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Can Rising Housing Prices Explain China's High Household Saving Rate?

Xin Wang and Yi Wen

China's average household saving rate is one of the highest in the world. One popular view attributes the high saving rate to fast-rising housing prices and other living costs in China. This article uses simple economic logic to show that rising housing prices and living costs per se cannot explain China's persistently high household saving rate. Although borrowing constraints and demographic changes can help translate housing prices to the aggregate saving rate, quantitative simulations using Chinese data on household income, housing prices, and demographics indicate that rising mortgage costs contribute at most 5 percentage points to the Chinese aggregate household saving rate, given the down payment structure of China's mortgage markets. (JEL D14, D91, E21, I31, R21)

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According to Friedman's (1957) permanent income hypothesis, rational consumers should save less when their income is growing fast because the need to save is reduced when people expect to be richer in the future than they are today. However, the reality in China is the opposite: China, as one of the fastest-growing economies, has an average household saving rate among the highest in the world.

"Aggregate household saving rate" is defined in this paper as the ratio of net changes in aggregate household financial wealth (e.g., bank deposits, government bonds, and stocks) to aggregate household disposable income.[1] Figure 1 shows that the average Chinese household saving rate was around 2 percent in 1978 (the first year of economic reform) and rose rapidly thereafter. The saving rate stabilized at around 20 to 25 percent after the early 1990s and peaked in 1994 and 2003 with values of 27 percent and 26 percent, respectively.

Such a persistently high aggregate household saving rate is extraordinary compared with developed nations such as the United States, which has had an average household saving rate of 2 percent since the early 1990s. However, the high Chinese saving rate is not unique. Figure 2 shows the household saving rates for Japan and Korea in the postwar period. Both economies had a high household saving rate—above 20 percent—during their rapid economic growth periods (Japan in the mid-1970s and Korea from 1987 to 1994).[2]

[1] Notice that our definition of the saving rate does not include changes in household nonfinancial wealth (such as housing investment).

[2] These data are based on the Organisation for Economic Co-operation and Development database, Hayashi (1986), and Bai and Qian (2009). We are unable to find reliable household saving data for India. However, according to a report from the Centre for Monitoring Indian Economy, India's household saving rate (including investment in fixed assets) in 2001 was 24 percent. This number rose to 35 percent in 2007 and 36 percent in 2008. Based on such information, India's household saving rate has reached a level similar to China's.

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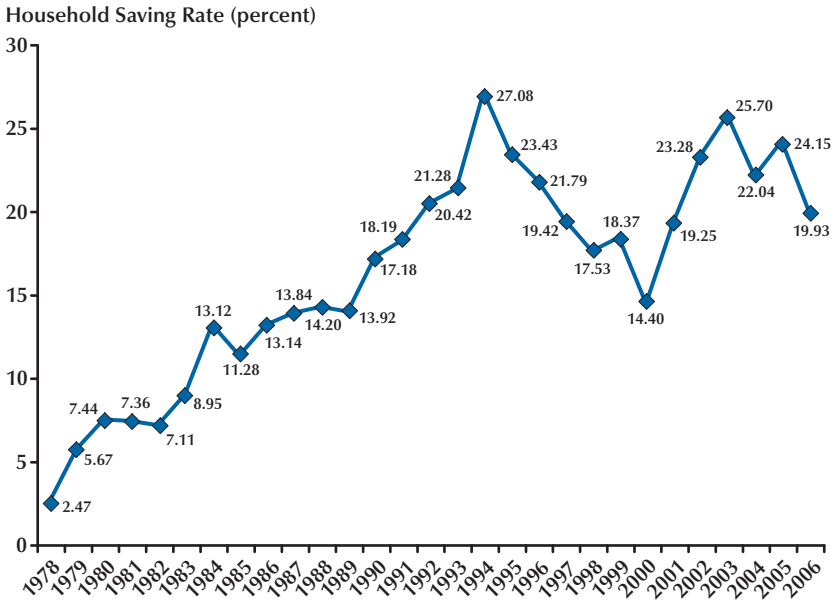
Figure 1

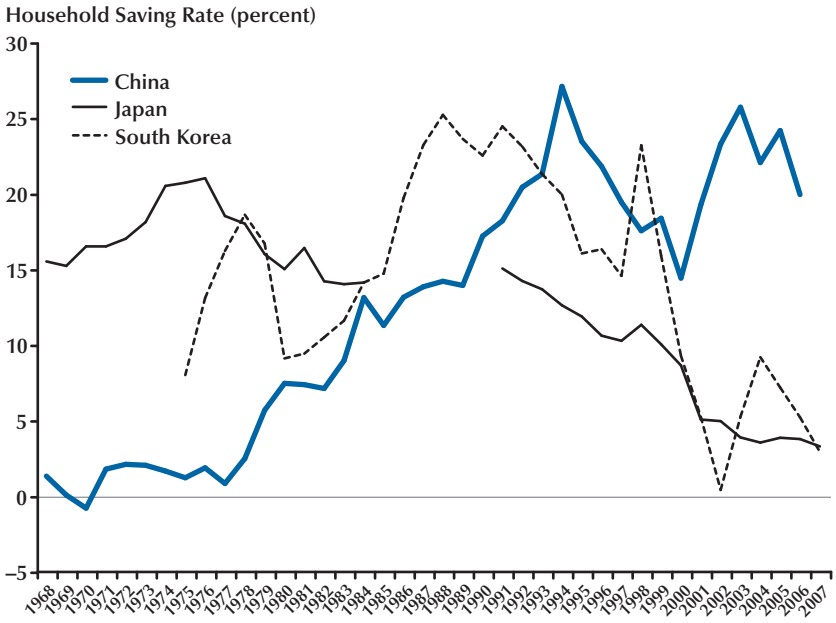
Chinese Household Saving Rate (1978-2006)



SOURCE: Bai and Qian (2009).

Figure 2

Cross-Country Comparison of Household Saving Rates (1968-2007)



Why the Japanese saved so much during the rapid stage of economic development is still an open question (see, e.g., Hayashi, 1986). Hence, it is not surprising that the high Chinese saving rate appears puzzling, especially given China's rapid income growth.

The high saving rate of Chinese households not only poses a challenge to economic theory, but also has become a source of recent political controversy and trade disputes with the United States and its other major trading partners. For example, the former Chairman of the Federal Reserve, Alan Greenspan, alleged that the high Chinese saving rate was likely the culprit of the recent American subprime mortgage crisis because it caused low interest rates in the world financial markets, which pushed Americans toward excessive consumption and housing finance (Greenspan, 2009). Current Chairman Ben Bernanke (2005) also argued that the "global saving glut" is partly responsible for the increase in the U.S. current account deficit.

What are the causes of the high Chinese saving rate? A growing segment of the macro literature has focused on understanding this phenomenon. Many factors have been proposed as possible causes, including rapid income growth, aging population, lack of social safety nets and unemployment insurance, precautionary saving motives, cultural tradition of thrift, high costs of education and health care, and rising housing prices, among others.[3] In particular, Wei and Zhang (2009) propose that the unbalanced sex ratio in China leads to competitive saving behavior in the marriage markets, which may significantly raise the aggregate household saving rate because men with adequate wealth accumulation (e.g., enough savings to buy houses) are more likely to attract marriage partners. Such competitive behavior further drives up housing prices and reinforces this competitive saving behavior. Chamon and Prasad (2010) argue that the rapidly rising private burdens of housing, education, and health care are the most important contributing factors. They also conjecture that the impact of these factors on saving can be amplified by underdeveloped financial and credit markets.

Indeed, the rapidly rising housing prices and other living costs in China are serious socioeconomic problems and have attracted much attention from the news media and policymakers. In Beijing and Shanghai, for example, the average housing price-to-income ratio (for a 27.0-square-meter [300-square-foot] living space) is about 12.[4] Specifically, a young married couple needs to save their entire income (a 100 percent saving rate) for 12 years to afford a 55.74-square-meter (600-square-foot) apartment.[5] Hence, it is not surprising that rising housing prices have been perceived as one of the most important factors underlying China's high aggregate household saving rate.

But can rising housing prices really explain the persistently high household saving rate in China? This is not only an empirical question, but also a theoretical one with broad implications for developing economies. To the best of our knowledge, little theoretical work has been done to carefully and quantitatively address this question. Based on simple economic logic and quantitative analysis, our answer to this question is basically "No."

More specifically, we show the following:

- In the absence of economic growth and borrowing constraints, the aggregate household saving rate of an economy is independent of housing prices.
- Only under the following combined conditions will high housing prices significantly increase the aggregate household saving

[3] This literature includes Modigliani and Cao (2004); Overland and Weil (2000); Horioka (1990); Horioka and Wan (2007); Chen, Imrohoroglu, and Imrohoroglu (2006); Song, Storesletten, and Zilibotti (2011); Yuan and Song (1999, 2000); and Wen (2009), among others.

[4] According to *China Statistical Yearbook* (2007), in 2006 the average living space per person was 27.1 square meters (291.7 square feet) in urban areas and 30.7 square meters (323.9 square feet) in rural areas. However, the average living space for new homebuyers is greater than 30 square meters (322.9 square feet).

[5] According to *China Statistical Yearbook* (2008), in 2007 the nationwide average housing price was 3,645 yuan per square meter, 10,661 yuan for Beijing, and 8,253 yuan for Shanghai. In 2007, the average disposable income per capita was 13,786 yuan nationwide, 21,989 yuan in Beijing, and 23,623 yuan in Shanghai. Hence, if the living space per person is 30 square meters (322.9 square feet), the ratio of housing price to disposable income would be 7.93 for the nation, 14.55 for Beijing, and 10.48 for Shanghai.

rate: (i) Agents have severe borrowing constraints with zero possibility of obtaining mortgage loans, (ii) over time, the population of potential future homebuyers increases rapidly relative to current homebuyers, and (iii) housing prices rise faster than household income. However, these conditions are inconsistent with Chinese reality. Quantitative simulations based on Chinese time-series data for household income, housing prices, demographic structure, and mortgage down payment requirements show that rising housing prices can contribute at most 5 percentage points to the aggregate saving rate.

The intuition is simple: Suppose the only reason to save is to buy a house. Regardless of the level of housing prices, income saved for future housing purchases by future homebuyers (called "would-be homebuyers" in this paper) is always canceled by housing expenditures of the current homebuyers in the measured aggregate saving ratio. In other words, as soon as a person spends his or her past savings to purchase a good, the average lifetime saving rate for that individual immediately becomes zero. If part of the expenditure is financed by bank loans against the buyer's future income, the average lifetime saving rate at the moment of the home purchase is *negative* because the buyer must continue to save in the future to repay the loans until the debt is completely repaid. Hence, if the population is not growing and housing prices are constant, the aggregate saving rate across all cohorts at any point in time is independent of housing prices, regardless of borrowing constraints.

On the other hand, if housing prices are rapidly growing, then the population share of future homebuyers is effectively increasing relative to that of current homebuyers. In this case, the expenditures of the current homebuyers cannot completely cancel the savings of the would-be homebuyers. Because young cohorts need to save more and for longer periods under borrowing constraints when housing prices increase, this is equivalent to a continuous expansion of the population size of the saving cohort relative to the dissaving cohort. In other words, both housing-price growth and borrowing constraints are equivalent to population growth in terms of their impact on the aggregate saving rate. We call such equivalence the "population effect." Under such population effect, housing prices may play an important role in determining the aggregate saving rate. However, if household income increases at roughly the same rate as housing prices (as is the case in China), then the anticipated rising permanent income would reduce the need to save and cancels the population effect. In fact, the rapid growth in household income is the key force driving the rapidly rising housing prices in China, given the scarcity of habitable land in China.

Therefore, our analysis clarifies a popular confusion or misunderstanding that attributes the high aggregate household saving rate in China to rising housing prices and other costs of living. The same logic can also be applied to discredit similar theories that view the rising private burden in education, childbearing, health care, marriage, and so on in China as the major factors contributing to China's high aggregate household saving rate.

Our analysis also reveals a potential tension or conflict between survey data and economic analysis. Suppose survey data unambiguously indicate that cost-of-living factors are the primary motive for each household to increase its saving rate. Such empirical facts by no means imply that rising living costs are responsible for the persistently high aggregate household saving rate because incomes saved for any spending needs will always be consumed at later stages of life. Hence, such types of savings will cancel across households among different cohorts. Even if savings are not entirely spent within a person's lifetime and become bequests, they would reduce the children's need to save by exactly the same amount. Thus, any such type of savings should be canceled through aggregation across age cohorts.

Hayashi (1986) analyzes the possible causes of Japan's high household saving rate in the 1960s and 1970s. His analysis includes discussions regarding the possible impact of rising housing prices on the saving behavior of Japanese house-

holds. In particular, using regression analysis, he finds that the average household saving rate of a given Japanese city is independent of that city's average housing prices.[6] Based on this finding, Hayashi concludes that rising housing prices per se are not the cause of Japan's high household saving rate because of the "saving-expenditure cancellation" effects across population and age cohorts. This conclusion is similar to ours. However, Hayashi did not conduct detailed theoretical analysis to rigorously prove the point, so his analysis is not generalizable and may not apply to China. In particular, he did not consider the possibility that under severe borrowing constraints, rising housing prices may significantly increase the aggregate household saving rate.

In this paper, we choose a simple consumption-saving model to illustrate our points, yet without the loss of generality. In the model, many variables (such as household income, housing prices, optimal age of homebuyers, and demographic structure) are deliberately kept exogenous so that comparative statistics can be easily obtained using Chinese data. The only endogenous optimization behavior derived from the model is consumption smoothing over a person's lifetime subject to borrowing constraints. This framework provides the simplest setup to calibrate the model using various Chinese time-series data.

The remainder of the paper is organized as follows. The next section presents a benchmark consumption-saving model without borrowing constraints and studies the effects of housing prices on the aggregate household saving rate. In subsequent sections we extend the analysis to include borrowing constraints, conduct robustness analysis, and consider other extensions of the basic model. The final section summarizes our findings and includes some policy recommendations.

[6] Hayashi also estimated the saving rates of homeowners, would-be homebuyers, and non-homeowners who do not plan to own houses in rural and urban areas. He argued that if housing prices have a significant impact on a household's saving rate, then the saving rate of would-be homebuyers should be significantly higher than the other two types of households, and urban households should have a higher saving rate than rural households. However, he did not find such differences in the Japanese data.

THE BASIC MODEL

Constant Income and Housing Prices

Suppose shelter (housing) is an indivisible and necessary consumption good that depreciates completely at the end of a homeowner's life. Given household income, increases in housing prices will force individual consumers to save more (and for a longer period) to afford a house. This positive association between housing prices and individual saving behavior may be why people view rising housing prices as a cause of the high aggregate saving rate in China. However, this view suffers from the fallacy of aggregation: It ignores the fact that when people purchase houses, they generate negative savings to society, canceling other people's positive savings.

More specifically, suppose that (i) the interest rate is zero and there is no discounting in the future,[7] (ii) each individual's only purpose for saving at a young age is to buy a house in middle age, and (iii) there are no debts or bequests at birth or after death. Clearly, in such a society, each person's average lifetime saving rate should be exactly zero. Although a higher housing price will increase an individual's saving rate before purchasing a house, it does not change the average lifetime saving rate because at the moment of home purchase, all of the buyer's positive savings are exactly canceled by the current expenditure. Therefore, if the population is stable over time (i.e., each age cohort has the same number of individuals), then the aggregate saving rate is also zero, independent of housing prices.

Formally, imagine an economy where all agents have the same momentary utility function, and a typical consumer lives for T periods with a constant income flow $\bar{Y}$ in each period. Each consumer needs to buy a house in period $t+1 \leq T$,[8] the price of a house is $M > \bar{Y}$, and there are no borrowing constraints except the zero debt

[7] Our results are robust to these assumptions.

[8] Because t can take arbitrary values, we can calibrate it using Chinese data. Making it endogenous complicates the analysis dramatically without additional gains. An additional advantage of keeping t exogenous is that we need not worry about how and when housing enters the utility function. That is, we can ignore the utility value of housing without loss of generality.

Table 1

Saving Behavior of Individual Consumers

Period:	1	…	*t*	*t*+1	*t*+2	…	*T*
Expenditure	$\bar{Y} - M/T$	…	$\bar{Y} - M/T$	$\bar{Y} - M/T + M$	$\bar{Y} - M/T$	…	$\bar{Y} - M/T$
Savings	M/T	…	M/T	$\frac{M}{T} - M$	M/T	…	M/T
Saving rate	$\frac{M}{T\bar{Y}}$	…	$\frac{M}{T\bar{Y}}$	$\frac{M}{T\bar{Y}} - \frac{M}{\bar{Y}}$	$\frac{M}{T\bar{Y}}$	…	$\frac{M}{T\bar{Y}}$

requirement and the assumption of 100 percent depreciation of a house at the end of a homeowner's life. Naturally, we also need to assume $T\bar{Y} > M$ to ensure that each consumer is able to afford a house with his or her lifetime income. Under these conditions, because of the zero interest rate and no discounting, the marginal utility of consumption (C) is exactly the same across time, so utility maximization implies that the consumer will save a constant amount of his or her personal income flow each period to smooth consumption.

Formally, the maximization problem is stated as follows:

$$\max: \sum_{\tau=1}^{T} u(C_\tau)$$

$$\text{s.t.: } \sum_{\tau=1}^{T} C_\tau + M \le T\bar{Y}.$$

Notice that we have deliberately omitted housing consumption in the utility function to simplify the analysis. This is an innocuous assumption because shelter is a necessary consumption good and the wealth effect generated from a house, if it exists, will only decrease the incentive for saving rather than increase it. The optimal solution to the above problem is

$$C_\tau = \bar{Y} - \frac{M}{T}.$$

That is, consumption is perfectly smoothed and equals a constant. However, notice that the total expenditure in period t+1 equals consumption plus the housing expenditure: $C_{t+1} + M$. This typical consumer's expenditure, savings, and saving rate in each period of his or her lifetime are reported in Table 1.

The first line of Table 1 indicates the consumer's living period (or age), the second line total expenditures in each period, the third line additional savings in each period, and the last line the saving rate in each period, which is defined as the ratio of additional savings to income.

Notice that the consumer's saving rate is always

$$\frac{M}{T\bar{Y}}$$

in each period except in period t+1. In period t+1, because of the additional expenditure of the housing purchase, the saving rate is negative,

$$\frac{M}{T\bar{Y}} - \frac{M}{\bar{Y}} < 0.$$

The consumer's average lifetime saving rate is

$$(1) \quad \text{Lifetime average saving rate} = \sum_{\tau=1}^{T} \frac{M}{T\bar{Y}} - \frac{M}{\bar{Y}} = 0.$$

Because the negative savings incurred at the moment of a home purchase exactly cancel the positive savings in the other periods, housing prices are irrelevant to the consumer's lifetime saving rate.

To compute the aggregate household saving rate in this economy with many different age cohorts for a particular period, we need to aggregate the saving rate of each age cohort in that period. There exist two measures (or definitions) of the aggregate saving rate:

(i) The average of the personal saving rate across cohorts weighted by the population share of each age cohort—namely,

$$(2)\quad \bar{S} = \sum_{\tau=1}^{T} \alpha_\tau s_\tau,$$

where α_τ represents the population share of cohort τ in the total population, and

$$s_\tau = \frac{S_\tau}{Y_\tau}$$

represents the saving rate of cohort τ.

(ii) The ratio of aggregate saving to aggregate income in the same period:

$$(3)\quad \bar{S} = \frac{\sum_{\tau=1}^{T} \alpha_\tau S_\tau}{\sum_{\tau=1}^{T} \alpha_\tau Y_\tau},$$

where α_τ still denotes the population share of cohort τ, S_τ denotes the savings of cohort τ, and Y_τ the income of cohort τ.

We can call definition (i) the "average household saving rate" and definition (ii) the "aggregate household saving rate." Clearly, if all cohorts have the same income levels and identical population shares, the two definitions are equivalent. However, if different cohorts have different income levels and population shares (e.g., because of income growth and population growth), the two measures of the aggregate saving rate are not identical. Because definition (ii) depends only on macro data and is consistent with the data presented in Figures 1 and 2, we adopt definition (ii) in equation (3) as the measure of the aggregate household saving rate for the remainder of this paper.

Assume for a moment identical population shares across cohorts (we relax this assumption in the next section); then

$$\alpha_\tau = \frac{1}{T}$$

in equation (3). In this case, because income and housing prices are time invariant, we can compute the aggregate household saving rate in equation (3) using information provided in Table 1 to obtain

$$(4)\quad \bar{S} = \frac{\sum_{\tau=1}^{T} \frac{1}{T} S_\tau}{\sum_{\psi=1}^{T} \frac{1}{T} Y_\tau} = \frac{\left(\sum_{\tau=1}^{T} \frac{M}{T}\right) - M}{\sum_{\tau=1}^{T} \bar{Y}} = 0,$$

namely, the aggregate saving rate is zero and independent of housing prices.

Hence, under the maintained assumptions of constant income and demographics, changes in the level of housing prices do not affect the aggregate saving rate, although they do affect individuals' saving rates. In other words, even if 99 percent of the total population is saving for future home purchases, the other 1 percent (homebuyers) can generate just enough negative savings to cancel the would-be homebuyers' positive savings, resulting in a zero aggregate saving rate. This logic of aggregation is simple but not always recognized.

However, does the conclusion continue to hold if income and housing prices grow over time? In a sense, continuously rising housing prices imply that young cohorts must continuously increase their saving rate and save for a longer period to afford a house. Consequently, the relative population share of would-be homebuyers will become larger than that of current homebuyers (even without population growth), and this population effect may result in a positive aggregate saving rate, holding income constant. On the other hand, if income is also growing over time, the effective share of would-be homebuyers relative to homebuyers will shrink because the need to save is reduced (a negative population effect), everything else equal. Therefore, if income and housing prices are growing at the same time, their population effects may (at least partially) cancel each other, leading to insignificant changes in the aggregate saving rate. This issue is the focus of the next subsection.

