure for the standalone firms in 2006.

Figure 3.3 illustrates the firms' access to the international and skilled-labor markets. In 1996, the affiliated firms had a higher share of exported output out of total output. By 2006, the standalone firms' share of exported output had increased, substantially reducing the gap between the two. Similarly, while the affiliated firms continued to have a higher share of imported material inputs, the gaps narrowed as the standalone firms' ratio of imported input to total inputs had increased in 2006. The affiliated firms hired a bigger fraction of highly educated workers in their total employment. Moreover, the mean value of the proportion of highly educated workers in both the affiliated and standalone firms had increased by 2006.

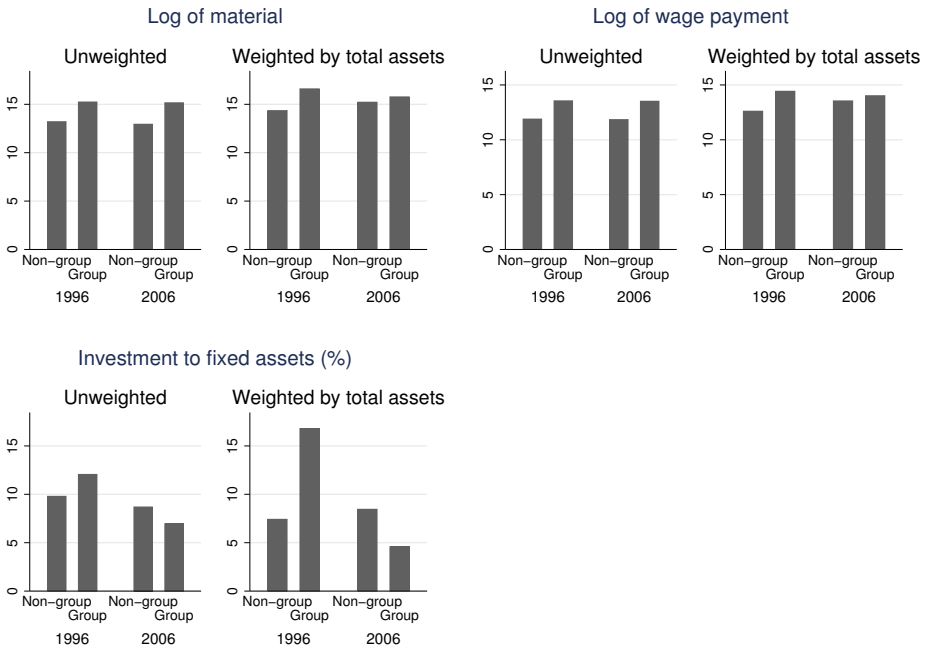


Figure 3.2: Firm production - mean value

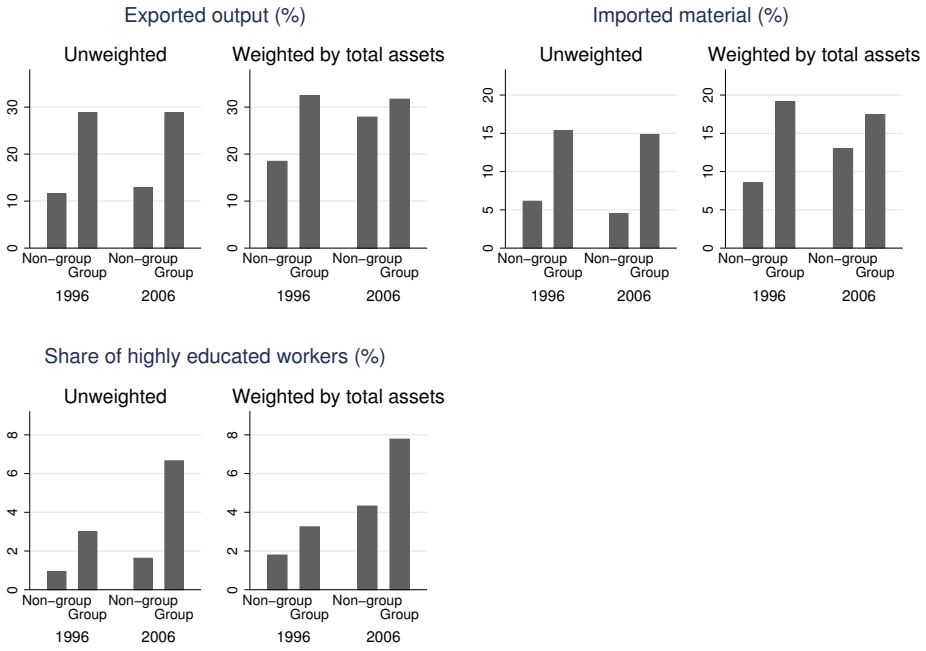


Figure 3.3: Firm market access – mean value

3.4 Results

3.4.1 Matching: Finding a Balanced Counterfactual

The origin of business groups in Indonesia cannot be separated from the state's interventionist policies, rent seeking, and the entrenchment of Suharto's cronies in the economy. Khanna and Yafeh (2007), drawing from the studies by Schwarz (1994), Fisman (2001), and Hanani (2006), report that business groups in Indonesia either belonged to Suharto and his family or people with close political connections to him; many had been a part of his military-business network since he was a junior officer in Central Java in the 1950s. Most of the business groups also benefited from close government involvement in business, state sponsorship, and monopoly rents allocated based on political favoritism. By the 2000s, Carney and Hamilton-Hart (2015) suggest, there had been continuities of the Suharto-era business groups' presence, especially the established groups that managed to survive after the fall of Suharto, and new but nonetheless politically connected business groups. In short, business-group membership in Indonesia was determined more by exogenous factors, such as family relationships, the old business network, and the availability of government-policy rents and protections – and less by the firms' actual productivity or production characteristics.

By that, in preprocessing data for the PSM procedure, rather than estimating a reduced-form specification of a certain model of business-group membership or a firm's acquisition by a business group, I set a more modest aim: to establish a balanced counterfactual for business-group membership. A balanced counterfactual is a set of standalone firms that shares similar features with the affiliated firms, except in their affiliation status. A balanced counterfactual's observations reduce the confounding observed and unobserved factors that can lead to a biased estimated effect of business-group membership.

Despite the political origin of business groups in Indonesia, we can identify a business-group member from the firm's observable characteristics. The business-group members are more likely bigger in size than the standalone firms. With their group network, the affiliated

firms are also more likely to adopt capital-intensive and export-oriented production than the unaffiliated firms. Moreover, the affiliated firms tend to be the mature and older firms. The business-group members are also less likely to operate in competitive industries or be located in the country's economically most competitive island, Java.

I present in table 3.2 the probit-regression results used to predict a firm's probability of being a member of a business group. The positive and significant coefficients of the firms' sales and number of workers show that larger firms were more likely to be a business-group member. Meanwhile,the square of the firm's log number of workers is negative, indicating the decelerating effect of the number of workers on the probability of being an affiliated firm. Firms with a higher log of total assets were more likely affiliated, albeit not statistically significantly so.

The non-linear specification of a firm's age suggests that the likelihood of being a business-group member was smaller for the young firms, but higher for the not-so-young and older firms. The level of capital intensity in production insignificantly correlated with the probability of being affiliated. Being an exporter, however, was closely associated with being a business-group member. Firms in a less sales-concentrated industry and those located on Java also tend to be unaffiliated. In the post-Suharto year 2006, firms were also less likely to be a business-group member.

The covariates in the probit-regression specification in table 3.2 passed the initial balance assessment proposed by Becker and Ichino (2002)[3]. The initial test shows that the probit specification produced a reasonably balanced predicted probability, or propensity score, for both the affiliated and unaffiliated firms. Among eleven covariates in table 3.2 assigned to nine blocks in which the mean propensity score does not differ between affiliated and standalone firms, or 11×9 comparisons, only three covariates have statistically significant different mean values: the firm's log sales in the first and fifth blocks and the Java dummy variable in block 2. This test result shows that generally firms with the same propensity score share the same distribution of firm characteristics, regardless of their affiliation status.

[3]The test is conducted using pscore, a Stata programs for ATT estimation based on propensity-score matching, written by Sascha O. Becker and Andrea Ichino.

Table 3.2: PROBIT RESULTS – PREDICTING GROUP AFFILIATION

Log sales	0.169***
	(0.0113)
Log number of workers	0.368***
	(0.0878)
Log number of workers, squared	-0.0253**
	(0.00808)
Log total assets	0.0241
	(0.0173)
Age	-0.0105***
	(0.00248)
Firm's age, squared	0.000195***
	(0.0000382)
Log capital per worker	-0.00706
	(0.0167)
Export=1	0.130***
	(0.0328)
Herfindahl index	0.426
	(0.225)
Located in Java=1	-0.382***
	(0.0302)
Year 2006=1	-0.102**
	(0.0315)
Observations	28335
Chi-2	1928.6
Prob>Chi-2	0
Pseudo R2	0.164

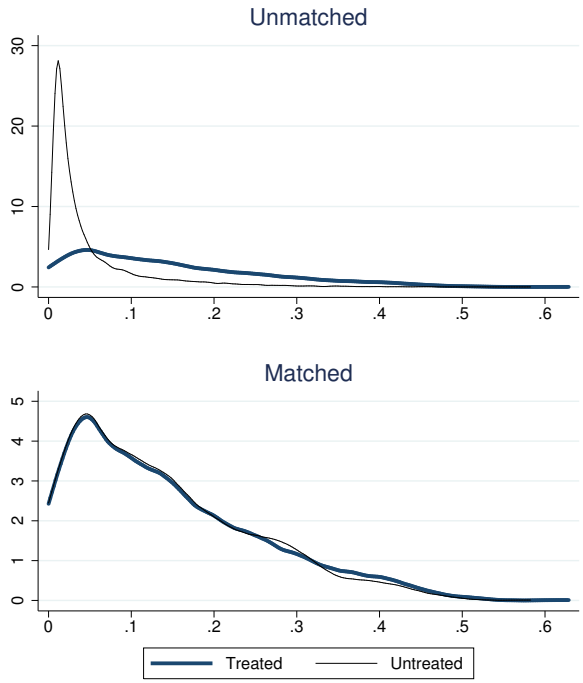
Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

I match the affiliated firms with their counterfactual by finding one observation of standalone firms within the closest proximity measured by propensity score – also known as the one-nearest matching procedure. In addition, to take into account the possibility that year-industry effects confound the ATT results, I modify the propensity score so that each matched pair comes from the same four-digit industry and year[4].

The kernel density in figure 3.4 shows that matching improved the balance between the

[4]Technically, I add the related industry-year code as a constant for each of the observations' propensity score, and I set a caliper so that affiliated firms can only be matched with standalone firms within the same industry-year.