Time-Varying Income and Housing Prices

In a model with time-varying income and housing prices, a consumer born in period 1 who needs to purchase a house in period t+1 solves the following problem:

Table 2

Saving Behavior of Different Age Cohorts

Age cohorts:	1	…	t	t+1	t+2	…	T
Permanent income	$\bar{Y}_t$	…	$\bar{Y}_1$	$\bar{Y}_0$	$\bar{Y}_{-1}$	…	$\bar{Y}_{-T+t+1}$
Housing price	M_t	…	M_1	M_0	M_{-1}	…	M_{-T+t+1}
Savings	M_t/T	…	M_1/T	$\frac{(1-T)M_0}{T}$	M_{-1}/T	…	M_{-T+t+1}/T
Saving rate	$\frac{M_t}{T\bar{Y}_t}$	…	$\frac{M_1}{T\bar{Y}_1}$	$\frac{(1-T)M_0}{T\bar{Y}_0}$	$\frac{M_{-1}}{T\bar{Y}_{-1}}$	…	$\frac{M_{-T+t+1}}{T\bar{Y}_{-T+t+1}}$

$$\max: \sum_{\tau=1}^{T} u(C_\tau)$$

$$\text{s.t.: } \sum_{\tau=1}^{T} C_\tau + M_{t+1} \le \sum_{\tau=1}^{T} Y_\tau.$$

The optimal solution is given by

$$C_\tau = \bar{Y} - \frac{M_{t+1}}{T},$$

where

$$\bar{Y} = \frac{1}{T}\sum_{\tau=1}^{T} Y_\tau$$

denotes a consumer's permanent income (i.e., average lifetime income). Total expenditure in period t+1 is $C + M_{t+1}$.

Suppose the optimal age for each consumer to become a homeowner is t+1 periods after birth. Suppose at the present moment this cohort of homebuyers faces housing price M_0 and has permanent income $\bar{Y}_0$. We call this age group "cohort t+1" or "homebuyer cohort." Based on such notations, the generation one period younger than cohort t+1 is called "cohort t," who will become homebuyers in the next period and face housing price M_1 and permanent income $\bar{Y}_1$. Analogously, the generation one period older than the homebuyer cohort is called "cohort t+2," who have already bought a house one period ago when the housing price was M_{-1} and permanent income was $\bar{Y}_{-1}$. Similarly, at the present moment all generations younger than the homebuyer cohort are called cohorts $\{1,2,\ldots,t\}$; these consumers will face housing prices $\{M_t,M_{t-1},\ldots,M_1\}$ and permanent income $\{\bar{Y}_t,\bar{Y}_{t-1},\ldots,\bar{Y}_1\}$, respectively, when they purchase homes in the future. Also, at the moment all generations older than the homebuyers are called cohorts $\{t+2,t+3,\ldots,T\}$; and each person in these cohorts bought a house with price $\{M_{-1},M_{-2},\ldots,M_{-T+t-1}\}$ and permanent income $\{\bar{Y}_{-1},\bar{Y}_{-2},\ldots,\bar{Y}_{-T+t-1}\}$, respectively, in the past.

Based on the above notations, we can tabulate the incomes, savings, and saving rates of different age cohorts at the present moment. The first line in Table 2 shows the age of different cohorts at the present moment, the second line their respective permanent income levels, the third line the housing prices they face when becoming a homeowner, the fourth line their current level of savings, and the last line their respective saving rate at the present moment. The table shows that at the same time point different age cohorts have different saving rates because permanent income and housing prices are changing over time. However, regardless of age, the saving rate of each cohort is a function of the housing price-to-income ratio $(M/\bar{Y})$ facing that particular cohort.

Therefore, if the housing price-to-income ratio remains constant over time despite growing housing prices and permanent income, then different age cohorts (except the homebuyer cohort) have the same saving rate, whereas the home-

buyer cohort always has a negative saving rate that offsets the positive savings of the other cohorts. Hence, the average saving rate across cohorts is exactly zero because each cohort is weighted identically by the factor $1/T$ in computing the societal average saving rate.

However, because by definition the aggregate saving rate is the ratio of aggregate saving to aggregate income, instead of the weighted sum of individuals' saving rates, the measured aggregate saving rate is not necessarily zero but depends on the current housing price-to-aggregate income ratio. That is, the negative savings of the homebuyer cohort (cohort t+1) may receive a lower (or higher) weight than $1/T$ if equation (3) is used as our measure of the aggregate saving rate. For example, if the ratio of cohort t+1's housing price (M_0) to aggregate income equals $1/T$, then the measured aggregate saving rate is still zero. However, if that ratio is greater than $1/T$, then the measured aggregate saving rate is less than zero because the negative savings caused by the homebuyer cohort more than offsets the total savings from other cohorts due to time-varying housing prices and income; if that ratio is less than $1/T$, the measured aggregate saving rate is positive.

To sort these effects, consider first the case in which permanent income and housing prices have constant growth rates according to the equations $\overline{Y}_\tau = (1 + a)\overline{Y}_{\tau-1}$ and $M_\tau = (1 + b)M_{\tau-1}$, respectively, where the growth rates a and b are both constants. Notice that if annual income grows at a constant rate, then the permanent income also grows at the same constant rate. Under these conditions, the aggregate saving rate is given by

$$(5)\quad \overline{S} = \frac{\sum_{\tau=-T+t+1}^{t} \frac{1}{T} S_\tau}{\sum_{\tau=-T+t+1}^{t} \frac{1}{T} Y_\tau} = \frac{\left(\sum_{\tau=-T+t+1}^{t} \frac{M_0 (1+b)^\tau}{T} \right) - M_0}{\sum_{\tau=-T+t+1}^{t} \overline{Y}_0 (1+a)^\tau}.$$

If $a \neq 0$ and $b \neq 0$, equation (5) can be simplified to

$$\overline{S} = \frac{M_0}{\overline{Y}_0} \frac{\frac{(1+b)^{-T+t+1}}{T} \frac{\left[1-(1+b)^T\right]}{1-(1+b)} - 1}{(1+a)^{-T+t+1} \frac{\left[1-(1+a)^T\right]}{1-(1+a)}},$$

which depends only on the housing price-to-income ratio of the current homebuyer cohort.

For example, suppose $a = b = 10$ percent, $T = 40$, and $t = 15$.[9] Then equation (5) gives an aggregate saving rate of 2.14 percent, which is trivial compared with the 20 percent Chinese aggregate saving rate. On the other hand, it is possible to obtain an aggregate saving rate of 20 percent in the model if we allow the growth rate of permanent income and housing prices to be 50 percent per year, which is hard to imagine in reality. Therefore, when housing prices and permanent income grow at the same rate within an empirically plausible range, housing prices are still largely irrelevant to the aggregate saving rate.

Calibration 1. We now use actual Chinese data to calibrate the model. Suppose that people start working at age 21 and retire at age 60; thus, we set the total working years $T = 40$. Also suppose that the average homebuyer's age is 35—that is, people must work and save for 15 years before buying a house. This implies that $t = 15$ in our model (e.g., in Table 2). Suppose that individuals in the homebuyer cohort (cohort t+1) become homeowners in the year 2007; in that year the housing price-to-income ratio in China was 7.93, so we set $M_0/\overline{Y}_0 = 8$. According to the *Chinese Statistical Yearbook* (2008), from 1978 to 2007 the growth rate of average family income was 12.57 percent in rural areas and 13.58 percent in urban areas; hence we set $a = 0.13$. According to the China Macroeconomic Information Network Database, the average growth rate of housing prices was 9.02 percent per year between 1991 and 2008; hence we set $b = 0.09$. Entering these numbers into equation (5), the estimated aggregate saving rate equals 1 percent: That is, rising housing prices explain only 1 percentage point of China's aggregate household saving rate, substantially below the actual 27 percent saving rate in 2007.

Moreover, even if the growth rate of housing prices exceeds that of income, the impact of rising housing prices on the aggregate saving rate is still quite limited. For example, when the growth

[9] $T = 40$ and $t = 15$ imply that each individual needs to work for 15 years to afford a house and work for 40 years to retire (income is assumed to be zero after retirement).

rate of household income is 10 percent per year, the average growth rate of housing prices must be almost 20 percent per year to reach an aggregate saving rate of 20 percent in the model. Although a 20 percent annual growth rate in housing prices is possible for a short period, we have not seen such a high average growth rate over a 10-year period in China or anywhere else in the world.

Calibration 2. The above calibration analysis is based on the assumption that the growth rates of income and housing prices are constant over time. If we allow the growth rate of income and housing prices to vary over time, how does this affect our results? Because the simple model is no longer analytically tractable under uncertainty, we assume perfect foresight to gain intuition. When the growth rates of both income and housing prices are time varying, Table 2 implies that the aggregate household saving rate is determined by

$$(6)\quad \bar{S} = \frac{\frac{1}{T}\sum_{\tau=-T+t+1}^{t} M_\tau - M_0}{\sum_{\tau=-T+t+1}^{t} \bar{Y}_\tau}.$$

As before, using 2007 as the base year for current homebuyers (cohort t+1), $M_0 = P_{2007}$, where P_{2007} denotes the average housing price in 2007. Recall that we use a 40-year window to compute the permanent income based on 40 years of average household income between year 2007 − t and year 2007 + T − t − 1, where T = 40. For example, the permanent income of cohort t+1 is denoted by

$$\bar{Y}_0 = \frac{1}{T}\sum_{j=2007-t}^{2007+T-t-1} Y_j.$$

Using the same method, we can also estimate the permanent incomes of cohorts {1,2,…,t} and cohorts {t+2,t+3,…,T}.[10] By entering the estimated values of housing prices facing homebuyers of different age cohorts, $\{M_t, M_{t-1},\ldots,M_0,\ldots,M_{-T+t-1}\}$, and the corresponding permanent incomes, $\{\bar{Y}_t,\bar{Y}_{t-1},\ldots,\bar{Y}_0,\ldots,\bar{Y}_{-T+t-1}\}$, into equation (6), we obtain an aggregate saving rate of 0.61 percent. Therefore, regardless of how the model is calibrated, we conclude that in the absence of borrowing constraints, rising housing prices alone cannot explain China's aggregate household saving rate.

[10] Computing young cohorts' permanent income requires the use of income data after 2009. Since such data do not exist, we extrapolate by assuming a 10 percent annual growth rate after 2009. We provide the sensitivity analyses in a later section.

BORROWING CONSTRAINTS AND DEMOGRAPHICS

Our basic model makes two important assumptions: (i) Consumers can completely smooth their consumption over a working lifetime by using future income to finance current mortgage payments. (ii) The population or demographic structure does not change over time. These assumptions are not realistic and may bias our results.

Assumption (i) would be innocuous if household income, housing prices, and population were constant over time. To understand this point, suppose consumers cannot borrow at all. Then cohort t+1 must increase its saving rate at a younger age to accumulate just enough money to pay off the entire mortgage before period t+1. In this case, if income and housing prices do not grow over time, the aggregate saving rate is still zero because the negative savings generated by cohort t+1 in the housing market still completely cancel the total positive savings from cohorts {1,2,…,t}. However, if income and housing prices grow over time, assumption (i) is no longer innocuous and borrowing constraints may greatly magnify the positive impact of housing prices on the aggregate saving rate.

The assumption of a constant population size does not allow our model to capture any transitional dynamics outside the steady state. Hence, the demographic structure is also important for the robustness of our analysis and conclusions and should be considered. Formal analyses with assumptions (i) and (ii) relaxed are presented below. We consider first the case with borrowing constraints and then the case with a time-varying population structure.

Table 3

Saving Behavior of Individuals under Borrowing Constraints*

Period:	1	…	t	t+1	t+2	…	T
Expenditure	$\bar{Y} - M/t$	…	$\bar{Y} - M/t$	$\bar{Y} + M$	$\bar{Y}$	…	$\bar{Y}$
Savings	M/t	…	M/t	$-M$	0	…	0
Saving rate	$\frac{M}{t\bar{Y}}$	…	$\frac{M}{t\bar{Y}}$	$\frac{-M}{\bar{Y}}$	0	…	0

NOTE: *Constant income and housing prices.

Table 4

Saving Behavior of Different Age Cohorts under Borrowing Constraints*

Age cohorts:	1	…	t	t+1	t+2	…	T
Permanent income	$\bar{Y}_t$	…	$\bar{Y}_1$	$\bar{Y}_0$	$\bar{Y}_{-1}$	…	$\bar{Y}_{-T+t+1}$
Housing price	M_t	…	M_1	M_0	M_{-1}	…	M_{-T+t+1}
Savings	M_t/t	…	M_1/t	$-M_0$	0	…	0
Saving rate	$\frac{M_t}{t\bar{Y}_t}$	…	$\frac{M_t}{T\bar{Y}_t}$	$\frac{-M_0}{\bar{Y}_0}$	0	…	0

NOTE: *Time-varying income and housing prices.

Borrowing Constraints

To facilitate future analysis, we first consider constant income and housing prices under borrowing constraints. If agents cannot borrow at all and the optimal timing for purchasing a home is still t+1 periods after birth (we examine the robustness of the results to this assumption later), the would-be homebuyers must then increase their saving rates before period t+1. This implies that from period 1 to t the saving rate is M/t, and optimal consumption is $\bar{Y} - M/t$. Between period t+2 and period T, the optimal consumption level is $\bar{Y}$ and the saving rate is zero. In period t+1, total expenditure (consumption plus housing purchase) is $\bar{Y} + M$. These statistics are summarized in Table 3.

Compared with Table 1, the addition of borrowing constraints raises the individual's saving rate from M/T to M/t; however, the average lifetime saving rate is still zero. Hence, if the population share of each age cohort is the same, the aggregate saving rate is also zero.

Now with time-varying income and housing prices, the effective share of each cohort is no longer the same because of the population effect. In this case, we can use a method similar to that used for Table 2 to compute each age cohort's saving rate under borrowing constraints. These results are summarized in Table 4.

Each generation purchases houses t+1 periods after birth. At a particular moment, the current homebuyer generation is called cohort t+1, and this cohort faces housing price M_0 and permanent income $\overline{Y}_0$. The one-period-younger generation is cohort t; this cohort will be buying houses in the next period, facing housing price M_1 and permanent income $\overline{Y}_1$, and this generation's current saving rate is M_1/t. Analogously, the one-period-older generation is cohort t+2; these individuals have already bought houses in the last period, faced housing price M_{-1} and permanent income $\overline{Y}_{-1}$, and their current saving rate is 0, in contrast to the model in Table 2. All cohorts proceed in a similar fashion.

Suppose permanent income and housing prices grow over time according to the equations $\overline{Y}_\tau = (1 + a)\overline{Y}_{\tau-1}$ and $M_\tau = (1 + b)M_{\tau-1}$, respectively, where the growth rates a and b are both constant. Under such conditions, the aggregate saving rate is given by

$$(7)\quad \overline{S} = \frac{\sum_{\tau=1}^{t} \frac{M_0(1+b)^\tau}{t} - M_0}{\sum_{\tau=-T+t+1}^{t} \overline{Y}_0(1+a)^\tau},$$

which can be simplified to

$$\overline{S} = \frac{M_0}{\overline{Y}_0} \frac{\frac{(1+b)}{t}\frac{\left[1-(1+b)^t\right]}{1-(1+b)} - 1}{(1+a)^{-T+t+1}\frac{\left[1-(1+a)^T\right]}{1-(1+a)}}.$$

It can be shown that the aggregate saving rate with borrowing constraints is larger than that without borrowing constraints. The intuition is as follows. Without borrowing constraints, when housing prices increase, the average saving rate of would-be homebuyers is larger than that of the current homeowners because of the population effect. With borrowing constraints, this population effect is significantly magnified because the saving rate of all homeowners is now zero. In other words, in computing the aggregate savings, the population weight of would-be homebuyers is increased from $1/T$ to $1/t$, while the population weight of the current homeowners is decreased from $1/T$ to 0. Because the aggregate income of all cohorts is the same, the ratio of aggregate savings to aggregate income (the aggregate saving rate) has increased under borrowing constraints.

Calibration. As in the previous analysis (with time-varying income and housing prices), we set $T = 40$, $t = 15$, $M_0/\overline{Y}_0 = 8$, $a = 0.13$, and $b = 0.09$. Substituting these values into equation (7) gives an aggregate saving rate of 16.66 percent. Alternatively, if we allow the growth rate of income and housing prices to vary over time (as in actual Chinese data), under the assumption of perfect foresight, the aggregate saving rate is given by

$$(8)\quad \overline{S} = \frac{\frac{\sum_{\tau=1}^{t} M_\tau}{t} - M_0}{\sum_{\tau=-T+t+1}^{t} \overline{Y}_\tau}.$$

Using the same method adopted in a previous section, namely, choosing 2007 as the base year for the current homebuyers (cohort t+1), estimating and computing the associated values for housing prices $\{M_t, M_{t-1}, \ldots, M_0, \ldots, M_{-T+t-1}\}$ and permanent incomes $\{\overline{Y}_t, \overline{Y}_{t-1}, \ldots, \overline{Y}_0, \ldots, \overline{Y}_{-T+t-1}\}$, and substituting the results into equation (8) gives an aggregate saving rate of 19.22 percent, higher than that implied by equation (7).

Clearly, under severe borrowing constraints (i.e., no borrowing at all), using actual Chinese time-series data for housing prices and income implies estimates of the aggregate saving rate that match the actual Chinese household saving rate quite well. It thus appears that rising housing prices can explain China's high household saving rate if borrowing constraints are taken into account. But is this really the case?

Not really. In reality, the degrees of borrowing constraints are not as severe as assumed in the previous analysis. Typically, homebuyers need to pay only one-third of the housing price as a down payment and can borrow at least two-thirds with the mortgage. But how would a slightly relaxed borrowing constraint affect our quantitative result?

To be conservative, we assume that the down payment requirement is as high as 50 percent of

Table 5

Saving Behavior of Individuals with 50 Percent Down Payment*

Period:	1	…	t	t+1	t+2	…	T
Expenditure	$\bar{Y} - M/t$	…	$\bar{Y} - M/t$	$\bar{Y} + M$	$\bar{Y}$	…	$\bar{Y}$
Savings	$M/2t$	…	$M/2t$	$\frac{M}{2(T-t)} - M$	$\frac{M}{2(T-t)}$	…	$\frac{M}{2(T-t)}$
Saving rate	$\frac{M}{2t\bar{Y}}$	…	$\frac{M}{2t\bar{Y}}$	$\frac{M}{2(T-t)\bar{Y}} - \frac{M}{\bar{Y}}$	$\frac{M}{2(T-t)\bar{Y}}$	…	$\frac{M}{2(T-t)\bar{Y}}$

NOTE: *Constant income and housing prices.

the house price.[11] In this case, the borrowing constraints do not bind if each generation's optimal time for buying a house is after working for 20 years (because of sufficient savings). However, as long as each generation still needs to purchase houses after working for only 15 years (as assumed previously), borrowing constraints will still bind for every generation with an empirically plausible growth rate of income and housing prices. A typical individual's saving behavior given these conditions is shown in Table 5.

Between period 1 and period t of an individual's lifetime, a consumer's annual saving is $M/2t$ (see Table 5); in period t+1, the total past savings are just enough to pay for the 50 percent down payment, so the consumer needs to borrow the other 50 percent from future income to pay for the mortgage. Thus, in period t+1 the buyer's housing expenditure is M and saving is

$$\frac{M}{2(T-t)} - M;$$

afterward, future saving for each period is always

$$\frac{M}{2(T-t)}.$$

[11] In China, the down payment required for home loans has been about one-third of the purchase price until recently. Now the down payment for the first house is one-third and that for the second house is one-half of the purchase price (some people in China own more than one home for investment purposes).

Based on such information and assuming time-varying income and housing prices, we can use the methods outlined in the previous sections to compute each cohort's saving rate at the same point of time (Table 6). As shown, if permanent income and housing prices follow a constant growth rule, $\bar{Y}_\tau = (1 + a)\bar{Y}_{\tau-1}$ and $M_\tau = (1 + b)M_{\tau-1}$, then the aggregate saving rate is given by

$$(9)\quad \bar{S} = \frac{\sum_{\tau=1}^{t} \frac{M_0(1+b)^\tau}{2t} + \sum_{\tau=-T+t+1}^{0} \frac{M_0(1+b)^\tau}{2(T-t)} - M_0}{\sum_{\tau=-T+t+1}^{t} \bar{Y}_0(1+a)^\tau}.$$

In such a case, we use Chinese data to set $T = 40$, $t = 15$, $M_0/\bar{Y}_0 = 8$, $a = 0.13$, and $b = 0.09$. Substituting these values into equation (9) gives an aggregate saving rate of 4.17 percent.

On the other hand, if the growth rates of income and housing prices are time varying, the aggregate saving rate is given by

$$(10)\quad \bar{S} = \frac{\frac{\sum_{\tau=1}^{t} M_\tau}{2t} + \frac{\sum_{\tau=-T+t+1}^{0} M_\tau}{2(T-t)} - M_0}{\sum_{\tau=-T+t+1}^{t} \bar{Y}_\tau}.$$

Using the same method as before, by setting 2007 as the base year for homebuyers (cohort t+1) and computing the associated housing prices $\{M_t, M_{t-1}, \ldots, M_0, \ldots, M_{-T+t-1}\}$ and permanent incomes

Table 6

Saving Behavior of Different Age Cohorts with 50 Percent Down Payment*

Age cohorts:	1	…	*t*	*t*+1	*t*+2	…	*T*
Permanent income	$\bar{Y}_t$	…	$\bar{Y}_1$	$\bar{Y}_0$	$\bar{Y}_{-1}$	…	$\bar{Y}_{-T+t+1}$
Housing price	M_t	…	M_1	M_0	M_{-1}	…	M_{-T+t+1}
Savings	$M_t/2t$	…	$M_1/2t$	$\frac{M_0}{2(T-t)} - M_0$	$\frac{M_{-1}}{2(T-t)}$	…	$\frac{M_{-T+t+1}}{2(T-t)}$
Saving rate	$\frac{M_t}{2t\bar{Y}_t}$	…	$\frac{M_1}{2t\bar{Y}_1}$	$\frac{M_0}{2(T-t)\bar{Y}_0} - \frac{M_0}{\bar{Y}_0}$	$\frac{M_{-1}}{2(T-t)\bar{Y}_{-1}}$	…	$\frac{M_{-T+t+1}}{2(T-t)\bar{Y}_{-T+t+1}}$

NOTE: *Time-varying income and housing prices.

$\{\bar{Y}_t,\bar{Y}_{t-1},\ldots,\bar{Y}_0,\ldots,\bar{Y}_{-T+t-1}\}$, equation (1) implies an aggregate saving rate of 4.34 percent.

We can make the following conclusions from the above analyses: Borrowing constraints can significantly amplify the positive effects of housing prices on the aggregate saving rate. However, as long as the borrowing constraints are not too severe (i.e., with a 50 percent down payment),[12] the effects of rising housing prices on the aggregate saving rate are quite moderate, less than 5 percentage points.