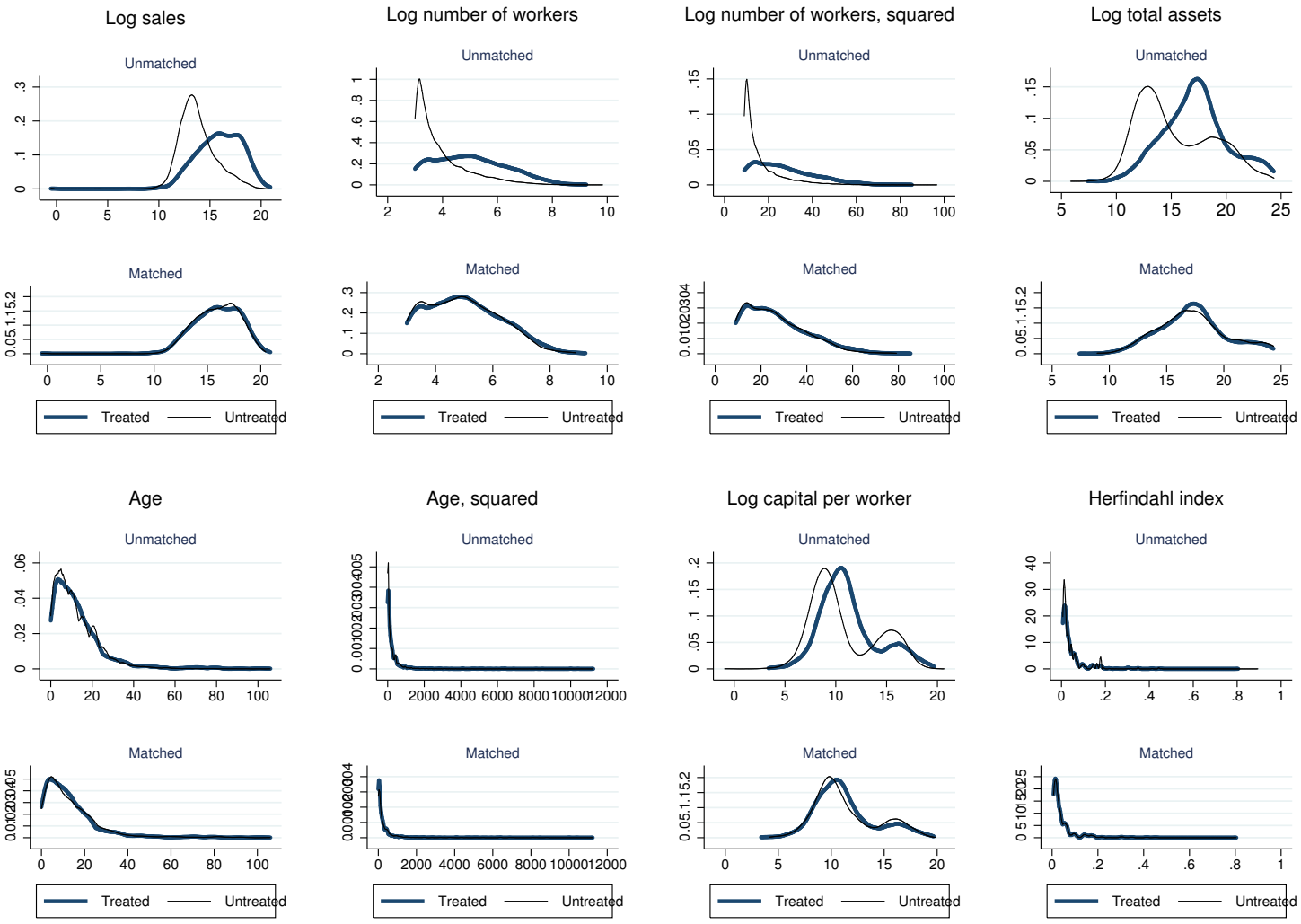
affiliated and standalone firms' propensity score. The lower part of figure 3.4 illustrates that after matching (matched observations), the probability of a firm's propensity score falling between certain values is more or less similar regardless of the firms' affiliation status – which was not the case before the matching (unmatched observations).



Note: Unmatched and matched refer to kernel density of the propensity score before and after matching.

Figure 3.4: Kernel density – estimated propensity score

Figure 3.5 confirms that matching increased the balance in the affiliated and standalone firms' covariates' values. Meaningful improvement in the balance of covariates' values is evident because the kernel density gap between the affiliated and unaffiliated firms was reduced after matching – except for the firms' age, the firms' squared age, and the Herfindahl index, which already shows balance even in unmatched observations.



Note: Unmatched and matched refer to kernel density of the covariate before and after matching.

Figure 3.5: Kernel density – covariates for matching

The formal test for the balancing hypothesis also shows that propensity-score matching significantly reduces the imbalance in the covariates used in the probit regression. Table 3.3 shows the result of basically two balancing tests. The first test is the standardized percentage bias, where the standardized bias for each covariate X in matched observation is measured as follows:

$$SB_b = 100 \times \frac{(\bar{X}_1 - \bar{X}_0)}{\sqrt{0.5(V_1(X) + V_0(X))}}, \tag{3.4}$$

where X_1 and V_1 are the mean and variance in the treated group and X_0 and V_0 are the mean and variance in untreated group (see Rosenbaum and Rubin (1985)). I apply equation 3.4 for unmatched (before matching) and matched observations. The other test is the variance ratio in each covariate between the treated and untreated groups.

Column 2 in panel A of table 3.3 and its visualization in figure 3.6 show that matching significantly improved the balance of each of the covariates. The values of the standardized percentage bias for matched observations are all below 10 percent, showing a strong balance between treated and control observations for each covariate. In column 4 of panel A, the variance ratios in each covariate in the matched observations are between 0.90 and 1.11, except for the firms' log of total assets, confirming the absence of troubling imbalance in the matched observations. Panel B of table 3.3 shows that overall, the values of the standardized percentage bias (B) and the variance ratio (R) of the propensity score are 11.8 and 0.96, which are within the range for acceptable balance (< 25 and within [0.5,2] for B and R respectively) suggested by Rubin (2001)

Table 3.3: Balance hypothesis test

		% Bias	% Reduction in bias	V(T)/ V(C)	
A. By covariate					
Log sales	Unmatched	107.5		1.49*	
	Matched	2	98.1	1.09	
Log number of workers	Unmatched	96.3		1.83*	
	Matched	6.2	93.5	1.05	
Log number of workers, squared	Unmatched	90.8		2.33*	
	Matched	6.8	92.5	1.09	
Log total assets	Unmatched	57.2		0.72*	
	Matched	-1.1	98.1	0.90*	
Firm's age	Unmatched	8.4		1.54*	
	Matched	-4.1	51.6	0.96	
Firm's age, square	Unmatched	11.4		2.79*	
	Matched	-2.8	75.8	0.98	
Log capital per workers	Unmatched	17.4		0.75*	
	Matched	-1.9	89.3	0.92	
Export=1	Unmatched	60.1			
	Matched	7.8	87		
Herfindahl index	Unmatched	4.4		1.23*	
	Matched	0	100	1	
Java=1	Unmatched	-38.6			
	Matched	2.3	94.1		
Year 2006=1		-11.1			
		0	100		
B. Summary of overall measures					
		Mean Bias	Median Bias	B	R
Propensity score	U	45.7	38.6	121.2*	1.35
	M	3.2	2.3	11.9	0.96

U and M refer to unmatched and matched observations. In part A, * if variance ratio outside [0.91; 1.10] for U and [0.90; 1.11] for M. In part B, * if B>25% and R outside [0.5; 2]. A * sign indicates a troubling mbalance (Rosenbaum and Rubin, 1985)

For the CEM, I preprocess the data by fully blocking the irrelevant or incomparable observations in both affiliated and unaffiliated firms. Following the procedure of Iacus et al. (2011b), I start by taking the same covariates used for the probit regression in the PSM and coarsen each of the covariates. To make substantively distinguishable groups, or strata, out of the covariates' coarsened values, I apply the following rule for cutpoints: the firms'

log of sales, log of total assets, and log of capital per worker are considered meaningfully distinguishable by every one-point increase of the log value. The number of cutpoints for each covariate is the determined by dividing the difference between the largest and the smallest values of each covariates by the effect of each marginal one-point increase. As a result, the firms' log of sales is coarsened by twenty-one cutpoints, the log of total assets nineteen cutpoints, and the log of capital per worker twenty-two cutpoints.

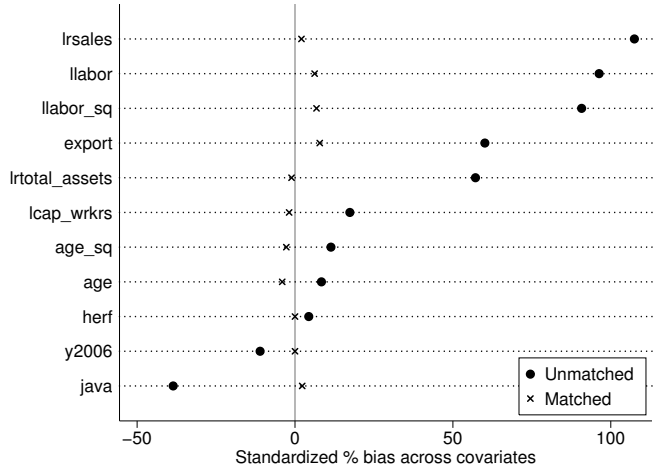


Figure 3.6: Standardized percentage bias

The log of the firm's number of workers and the log's squared value are deemed meaningfully different at every 0.5-point increase of the log value, making the number of cutpoints fourteen. The firms' age values, from less than 1 to 106 years, are grouped into eleven equal-sized bins. The cutpoints for industry sales competitiveness (the Herfindahl index) are 0.01, 0.15, and 0.25, referring to the classification convention for highly-competitive, unconcentrated, moderately concentrated, and highly concentrated industries. The original, uncoarsened observations of both affiliated and unaffiliated firms are assigned to each of the strata based on covariate cutpoints.

The summary of matching in table 3.4 shows that the coarsening procedure produces 13,796 strata. Out of that number, 518 strata have observations from both affiliated and unaffiliated firms. The remaining strata are dropped, and in the 518 matched strata, the matched observations consist of 579 affiliated firms and their counterfactual of 3,713 standalone firms. The $\mathcal{L}_1$ test, which is based on the absolute difference in the value of covariates between the affiliated and unaffiliated firms (Iacus et al., 2011a), confirms that the CEM-matched observations are more balanced than the uncoarsened observations. Panel B in table 3.4 shows that multivariate imbalance $\mathcal{L}_1$ in matched observations at least does not exceed the imbalance in unmatched observations. Moreover, comparing columns 1 and 2 in panel B of table 3.4 shows that CEM substantially reduced univariate imbalance in each of the covariates.

Table 3.4: CEM MATCHING SUMMARY

A. Matching summary		
Number of strata	13,796	
Number of matched strata	518	
	Standalone	Affiliated
All	28,570	1,580
Matched	3,713	579
Unmatched	24,857	1,001
B. Balance test $\mathcal{L}_1$		
	Unmatched	Matched
Multivariate imbalance	0.9999	0.9978
Univariate imbalance		
- Log sales	0.46	0.07
- Log number of workers	0.42	0.05
- Log number of workers, squared	0.42	0.05
- Log total assets	0.36	0.08
- Firm's age	0.08	0.09
- Firm's age, squared	0.06	0.08
- Log capital per worker	0.29	0.07
- Export=1	0.27	0.00
- Herfindahl index	0.11	0.13
- Java=1	0.17	0.00
- Year 2006=1	0.06	0.00

3.4.2 The Effect of Business-Group Membership on Firms' Performance

I find that, in general, being a business-group member positively affected the firms' performance. The four estimation strategies – the OLS and firm fixed-effects regressions as well as PSM and CEM matching methods – shown in table 3.5 confirm that the affiliated firms performed better than the standalone firms. Particularly notable and statistically significant were the effcts of business-group membership on a firm's earnings before interest and tax (EBIT) and its labor productivity, defined as the firm's value added per worker. The results suggest there was a business-group membership performance premium in the Indonesian manufacturing industry.

Table 3.5: Did business-group membership increase firms' performance?