Our analysis also indicates that, relative to rising housing prices and other living costs, borrowing constraints may play a more important role in explaining China's high household saving rate. This also explains why more than a decade of rising U.S. housing prices before the recent financial crisis did not induce a high household saving rate: American families are much less borrowing constrained than Chinese households. Our conclusion is consistent with the analysis of Wen (2009), who shows in a general equilibrium growth model that borrowing constraints not only induce a high precautionary saving rate under income uncertainty, but also make this precautionary saving rate an increasing function of income growth. Thus, a high income growth rate can lead to a high aggregate saving rate under borrowing constraints and income uncertainty.

Demographics

As with income and housing price changes, a changing population should have no impact on the aggregate saving rate without borrowing constraints. Thus, this section considers only cases with borrowing constraints.

If the population changes over time, the population weights α_τ in equation (3) for different cohorts must be adjusted accordingly when computing the aggregate saving rate. Thus, if W_τ denotes cohort τ's share in total population and assuming that permanent income and housing prices follow the equations $\bar{Y}_\tau = (1+a)\bar{Y}_{\tau-1}$ and $M_\tau = (1+b)M_{\tau-1}$, then the aggregate saving rate based on equation (3) is given by

$$\bar{S} = \frac{\sum_{\tau=1}^{t} W_\tau \frac{M_0(1+b)^\tau}{t} - W_0 M_0}{\sum_{\tau=-T+t+1}^{t} W_\tau \bar{Y}_0 (1+a)^\tau}, \quad (11)$$

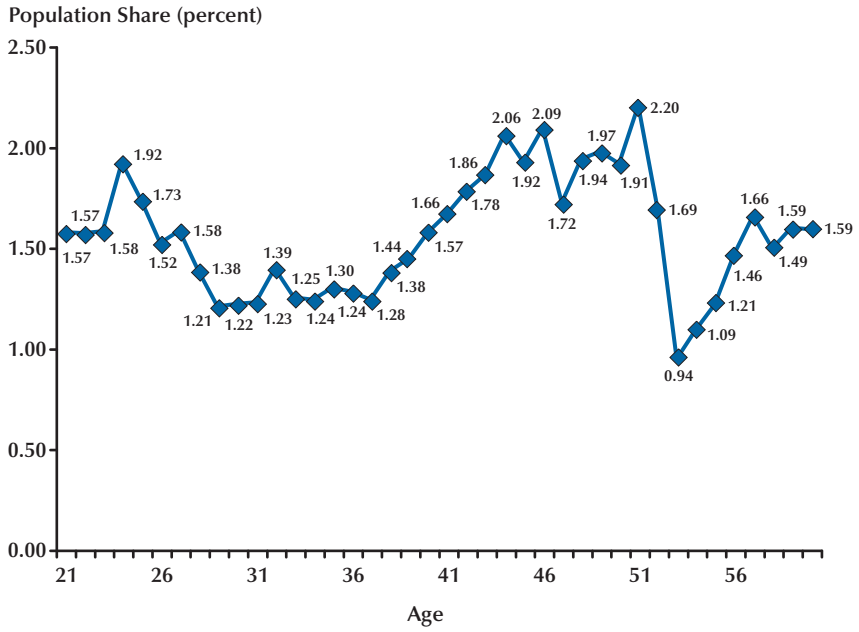
which is analogous to equation (7).

Based on the population shares of individuals 21 to 60 years of age provided in *China Population and Employment Statistics Yearbook* (2008), assuming that working ages are from 21 to 60, the average homebuyer's age is 35 (i.e., he

[12] The actual down payment requirement in China is less than 50 percent. Assuming a smaller value further reduces the impact of housing prices on the aggregate saving rate.

Figure 3

Population Shares of Different Age Cohorts in 2007



SOURCE: *China Statistical Yearbook*.

or she must work for 15 years to buy a house); using the average income growth and housing price growth in China, equation (11) implies an aggregate saving rate of 10.47 percent, lower than the value with constant population. If we allow a 50 percent down payment for the mortgage, the implied aggregate saving rate is negative (–0.75 percent), also lower than the value with constant population.

If we allow the growth rates of income and housing prices to vary over time, under 100 percent borrowing constraints (100 percent down payment), the aggregate saving rate is given by

$$\bar{S} = \frac{\sum_{\tau=1}^{t} W_\tau \frac{M_\tau}{t} - W_0 M_0}{\sum_{\tau=-T+t+1}^{t} W_\tau \bar{Y}_\tau}. \quad (12)$$

Using a similar calibration method as in the previous section by choosing 2007 as the base year for the homebuyer cohort, the implied aggregate saving rate is 11.32 percent, lower than the value with constant population. If we allow a 50 percent down payment, the implied aggregate saving rate is –1.62 percent, also lower than the value with constant population.

The reason that taking the demographic structure into account yields a lower aggregate saving rate, everything else equal, is that in recent years the homebuyer cohort is at its peak in terms of its population share. Therefore, the negative savings generated by this cohort receives larger weight than other cohorts. Figure 3 plots the demographic structure in China based on *China Population and Employment Statistics Yearbook* (2008), given the assumption that working ages are between 21 and 60 and the average homebuyer's age is 35. The homebuyer cohort peaked around 2007.

If the base year of the homebuyer cohort is moved to other years, such as 2005 or earlier, or if we change the assumed age of homebuyers, the implied aggregate saving rate will differ only

Table 7

Aggregate Saving Rate under Different Assumptions

Assumptions	Equation	Saving rate (%)
No BC, constant {D, I, P}	(4)	0.00
No BC, constant D, constant growth in {I, P}	(5)	1.00
No BC, constant D, time-varying growth in {I,P}	(6)	0.61
100% BC, constant D, constant growth in {I,P}	(7)	16.66
100% BC, constant D, time-varying growth in {I,P}	(8)	19.22
50% BC, constant D, constant growth in {I,P}	(9)	4.17
50% BC, constant D, time-varying growth in {I,P}	(10)	4.34
Time-varying D, 100% BC, constant growth in {I,P}	(11)	10.47
Time-varying D and growth in {I,P}, 100% BC	(12)	11.32
Time-varying D, 50% BC, constant growth in {I,P}		–0.75
Time-varying D and growth in {I,P}, 50% BC		–1.62

NOTE: BC, borrowing constraints; D, population; I, income; P, housing price; 100% BC, full down payment.

insignificantly from the values obtained above. The reason is simple: Unless the population has been sharply declining so that the population share of the homebuyer cohort is always significantly larger than that of the would-be homebuyer cohorts (which is inconsistent with Chinese data), taking the demographic structure into account cannot strengthen the effect of rising housing prices on the aggregate saving rate.

Summary of Analyses

The previous analyses covered three scenarios: (i) time-varying income and housing prices, (ii) borrowing constraints, and (iii) demographic changes. The results are briefly summarized in Table 7. The first column lists the assumptions, the second column shows the corresponding equation used to compute the aggregate saving rate, and the last column shows the numerical value of the aggregate saving rate.

The first three rows in Table 7 show that without borrowing constraints and demographic changes, rising housing prices contribute little to the aggregate saving rate: less than 1 percent. The subsequent two rows show that under complete borrowing constraints (with zero possibility to borrow), rising housing prices can have large effects on the aggregate saving rate, ranging from 16.66 to 19.22 percent. However, such effects are quickly dampened once the degree of borrowing constraints is reduced. For example, with a 50 percent down payment requirement, the aggregate saving rate is reduced to 4.17 percent and 4.34 percent, respectively, depending on the specific income process. In addition, if China's demographic structure is taken into account, the last two rows in the table show that the saving rate is reduced further: down to –0.75 percent and –1.62 percent, respectively. Therefore, given Chinese time-series data on household income, mortgage prices, borrowing costs, and demographics, we can conclude that the aggregate household saving rate is essentially unrelated to housing prices.

MORE SENSITIVITY ANALYSES

Different Extrapolations

In the previous analyses, we extrapolated the future growth rates of permanent income and housing prices beyond 2009 when considering the effects of time-varying income and housing prices. For example, in equation (10) we assumed future growth rates of income and housing prices

Table 8

Sensitivity Analysis for Different Future Growth Rates*

	Expected housing price growth (%)				
	8	9	10	11	12
Expected income growth (%)					
8	1.81	3.24	4.79	6.48	8.34
9	1.73	3.09	4.57	6.19	7.95
10	1.64	2.93	4.34	5.87	7.55
11	1.55	2.77	4.10	5.55	7.13
12	1.46	2.60	3.85	5.22	6.70
Time-varying population (%)					
8	–4.44	–3.16	–1.77	–0.25	1.40
9	–4.26	–3.04	–1.70	–0.24	1.35
10	–4.07	–2.90	–1.62	–0.23	1.29
11	–3.87	–2.76	–1.55	–0.22	1.23
12	–3.67	–2.61	–1.46	–0.21	1.16

NOTE: *For individuals with 50 percent down payment.

of 10 percent per year after 2009. In the following, we conduct sensitivity analyses on equation (10) by considering other possible growth rates for future income and housing prices. Let us assume a 50 percent down payment requirement and that future growth rates of income and housing prices take the values of 8 percent, 9 percent, 10 percent, 11 percent, and 12 percent, respectively. The implied aggregate saving rates under these possible future growth rates for income and housing prices are reported in Table 8, where the top panel assumes a constant demographic structure and the bottom panel considers a time-varying population.

First, Table 8 shows that, given the growth rate of housing prices (i.e., the columns), the aggregate saving rate decreases as the growth rate of income increases. This is consistent with the permanent income hypothesis. Second, the aggregate saving rate increases when housing prices are growing faster, given the income growth (i.e., the rows). The main reason for this increase is the existence of borrowing constraints. Third, the aggregate saving rate is highest (as high as 8.34 percent) when the expected future income growth rate is 8 percent and that of housing prices is 12 percent. However, if we reduce the down payment requirement from 50 percent to 33 percent, the aggregate saving rate becomes essentially zero. Even if the down payment remains 50 percent, taking into account China's demographic structure (lower panel in Table 8) also reduces the implied aggregate saving rate from 8.34 percent to 1.40 percent. Therefore, unless people expect that (i) housing prices will grow much faster than 12 percent per year, (ii) future income growth is significantly lower than 8 percent per year, and (iii) the borrowing constraints are more severe than the 50 percent down payment requirement, housing prices cannot explain China's persistently high aggregate household saving rate.

Other Possible Extensions

Our analysis so far is based on a simple economic model. However, our simple model can be further enriched. In this subsection, we discuss some possible extensions and the likely effects of such extensions on our results.

Endogenous Timing of Home Purchase. The optimal timing of home purchase t in our model

is exogenous and is calibrated using the average homebuyer's age (working years). If we can make this variable endogenous, the model has the potential to explain the difference in the optimal age of homebuyers across countries. However, even if this variable is endogenized, we still need to calibrate the other parameters so that the model-predicted timing of home purchase matches that in the data. This is not much different from exogenously setting $t = 15$, as we did herein. Therefore, even if t were endogenous, our results would still hold under similar calibrations.

Inclusion of Wealth Effects. In our simple model, a shelter is a pure consumption good and generates a constant lifetime utility. In reality, a shelter is also a capital good because it may yield capital gains when housing prices appreciate, which may generate positive wealth effects. However, this simplification does not hurt our analysis. If shelters were introduced into our model as a capital good (or durable consumption good), the situation is the same for the would-be homebuyer cohorts when the housing price increases; but for the current homeowners, it implies that their wealth would increase, which would decrease their saving incentives and mitigate the positive impact of rising housing prices on lifetime savings. Such a wealth effect may explain why the aggregate household saving rate in developed countries has been declining over the past decade. For example, Case, Quigley, and Shiller (2006), whose empirical analysis is based on U.S. cross-country and cross-state data, find that for every 10 percent increase in housing prices, the consumption-to-income ratio increases by 1.1 percent and the saving rate decreases by 1.1 percent. These authors explain their findings based on the wealth effect. Hence, introducing a wealth effect into our model would only strengthen our conclusion that rising housing prices cannot explain China's high aggregate saving rate.

Depreciation Less than 100 Percent. The previous analyses are based on the assumption that a house has zero market value at the end of a homeowner's life. This assumption is not realistic, but it is an innocuous assumption and does not affect our main results. The reason is simple: If homeowners could sell houses at the end of their lifetimes, they could then borrow against the home equity to increase consumption when young and use the proceeds from mortgage sales to repay their debt at the end of life. This would effectively relax borrowing constraints and reduce each individual's saving rate before buying a house. More specifically, if the market value of the house does not change over time and can be collateralized, an individual would then have no need to save before purchasing a home, would incur a negative saving rate (or positive borrowing) equivalent to the market value of the house when purchasing a home, and would incur a positive saving rate when selling the home at the end of life. Thus, the average lifetime saving rate would still be zero.

The Hump-Shaped Curve of Lifetime Income. Our model assumes that household income is either constant or increasing over time, but in reality income follows a life cycle with an inverted-U shape: Personal income peaks in middle age. However, our results are not sensitive to this income pattern. First, in our model the measured income is household or family income, not individual income. Household income is less hump-shaped than individual income unless both husband and wife are identical wage earners. Second, and more important, the primary concern for a hump-shaped income profile is that agents are more borrowing constrained at a young age. But in our model we have set the optimal age of home purchase as 35 (i.e., 15 years after joining the workforce), which is roughly the peak year of lifetime income. Thus, our calibration makes the concern of borrowing constraints due to a hump-shaped income pattern less relevant. In addition, our calibration of the down payment requirement of 50 percent has effectively overestimated the actual degree of borrowing constraints; we showed that, even under a 50 percent down payment requirement, the influence of rising housing prices on the aggregate saving rate is insignificant. Hence, taking into account the inverted-U curve of lifetime income should not change our results significantly.

Bequests. In China, many parents give money to their children to buy houses because the

children cannot afford the high mortgage costs. Hence, one popular view is that such altruism raised China's aggregate saving rate. We can use a version of our simple model to show that this view is incorrect because it again suffers from the fallacy of aggregation. The intuition is simple: Bequests from parents reduce their children's need to save; hence, at the aggregate level, bequests may have little effect on the average household saving rate.

CONCLUSION

Our analysis shows the following: (i) Without borrowing constraints and population growth, the aggregate household saving rate is essentially independent of rising housing prices. (ii) Accounting for China's demographics reduces the aggregate saving rate because the ratio of homebuyers to non-homebuyers has been increasing, which increases the weights of the negative savings of the homebuyers in aggregate savings. (iii) Under borrowing constraints the aggregate saving rate can become quite sensitive to housing prices; however, with realistic degrees of borrowing constraints (such as allowing for a 50 percent down payment), rising housing prices can generate an aggregate saving rate of 4.17 percent without considering the Chinese demographic structure (this value becomes zero if the demographic structure is taken into account). These values are too small to explain China's 20 percent aggregate saving rate. Therefore, our analysis clarifies a popular misunderstanding or fallacy that attributes the rapidly rising costs of living, such as housing, education, health care, and so on, to China's high aggregate household saving rate. This view ignores the saving-expenditure cancellation effect across cohorts.

If the rapidly rising housing prices and other costs of living are not responsible for the persistently high Chinese saving rate, what factors actually cause such saving? We believe that large uninsurable uncertainty and severe borrowing constraints in conjunction with rapid income growth may provide the answer to China's high household saving rate. For example, Wen (2009) shows that when individuals face large uninsured idiosyncratic risk and severe borrowing constraints, their marginal propensity to save becomes a positive function of the growth rate of their permanent income. Thus, rapid income growth could imply an extremely high household saving rate when financial markets are incomplete. In particular, Wen (2009) shows that a standard buffer-stock saving model with incomplete financial markets could generate a 30 percent aggregate household saving rate when the income growth rate is 10 percent per year. In this case, an individual's expenditure does not completely cancel his or her precautionary saving because of the need for a buffer stock at any moment in life. In other words, it is optimal to always maintain a positive stock of personal saving as self-insurance against unpredictable shocks.

Our findings also have some policy implications. Although rapidly rising housing prices may have adverse welfare effects on would-be homebuyers, policies designed to reduce housing prices may be effective in reducing the individual saving rate of young people but will not be effective in reducing the aggregate saving rate. In comparison, policies designed to reduce borrowing constraints and improve the efficiency of the financial system may prove more effective in reducing the aggregate saving rate.

REFERENCES

Bai, Chong-en and Qian, Zhenjie. "Factor Income Share in China: The Story Behind the Statistics." *Economic Research*, 2009, *3*, pp. 27-41.

Bernanke, Ben S. "The Global Saving Glut and the U.S. Current Account Deficit." Remarks by Governor Ben S. Bernanke at the Sandridge Lecture, Virginia Association of Economics, Richmond, Virginia, March 10, 2005; www.federalreserve.gov/boarddocs/speeches/2005/200503102/.

Carroll, Christopher D.; Overland, Jody and Weil, David N. "Saving and Growth with Habit Formation." *American Economic Review*, June 2000, *90*(3), pp. 341-55.

Case, Karl E.; Quigley, John M. and Shiller, Robert J. "Comparing Wealth Effects: The Stock Market versus the Housing Market." *Berkeley Electronic Journal of Microeconomics: Advances in Macroeconomics*, 2005, *5*(1), Article 1.

Chamon, Marcos D. and Prasad, Eswar, S. "Why Are Saving Rates of Urban Households in China Rising?" *American Economic Journal: Macroeconomics*, January 2010, *2*(1), pp. 93-130.

Chen, Kaiji; Imrohoroglu, Ayse and Imrohoroglu, Selahattin. "The Japanese Saving Rate." *American Economic Review*, December 2006, *96*(5), pp. 1850-58.

China Macroeconomic Network Database. www.macrochina.com.cn/english/index.shtml.

China Population and Employment Statistics Yearbook 2008. Beijing: China Statistics Press, 2008.

China Statistical Yearbook 2007. Beijing: China Statistics Press, 2007.

China Statistical Yearbook 2008. Beijing: China Statistics Press, 2008.

Friedman, Milton. *A Theory of the Consumption Function*. Princeton, NJ: Princeton University Press, 1957.

Greenspan, Alan. "The Fed Didn't Cause the Housing Bubble." *Wall Street Journal*, March 11, 2009, p. A15; http://online.wsj.com/article/SB123672965066989281.html.

Hayashi, Fumio. "Why Is Japan's Saving Rate So Apparently High?" in Stanley Fischer, ed., *NBER Macroeconomics Annual 1986*. Volume 1. Cambridge, MA: MIT Press, pp. 147-234.

He, Xinhua and Cao, Yongfu. "Understanding the High Saving Rate in China." *China and World Economy*, 2007, *15*(1), pp. 1-13.

Horioka, Charles Y. "Why Is Japan's Household Saving Rate So High? A Literature Survey." *Journal of the Japanese and International Economics*, March 1990, *4*(1), pp. 49-92.

Horioka, Charles Y. and Wan, Hunmin. "The Determinants of Household Saving in China: A Dynamic Panel Analysis of Provincial Data." *Journal of Money, Credit, and Banking*, December 2007, *39*(8), pp. 2077-96.

Modigliani, Franco and Cao, Shi L. "The Chinese Saving Puzzle and the Life-Cycle Hypothesis." *Journal of Economic Literature*, March 2004, *42*(1), pp. 145-70.

Song, Zheng; Storesletten, Kjetil and Zilibotti, Fabrizio. "Growing Like China." *American Economic Review*, February 2011, *101*, pp. 196-233.

Wei, Shang-Jin and Zhang, Xiaobo. "The Competitive Saving Motive: Evidence from Rising Sex Ratios and Savings Rates in China." NBER Working Paper No. 15093, National Bureau of Economic Research, June 2009; www.nber.org/papers/w15093.pdf.

Wen, Yi. "Saving and Growth under Borrowing Constraints: Explaining the 'High Saving Rate' Puzzle." Working Paper No. 2009-045C, Federal Reserve Bank of St. Louis, September 2009, revised June 2010; http://research.stlouisfed.org/wp/2009/2009-045.pdf.

Yuan, Zhigang and Song, Zheng. "Urban Consumption Behavior and China's Economic Growth." *Economic Research Journal*, 1999, *11*, pp. 20-28 [in Chinese].

Yuan, Zhigang and Song, Zheng. "The Age Composition of Population, the Endowment Insurance System and Optimal Savings Ratio in China." *Economic Research Journal*, 2000, *11*, pp. 24-32 [in Chinese].

Political Economy Determinants of Non-agricultural Trade Policy

Subhayu Bandyopadhyay and Suryadipta Roy

The authors investigate several existing political economy hypotheses on trade policy using cross-country trade-protection data for non-agricultural goods. The authors find that a left-leaning political regime leads to pro-labor trade policies only for a subset of trade policy measures. In addition, they find that income inequality and country-level corruption appear to be important determinants of trade policy. For various measures of trade protection, it appears that corruption tends to hurt labor interests by increasing trade protection in labor-abundant countries and reducing trade protection in capital-abundant countries. This finding suggests that corruption, among other factors, may move trade policy away from the desires of the median voter. (JEL F10, F11, F13, D73)

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Trade policy is often used by policymakers to favor certain constituencies. Tariffs and non-tariff barriers lead to increases in the price of the goods produced by import-competing sectors. Consequently, incomes of some factors of production in these sectors often rise at the expense of other factors. The theoretical foundations of this idea come from the famous Stolper-Samuelson theorem, which shows that protection raises the real return of the factor used intensively by the import-competing sector, while reducing the real return of the factor used intensively by the export sector. This result along with the Heckscher-Ohlin theorem on trade patterns suggest that, for a given country, greater protectionism causes hardships for its abundant factor but benefits its scarce factor. Thus, protectionism causes labor to lose in labor-abundant countries but gain in capital-abundant countries.

Consequently, if capital ownership is concentrated in the hands of a few in both labor- and capital-abundant countries, then the median voter in both countries will be a laborer. Majority voting will favor trade liberalization (or free trade) in labor-abundant countries but protectionism in capital-abundant ones (where labor loses from trade).The greater the income inequality in a country, the more pronounced this effect is likely to be. Therefore, one can expect inequality to reduce trade protection in labor-abundant countries, while raising it in capital-abundant ones.

The motive for appeasing the majority may be reinforced or neutralized by the political ideology of the government. For example, an increase in the leftist orientation of a government may lead to an increase in the weight attached to labor welfare relative to capital welfare in the government's weighted objective function. This will result in trade policies that are more pro-labor and complementary to the median-voter effect discussed above.