	Regression		Matching, ATT	
	OLS	FE	PSM	CEM
Return on assets (ROA)	0.0242	0.0870	0.038	0.0443
	(0.0270)	(0.0701)	(0.052)	(0.0303)
Log earning before interest and tax (EBIT)	0.233***	-0.0653	0.211***	0.141
	(0.0383)	(0.0949)	(0.054)	(0.107)
Log value added per labor (VA/L)	0.196***	0.0262	0.113**	0.0715
	(0.0246)	(0.0534)	(0.039)	(0.0540)

PSM refers to the propensity-score matching method. CEM refers to coarsened-exact-matching method. ATT is the average treatment effects on the treated group. In this case, ATT refers to the average effect for matched firms of being affiliated. The supporting estimation results are in appendix A. The OLS and FE results are drawn from row 1 of table A.1. PSM results are from rows 2, 4, and 6 of columns 3 and 4 of table A.2. CEM results are from row 1 of table A.3
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.5 a shows positive – though not statistically significant– coefficient of a firm's business-group membership status on its return on assets (ROA). In the main PSM specification in row 1 and column 3 of table 3.5, business-group membership increased a firm's ROA by about four percentage points – or a 9 percent increase from the mean value of the

standalone firms' ROA in the matched observations (see table A.2). In column 1, the baseline OLS regression shows a smaller ROA increase, about two percentage points, as a result of being an affiliated firm. Meanwhile, the CEM estimation shows that the affiliated firms' ROA was four percentage points higher than the unaffiliated firms' ROA, which is more or less in line with the result from the PSM method. he bein Row 2 of table 3.5 suggests business-group membership also increased a firm's earnings before interest and tax (EBIT). Applying the PSM estimation strategy, the affiliated firms had 21 percent higher earnings than the standalone firms. The OLS regression shows that the affiliated firms' EBIT was 23 percent more than unaffiliated firms. Though lacking statistical significance, the CEM results still suggests that a group affiliation was associated with a 14 percent higher EBIT, while the fixed-effects regression reports no discernible effect on the firms' EBIT.

Being a business-group member led to an 11 percent increase in a firm's labor productivity, as shown in the PSM result in row 3 in column 3 of table 3.5. The baseline results from the OLS regression shows that laborers in the affiliated firms were 20 percent more productive than laborers in the standalone firms. Meanwhile, the CEM and fixed-effects estimation both show smaller and statistically insignificant effects: 7 and 3 percent increases for the affiliated firms.

The firm's estimated performance effects shown in table 3.5 are drawn from fuller and more detailed specification results presented in the appendix A. Table A.1 in appendix A shows the complete OLS and firm fixed -effects regressions' results. Table A.2 reports the average effect (ATT) of being in a business group, using the PSM method. And table A.3 reports the CEM results. I estimate the effect of business-group membership by running an OLS regression of a firm's performance indicators on its affiliation status, weighted by the CEM weights (King, 2012). To reduce the confounding effects of industry-, year-, and industry-year-specific shocks to a firm's productivity, I control for the dummy variables year, four-digit industry, and industry-year interaction in the baseline OLS specification as well as in the OLS regression run using CEM specifications' results.

3.4.3 The Effect of Business-Group Membership on Firms' Production Activities

If business-group membership increased firms' performance, the affiliated firms should have had more expansive operations and more production activity. Although I find positive effects of business-group membership on firms' performance as seen in table 3.5, the evidence concerning production activities is less conclusive. Table 3.6 shows a mixed bag of estimation results in three measures of the size of a firm's production: usage of materials; wage-bill payment; and investment, defined as percentage of investment out of total fixed assets.

Table 3.6: DID BUSINESS-GROUP MEMBERSHIP INCREASE FIRMS' PRODUCTION ACTIVITIES?

	Regression		Matching, ATT	
	OLS	FE	PSM	CEM
Log material	-0.0789**	0.0819	-0.105*	-0.00973
	(0.0282)	(0.0460)	(0.050)	(0.104)
Log wage payment	0.0991***	0.0623	0.149***	0.175*
	(0.0176)	(0.0394)	(0.034)	(0.0714)
Ratio of investment to total assets (%)	-0.159	-2.206	0.333	-0.620
	(1.155)	(2.742)	(1.49)	(2.013)

PSM refers to the propensity-score matching method. CEM refers to coarsened-exact-matching method. ATT is the average treatment effects on the treated group. In this case, ATT refers to the average effect for matched firms of being affiliated. The supporting estimation results are in appendix B. The OLS and FE results are drawn from row 1 of table B.1. PSM results are from rows 2, 4, and 6 of columns 3 and 4 of table B.2. CEM results are from row 1 of table B.3
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Business-group membership, interestingly, is associated with lower spending on materials, even after controlling for the capital-intensity level of firms' production technology. In the main PSM specification in row 1 and column 3 of table 3.6, affiliated firms appeared to use 10 percent less material than the standalone firms did. Similarly, the OLS regression result shows that the affiliated firms' spending on material was about 8 percent less than the unaffiliated firms'. The CEM also reports a negative effect of being an affiliated firm

on a firm's use of material, although the effect is very small and statistically insignificant.

On the other hand, I find that the affiliated firms spent more on wages, even after controlling for the number of laborers the firms employed. As seen in row 2 of table 3.6, the business-group members' wage-bill payment was 15 percent more than the standalone firms' in the PSM specification. The OLS regression shows that affiliated firms' wage expenditure was 15 percent higher than the unaffiliated firms' expenditure. The CEM specification also confirms this result: the affiliated firms' wage bills were 18 percent higher than the standalone firms'.

Meanwhile, the results on the investment effects are rather inconclusive. The PSM estimation suggests that the ratio of the affiliated firms' investment to their total assets was 0.3 percentage points higher than the standalone firms'. In the matched observations, the mean value of standalone firms' investment was 9.53 percent of their total assets (see table B.2); therefore, a 0.3-percentage-points increase is equivalent to a 3.5 percent increase a firm's investment ratio. Yet, the OLS regression and CEM method shows that the affiliated firms' investment ratios were 0.16 and 0.60 percentage point less than the unaffiliated firms'. None of these incremental changes, however, were statistically significant, suggesting lack of strong evidence on the impact of business membership on the firms' investment.

The supporting estimation results are presented in the appendix B. As in the estimation strategies for performance effects, the full OLS and fixed-effects regression results are in table B.1. The PSM and CEM estimation results are presented in table B.2 and table B.3 in appendix B.

3.4.4 The Effect of Business-Group Membership on Firms' Access to Markets

I find that the affiliated firms had better access to the markets than standalone firms. This finding suggests that the business-group members' performance premium more likely came from their special ability to enter the export market and to secure important inputs than

from larger production activities. Table 3.7 shows generally positive effects of business-group membership on the firms' access to the export market, imported inputs, and the pool of highly educated labor. This effect of access to markets is particularly pronounced in the input markets, especially access to the pool of laborers with high educational attainment.

Table 3.7: Did business-group membership improve firms' access to market?

	Regression		Matching, ATT	
	OLS	FE	PSM	CEM
Exported product (%)	-1.781**	0.304	1.491	0.810
	(0.594)	(1.426)	(1.29)	(1.696)
Imported input (%)	2.276***	0.998	1.614	2.278
	(0.689)	(1.518)	(0.908)	(1.251)
Share of highly educated workers (%)	1.574***	0.835**	1.240***	0.949***
	(0.179)	(0.312)	(0.263)	(0.289)

PSM refers to the propensity-score matching method. CEM refers to coarsened-exact-matching method. ATT is the average treatment effects on the treated group. In this case, ATT refers to the average effect for matched firms of being affiliated. The supporting estimation results are in appendix C. The OLS and FE results are drawn from row 1 of table C.1. PSM results are from rows 2, 4, and 6 of columns 3 and 4 of table C.2. CEM results are from row 1 of table C.3
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

I measure a firm's ability to compete in the international market by the percentage of its total product that it exported. The main PSM specification in row 1 and column 3 of table 3.7 shows that the affiliated firms' percentage of exported products out of their total products was 1.5 percentage points higher than the standalone firms' – which is equal to a 5.4 percent increase over the standalone firms' mean value of 27.5 percent in the matched observations (see table C.2). In the OLS regression, the affiliated firms' percentage of exported products was 1.8 percentage point less than the unaffiliated firms'. At the same time, the CEM and fixed-effects regression results show that the affiliated firms exported 0.8 and 0.3 percentage point more of their product than the standalone firms. Overall, these numbers suggest positive effects of business-group membership on the firms' ability to export.

The effects of business-group membership were more evident in the input markets. In the PSM specification, the percentage of imported inputs in the affiliated firms' total material used was 1.6 percentage points higher than in the unaffiliated firms'. This figure was about 12 percent higher than the mean value of the percentage of imported inputs by non-business-group members in matched observations as shown in table C.2. The CEM estimation in column 4 of table 3.7 also shows similar positive effects of group membership, while the OLS regression shows a statistically significant 2.7-percentage-point difference in the percentage of imported inputs between the affiliated and the standalone firms. We should expect this if the affiliated firms' better access to international input markets came from the preferential import tariffs and the monopolies granted by the government to the group, but this topic is beyond the scope of this essay.

Moreover, it is clear that the affiliated firms had better access to the pool of highly educated laborers – defined as workers who hold a bachelor's degree or above. The PSM estimation shows that being a business-group member led to a 1.24-percentage-point higher share of educated workers – equivalent to a 26 percent increase, in comparison to the mean value of the share in the non-member firms (see table C.2 in appendix C). The other three estimation strategies unequivocally support this finding of a substantial advantage of business-group membership (see row 3 of table 3.7). This suggests that business-group membership is useful in dealing with a lower supply of public goods, in this case higher education. It also confirms the finding by Sato (2003) on the role of business groups in creating a new class of business managers in Indonesia.

The supporting estimation results on the effects of business-group membership on firms' access to markets are fully presented in the appendix C. The full OLS and fixed-effects regression results are in table C.1. The results of PSM and CEM strategies are presented in tables C.2 and C.3.

3.5 Conclusion

In sum, I find, first, a business-group premium for firms' performance in the Indonesian manufacturing industry. The positive coefficients of being a member of business group on the firms' return on assets, earnings, and labor productivity indicate the value of business-group membership in the Indonesian manufacturing industry in 1996 and 2006. Second, in exploring the channel through which business-group membership created a performance premium, I find that the effects of business-group membership in promoting more production activities are rather ambiguous, although I find evidence for positive effects on the firms' ability to spend more on wages. Third, the firms' performance premium were more likely to come from the effects of membership on access to markets. The market-access effects were particularly pronounced in the imported-inputs market and market for highly educated labor. The main takeaway of this essay is that for a manufacturing firm, being a business-group member in Indonesia was economically valuable and rewarding.

Appendix A

The full specification results on the performance effects of business-group membership using OLS and fixed-effects regressions and the PSM and CEM matching methods are presented below.