Dutt and Mitra (2002, 2005) provide evidence in support of both the inequality and political ideology hypotheses, respectively. Using a framework similar to the Heckscher-Ohlin Stolper-

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Samuelson framework, Djerdijan (2007) studies the simultaneous interaction of inequality and political ideology on trade policy. He finds that an increase in income inequality in a pro-worker regime is associated with more equitable trade policies, while in a pro-capitalist regime it is associated with more inequitable trade policies.

Our paper adds to the existing literature in the following ways. First, unlike the existing literature on cross-country trade policy, we use trade-protection data for the non-agricultural sector instead of aggregate trade data. We do this because, while the non-agricultural sector (e.g., mining and manufacturing) can be categorized as either labor intensive or capital intensive, it is difficult to ignore land as a third factor of production for the agricultural sector. Therefore, given that a prime motivation of this study is to understand how trade policy affects income distribution between labor and capital, using non-agricultural trade-protection data is more appropriate than using aggregate trade data. Second, in addition to studying the inequality and political ideology hypotheses, we incorporate a corruption hypothesis as another determinant of trade policy. The theoretical motivation behind incorporating corruption involves political influence: According to interest group models of international trade (Findlay and Wellisz, 1982; Hillman, 1982; and Grossman and Helpman, 1994), organized special interest groups lobby the government for trade protection and also provide campaign contributions to influence policy. Recent work by Gawande, Krishna, and Olarreaga (2009) suggests that the weights that governments attach to these contributions are positively correlated with levels of corruption. That is, more-corrupt governments attach higher weights to campaign contributions (relative to social welfare) in their respective objective functions. We build on this strand of the literature by allowing the level of corruption to interact with the capital-to-labor ratio. This allows us to analyze how corruption is associated with factor abundance in a Heckscher-Ohlin type model. The existing literature on the effects of corruption on trade openness and income distribution is relatively sparse. In a recent contribution, Roy (2010) finds corruption to be anti-labor: For the countries he studied, it reduces trade openness (measured by the trade-to-GDP [gross domestic product] ratio) in low-income countries and increases openness in high-income countries.

Our paper departs from Roy (2010) in two major ways. First, we use data on the capital-to-labor ratio instead of per capita income and can therefore address trade policies in the context of Heckscher-Ohlin type factor-abundance models. Second, we use trade-protection data for non-agricultural commodities instead of a broad measure of trade openness as the dependent variable in our regressions, for reasons discussed above.

The paper is organized as follows: The next section discusses the econometric model and the data sources; the third section reports the results for the baseline specification; the fourth section discusses the robustness tests; and the final section offers conclusions.

ECONOMETRIC MODEL

Based on the discussions in the previous section, we focus on these hypotheses:

The inequality hypothesis: All things equal, an increase in inequality will reduce trade protection in labor-abundant countries and increase trade protection in capital-abundant countries. Following Dutt and Mitra (2002), we estimate the following trade-protection equation for non-agricultural goods using cross-country measures on inequality and the capital-to-labor ratio:

$$TR_i = \alpha_0 + \alpha_1 INEQ_i + \alpha_2 INEQ_i \times (K/L)_i + \alpha_3 (K/L)_i + error. \quad (1)$$

From equation (1), the marginal effect of the $INEQ_i$ variable on TR_i is $\alpha_1 + \alpha_2 (K/L)_i$. Consider a labor-abundant country. In this case, $(K/L)_i$ is small and the sign of the marginal effect of inequality is likely to be driven by the coefficient α_1. Following the majority rule discussed above, in this country protection is expected to fall when inequality rises, giving the prior $\alpha_1 < 0$. Now consider a capital-abundant economy. In this case, $(K/L)_i$ is large and the sign of the marginal effect of inequality will be driven by the coeffi-

cient α_2. In this country, protection is expected to rise with inequality, giving the prior $\alpha_2 > 0$.

The ideology hypothesis: All things equal, an increase in the leftist political ideology of the government will reduce trade protection in labor-abundant countries and raise trade protection in capital-abundant countries. Dutt and Mitra (2005) used a specification of the following form to test the interaction between political ideology and the capital-to-labor ratio:

$$TR_i = \delta_0 + \delta_1 ID_i + \delta_2 ID_i \times (K/L)_i + \delta_3 (K/L)_i + error, \quad (2)$$

where ID_i denotes the political ideology of the government. If ID_i increases with left-wing ideology, then according to the ideology hypothesis, $\delta_1 < 0$ and $\delta_2 > 0$. In a related work, Dutt and Mitra (2006) combine the inequality and ideology hypotheses to test for the joint effect of the majority rule and political ideology on trade policy. We add a third hypothesis.

The corruption hypothesis: All things equal, if corruption has an anti-labor and pro-capital effect on trade policy, an increase in corruption will increase trade protection in labor-abundant countries and reduce trade protection in capital-abundant countries. (Conversely, if corruption has a pro-labor and anti-capital effect on trade policy, an increase in corruption will reduce trade protection in labor-abundant countries and increase trade protection in capital-abundant countries.)

The following specification tests for the differential effects of corruption on trade protection in labor-abundant and capital-abundant countries:

$$TR_i = \gamma_0 + \gamma_1 CORR_i + \gamma_2 CORR_i \times (K/L)_i + \gamma_3 (K/L)_i + error, \quad (3)$$

where $CORR_i$ is a measure of the level of corruption in country i.

If a higher level of corruption is associated with greater influence for pro-capital lobby groups (away from the median voter) in the design of trade policy, then we should expect $\gamma_1 > 0$ and $\gamma_2 < 0$. Figure 1 presents scatter plots of countries for two different protection measures—the Overall Trade Restrictive Index (OTRI) (top panels) and the weighted average tariff (bottom panels)—against an average measure of corruption (for the years 1996, 1998, and 2000) obtained from the World Governance Indicators. For the OTRI, higher values of corruption seem to be associated with greater trade protection in general, with the effect of corruption being higher for capital-abundant countries (i.e., countries with greater than the median capital-to-labor ratio for the sample). For the weighted average tariff, higher values of corruption seem to increase tariff protection more in labor-abundant countries (i.e., countries with less than the median capital-to-labor ratio for the sample) than capital-abundant countries. Thus, the effect of corruption on trade policy is an open-ended question, and the signs for γ_1 and γ_2 can suggest whether it is beneficial or harmful to the interests of labor—the median voter.

We also address complementarity versus substitutability of each of the individual hypotheses. If inequality, ideology, and corruption are correlated with each other, then the individual models might be substitutes for one another. However, it is possible that each individual hypothesis conveys additional information, so that a comprehensive model incorporating all three might explain trade policy better. Thus, the following comprehensive specification nests all three hypotheses:

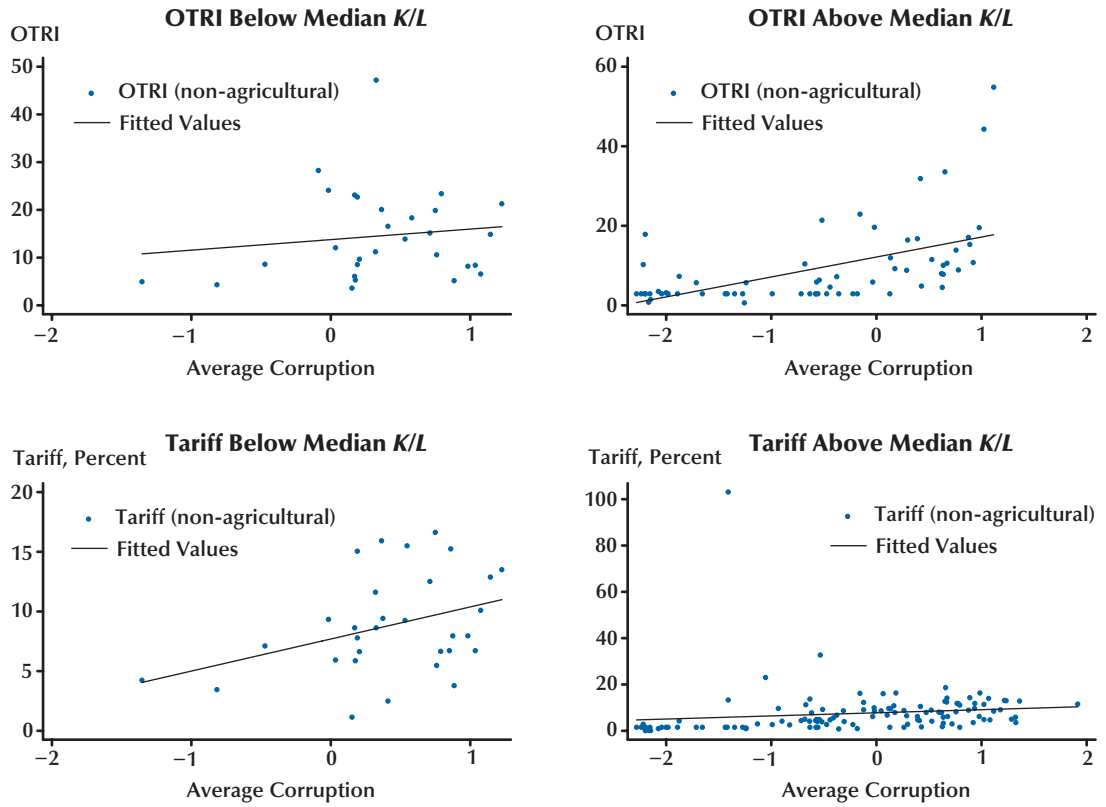
$$TR_i = \beta_0 + \beta_1 INEQ_i + \beta_2 INEQ_i \times (K/L)_i + \beta_3 ID_i + \beta_4 ID_i \times (K/L)_i + \beta_5 CORR_i + \beta_6 CORR_i \times (K/L)_i + \beta_7 (K/L)_i + error. \quad (4)$$

Based on Bayesian and non-Bayesian criteria and the goodness of fit measured by (adjusted) R^2, our results indicate that the comprehensive model dominates each of the individual hypotheses. Moreover, while we find substantial support for the inequality and the corruption hypotheses in the comprehensive model, we do not find significant support for the ideology hypothesis in predicting non-agricultural trade protection.

We use three separate measures of trade protection for non-agricultural commodities (obtained from the newly constructed 2008 World Trade Indicators from the World Bank) as dependent

Figure 1

Corruption and Trade Protection



variables: (i) OTRI, (ii) the simple average tariff, and (iii) the weighted average tariff. The OTRI is a summary measure of the impact of each country's trade policy on its aggregate imports. It is the uniform tariff that, if imposed on imports in place of the existing structure of protection, would leave aggregate imports at their current level (Kee, Nicita, and Olarreaga, 2009).[1] We use the average value of the OTRI for 2006 and 2007, the only years for which data are available. The simple average tariff rate is the average of all the applied tariff rates on non-agricultural commodities that a country applies to its trading partners. However, this includes tariff lines where there are no trade flows. Thus, for comparison we include another dependent variable—the trade-weighted average tariff rate. Using these different protection measures ensures that our results are robust to alternative measures of trade protection. For both the simple and weighted tariffs, we use the average during the period 2001-07.

Data on asset inequality are adopted from Easterly (2007). The measure for the asset-inequality variable is the average adjusted Gini coefficient during the period 1960-98.[2] Data on political ideology are from the Database of Politi-

[1] Coughlin (2010) provides an excellent review of the different World Bank trade restrictive indices. Given that non-tariff barriers might provide more protection than tariffs, as in the case of certain developed countries (e.g., the United States or the European Union), it might be misleading to focus on tariffs only. Thus, in addition to the tariff measures, we also use the OTRI measure as another trade policy indicator in our regressions.

[2] Easterly (2007) contains an elaborate discussion on the construction and applicability of this inequality measure.

cal Institutions (DPI) based on Beck et al. (2001), which is a large cross-country database of political institutions compiled by the Development Research Group of the World Bank, covering 178 countries between 1975 and 2009. The ideological orientation variable in the DPI is recoded as follows to reflect the extent to which the relevant government authority (presidential or parliamentary) can be classified as leftist: Left wing = 3, centrist = 2, and right wing = 1; hence, the higher numbers signify more-leftist orientation. We use the average of the variable between 1991 and 2000.

Our baseline specification presents results using the Nehru-Dhareshwar (Nehru and Dhareshwar, 1993) capital-to-labor ratio data adopted from Dutt and Mitra (2002) that use the average value of the capital-to-labor ratio for the 1980s. The capital-to-labor ratio was calculated by dividing Nehru-Dhareshwar capital stock data (Nehru and Dhareshwar, 1993) by the labor supply. The latter is defined as the population between the ages 15 and 64, according to the World Development Indicators.

Subsequently, we performed robustness checks using, respectively, the Summers-Heston and the Easterly-Levine capital-per-worker data for the 1980s (both adopted from Dutt and Mitra, 2002).[3] The corruption measure was obtained from the World Governance Indicators created by Kaufmann, Kraay, and Mastruzzi (2010), who have constructed six broad aggregates that measure governance for over 200 countries starting in 1996. We use the "control of corruption" indicator, which measures perceptions of corruption, and take the average of the index for the years 1996, 1998, and 2000.[4] (See the Data Appendix for variables and sources.) The corruption index is standardized to have zero mean and standard deviation 1 in the sample, with higher values representing better governance. For easy exposition, we multiply the index by –1, such that higher values of the index denote greater corruption.

Thus, data for the explanatory variables are lagged to those for the dependent variables. The trade policy measures our paper seeks to explain are from the 2001-07 period, while those of the important explanatory variables (i.e., inequality, political ideology, corruption, and the capital-to-labor ratio) all predate the protection measures in that the latest data for these variables are for the year 2000. This rules out the possibility of any feedback effect that the dependent variables might have on the explanatory variables in our dataset.[5]

SUMMARY STATISTICS AND REGRESSION RESULTS

Table 1A presents summary statistics for the major variables of interest. Hong Kong turns out to be the most open country, with OTRI = 0.6 and zero values for the two tariff measures. Singapore and Macao also have zero values for the weighted and unweighted tariffs, respectively.[6] In general, low-income countries seem to have higher trade protection compared with high-income countries. Thus, Tanzania, Djibouti, and Bermuda have the highest levels for the OTRI, simple average tariff, and weighted average tariff, respectively. The inequality measure ranges from a minimum of 23.97 for Mongolia to a maximum

[3] The Summers-Heston data are in constant 1985 international dollars. The Easterly-Levine data are constructed from the Summers-Heston disaggregated sectoral investment data along with disaggregated sector-level depreciation. The Nehru-Dhareshwar data include the largest number of countries, followed by the Summers-Heston data and the Easterly-Levine data.

[4] The control-of-corruption indicator is a measure of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

[5] This was consciously done to circumvent the problem of finding suitable instruments for all the explanatory variables. Obviously, for the (suspected) endogenous variables we needed to have at least four separate variables that (i) are individually highly correlated with each of the explanatory variables and (ii) satisfy the over-identifying restrictions (i.e., not correlated with the error term in the various specifications). Satisfying both restrictions for four separate explanatory variables would be a tall order. (See Murray, 2006, for a detailed discussion in this regard.) It is notoriously difficult to find instrument(s) for corruption alone in equations of trade protection or trade openness (see, e.g., Azfar, 2002) that satisfy the overidentifying restrictions. On these grounds, we decided to use lagged data for the explanatory variables that predate the dependent variables, such that the explanatory variables used in the study are not affected by feedback effects from trade policy on income distribution or the production structure.

[6] We addressed the issue of outliers in our data by running regressions after dropping Hong Kong, Macao, and Singapore from the pool of countries. Our major results involving the signs and the significance of the coefficients remain unaffected.

Table 1A

Summary Statistics

	Observations	Mean	Standard deviation	Minimum	Maximum
OTRI	95	10.80	10.22	0.6	54.9
Simple average tariff	174	9.01	6.31	0	32.53
Weighted average tariff	174	7.74	7.46	0	66.65
Inequality	130	42.23	9.10	23.97	67.46
Ideology	125	2.08	0.79	1	3
Corruption	184	0.02	0.99	–2.28	1.91
ln(Nehru-Dhareshwar *K*/*L*)	75	9.47	1.95	5.67	15.99
ln(Easterly-Levine *K*/*L*)	58	9.29	1.35	5.45	11.73
ln(Summers-Heston *K*/*L*)	63	9.10	1.28	5.33	11.05

Table 1B

Correlation Matrix

	OTRI	Simple average tariff	Weighted average tariff	Inequality	Ideology	Corruption	ln(ND *K*/*L*)
OTRI	1						
Simple average tariff	0.82	1					
Weighted average tariff	0.81	0.97	1				
Inequality	0.45	0.49	0.45	1			
Ideology	–0.07	–0.04	–0.09	–0.11	1		
Corruption	0.69	0.80	0.77	0.72	–0.09	1	
ln(Nehru-Dhareshwar *K*/*L*)	–0.69	–0.79	–0.72	–0.69	–0.04	–0.82	1
ln(Easterly-Levine *K*/*L*)	–0.69	–0.79	–0.71	–0.68	–0.08	–0.78	0.89
ln(Summers-Heston *K*/*L*)	–0.70	–0.80	–0.71	–0.67	–0.07	–0.79	0.90

NOTE: Number of observations = 34. ND, Nehru-Dhareshwar.

of 67.46 for Gabon. The corruption measure ranges from a minimum of –2.28 for Finland to a maximum of 1.91 for Zaire. Other results for low-income countries are similar to those for trade protection: These countries have higher levels of asset inequality (mainly in sub-Saharan Africa) and higher levels of corruption. Table 1B reports the correlation levels between the dependent variables and the different explanatory variables. All trade-protection measures are correlated with higher asset inequality and greater corruption, with the correlation coefficient varying from 0.45 to 0.49 for inequality and 0.69 to 0.80 for corruption. On the other hand, the ideology variable seems to be weakly negatively correlated with the protection measures. Corruption is highly correlated with income inequality ($r = 0.72$) for the minimum number of observations for which all the variables are present in the sample ($n = 34$). Thus, not including corruption as an explanatory variable would lead to an omitted variable bias in estimating trade policy.

Table 2A reports results for the inequality hypothesis for non-agricultural goods using the

Table 2A

Inequality Hypothesis

	Dependent variable: OTRI	Dependent variable: Simple average tariff	Dependent variable: Weighted average tariff
Inequality	–2.59***	–1.17***	–0.73***
	(0.87)	(0.30)	(0.26)
Inequality × ln(Nehru-Dhareshwar *K*/*L*)	0.31***	0.14***	0.091***
	(0.10)	(0.03)	(0.02)
ln(Nehru-Dhareshwar *K*/*L*)	–13.70***	–7.60***	–5.13***
	(3.50)	(1.27)	(1.12)
Akaike information criteria (AIC)	438.40	414.70	386.30
Bayesian information criteria (BIC)	446.80	423.70	395.40
Adjusted R^2	0.29	0.46	0.42
Ramsey RESET test *p*-value	0.01	0.40	0.61
Number of observations	60	71	71

NOTE: Robust or bootstrap standard errors are in parentheses. Low *p*-values of the Ramsey RESET test indicate misspecification; *** indicates significance at the 1 percent level.

Table 2B

Ideology Hypothesis

	Dependent variable: OTRI	Dependent variable: Simple average tariff	Dependent variable: Weighted average tariff
Ideology	–17.2	–10.2**	–6.26*
	(12.00)	(4.96)	(3.43)
Ideology × ln(Nehru-Dhareshwar *K*/*L*)	2.41*	1.35**	0.83**
	(1.39)	(0.56)	(0.37)
ln(Nehru-Dhareshwar *K*/*L*)	–6.42**	–4.84***	–3.32***
	(2.90)	(1.29)	(0.89)
AIC	376.70	352.80	327.40
BIC	384.40	361.10	335.70
Adjusted R^2	0.16	0.38	0.35
Ramsey RESET test *p*-value	0.0002	0.001	0.01
Number of observations	50	59	59

NOTE: Robust or bootstrap standard errors are in parentheses. Low Ramsey RESET test *p*-values indicate misspecification; *, **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

equation (1) specification. For all measures of trade protection, the inequality variable is negative and significant and the interaction term between inequality and the capital-to-labor ratio (measured by the Nehru-Dhareshwar capital-to-labor ratio data) is positive and significant (both at the 1 percent level). Thus, greater inequality is associated with reduced trade protection for non-agricultural goods in labor-abundant countries and more trade protection for such goods in capital-abundant countries. Given that the median voter (or labor) will gain from more trade in labor-abundant

Table 2C

Corruption Hypothesis

	Dependent variable: OTRI	Dependent variable: Simple average tariff	Dependent variable: Weighted average tariff
Corruption	–10.50	4.02	4.85†
	(8.92)	(3.40)	(2.93)
Corruption × ln(Nehru-Dhareshwar *K*/*L*)	1.53*	–0.01	–0.19
	(0.87)	(0.30)	(0.26)
ln(Nehru-Dhareshwar *K*/*L*)	0.85	–0.10	–0.20
	(0.84)	(0.39)	(0.27)
AIC	448.00	436.50	404.30
BIC	456.50	445.70	413.60
Adjusted R^2	0.34	0.50	0.47
Ramsey RESET test *p*-value	0.02	0.32	0.49
Number of observations	62	74	74

NOTE: Robust or bootstrap standard errors are in parentheses. Low Ramsey RESET test *p*-values indicate misspecification; † and * indicate significance at the 15 and 10 percent levels, respectively.

countries and lose from more trade in capital-abundant countries, majority interests may be an important factor in driving non-agricultural trade protection. Based on the results in Table 2B, non-agricultural tariff protection also lends some support to the ideology hypothesis. For both the simple and weighted average tariffs, the ideology variable is negative and significant, while the interaction term between ideology and the capital-to-labor ratio is positive and significant. Given that the ideology measure captures pro-worker interests, left-wing political ideology is associated with pro-labor non-agricultural trade policies in both labor-abundant and capital-abundant countries. These results provide support for the conclusions of Dutt and Mitra (2002, 2005) regarding non-agricultural commodities. However, based on the results in Table 2C, we do not find any evidence of a correlation between corruption and trade protection because both corruption and the interaction term (between corruption and the capital-to-labor ratio) are generally not statistically significant.

Given our previous findings on the high degree of correlation between corruption and trade protection and corruption and inequality, we suspect misspecification problems based on results from the stand-alone regressions. Thus, we estimate a comprehensive model for trade protection with inequality, ideology, and corruption along with their interactions with the capital-to-labor ratio as explanatory variables as in equation (4).