Table A.1: Baseline estimates, firms' performance – OLS and firm-fixed effects

	ROA		Log EBIT		Log (VA/Labor)	
	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
Group=1	0.0242	0.0870	0.233***	-0.0653	0.196***	0.0262
	(0.0270)	(0.0701)	(0.0383)	(0.0949)	(0.0246)	(0.0534)
Log sales	0.183***	0.276***	0.822***	1.004***	0.617***	0.689***
	(0.00810)	(0.0335)	(0.0255)	(0.0455)	(0.0178)	(0.0271)
Log number of workers	-0.0129	-0.0596	0.304***	0.302	-0.421***	-0.416***
	(0.0444)	(0.155)	(0.0604)	(0.198)	(0.0361)	(0.107)
Log number of workers, squared	-0.00413	-0.0128	-0.0172***	-0.0522*	-0.0172***	-0.0368**
	(0.00441)	(0.0156)	(0.00515)	(0.0203)	(0.00283)	(0.0112)
Log total assets	-0.152***	-0.106***	0.0531***	0.0262	0.0351***	0.00782
	(0.00939)	(0.0190)	(0.00992)	(0.0309)	(0.00614)	(0.0160)
Age	-0.00406***	0.000558	-0.00476**	-0.00319	-0.00419***	-0.00343
	(0.000969)	(0.00416)	(0.00148)	(0.00468)	(0.000773)	(0.00230)
Firm's age, squared	0.0000192	-0.0000156	0.0000643*	-0.0000511	0.0000803***	0.00000984
	(0.0000141)	(0.0000478)	(0.0000295)	(0.0000820)	(0.0000132)	(0.0000299)
Log capital per worker	0.00768	-0.00549	-0.00884	-0.0129	-0.00649	0.0000932
	(0.00896)	(0.0182)	(0.00927)	(0.0301)	(0.00574)	(0.0156)
Export=1	-0.0463**	-0.0130	0.0945***	-0.0134	0.0519***	0.0260
	(0.0166)	(0.0577)	(0.0221)	(0.0817)	(0.0138)	(0.0473)
Herfindahl index	-0.162		-0.774		-0.699	
	(0.696)		(1.201)		(0.811)	
Located in Java=1	-0.0830***		-0.232***		-0.169***	
	(0.0153)		(0.0178)		(0.0107)	
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	No	Yes	No	Yes	No
Year-industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	Yes	No	Yes	No	Yes
Observations	28335	28335	27096	27096	28335	28335
R-squared	0.181	0.206	0.751	0.434	0.687	0.481

Standard errors in parentheses, adjusted for clusters in firm's panel data ID.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.2: Propensity score matching - firms' performance

Variable	Num. obs	Sample	Treated	Controls	Difference	S.E	T-stat
ROA	26,827	Unmatched	0.451	0.399	0.052	0.027	1.93
	1,508	Matched – ATT	0.451	0.413	0.038	0.052	0.73
Log EBIT	25,665	Unmatched	14.324	11.885	2.439	0.056	43.83
	1,431	Matched – ATT	14.324	14.113	0.211	0.054	3.90
Log(VA/labor)	26,827	Unmatched	9.888	8.832	1.056	0.030	34.99
	1,508	Matched – ATT	9.888	9.774	0.113	0.039	2.90

One-nearest matching method. SE: heteroskedasticity-consistent analytical population standard errors (Abadie and Imbens, 2006)

Table A.3: ATT, Coarsened exact matching – firms' performance

	ROA		Log EBIT		Log (VA/Labor)	
	(1)	(2)	(3)	(4)	(5)	(6)
ATT (Group=1)	0.0464	0.0443	0.133	0.141	0.101	0.0715
	(0.0320)	(0.0303)	(0.125)	(0.107)	(0.0630)	(0.0540)
Year effects	No	Yes	No	Yes	No	Yes
Industry effects	No	Yes	No	Yes	No	Yes
Year-industry effects	No	Yes	No	Yes	No	Yes
Observations	4292	4292	4147	4147	4292	4292
R-squared	0.000632	0.214	0.000411	0.376	0.000966	0.396

ATT is the β_1 of the OLS regression $Y_{it} = \beta_1 Group + \epsilon_{it}$, weighted by the CEM weight (King, 2012). Standard errors in parentheses, adjusted for clusters in firms' panel data ID.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix B

The full specification results on the effects business-group membership on production activities using OLS and fixed-effects regressions and the PSM and CEM matching methods are presented below.

Table B.1: Baseline estimates, firms' operation – OLS and firm-fixed effects

	Log material		Log wage payment		Investment to assets, %	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
Group=1	-0.0789**	-0.0819	0.0991***	0.0623	-0.159	-2.206
	(0.0282)	(0.0460)	(0.0176)	(0.0394)	(1.155)	(2.742)
Log sales	0.979***	1.065***	0.283***	0.229***	0.895***	0.0924
	(0.0234)	(0.0219)	(0.00894)	(0.0153)	(0.195)	(0.971)
Log number of workers	-0.0688	-0.210*	0.960***	0.730***	-5.552***	-7.570
	(0.0435)	(0.0938)	(0.0283)	(0.0899)	(1.664)	(7.889)
Log number of workers, squared	0.00569	0.0158	-0.0205***	-0.00106	0.295	0.289
	(0.00323)	(0.00970)	(0.00266)	(0.00943)	(0.168)	(0.825)
Log total assets	0.0387***	0.0342*	0.0410***	0.00783	2.661***	4.685***
	(0.00677)	(0.0166)	(0.00506)	(0.0108)	(0.389)	(0.969)
Age	0.00253*	0.00491*	0.0000609	-0.00160	-0.219***	-0.0636
	(0.001000)	(0.00250)	(0.000702)	(0.00208)	(0.0405)	(0.157)
Firm's age, squared	-0.0000857***	-0.0000552	0.0000264*	-0.00000582	0.00193**	0.000544
	(0.0000199)	(0.0000410)	(0.0000129)	(0.0000324)	(0.000666)	(0.00202)
Log capital per worker	-0.0475***	-0.0310	-0.0152**	-0.00125	-3.130***	-5.476***
	(0.00623)	(0.0160)	(0.00486)	(0.0107)	(0.379)	(0.982)
Export=1	0.0104	0.0476	0.0137	-0.0589	-1.077	2.761
	(0.0149)	(0.0482)	(0.0114)	(0.0332)	(0.691)	(2.650)
Herfindahl index	1.287**		-0.276		-11.07	
	(0.468)		(0.456)		(20.97)	
Located in Java=1	0.188***		-0.0576***		-2.403***	
	(0.0133)		(0.00976)		(0.606)	
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	No	Yes	No	Yes	No
Year-industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	Yes	No	Yes	No	Yes
Observations	28285	28285	28324	28324	28335	28335
R-squared	0.879	0.760	0.861	0.581	0.0253	0.0953

Standard errors in parentheses, adjusted for clusters in firms' panel data ID.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B.2: Propensity score matching – firms' operation

Variable	Num. obs	Sample	Treated	Controls	Difference	S.E	T-stat
Log material	26,784	Unmatched	15.241	13.130	2.111	0.054	38.81
	1,501	Matched – ATT	15.241	15.346	-0.105	0.050	-2.09
Log wage payment	26,817	Unmatched	13.549	11.863	1.686	0.038	44.23
	1,507	Matched – ATT	13.549	13.400	0.149	0.034	4.38
Investment to assets, %	26,827	Unmatched	9.859	9.379	0.480	0.912	0.53
	1,508	Matched – ATT	9.859	9.525	0.333	1.49	0.22

One-nearest matching method. SE: heteroskedasticity-consistent analytical population standard errors (Abadie and Imbens, 2006)

Table B.3: ATT, Coarsened exact matching - firms' operation

	Log material		Log wage payment		Investment to assets, %	
	(1)	(2)	(3)	(4)	(5)	(6)
ATT (Group=1)	-0.0539	-0.00973	0.0768	0.175*	-0.233	-0.620
	(0.127)	(0.104)	(0.0859)	(0.0714)	(2.174)	(2.013)
Year effects	No	Yes	No	Yes	No	Yes
Industry effects	No	Yes	No	Yes	No	Yes
Year-industry effects	No	Yes	No	Yes	No	Yes
Observations	4217	4217	4292	4292	4292	4292
R-squared	0.0000629	0.462	0.000280	0.409	0.00000503	0.166

ATT is the β_1 of the OLS regression $Y_{it} = \beta_1 Group + \epsilon_{it}$, weighted by the CEM weight (King, 2012). Standard errors in parentheses, adjusted for clusters in firms' panel data ID.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix C

The full specification results on the market-access effects of business-group membership using OLS and fixed-effects regressions and the PSM and CEM matching method are presented below.

Table C.1: Baseline estimates, firms' market access – OLS and firm-fixed effects

	Exported product (%)		Imported input (%)		Highly educated workers (%)	
	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
Group=1	-1.781**	0.304	2.276***	0.998	1.574***	0.835**
	(0.594)	(1.426)	(0.689)	(1.518)	(0.179)	(0.312)
Log sales	-0.234**	0.628	0.983***	1.196**	0.446***	0.274***
	(0.0825)	(0.355)	(0.131)	(0.379)	(0.0287)	(0.0732)
Log number of workers	-0.483	-5.522	-6.902***	-0.104	1.630***	0.824
	(0.899)	(2.880)	(1.074)	(2.964)	(0.175)	(0.443)
Log number of workers, squared	0.155	0.690*	0.879***	0.0964	-0.223***	-0.128**
	(0.101)	(0.329)	(0.119)	(0.312)	(0.0161)	(0.0443)
Log total assets	0.0196	-0.0939	0.755***	-0.433	0.323***	0.146*
	(0.120)	(0.367)	(0.152)	(0.340)	(0.0419)	(0.0631)
Age	-0.167***	-0.0893*	-0.00902	0.0478	-0.0433***	-0.0204
	(0.0167)	(0.0417)	(0.0205)	(0.0602)	(0.00457)	(0.0127)
Firm's age, squared	0.00158***	0.00107	-0.000506	-0.000668	0.000516***	0.000371
	(0.000328)	(0.000592)	(0.000362)	(0.000795)	(0.0000783)	(0.000224)
Log capital per worker	-0.234*	0.152	-0.562***	0.588	-0.257***	-0.159**
	(0.118)	(0.359)	(0.149)	(0.336)	(0.0411)	(0.0609)
Export=1	67.20***	48.99***	5.447***	5.511***	0.520***	0.253
	(0.512)	(1.867)	(0.433)	(1.368)	(0.0803)	(0.202)
Herfindahl index	-11.30		-48.21**		-14.99***	
	(7.947)		(16.07)		(3.808)	
Located in Java=1	-2.487***		-0.450		-0.136	
	(0.242)		(0.300)		(0.0705)	
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	No	Yes	No	Yes	No
Year-industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	Yes	No	Yes	No	Yes
Observations	28335	28335	28284	28284	28335	28335
R-squared	0.813	0.551	0.242	0.140	0.334	0.192

Standard errors in parentheses, adjusted for clusters in firms' panel data ID.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table C.2: Propensity score matching – firms' market access

Variable	Num. obs	Sample	Treated	Controls	Difference	S.E	T-stat
Exported product (%)	26,827	Unmatched	29.010	12.548	16.462	0.824	19.98
	1,508	Matched – ATT	29.010	27.519	1.491	1.159	1.29
Imported input (%)	26,783	Unmatched	15.214	5.242	9.973	0.520	19.18
	1,501	Matched – ATT	15.214	13.600	1.614	0.908	1.78
Highly educated workers (%)	26,827	Unmatched	4.717	1.302	3.415	0.116	29.52
	1,508	Matched – ATT	4.717	3.477	1.240	0.263	4.71

One-nearest matching method. SE: heteroskedasticity-consistent analytical population standard errors (Abadie and Imbens, 2006)

Table C.3: ATT, Coarsened exact matching – firms' market access

	Exported product (%)		Imported input (%)		Highly educated workers (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
ATT (Group=1)	-1.298	0.810	1.757	2.278	1.738***	0.949**
	(2.041)	(1.696)	(1.527)	(1.251)	(0.412)	(0.289)
Year effects	No	Yes	No	Yes	No	Yes
Industry effects	No	Yes	No	Yes	No	Yes
Year-industry effects	No	Yes	No	Yes	No	Yes
Observations	4217	4217	4292	4292	4292	4292
R-squared	0.0000629	0.462	0.000280	0.409	0.00000503	0.166

ATT is the β_1 of the OLS regression $Y_{it} = \beta_1 Group + \epsilon_{it}$, weighted by the CEM weight (King, 2012). Standard errors in parentheses, adjusted for clusters in firms' panel data ID.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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Curriculum Vitae

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