The results are reported in Table 3. For trade protection measured by the OTRI, however, none of the explanatory variables turn out to be significant. Except for inequality and its interaction with the capital-to-labor ratio, all other explanatory variables in this regression have signs opposite to those anticipated. Moreover, as indicated by the Ramsey RESET test, there seem to be misspecification problems in the comprehensive model for the OTRI since the null hypothesis of no omitted variables is rejected based on a significant *F*-test. The inequality hypothesis is validated by both the tariff measures. However, we do not find any support for the ideology hypothesis.

The corruption variable, however, is positive and significant at the 10 percent level for the simple tariff and at the 5 percent level for the weighted tariff. The interaction term between corruption and the capital-to-labor ratio is negative in both tariff regressions and statistically significant for the weighted tariff. Thus, we find some evidence that corruption is associated with

Table 3

Comprehensive Model

	Dependent variable: OTRI	Dependent variable: Simple average tariff	Dependent variable: Weighted average tariff
Inequality	–0.03	–0.73**	–0.63*
	(1.36)	(0.36)	(0.34)
Inequality × ln(Nehru-Dhareshwar *K*/*L*)	0.01	0.07*	0.063*
	(0.13)	(0.04)	(0.04)
Ideology	5.57	–1.01	–0.31
	(10.70)	(3.18)	(2.37)
Ideology × ln(Nehru-Dhareshwar *K*/*L*)	–0.06	0.30	0.14
	(0.99)	(0.30)	(0.22)
Corruption	–1.60	7.98*	8.64**
	(9.64)	(4.08)	(3.27)
Corruption × ln(Nehru-Dhareshwar *K*/*L*)	0.72	–0.48	–0.62*
	(0.95)	(0.40)	(0.32)
ln(Nehru-Dhareshwar *K*/*L*)	0.93	–4.41**	–3.57**
	(7.37)	(1.94)	(1.71)
AIC	360.20	325.60	306.50
BIC	375.50	342.20	323.10
Adjusted R^2	0.44	0.63	0.57
Ramsey RESET test *p*-value	0.02	0.23	0.15
Number of observations	50	59	59

NOTE: Robust or bootstrap standard errors are in parentheses. Low Ramsey RESET test *p*-values indicate misspecification; * and ** indicate significance at the 10 and 5 percent levels, respectively.

greater protection in labor-abundant countries and reduced protection in capital-abundant countries. The Ramsey RESET test does not report any misspecification problem for the tariff regressions. The comprehensive model explains a larger portion of the variation for each dependent variable in comparison with the stand-alone models in equations (1) through (3), as indicated by the higher values of the adjusted R^2. Also, for all dependent variables, both the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) select the comprehensive model over the models of the individual hypotheses.

ROBUSTNESS CHECKS

First, we try to address the issue of omitted variable bias by controlling for various country-level characteristics that might be correlated with the important explanatory variables in the regressions. We use three control variables found to be important determinants of trade policy in previous studies: an inverse index of democracy (the Gastil index of political rights), a measure of human capital, and the logarithm of per capita income. The logic behind introducing these control variables is the following: The level of political rights has been found to be an important predictor of trade policy, because democratic regimes may differ from dictatorial regimes in terms of income distribution considerations (Milner and Kubota, 2005). Literacy (or human capital) measured by years of schooling may also be an important determinant of trade protection (openness) of countries. For example, educated individuals may be better able to understand the deadweight costs of trade protection that favors special interest groups (Dutt and Mitra, 2002). Finally, per capita income has often been used in

the literature because low-income countries may use trade policy (tariff barriers) to generate revenue when the income tax base is small.

The political rights measure is an average of the score for political rights and civil rights between 1991 and 2000 from Freedom House, with higher values denoting less political freedom. The measure of human capital, adopted from Neeman, Paserman, and Simhon (2008), is an index of human capital based on a piecewise linear function of total years of schooling for the population age 25 and above, as obtained from Barro and Lee (2000). Data on real per capita income for countries are from the World Development Indicators. We also introduce several regional dummies based on groupings from the World Trade Indicators to capture geographical or structural characteristics otherwise not incorporated in the regressions.

Results for the comprehensive model with the regional dummy variables[7] included are reported in column A of Tables 4 through 6. Both the inequality and corruption hypotheses find strong support from the two tariff measures: The interaction term between the capital-to-labor ratio and each hypothesis is significant at the 1 percent level. None of the explanatory variables are significant for the OTRI. Moreover, the ideology hypothesis does not find support in any of the regressions. The results remain unchanged once we control for political rights, human capital, and per capita income (see column B of Tables 4 through 6). None of the control variables are significant. A striking feature of the model is that for cross-country data it can explain a substantial portion of variation for both tariff measures, as characterized by the (adjusted) R^2 values of 0.82 and 0.83 for the weighted and unweighted tariffs, respectively.

We also carry out further robustness checks by introducing additional controls that might be correlated with trade protection as well as the institutional structure of the economy. These include the distance of the country from the equator, measured by its latitude; dummy variables indicating the religious composition of the population; the legal origin; and the ethno-linguistic fractionalization index, which has been found to be an important determinant of corruption in previous studies (La Porta et al., 1999). Data on all the variables are adopted from Neeman, Paserman, and Simhon (2008). The results are reported in column C of Tables 4 through 6. The inclusion of these variables essentially has no impact on our previous conclusions regarding the inequality and corruption hypotheses. Interestingly, we find support for the ideology hypothesis from the unweighted tariff measure since both ideology and its interaction with the capital-to-labor ratio are significant (at the 5 percent level). Moreover, the values of the (adjusted) R^2 for the tariff measures are higher. The results also indicate that the comprehensive model does not receive much support from the OTRI protection measure in that none of the explanatory variables (inequality, political ideology, and corruption) turn out to be significant. One explanation is that the OTRI is a summary measure that incorporates both tariff and non-tariff barriers, and because non-tariff barriers are more prevalent in high-income (capital-abundant) countries than low-income (labor-abundant) countries, there might not be substantial variability in the data for the model to significantly explain variations in the OTRI. Moreover, the OTRI measure is available for a much smaller sample of countries (95) compared with that for the tariff measures (174).

Finally, we use the Easterly-Levine and the Summers-Heston capital-per-worker data as explanatory variables instead of the Nehru-Dhareshwar capital-per-worker data. Interestingly, we find strong support for both the inequality and the corruption hypotheses from the OTRI trade policy measure (see columns D and E of Table 6). For regressions with the tariff measures, we also find support for these hypotheses when we use the Summers-Heston capital-to-labor ratio as an explanatory variable (see column E of Tables 4 and 5). However, the corruption hypothesis does not receive significant support from the simple or weighted tariff regressions using the Easterly-Levine capital-to-labor ratio because both corruption and its interaction term do not

[7] The regional groupings that were found to be significant on the basis of a Wald test and, hence, the regressions include East Asia and the Pacific, sub-Saharan Africa, South Asia, the Middle East, and Latin America.

Table 4

Simple Average Tariff

	(A)	(B)	(C)	(D)	(E)
Inequality	–1.15***	–1.13***	–1.44***	–1.86**	–1.58*
	(0.30)	(0.35)	(0.40)	(0.79)	(0.78)
Inequality × ln(Nehru-Dhareshwar *K*/*L*)	0.11***	0.11***	0.15***		
	(0.03)	(0.04)	(0.04)		
Ideology	–3.36	–3.93†	–4.74**	2.80	0.15
	(2.38)	(2.52)	(2.24)	(4.89)	(4.21)
Ideology × ln(Nehru-Dhareshwar *K*/*L*)	0.35	0.40†	0.50**		
	(0.25)	(0.26)	(0.24)		
Corruption	10.00***	9.78***	14.40***	11.10†	15.70**
	(2.59)	(2.67)	(3.41)	(6.80)	(6.86)
Corruption × ln(Nehru-Dhareshwar *K*/*L*)	–0.86***	–0.84***	–1.41***		
	(0.26)	(0.26)	(0.34)		
ln(Nehru-Dhareshwar *K*/*L*)	–5.98***	–5.81***	–7.87***		
	(1.54)	(1.78)	(2.11)		
ln(Real GDP per capita)		–0.86	–0.61	–0.53	1.06
		(0.81)	(0.92)	(1.12)	(1.02)
Political rights		–0.13	–0.55	0.45	0.30
		(0.56)	(0.53)	(1.16)	(0.91)
Human capital		1.96	0.72	–2.93	2.63
		(2.26)	(3.02)	(4.75)	(4.03)
Inequality × ln(Easterly-Levine *K*/*L*)				0.17*	
				(0.09)	
Ideology × ln(Easterly-Levine *K*/*L*)				–0.37	
				(0.51)	
Corruption × ln(Easterly-Levine *K*/*L*)				–1.06	
				(0.73)	
ln(Easterly-Levine *K*/*L*)				–6.17†	
				(3.86)	
Inequality × ln(Summers-Heston K/L)					0.16*
					(0.09)
Ideology × ln(Summers-Heston *K*/*L*)					0.01
					(0.45)
Corruption × ln(Summers-Heston *K*/*L*)					–1.52*
					(0.75)
ln(Summers-Heston *K*/*L*)					–8.43*
					(4.50)
Regional groupings	Yes	Yes	Yes	Yes	Yes
Latitude, religion dummies, legal origin dummies, fractionalization index			Yes	Yes	Yes
AIC	282.20	286.60	283.80	214.50	239.70
BIC	309.20	319.80	329.50	252.50	279.50
Adjusted R^2	0.83	0.83	0.84	0.80	0.77
Number of observations	59	59	59	45	49

NOTE: Robust or bootstrap standard errors are in parentheses; †, * , **, and *** indicate significance at the 15, 10, 5, and 1 percent levels, respectively.

Table 5

Weighted Average Tariff

	(A)	(B)	(C)	(D)	(E)
Inequality	–1.01***	–1.20***	–1.26***	–1.00†	–1.02*
	(0.29)	(0.30)	(0.34)	(0.65)	(0.59)
Inequality × ln(Nehru-Dhareshwar *K*/*L*)	0.10***	0.12***	0.13***		
	(0.03)	(0.03)	(0.04)		
Ideology	–2.20	–2.84	–2.84	3.23	2.84
	(1.99)	(2.20)	(2.09)	(3.76)	(3.56)
Ideology × ln(Nehru-Dhareshwar *K*/*L*)	0.20	0.25	0.26		
	(0.21)	(0.23)	(0.23)		
Corruption	10.00***	11.40***	12.40***	8.55†	12.00**
	(2.20)	(2.16)	(2.68)	(5.53)	(5.48)
Corruption × ln(Nehru-Dhareshwar *K*/*L*)	–0.91***	–1.04***	–1.19***		
	(0.22)	(0.21)	(0.27)		
ln(Nehru-Dhareshwar *K*/*L*)	–5.26***	–6.18***	–6.63***		
	(1.51)	(1.58)	(1.88)		
ln(Real GDP per capita)		–0.22	0.13	–0.24	0.35
		(0.74)	(0.74)	(0.83)	(0.74)
Political rights		–0.68†	–0.85*	–0.64	–0.84
		(0.43)	(0.45)	(1.08)	(0.75)
Human capital		–1.53	–3.68*	–7.27**	–4.76*
		(1.71)	(1.97)	(2.76)	(2.68)
Inequality × ln(Easterly-Levine *K*/*L*)				0.091	
				(0.07)	
Ideology × ln(Easterly-Levine *K*/*L*)				–0.47	
				(0.41)	
Corruption × ln(Easterly-Levine *K*/*L*)				–0.78	
				(0.57)	
ln(Easterly-Levine *K*/*L*)				–2.83	
				(2.82)	
Inequality × ln(Summers-Heston K/L)					0.10†
					(0.07)
Ideology × ln(Summers-Heston *K*/*L*)					–0.39
					(0.38)
Corruption × ln(Summers-Heston *K*/*L*)					–1.13*
					(0.60)
ln(Summers-Heston *K*/*L*)					–4.12
					(3.44)
Regional groupings	Yes	Yes	Yes	Yes	Yes
Latitude, religion dummies, legal origin dummies, fractionalization index			Yes	Yes	Yes
AIC	259.00	260.70	261.20	193.00	210.80
BIC	286.00	293.90	306.90	231.00	250.60
Adjusted R^2	0.82	0.82	0.83	0.81	0.79
Number of observations	59	59	59	45	49

NOTE: Robust or bootstrap standard errors are in parentheses; †, * , **, and *** indicate significance at the 15, 10, 5, and 1 percent levels, respectively.

Table 6

OTRI

	(A)	(B)	(C)	(D)	(E)
Inequality	–0.94	0.29	1.12	–4.64**	–4.07***
	(1.63)	(2.18)	(2.97)	(2.01)	(1.13)
Inequality × ln(Nehru-Dhareshwar *K*/*L*)	0.09	–0.04	–0.13		
	(0.16)	(0.21)	(0.30)		
Ideology	–2.10	–2.07	0.12	12.90	14.50
	(9.66)	(11.30)	(14.90)	(13.80)	(13.70)
Ideology × ln(Nehru-Dhareshwar *K*/*L*)	0.24	0.23	0.10		
	(0.83)	(0.99)	(1.27)		
Corruption	0.77	–6.63	–8.73	35.30***	44.00***
	(8.35)	(11.60)	(17.10)	(10.20)	(11.90)
Corruption × ln(Nehru-Dhareshwar *K*/*L*)	0.24	0.54	0.65		
	(0.85)	(1.02)	(1.72)		
ln(Nehru-Dhareshwar *K*/*L*)	–2.97	4.12	9.17		
	(8.65)	(11.60)	(16.80)		
ln(Real GDP per capita)		–3.94	–3.60	–0.95	0.49
		(2.69)	(2.92)	(2.07)	(1.72)
Political rights		1.11	2.08	1.87	0.63
		(1.99)	(2.69)	(2.62)	(1.98)
Human capital		–10.40	–14.10	0.80	–1.01
		(12.70)	(14.90)	(7.10)	(6.34)
Inequality × ln(Easterly-Levine *K*/*L*)				0.46**	
				(0.21)	
Ideology × ln(Easterly-Levine *K*/*L*)				–1.32	
				(1.35)	
Corruption × ln(Easterly-Levine *K*/*L*)				–3.97***	
				(1.13)	
ln(Easterly-Levine *K*/*L*)				–19.40**	
				(8.01)	
Inequality × ln(Summers-Heston K/L)					0.43***
					(0.13)
Ideology × ln(Summers-Heston *K*/*L*)					–1.37
					(1.39)
Corruption × ln(Summers-Heston *K*/*L*)					–4.79***
					(1.24)
ln(Summers-Heston *K*/*L*)					–18.90**
					(7.31)
Regional groupings	Yes	Yes	Yes	Yes	Yes
Latitude, religion dummies, legal origin dummies, fractionalization index			Yes	Yes	Yes
AIC	353.80	349.90	358.40	197.90	223.50
BIC	378.70	380.50	400.50	231.20	259.00
Adjusted R^2	0.54	0.59	0.54	0.62	0.59
Number of observations	50	50	50	36	40

NOTE: Robust or bootstrap standard errors are in parentheses; †, * , **, and *** indicate significance at the 15, 10, 5, and 1 percent levels, respectively.

remain significant at the conventional level (see column D of Tables 4 and 5). The difference in the results probably can be attributed to the differences in the methodology and the assumptions behind construction of the data on capital stock, as these different cross-country datasets return different country rankings on capital per worker.[8]

CONCLUSION

Using cross-country trade-protection data for non-agricultural commodities, we find that in the presence of inequality and left-wing ideology, corruption is systematically related to higher protection in labor-abundant countries and lower protection in capital-abundant countries, thereby hurting labor (i.e., the median voter) in both situations. Moreover, we find that in the presence of inequality and corruption, political ideology may not be a significant factor in explaining trade protection for non-agricultural goods. The hypothesis that left-leaning governments will be pro-labor in their trade policy is supported only in a small number of specifications. On the other hand, the inequality hypothesis receives more consistent support as a major determinant of non-agricultural trade policy. These differences in our findings relative to Dutt and Mitra (2002, 2005, and 2006) are interesting, and our use of non-agricultural trade-protection data seems to be critical. The results also bring to light the interactions among inequality, ideology, and corruption in determining trade policy. Future work in this area should take the influence of lobbying into consideration, in addition to invoking concerns about the majority rule and the partisan nature of government.

[8] See Barseghyan and DiCecio (2010) for a discussion in this regard.

REFERENCES

Azfar, Omar. "The New Institutional Approach to Economic Development: An Analytic Primer." Paper No. 02/03, IRIS Center, University of Maryland, March 2002; www.iris.umd.edu/Reader.aspx?TYPE=FORMAL_PUBLICATION&ID=70843195-11ce-426b-b8ff-bb0076128693.

Barro, Robert J. and Lee, Jong-Wha. "International Data on Educational Attainment: Updates and Implications." Working Paper No. 42, Center for International Development, Harvard University, April 2000; www.hks.harvard.edu/centers/cid/publications/faculty-working-papers/cid-working-paper-no.-42.

Barseghyan, Levon and DiCecio, Riccardo. "Cross-country Income Convergence Revisited." Working Paper No. 2010-021, Federal Reserve Bank of St. Louis, July 2010; http://research.stlouisfed.org/wp/2010/2010-021.pdf.

Beck, Thorsten; Clarke, George; Groff, Alberto; Keefer, Philip and Walsh, Patrick. "New Tools and New Tests in Comparative Political Economy: The Database of Political Institutions." *World Bank Economic Review*, 2001, *15*(1), pp. 165-76.

Coughlin, Cletus C. "Measuring International Trade Policy: A Primer on Trade Restrictiveness Indices." Federal Reserve Bank of St. Louis *Review*, September/October 2010, *92*(5), pp. 381-94; http://research.stlouisfed.org/publications/review/10/09/Coughlin.pdf.

Djerdjian, Daron O. "Ideology, Inequality and Inequitable Trade Policies." *B.E. Journal of Economic Analysis & Policy*, August 2007, *7*(1), Article 39.

Dutt, Pushan and Mitra, Devashish. "Endogenous Trade Policy through Majority Voting: An Empirical Investigation." *Journal of International Economics*, October 2002, *58*(1), pp. 107-33.

Dutt, Pushan and Mitra, Devashish. "Political Ideology and Endogenous Trade Policy: An Empirical Investigation." *Review of Economics and Statistics*, February 2005, *87*(1), pp. 59-72.

Dutt, Pushan and Mitra, Devashish. "Labor versus Capital in Trade-Policy: The Role of Ideology and Inequality." *Journal of International Economics*, July 2006, *69*(2), pp. 310-20.

Easterly, William. "Inequality Does Cause Underdevelopment: Insights from a New Instrument." *Journal of Development Economics*, November 2007, *84*(2), pp. 755-76.

Findlay, Ronald and Wellisz, Stanislaw. "Endogenous Tariffs, the Political Economy of Trade Restrictions, and Welfare," in J. Bhagwati, ed., *Import Competition and Response*. Chicago: University of Chicago, 1982.

Gawande, Kishore; Krishna, Pravin and Olarreaga, Marcelo. "What Governments Maximize and Why: The View from Trade." *International Organization*, Summer 2009, *63*(3), pp. 491-532.

Grossman, Gene M. and Helpman, Elhanan. "Protection for Sale." *American Economic Review*, September 1994, *84*(4), pp. 833-50.

Hillman, Arye L. "Declining Industries and Political Support Protectionist Motives." *American Economic Review*, December 1982, *72*(5), pp. 1180-87.

Kaufmann, Daniel; Kraay, Aart and Mastruzzi, Massimo. "The Worldwide Governance Indicators: Methodology and Analytical Issues." Policy Research Working Paper No. 5430, World Bank, 2010; http://siteresources.worldbank.org/INTMACRO/Resources/WPS5430.pdf.

Kee, Hiau Looi; Nicita, Alessandro and Olarreaga, Marcelo. "Estimating Trade Restrictiveness Indices." *Economic Journal*, January 2009, *119*(534), pp. 172-99.

La Porta, Rafael; Lopez-de-Silanes, Florencio; Shleifer, Andrei and Vishny, Robert. "The Quality of Government." *Journal of Law, Economics, and Organization*, 1999, *15*(1), pp. 222-79.

Milner, Helen V. and Kubota, Keiko. "Why the Move to Free Trade? Democracy and Trade Policy in the Developing Countries." *International Organization*, Winter 2005, *59*(1), pp. 107-43.

Murray, Michael P. "Avoiding Invalid Instruments and Coping with Weak Instruments." *Journal of Economic Perspectives*, Fall 2006, *20*(4), pp. 111-32.

Neeman, Zvika; Paserman, M. Daniele and Simhon, Avi. "Corruption and Openness." *B.E. Journal of Economic Analysis & Policy*, 2008, *8*(1), Article 50.

Nehru, Vikram and Dhareshwar, Ashok. "A New Database on Physical Capital Stock: Sources, Methodology, and Results." *Revista de Análisis Económico* (*Economic Analysis Review*), 1993, *8*(1), pp. 37-59.

Roy, Suryadipta. "Is Corruption Anti-labour?" *Applied Economics Letters*, March/April 2010, *17*(4-6), pp. 329-33.

DATA APPENDIX

Variable	Description	Source	Number of countries included
Corruption, 1996-2000 average	Aggregate of several indicators, measuring "the extent to which public power is exercised for private gain" (p. 3)	Kaufmann, Kraay, and Mastruzzi (2010); http://info.worldbank.org/governance/wgi/index.asp	184
Inequality, 1960-98 average	Gini coefficient	Easterly (2007); http://williameasterly.org/academic-work/peer-reviewed-publications/	130
Political ideology, 1991-2000 average	Political orientation of the chief executive	Beck et al. (2001)	125
Capital per worker: Nehru-Dhareshwar, 1980s average	Total physical capital (divided by labor force)	Nehru and Dhareshwar (1993); World Bank	75
Capital per worker: Summers-Heston, 1980s average	Capital stock per worker	Penn World Tables 5.6; http://datacentre2.chass.utoronto.ca/pwt56/	63
Capital per worker: Easterly-Levine, 1980s average	Capital stock per worker	Global Development Network Growth Database; http://dri.fas.nyu.edu/object/dri.resources.growthdatabase	58
OTRI, 2006-07 average	Uniform equivalent tariff that would maintain the country's aggregate import volume at its current level	World Trade Indicators (2008) World Bank	95
Simple average tariff, 2001-07 average	Average of the applied tariff rates available at HS 6-digit product level	World Trade Indicators (2008) World Bank	151
Weighted average tariff, 2001-07 average	Average of the applied tariff rates available at HS 6-digit product level weighted by trade import values	World Trade Indicators (2008) World Bank	151
Regional groupings	Region dummy variables	World Trade Indicators (2008) World Bank	
Real per capita income, 1991-2000 average	Average value of the logarithm of real per capita income	World Development Indicators (2010) World Bank	177
Human capital, latitude, religion dummy, legal origin dummy, fractionalization index		See Neeman et al. (2008)	

NOTE: HS, Harmonized Commodity Description and Coding System.

TARP Beneficiaries and Their Lending Patterns During the Financial Crisis

Silvio Contessi and Johanna L. Francis

This paper provides a systematic analysis of the lending performance of U.S. commercial banks and savings institutions that received financial support through the Capital Purchase Program (CPP) established in October 2008. The authors combine U.S. Treasury data on recipients of the CPP with quarterly financial data for the entire population of depository institutions to reconstruct aggregate lending and gross credit flows (expansion and contraction). CPP institutions experienced a less severe lending contraction than non-CPP institutions for all types of loans and bank asset levels. The authors find no evidence of unusual reallocation of lending across depository institutions. (JEL E44, E51, G21)

Federal Reserve Banks of St. Louis *Review*, March/April 2011, *93*(2), pp. 105-25.

Analyses of disaggregated commercial bank data reveal substantial heterogeneity among groups of banks along various dimensions of activity, including the dynamics of lending. This paper undertakes a systematic analysis of the lending performance of U.S. depository institutions (banks and thrifts, termed DIs hereafter) that distinguishes between two groups: the DIs that received financial support through the Capital Purchase Program (CPP) of the Troubled Asset Relief Program (TARP) of 2008-10 and those that did not receive any assistance through this program (non-CPP).

Analyses of the lending patterns are relevant because the explicitly stated objective of the CPP and other related programs was to slow the lending decline.[1] Therefore, the objective of our analysis is to identify possible prima facie differences in lending patterns in these two groups of DIs to pave the way for further analysis on the impact of the CPP on lending. The Office of the Special Inspector General for the Troubled Asset Relief Program (SIGTARP, 2009a) scrutinized the lending behavior of nine large financial institutions that received CPP assistance and found a contraction in their lending, suggesting that the CPP program did not deliver what it promised. Our analysis is more extensive—in fact, as extensive as feasible: We study the entire population of U.S. commercial banks and thrifts. We construct a novel dataset based on four sources of data. We

[1] This objective was clearly stated by Treasury Secretary Geithner in the "Remarks" section introducing the Financial Stability Plan (February 10, 2009): "The capital will come with conditions to help ensure that every dollar of assistance is used to generate a level of lending greater than what would have been possible in the absence of government support." In addition to reducing the impact of the credit contraction, the program was designed to favor the ordered recapitalization of financial institutions, an argument put forth by many commentators and economists (Hoshi and Kashyap, 2010).

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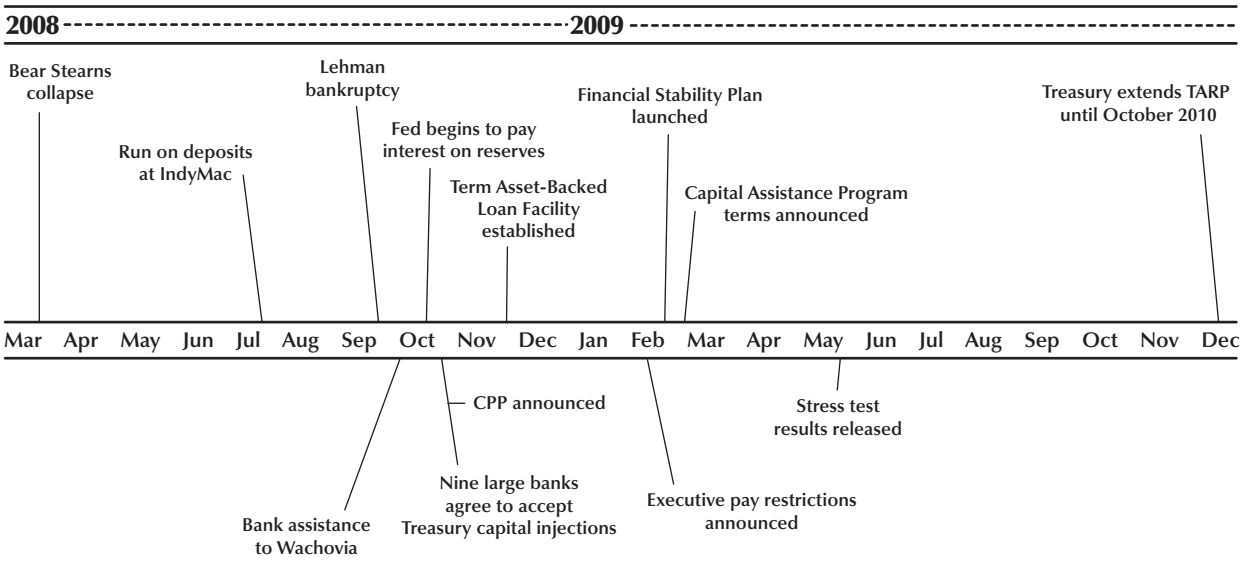
Figure 1

Timeline for Economic Crisis



first combine public regulatory data at the level of the individual financial institution—namely, loans of all U.S. commercial banks (through Call Reports [CRs]) and thrifts (through Thrift Financial Reports [TFRs]).[2] This allows us to use data on cross-mergers and acquisitions to control for situations in which a bank acquires one or more thrifts and vice versa. We then match Treasury data on the CPP disbursement to the CRs and TFRs (summarized in the "Data and Descriptive Statistics" section). Using this dataset we study aggregate and gross credit flows series for U.S. commercial banks and thrifts between 1998:Q1 and 2010:Q2, dividing them into CPP and non-CPP beneficiaries.[3]

We show that the DIs that received CPP assistance exhibited less contraction than non-CPP beneficiaries. This is particularly evident for real estate lending and relatively larger institutions. We emphasize that a better performance of CPP beneficiaries may be due to either the fact that the CPP actually slowed the decline in lending or to selection and endogeneity problems that are not addressed here but which we attempt to analyze in related research. We then use gross credit flows (expansion and contraction) to determine whether unusual reallocation of credit occurred across banks during the crisis and find no evidence of this in our data.

THE TARP: AN OVERVIEW

The TARP is part of the Emergency Economic Stabilization Act signed into law on October 3, 2008. This and other events pertaining to the financial crisis are shown in the timeline of selected events in Figure 1. The initial plan proposed by U.S. Secretary of the Treasury Henry Paulson and Federal Reserve Chairman Ben Bernanke was to allow the U.S. Treasury to purchase or insure up to $700 billion of a wide array of "troubled assets" that included not only

[2] This type of study has rarely been done thus far, except for Lown, Peristiani, and Robinson (2006) and Avery and Samolyk (2004). The CRs have been widely used in applied banking research; see, for example, Cebenoyan and Strahan (2004) and Kishana and Opielab (2006).

[3] More precisely, the definition of "depository institutions" includes mutual savings banks, savings and loan associations, credit unions, and regulated investment companies.

mortgage-backed securities but also "any other financial instrument" on the books of U.S. financial institutions; the plan's objective was to promote stability in the financial system. The initial course of action had to be altered because major complications in pricing these complex assets prevented immediate action at the peak of the financial crisis. On October 14, 2008, the U.S. Treasury established the CPP with the intent to recapitalize banks by purchasing $250 billion in preferred shares of stocks in "healthy qualifying financial institutions" (banks, savings associations, bank holding companies [BHCs], and certain savings and loans institutions). The initial $125 billion was dispersed to the nine largest banks and the remaining funds were soon made available to other institutions.[4] The Treasury determined eligibility and allocation of funds after consultation with the appropriate federal banking agency charged with supervision of the applicant. The capital injections were normally achieved by the purchase of senior preferred stocks. In return for its investment, the Treasury received dividend payments and warrants.[5] The value of the shares bought by the U.S. Treasury was between 1 and 3 percent of the participating institutions' risk-weighted assets, not to exceed $25 billion. The Treasury specified the qualifications for preferred shares and dividend payments.

According to the guidelines established by the Treasury, any qualifying financial institution was entitled to apply for CPP assistance.[6] The applications were submitted to the institution's primary regulator for initial eligibility determination. The federal banking agency then reviewed many financial aspects of the bank, especially its CAMELS rating.[7] The federal banking agency then classified each bank into one of three categories:

> *Category 1* applications were evaluated by the TARP Investment Committee, composed of senior Treasury officials. The Committee could grant preliminary approval for an application and send it to the assistant secretary for financial stability, who had the final authority to approve the application.
>
> *Category 2* applications were sent to the investment committee at the Treasury's Office of Financial Stability. The committee could recommend an application for approval, request more information, or recommend withdrawal. If recommended for approval, the Category 1 process was initiated.
>
> *Category 3* applicants were asked to send more information or withdraw their applications.

The settlement stage then began within two business days at which point the transactions were publicly announced, but announcements were not made regarding applicants that did not receive funding. The Treasury website lists details of terms and conditions on the shares, warrants, loans, and so on (for example, dividends, limits, executive compensation, repurchasing, and reporting).[8] Although the individual financial institutions had to meet certain standards, they were not required to report on the use of funds, a fact that was subsequently widely criticized (see SIGTARP, 2009b).

After May 2009, the program took two somewhat unanticipated turns. First, some financial institutions volunteered to return the capital injection earlier than expected. Accordingly, the Treasury established guidelines for the repayment

[4] The nine banks are Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JPMorgan, Morgan Stanley, State Street, Wells Fargo, and Merrill Lynch.

[5] The February Report by the Congressional Oversight Panel indicates that for every $100 invested, the Treasury received stock and warrants worth only approximately $66; see Congressional Oversight Panel (2009), pp. 5-11. The receipt of warrants to purchase common stock was intended to allow the Treasury to gain from potential stock price increases.

[6] Such applications listed guidelines and asked for contact information and information on the amount of shares requested, the sum of the institution's total risk-weighted assets, and a description of any mergers, acquisitions, and capital raising that were currently pending.

[7] A confidential rating of a bank's overall condition that is based on capital adequacy (C), asset quality (A), management quality (M), earnings (E), liquidity, (L) and sensitivity to market risk (S)—hence CAMELS.

[8] By December 31, 2009, a few hundred billion dollars of TARP funds had been committed in a total of 12 programs, including the American International Group (AIG) Targeted Investment Program ($69.8 billion), Legacy Securities Public-Private Investment Program ($30 billion), and the Automotive Industry Financing Program ($81.3 billion).

of the funds through redemption of an institution's preferred stocks and repurchase of the warrants, upon approval by its regulators. Second, the Treasury announced that the application period for publicly held financial institutions to participate in the CPP ended on November 14, 2009, at the same time allowing the beneficiaries of the program to keep the funds if they wished.[9]

SIGTARP (2009a) and Congressional Oversight Panel (2009) provide a more detailed analysis of the TARP funds distributed to other programs. In the next sections, readers are first cautioned to handle lending data with care, and then the construction of the dataset and prima facie differences between CPP and non-CPP DIs are discussed.

Lending Data During the Crisis: Handle Aggregate Data with Care

Figure 2 shows monthly total loans and leases by commercial banks and their components: real estate loans, individual loans, commercial and industrial (C&I) loans, and other loans. This measure is part of the H.8 data, which provide weekly aggregate balance-sheet data for commercial banks with a charter in the United States. H.8 data are weekly and monthly estimates based on data reported by a sample (not the entire population) of domestically chartered commercial banks and U.S. branches and agencies of foreign banks.[10] The 70 banks that make up the top percentile of commercial banks based on total assets represented about 73 percent of the total loans in the 2009:Q1 CRs.

If considered over the past three decades, the series appears to be approximately on trend but slightly erratic during the recent recession; the total amount of loans and leases remains fairly constant until the end of 2008:Q3, when that amount increases sharply and then declines. Similarly, the consumer loans series exhibits a noticeable increase in the spring of 2010. We later discuss two reasons such data should be handled with extreme care when making inferences about lending dynamics during the crisis.

Accounting for Bank Dynamics

Among the key provisions of the Financial Services Modernization Act of 1999 (also known as the Gramm-Leach-Bliley Act of 1999) were the removal of financial specialization and the allowance of cross-acquisitions among banks and other financial institutions. When a commercial bank acquires a thrift, an insurance company, or another financial firm, the loans of the target (acquired) company suddenly appear as additional aggregate commercial bank loans even though no real change in credit took place in the economy. A similar increase is observed when a non-bank institution (for example, a credit card company) becomes a commercial bank. We term these institutions, which previously would not have held commercial bank charters, "new" commercial banks.

Several financial entities that would not typically be regulated as banks (such as Merrill Lynch and American Express) acquired charters during the financial crisis because they either applied for a charter or were acquired by regulated commercial banks and thrifts and thus now would file CRs and TFRs.[11]

Many such transactions occurred during the crisis, at times creating an upward shift to the series that should not be interpreted as an *increase* in lending. As an example, we consider the acquisition of the banking operations of Washington Mutual—a saving institution—by JPMorgan Chase—a commercial bank—on September 25, 2008. *Not* accounting for the acquisition of

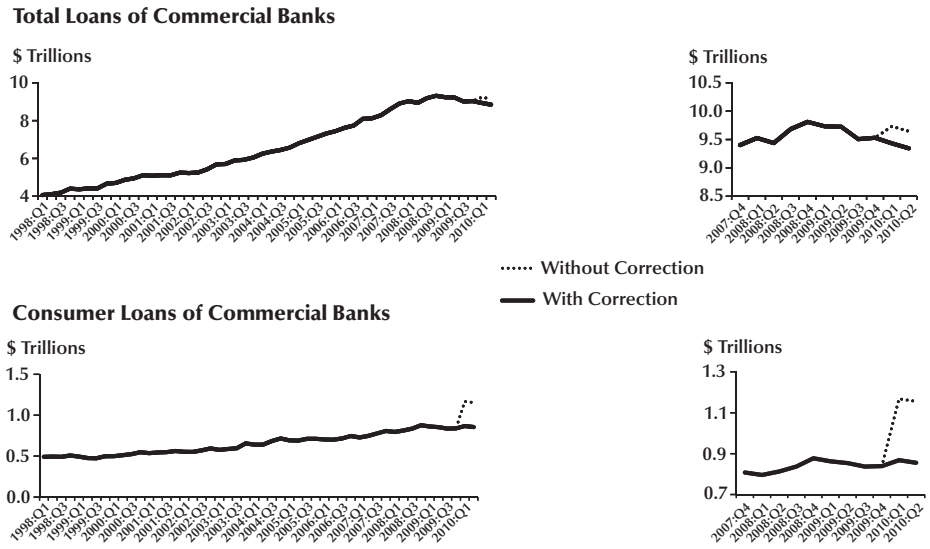
[9] See "Road to Stability" (www.financialstability.gov/roadtostability/capitalpurchaseprogram.html) for details.

[10] Footnote 1 of the H.8 releases explains the procedure used to estimate these figures (see www.federalreserve.gov/releases/h8/current/default.htm). The data for domestically chartered commercial banks and U.S. branches and agencies of foreign banks are estimated by benchmarking weekly data provided by a sample of banks to quarter-end reports of condition (CRs). Large domestically chartered commercial banks are defined as the top 25 domestically chartered commercial banks, ranked by domestic assets as of the previous commercial bank CR to which the H.8 release data have been benchmarked. Because H.8 figures are estimates, they are revised like other data series (e.g., the components of gross domestic product) when more information becomes available.

[11] Namely, these entities are Goldman Sachs, Morgan Stanley, Merrill Lynch, American Express, CIT Group Inc., Hartford Financial Services, Discover Financial Services, GMAC Financial Services, IB Finance Holding Company, and Protective Life Corporation.

Figure 2

Aggregate Lending of Commercial Banks (with and without correcting for FAS Nos. 166 and 167)



NOTE: FAS, Financial Accounting Statements.

SOURCE: H.8 data.

Washington Mutual by JPMorgan Chase in September 2008 would overestimate the total commercial bank loans in 2008:Q3 because the loans of Washington Mutual—a saving institution—entered the pool of loans of JPMorgan Chase—a bank—at the end of September 2009 and appear as a large expansion of the latter's credit. Our study deals with mergers and acquisitions on a case-by-case basis. Moreover, we eliminate new banks from the study if the lending data for the period before the acquisition of their charter are not available and because their lending portfolios and patterns are significantly different from ordinary banks or thrifts.

Consumer Loans in 2010

A second example of unusual behavior of a lending series is observed in the consumer loans series in the spring of 2010 (El-Ghazaly and Gopalan, 2010). Aggregate data on consumer loans during March and April 2010 apparently suggest a dramatic expansion in credit to consumers. At first glance, this jump could be interpreted as evidence of banks loosening their credit standards or originating more consumer loans in a recovering economy. While consumer loans did expand relative to the previous months, the impressive increases in March and April 2010 were caused by a change in accounting standards.

In June 2009, the Financial Accounting Standards Board issued two new Financial Accounting Statements (FASs), Nos. 166 and 167, that changed how banks treat off-balance-sheet special-purpose entities (SPEs) and the investments in these entities.[12] As a result, regulated financial institutions were required to begin consolidating SPEs onto their balance sheets for any

[12] Banks and other financial institutions rely on an "originate-to-distribute" business model to transfer assets from their balance sheets, bundling risky assets (such as mortgages, credit cards, and auto loans) into securities and then selling them to investors in the secondary market. Selling these assets in the secondary market allows banks to increase servicing revenues and other loan sale income (fees and income associated with collecting and distributing loan payments and other services [e.g., tax payments]) while passing along the credit risk to a larger pool of investors.

SPEs in which they hold a controlling financial interest. SPEs in which a controlling interest is held must be included in the accounting for risk-weighted assets (as Tier 2 capital) for purposes of calculating capital requirements.[13]

As a result of these regulatory changes, assets that had previously been included as off-balance-sheet items are now incorporated on the balance sheet to calculate capital requirements. This change affected the total volume of loans and leases reported beginning in 2009:Q4, particularly loans to individuals and other smaller categories of loans. The change in reporting requirements effectively "increased" loans to consumers by approximately $330 billion in 2010:Q1.[14] Information about how these changes were implemented by individual banks and thrifts is not available; thus we can adjust only the aggregate data for the amount of the change and so can report some of our series only until the end of 2009.

DATA AND DESCRIPTIVE STATISTICS

Our complete dataset aggregates four other datasets. The first two sources for this study are the Consolidated Reports of Condition and Income database (commonly called the Call Reports and the Thrift Reports). Unless otherwise specified, our last data point is the end of June 2010.

The CRs contain quarterly regulatory information for all banks regulated by the Federal Reserve System, the Federal Deposit Insurance Corporation (FDIC), and the Comptroller of the Currency. The TFRs contain similar information for all thrifts regulated by the Office of Thrift Supervision. In these datasets, DIs report their individual-entity lending activities on a consolidated basis for the entire group of banks or thrifts owned by the reporting entity at the end of each quarter. We use the data available (at the time of this writing) covering the quarters between 1998:Q1 and 2010:Q2. During this period the number of reporting entities in the CRs fell from 10,271 to 7,403, while the number of reporting entities in the TFRs fell from 1,195 to 753 as a result of bank failures, mergers, and acquisitions. See Aubuchon and Wheelock (2010) for an analysis of recent bank failures.

To account for consolidation, entry, and exit during the sample period, we match the CR and TFR data with the National Information Center's transformation table available from the Board of Governors of the Federal Reserve System.[15] This matching process allows us to account for problems generated by commercial banks' acquisitions of thrifts and thrifts' acquisitions of banks as mentioned previously. This correction is critical because the Gramm-Leach-Bliley Act removed financial specialization and allowed cross-acquisitions between banks and thrifts. We explain our reconciliation of these sources of information in the appendix.

Finally, we omit the new commercial banks, as defined in the previous section, because their lending portfolios and patterns are significantly different from those of ordinary banks or thrifts and we lack comparable data from earlier periods. Once we remove the double counting of loans due to mergers and acquisitions, failures, and new commercial banks in the database, we match the Treasury data on the CPP disbursements to the unbalanced panel created from CRs and TFRs.

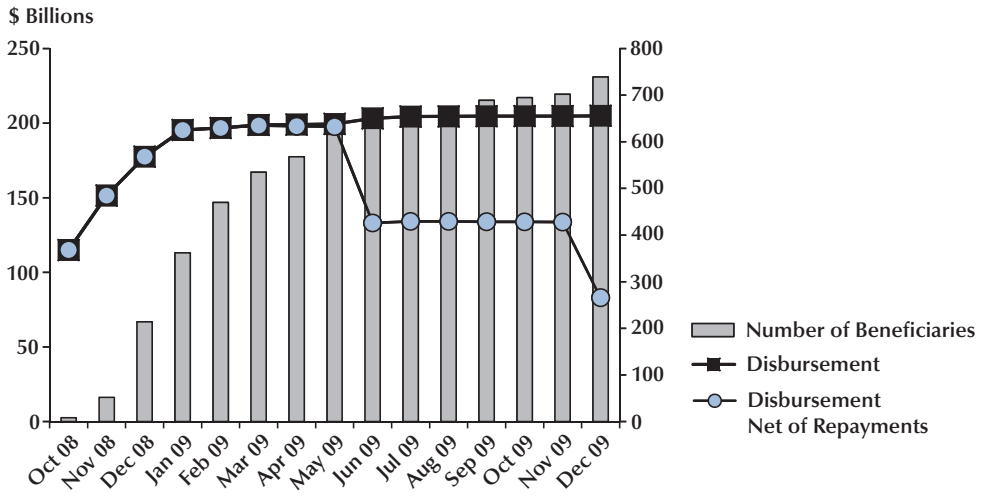
[13] There is an optional transition period of two financial reporting quarters after the date a banking organization is required to implement FASs 166 and 167, which allows institutions to slowly begin the transfer of such assets to their balance sheets. Beginning on November 9, 2009, banks with fiscal year-ends between November 9 and January 1 were required to begin reporting assets contained in special investment vehicles as on-balance-sheet items and all other banks were required to make the changes beginning January 1, 2010. In addition to the changes in reporting requirements instituted by FASs 166 and 167, on January 28, 2010, federal banking agencies (Office of the Comptroller of the Currency, Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and the Office of Thrift Supervision) issued a final rule that amended the risk-based capital guidelines established in FASs 166 and 167; the final rule eliminates the exclusion of asset-backed commercial paper programs from risk-weighted assets. Banking institutions were permitted a phase-in period for the elimination of this exclusion.

[14] See www.federalreserve.gov/releases/h8/h8notes.htm#notes_20100625.

[15] Similar information is publicly available in the Bank Holding Company Data available on the Chicago Fed website (www.chicagofed.org/webpages/banking/financial_institution_reports/bhc_data.cfm).

Figure 3

TARP/CPP Disbursements and Repayments (October 2008–December 2009)



SOURCE: Authors' calculations based on Treasury data.

We describe the salient features of CPP beneficiaries using the non-CPP DIs for comparison. We group institutions using information on the distribution of TARP funds from the TARP Transactions Reports updated weekly by the U.S. Treasury since the program's inception in October 2008.[16] Figure 3 plots the patterns of monthly disbursements and repayments derived from these data, using the Treasury Transactions Report releases.[17] The figure shows the total number of beneficiaries by month (vertical bars), the total disbursement (squares), and the monthly disbursement net of repayments (circles). Over its first 15 months, the CPP allowed the injection of almost $205 billion of capital into approximately 730 financial entities (U.S. Treasury, 2009).[18] As of December 31, 2009, 71 institutions had redeemed their preferred stocks and about $83 billion stayed invested in the remaining beneficiaries. It should be noted that the observational units in the Transactions Reports are financial holdings and not individual banks or thrifts per se. The institutions that received funding under the program could allocate the funds to any of the institutions they control. Therefore, in the remainder of the analysis we reaggregate individual DIs that have a charter (and an entity identification number in

[16] The allocation of CPP funds to BHCs instead of individual banks and thrifts has raised some criticism (Coates and Scharfstein, 2009) and creates various issues in our dataset because, unlike the TFRs and the CRs, the TARP Transactions Reports list the BHCs. Therefore, we organized the data as follows. First, we determined the entity identification numbers for all DIs listed to make the TARP information compatible with our CR and TFR information. By using the Competitive Analysis and Structure Source Instrument for Depository Institutions (CASSIDI) database managed by the Federal Reserve Bank of St. Louis and the Federal Financial Institutions Examination Council's institution history database, we determined the set of institutions each BHC controls, BHC by BHC. We organized our data into five categories. If the BHC controls only a single bank or thrift, we match the TARP Transactions Report information with the single bank or thrift's Federal Reserve entity identification number. When the BHC controls several different banks or a mix of banks and thrifts, all of the loans of the individual banks and thrifts are totaled and the group is given the BHC's entity identification number. Additionally, we separated out the funds distributed to large lenders and other beneficiaries that are either nonfinancial institutions (namely, General Motors and Chrysler) or new commercial banks and thrifts.

[17] See the relevant files on the Financial Stability website (www.financialstability.gov/). The Congressional Oversight Panel (2009) reported some difficulties in confirming the exact value of the Treasury disbursements using these figures.

[18] The latest available TARP Transactions Report was accessed on January 31, 2010, and contains information for the period ending January 13, 2010. See www.financialstability.gov/latest/reportsanddocs.html for details.

Table 1

Descriptive Statistics for Selected Variables (2009:Q3): All Depository Institutions

	CPP (N = 924)			Non-CPP (N = 7,186)			All DIs (N = 8,110)		
Observations	Mean	Median	Max.	Mean	Median	Max.	Mean	Median	Max.
Total loans***	9.64 ($ bil)	305 ($ mil)	740 ($ bil)	481,840 ($ bil)	88 ($ mil)	361 ($ bil)	1.53 ($ bil)	101 ($ mil)	740 ($ bil)
Total assets***	19.50 ($ bil)	434 ($ mil)	1,670 ($ bil)	891,658 ($ bil)	134 ($ mil)	548 ($ bil)	3.01 ($ bil)	151 ($ mil)	1,670 ($ bil)
Real estate loans***	5.56 ($ bil)	231 ($ mil)	448 ($ bil)	313,717 ($ bil)	64 ($ mil)	201 ($ bil)	0.91 ($ bil)	74 ($ mil)	448 ($ bil)
C&I loans***	1.93 ($ bil)	40 ($ mil)	154 ($ bil)	72,693 ($ bil)	9 ($ mil)	70.8 ($ bil)	0.28 ($ bil)	10 ($ mil)	154 ($ bil)
Individual loans***	1.25 ($ bil)	6 ($ mil)	114 ($ bil)	67,806 ($ bil)	3 ($ mil)	92.8 ($ bil)	0.20 ($ bil)	3 ($ mil)	114 ($ bil)
Real estate/Total loans***	0.78	0.81	1.0	0.77	0.80	1.0	0.77	0.80	1.0
C&I/Total loans***	0.17	0.15	1.0	0.15	0.12	1.0	0.15	0.13	1.0
Individual/Total loans***	0.05	0.02	1.0	0.08	0.05	1.0	0.08	0.05	1.0
Loans/Assets***	0.69	0.71	1.0	0.60	0.63	1.0	0.61	0.64	1.0
Deposits/Assets***	0.79	0.81	0.98	0.82	0.84	0.98	0.82	0.83	0.98
Leverage***	10.4	10.4	64.1	10.1	9.9	99.1	10.2	10.0	99.1
Cash/Assets***	0.06	0.03	0.67	0.07	0.04	0.81	0.07	0.04	0.81

NOTE: The table includes all banks and thrifts in our sample (subject to the exclusion of investment banks and "new" banks discussed in the "Data and Descriptive Statistics" section). C&I refers to commercial and industrial loans; individual loans are loans to consumers, typically with no collateral provided (e.g., credit card lines). ***, Statistically significant at the 1 percent level in a *t*-test for differences in the mean of each variable between CPP and non-CPP DIs.

Table 2

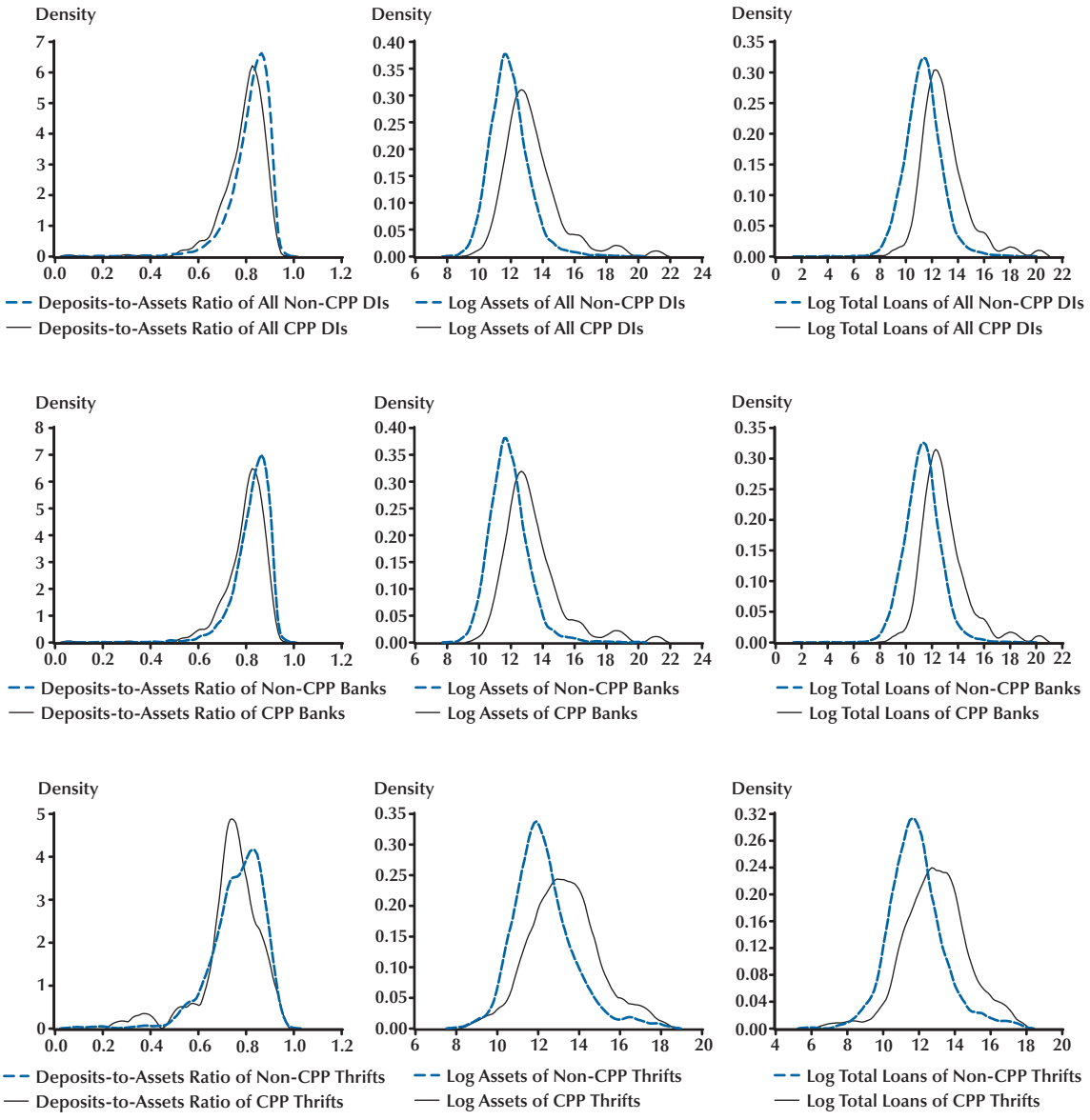
Descriptive Statistics for Selected Variables (2009:Q3)

	CPP (N = 860)			Non-CPP (N = 6,493)			All Banks (N = 7,353)		
Observations	Mean	Median	Max.	Mean	Median	Max.	Mean	Median	Max.
Banks									
Total loans***	10.2 ($ bil)	301 ($ mil)	740 ($ bil)	448 ($ mil)	86 ($ mil)	361 ($ bil)	1.6 ($ bil)	98 ($ mil)	740 ($ bil)
Total assets***	20.8 ($ bil)	425 ($ mil)	1,670 ($ bil)	850 ($ mil)	130 ($ mil)	548 ($ bil)	3.2 ($ bil)	148 ($ mil)	1,670 ($ bil)
Real estate loans***	5.9 ($ bil)	227 ($ mil)	448 ($ bil)	278 ($ mil)	61 ($ mil)	201 ($ bil)	0.9 ($ bil)	70 ($ mil)	448 ($ bil)
C&I loans***	2.0 ($ bil)	40 ($ mil)	154 ($ bil)	75 ($ mil)	9 ($ mil)	70.8 ($ bil)	0.3 ($ bil)	11 ($ mil)	154 ($ bil)
Individual loans***	1.3 ($ bil)	6 ($ mil)	114 ($ bil)	65 ($ mil)	3 ($ mil)	92.8 ($ bil)	0.2 ($ bil)	4 ($ mil)	114 ($ bil)
Real estate/Total loans***	0.78	0.81	1.0	0.76	0.79	1.0	0.76	0.79	1.0
C&I/Total loans***	0.18	0.15	0.96	0.16	0.13	1.0	0.16	0.14	1.0
Individual/Total loans***	0.05	0.02	1.0	0.08	0.05	1.0	0.08	0.05	1.0
Loans/Assets***	0.68	0.71	0.95	0.59	0.62	1.0	0.60	0.63	1.0
Deposits/Assets***	0.80	0.81	0.98	0.82	0.84	0.98	0.82	0.84	0.98
Leverage***	10.4	10.3	64.1	10.2	9.90	99.1	10.2	10.0	99.1
Cash/Assets***	0.06	0.04	0.67	0.07	0.05	0.81	0.07	0.05	0.81
	CPP (N = 64)			**Non-CPP (N = 693)**			**All Thrifts (N = 757)**		
Observations	Mean	Median	Max.	Mean	Median	Max.	Mean	Median	Max.
Thrifts									
Total loans	1,667 ($ mil)	463 ($ mil)	19.8 ($ bil)	794 ($ mil)	125 ($ mil)	50.1 ($ bil)	867 ($ mil)	135 ($ mil)	50.1 ($ bil)
Total assets	2,410($ mil)	531 ($ mil)	31.6 ($ bil)	1,280 ($ mil)	177 ($ mil)	89.7 ($ bil)	1,375 ($ mil)	186 ($ mil)	89.7 ($ bil)
Real estate loans	936 ($ mil)	374 ($ mil)	9.1 ($ bil)	651 ($ mil)	110 ($ mil)	36.5 ($ bil)	674 ($ mil)	115 ($ mil)	36.5 ($ bil)
C&I loans	503 ($ mil)	25 ($ mil)	12.8 ($ bil)	49 ($ mil)	2 ($ mil)	11.5 ($ bil)	87 ($ mil)	3 ($ mil)	11.5 ($ bil)
Individual loans	228 ($ mil)	8 ($ mil)	6.0 ($ bil)	94 ($ mil)	2 ($ mil)	16.7 ($ bil)	105 ($ mil)	2 ($ mil)	16.7 ($ bil)
Real estate/Total loans***	0.83	0.89	1.0	0.89	0.94	1.0	0.89	0.94	1.0
C&I/Total loans***	0.11	0.08	0.70	0.06	0.02	1.0	0.06	0.03	1.0
Individual/Total loans***	0.06	0.03	0.34	0.05	0.02	1.0	0.05	0.02	1.0
Loans/Assets*	0.73	0.74	0.93	0.69	0.74	1.0	0.69	0.74	1.0
Deposits/Assets	0.74	0.75	0.91	0.76	0.78	0.98	0.76	0.78	0.98
Leverage*	10.50	10.70	23.00	9.90	9.50	97.90	9.90	9.70	97.90
Cash/Assets	0.02	0.01	0.08	0.02	0.01	0.34	0.02	0.01	0.34

NOTE: Includes all banks and thrifts in our sample (subject to the exclusion of investment banks and "new" banks discussed in the "Data and Descriptive Statistics" section). C&I refers to commercial and industrial loans; individual loans are loans to consumers, typically with no collateral provided (e.g., credit card lines). *** and *, Statistically significant at the 1 percent and 10 percent levels, respectively, in a *t*-test for differences in the mean of each variable between CPP and non-CPP DIs.

Figure 4

Kernel Size Distribution of Deposits-to-Assets Ratios, Log Asset, and Log Total Loans of CPP and non-CPP DIs (2009:Q3)



SOURCE: Authors' calculations based on CRs, TFRs, and Treasury data.

the CRs and TFRs) into a consolidated entity according to a procedure discussed in the appendix. In our data, 28 CPP "multi-unit" beneficiaries control 110 banks and thrifts.

Tables 1 (all DIs) and 2 (banks and thrifts separately) and Figure 4 summarize some relevant variables and ratios. They distinguish between institutions that received CPP funding and those that did not and use the entire population of DIs as a term of comparison. Figure 4 considers total assets and total loans, which are measures of bank size, at the end of 2009:Q3. We plot the distribution of CPP and non-CPP banks and thrifts using the logarithm of assets on the horizontal axis. We repeat the same plots for the logarithm of total loans for banks, thrifts, and all DIs and plot a similar distribution for the deposit-to-assets ratio.[19] Table A1 in the appendix lists variables and correspondence from CRs and TFRs.

Figure 4 uses kernel density plots for banks and thrifts in terms of assets (second column, second and third rows) or total loans (third column, second and third rows) to provide a visual comparison between CPP beneficiaries (solid line) and non-CPP DIs (dashed line). A quick comparison of the graphs shows that banks are larger on average, but there are relatively more small banks than small thrifts. The largest banks in our sample have outstanding loans of about $740 billion, which is about 15 times the outstanding loans of the largest thrift. Consistent with the role of thrifts in the U.S. economy, their average real estate loans as a share of total loans are larger than the share of real estate loans extended by banks. On average, banks have lower loans-to-assets ratios,[19] lower leverage (assets-to-equity ratio), and are more dependent on deposits as a share of total liability plus equity.

The comparison between CPP and non-CPP DIs shows that CPP beneficiaries are larger than non-beneficiaries in terms of total loans and in terms of total assets (on average, about 20 times larger, but this is skewed to some extent by the fact that the largest DIs—Citibank, JPMorgan Chase, and Bank of America—received CPP support). CPP DIs extend a slightly larger share of real estate and C&I loans and have slightly larger leverage and lower deposits-to-assets ratios. These differences characterize both the thrifts and the banks that received CPP funds.

[19] Summary statistics are calculated before the regrouping of multi-unit DIs, which leaves 614 banks and 54 thrifts for a total of 668 CPP beneficiaries. The number of observations is reported in the tables. All variables for banks and thrifts are comparable except for cash.

LENDING PATTERNS

In this section, we describe the methodology used to reconstruct lending patterns and discuss the results obtained from analyzing lending data between 1998:Q1 and 2010:Q2 (inclusive).

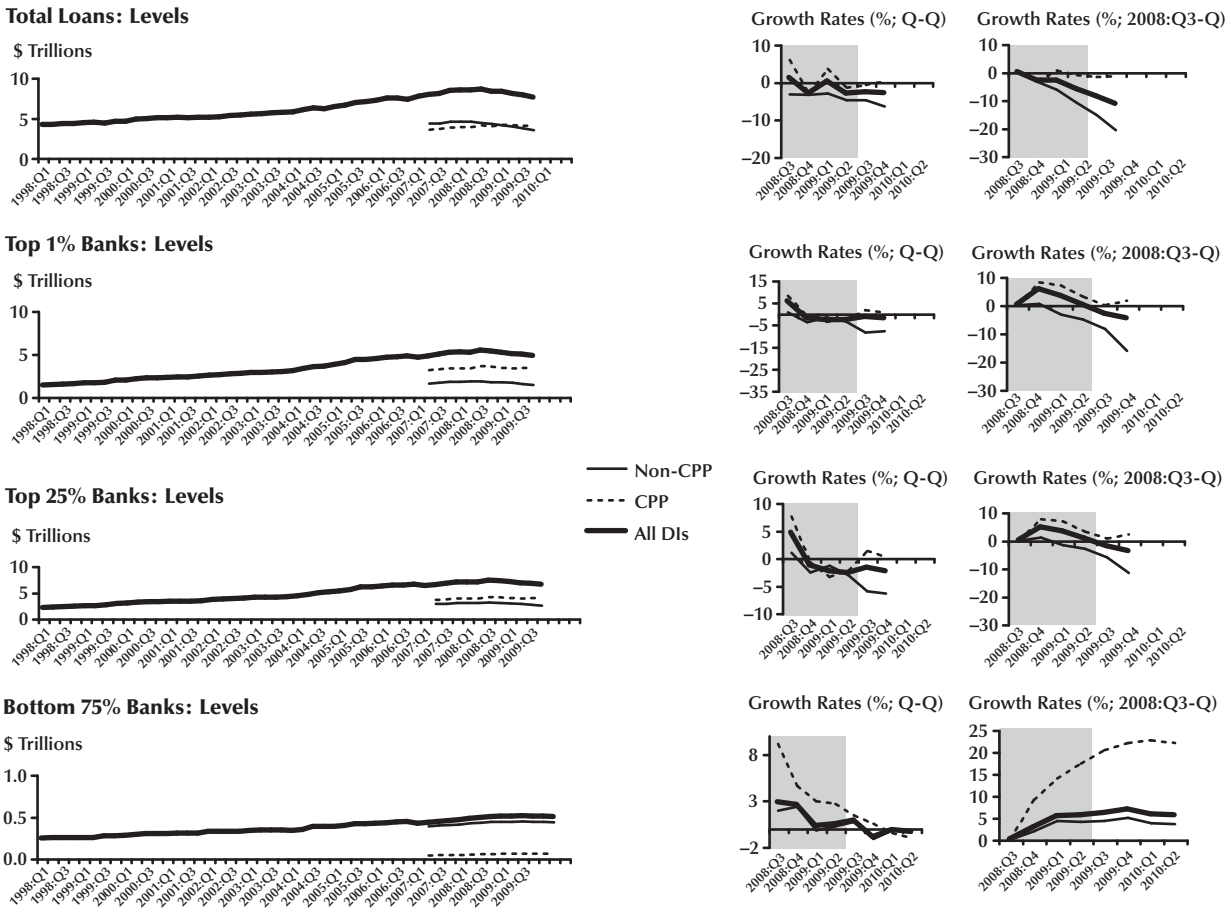
Methodology

Aggregate Stocks. We first reconstruct loan stocks by totaling the loans of the individual banks and thrifts and adjusting for mergers, acquisitions, and failures (see the appendix). We consider four types of loans: total loans, real estate loans, C&I loans, and loans to consumers. Our aggregate stocks differ from the H.8 data release for reasons discussed extensively in Den Haan, Summer, and Yamashiro (2003, 2007) and—with a specific focus on the current crisis—in Contessi and Francis (forthcoming). We cross-checked our series with the aggregate loan data released by the FDIC for thrifts and banks and confirmed a close match between each pair of series. We also reconstruct outstanding loans by bank size, using the top percentile, the top 25 percentiles, and the bottom 75 percentiles of banks and thrifts ranked by total assets. Once we determine the outstanding loans for the population of banks and thrifts, we split the sample into two groups—CPP DIs and non-CPP DIs—depending on whether they received CPP support at any time between the beginning of the program in October 2008 and the end of December 2009.

Outstanding loans by type of loan and size of bank are plotted in the left columns of the graphs in Figures 5 and 6, along with the quarter-to-quarter growth rates for these series during the quarters in which the CPP was created and implemented (the right side of each figure).

Figure 5

Loans of Commercial Banks and Thrifts by Size of Institutions (2008:Q1–2010:Q2)



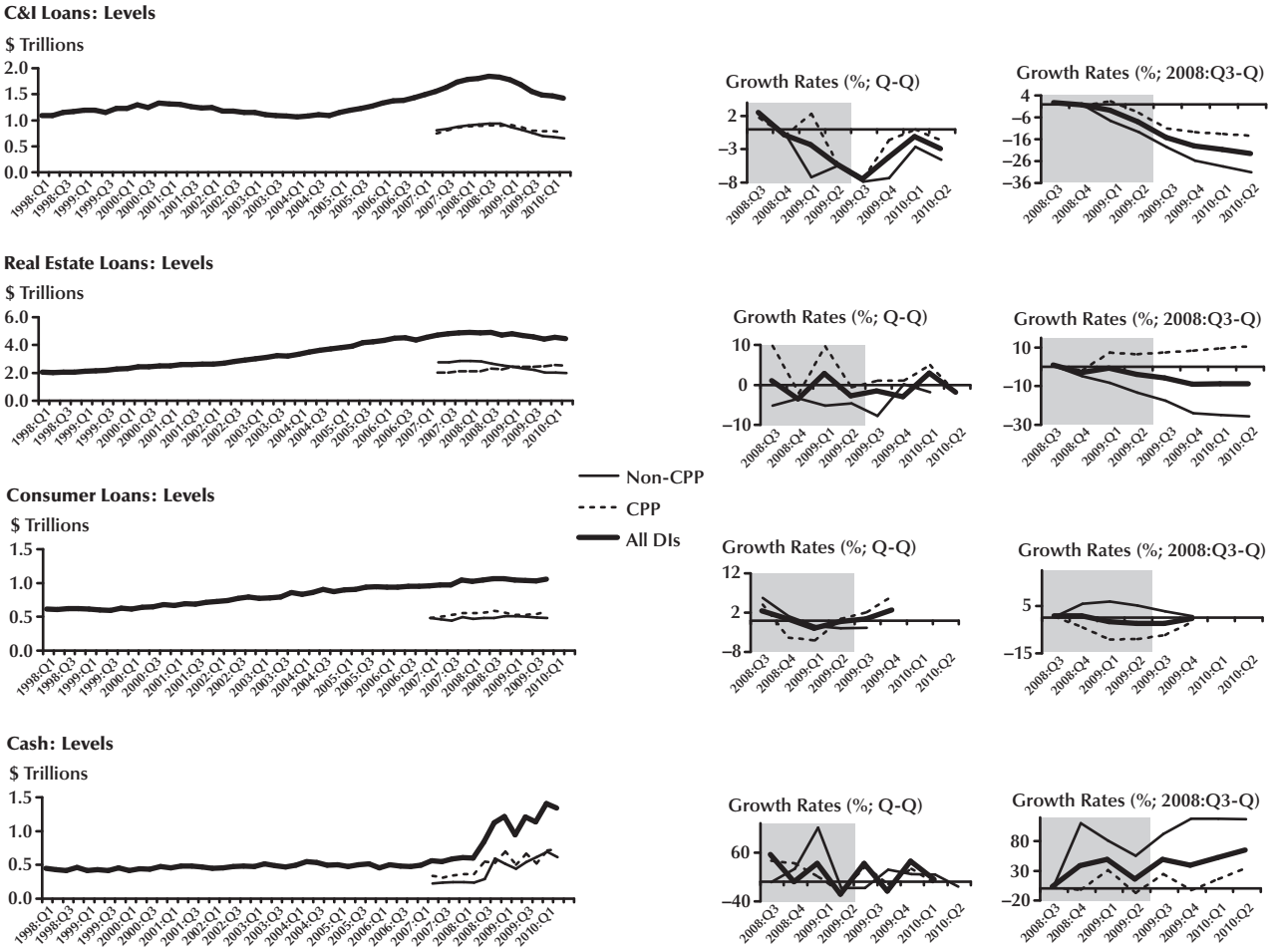
NOTE: Authors' calculations based on CR, TFR, and Treasury data. Q-Q, quarter on quarter; 2008:Q3-Q, between 2008:Q3 and the quarter on the horizontal axis. Gray bars indicate NBER-dated recessions. See text for details.

Nominal Gross Credit Flows. To understand gross credit flows, we begin with a methodology developed by Davis, Haltiwanger, and Schuh (1996) for flows of workers into and out of employment and subsequently adapted to banking flows by Dell'Ariccia and Garibaldi (2005). Figure 7 depicts the relationship between job flows and loan flows. Following Dell'Ariccia and Garibaldi (2005), we create measures of credit expansion and credit contraction to determine measures of gross flows, net flows, and credit reallocation in excess of net credit changes. For each DI, i, and period, t, $l_{i,t}$ is the value of nominal loans in one quarter and $\Delta l_{i,t} = l_{i,t} - l_{i,t-1}$ is the change in total loans.

We define "loan creation" as the sum of the change in loans for all DIs that increased their loans since the previous quarter; we define "loan destruction" as the absolute value of the decrease in loans for all DIs that reduced their loan holdings from the previous quarter. In other words, a DI expands credit in a given period if its credit growth is positive and contracts credit in a given period if its credit growth is negative. Then

Figure 6

Aggregate Loans and Gross Loan Flows of Commercial Banks and Thrifts by Type of Loan (2008:Q1–2010:Q2)



NOTE: Gray bars indicate NBER-dated recessions. See Figure 5 note and text for details.

SOURCE: Authors' calculations based on CR, TFR, and Treasury data.

"gross flows" is the sum of loan creation and loan destruction (whereas "net flows" is the difference between the two).

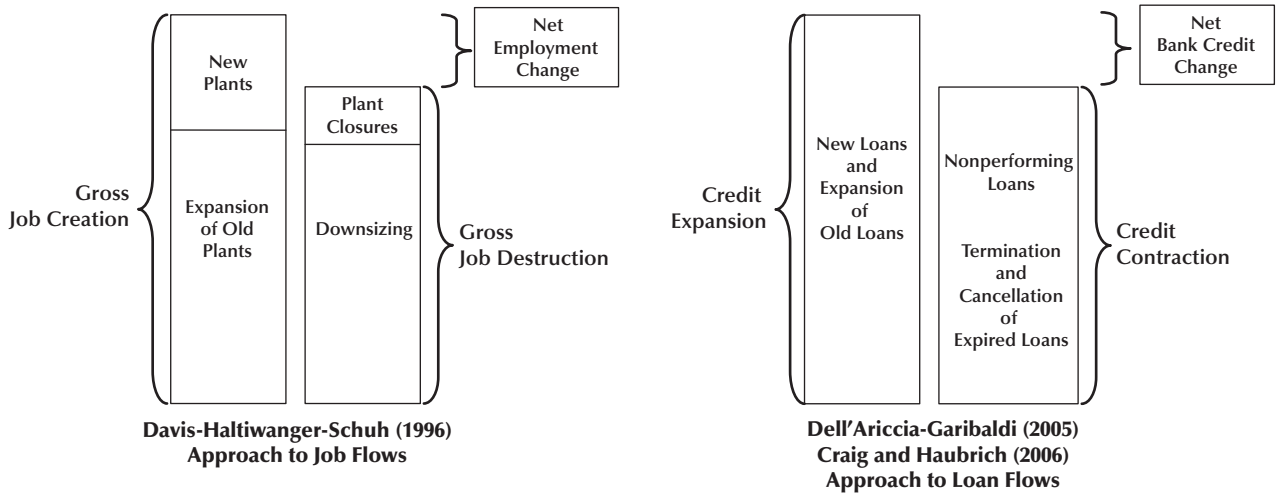
We reconstruct gross flows as follows. We first compute *adjusted credit growth rates* $\tilde{g}_{it}$, defined as $\tilde{g}_{it} = \tilde{\Delta} l_{it} / [0.5 * (l_{it-1} + l_{it})]$, that is, the ratio between the adjusted change in total loans between t and $t-1$ ($\tilde{\Delta} l_{it}$) and the average value of loans between t and $t-1$, which then bounds the adjusted credit growth rate between –2 and +2.

Naturally, $\tilde{g}_{it}$ is positive for the generic bank i if it has expanded loans between t and $t-1$ and is negative in the opposite case. We then aggregate individual adjusted credit growth rates over the share of the population of DIs for which $\tilde{g}_{it}$ is positive, as follows:

$$POS_t = \sum_{i|\tilde{g}_{it} \geq 0}^{N} \tilde{g}_{it} \left(\frac{0.5 * (l_{it-1} + l_{it})}{\sum_{i=1}^{N} l_{it-1}} \right) = \frac{\sum_{i|\Delta \tilde{l}_{it} \geq 0}^{N} \Delta \tilde{l}_{it}}{\sum_{i=1}^{N} l_{it-1}}.$$

Figure 7

Approach to Gross Loan Flows*



NOTE: *Based on Garibaldi and Dell'Ariccia (2005).

We calculate a similar measure for those DIs that exhibit a decrease in loans $\tilde{g}_{it} < 0$,

$$NEG_t = \sum_{i|\tilde{g}_{it}<0}^{N} |\tilde{g}_{it}| \left(\frac{0.5 * (l_{it-1} + l_{it})}{\sum_{i=1}^{N} l_{it-1}} \right) = \frac{\sum_{i|\Delta\tilde{l}_{it}<0}^{N} \Delta\tilde{l}_{it}}{\sum_{i=1}^{N} l_{it-1}}.$$

POS_t then becomes a measure of all banks that are expanding lending in a given period, while NEG_t is a measure of all banks that are contracting lending in a given period. We split changes in lending across time into these two measures to understand how gross flows have changed over time. Given these two measures of credit expansion (POS_t) and contraction (NEG_t), we can define the net growth rate of credit as their difference, $NEG_t = POS_t - NEG_t$, and a measure of reallocation in excess of the net credit change, $EXC_t = POS_t + NEG_t - |NEG_t|$. We use these measures to discuss *nominal flows*. A series of adjusted nominal flows can be created in other ways, but we focus on this method as it provides a conservative measure of loan growth and is consistent with other work in this area (see Dell'Ariccia and Garibaldi, 2005, and Contessi and Francis, 2010).

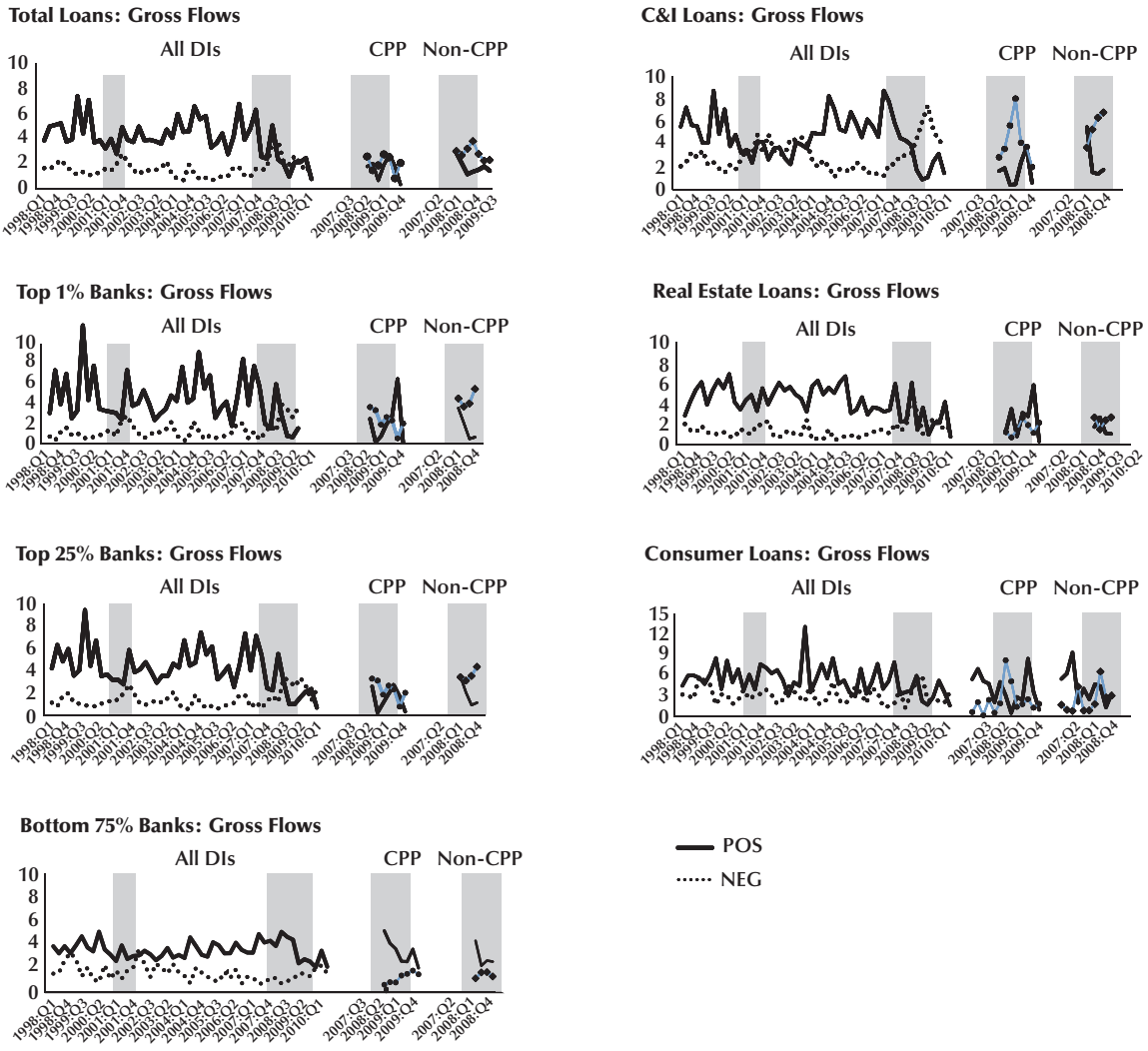
DISCUSSION

Figures 5 and 6 show graphs of our series for the levels of outstanding loans and the gross flows as previously defined. In these graphs, aggregate stocks of outstanding loans are plotted on the left; their growth rate in the middle; and gross flows, expansion, and contraction on the right. We distinguish among all DIs, DIs that received CPP support at any point in time, and DIs that never received CPP support.

Figure 8 shows the now-clear decline of DI lending, which was dubious at the peak of the crisis (Chari, Christiano, and Kehoe, 2008) but clearly began in the winter of 2008-09 (Contessi and Francis, forthcoming) and continues to date. The graphs on the left plot the level of outstanding loans for all DIs (thick solid line), CPP beneficiaries (solid line), and non-CPP beneficiaries (dotted line). All series show a clear decline during 2009, with some bumpiness in the growth rate graphs in the middle of the figure. If the lending decline was approximately the same for CPP and non-CPP institutions at the end of 2008, it later became much more pronounced for DIs that did not receive funding through the TARP-CPP program.

Figure 8

Loans of Commercial Banks and Thrifts by Size of Institutions (2008:Q1–2010:Q2)



NOTE: Authors' calculations based on CR, TFR, and Treasury data. Gray bars indicate NBER-dated recessions. See text for details.

It should be emphasized that establishing causality in this context is difficult. The difference in the lending decline between the CPP and non-CPP recipients may not be due to the effects of the CPP but may simply reflect a selection effect. In this context, the selection may affect the observed lending patterns because DIs that were in distress and not likely to benefit from the program were excluded from the CPP and may have experienced a de facto larger lending decline. Therefore, we caution against making inferences based solely on our series and leave the problem of identifying the effects of selection into treatment to future research. A second noteworthy fact is that CPP institutions had a history of stronger lending expansion that may have affected their propensity to reduce lending less than other banks and thrifts, regardless of the program.

The graphs on the second, third, and fourth rows of Figure 8 illustrate the contribution of

various groups of DIs to the lending contraction. We identify three groups of banks based on total assets as a proxy for size and regroup the population of more than 8,100 DIs into three quantiles: the largest 80 DIs in the top percentile (second row), the largest 2,080 DIs in the top quartile (third row), and the smallest 6,000 banks (fourth row). Because the size distribution of banks is so skewed to the right, the pattern of aggregate lending is clearly dominated by the larger banks. The growth rates of the banks in the top percentile are quite similar to the growth rates for all banks because these banks are so large that their patterns have a strong effect on the summary statistics. We also note an even more pronounced decline of lending among DIs in the top percentile for the non-CPP DIs than for the entire set of banks.

The fourth-row graph in Figure 8 shows quite clearly that the large majority of small- and medium-sized DIs did not participate in the CPP program either because they did not apply or did not meet the requirements in terms of sufficient financial soundness. Here again, the difference in lending performance of CPP and non-CPP institutions emerges with CCP DIs outperforming non-CPP DIs in terms of lower lending contraction. These graphs also illustrate how the lending contraction from this portion of the credit market was relatively smaller, even if the loan growth rates of these DIs declined to almost zero by the second half of 2009.

Figure 6 distinguishes among three types of loans: real estate loans, C&I loans, and loans extended to individuals (non-real estate consumer loans). In relative terms, the largest contraction was recorded in C&I loans, which are more procyclical than other types of loans.[20] The drop in the stock of these loans is quite dramatic, and the growth rates do not differ much between CPP and non-CPP institutions. Loans extended to individuals also follow a similar pattern for the two groups of DIs, with mildly negative growth rates, particularly at the beginning of 2009.

The most interesting difference between DIs that received CPP support and those that did not is for real estate loans. Non-CPP institutions show a steep decline in lending in this category, but DIs that received CPP funding display mildly positive (though close to zero) growth rates. It should be clear that a comparison of these two lending series does not clarify the direction of causality between the CPP program and the general contraction in lending, since the group of non-CPP DIs does not represent an appropriate control group for the supported institutions.[21] The apparently better performance of CPP beneficiaries may be affected by selection problems.

Now we consider reallocation across institutions, using gross flows plotted in Figure 8 for various types of loans and three classes of banks. The lines that extend back to 1998 plot credit expansion and contraction for all DIs, whereas the shorter lines plot credit flows for CPP banks and non-CPP banks starting in 2007, before the beginning of the financial crisis. The gray bars represent recessions over these years as dated by the National Bureau of Economic Research (NBER).

In observing our gross flows series from a historical perspective, we notice first that there are significant gross flows at any point of the cycle in any of these series—either total loans or loans disaggregated by type and bank size. Second, the coexistence of expansions and contractions in lending growth is observable across loan types and bank sizes. These observations suggest that the large gross flows observed at the aggregate level do not reflect portfolio reallocation across types of loans because sizable flows exist within each category of loans. Finally, the figures show that large gross flows exist for banks of all sizes, so the aggregate flows do not merely reflect the heterogeneous behavior of banks of different sizes.

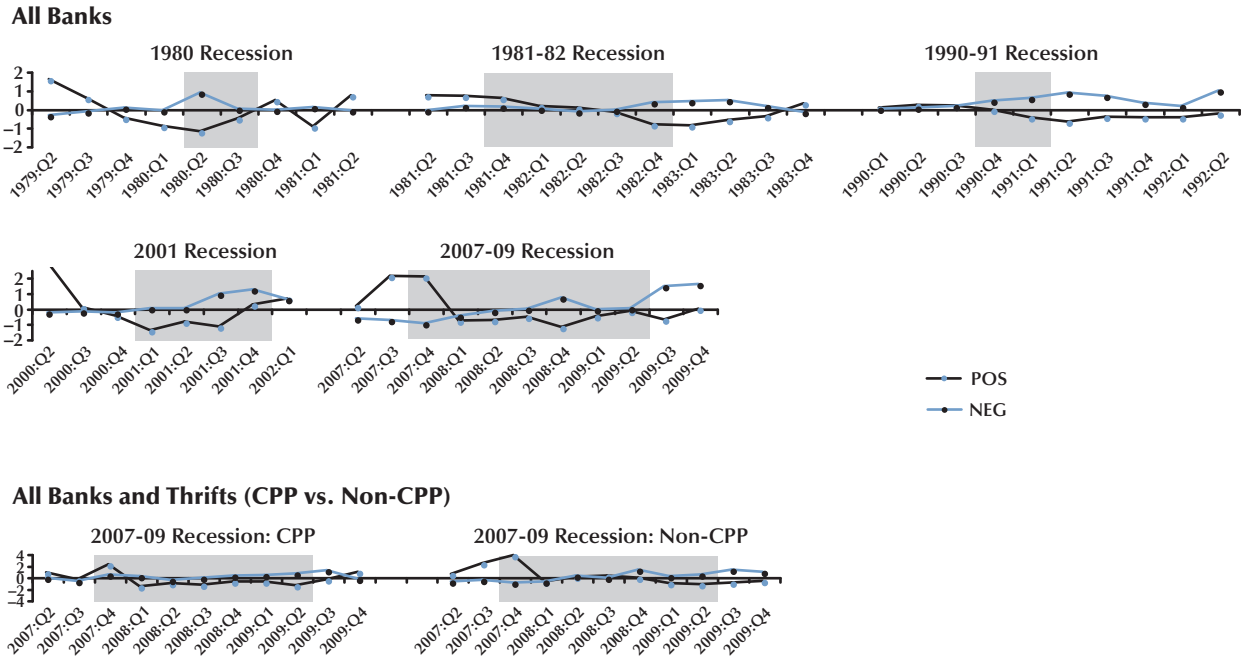
Consider the quarters of the crisis and focus on the distinction between CPP and non-CPP beneficiaries. If there were a group of banks contracting loans and another group expanding loans

[20] See Contessi and Francis (forthcoming). Note that ordinary banks are no longer the main providers of C&I loans. Syndicated lending and the commercial paper market provide the majority of such lending. Banks do, however, provide lines of credit that firms can use during times of reduced liquidity in the market.

[21] A more appropriate term of comparison would be a priori similar banks that did not receive the CPP; see Chang and Contessi (2011).

Figure 9

Cyclical Component of the Credit Expansion and the Credit Contraction Series for Total Loans around Five Recessions



NOTE: The lines are the cyclical components of the levels of credit expansion (POS) and credit contraction (NEG) around NBER-dated recessions (gray shading). The trend is identified using the Hodrick-Prescott filter. See text for details.

SOURCE: Authors' calculations based on CR and TFR data.

to take over the customers from these institutions, sharp increases should be observed in both our positive and negative series. Instead, the graphs show essentially no evidence of reallocation between CPP and non-CPP beneficiaries but simply a generalized contraction. Finally, the gross flows series are broadly consistent with our loan stock and growth rate series.

Comparison of Different Recessions

We examine the behavior of gross credit flows for five recessions for which we recomputed flows for total loans. The current crisis magnifies a general feature of these series: Credit contraction tends to increase during recessions, while credit expansion decreases (Dell'Ariccia and Garibaldi, 2005). For the overall U.S. economy, our estimates show a cross-sectional reduction of net credit only on rare occasions, most notably during and after the 1990-91 recession, an occasion related to the severity of the savings and loan crisis. However, the typical pattern of other recessions, including the 2007-09 recession, is a drop in credit expansion and a sharp increase in credit contraction that generally leave net flow growth positive, albeit small.

Gross bank loan flows behaved similarly over three of the past five recessions (1980, 1981-82, and 2001). However, during the 1990-91 recession gross bank flows behaved quite differently. The *start* of the current recession appears similar to the start of the 1980 and 2001 recessions, but adding data for 2008 and 2009 makes the pattern more similar to the start of the 1990-91 recession

(Figure 9). In the 1980 and 1981-82 recessions, net credit followed a V-shaped pattern, with credit expansion falling quickly below trend just before and during the recession and rebounding sharply immediately after the trough in economic activity. Credit contraction followed the opposite pattern, rising quickly above trend and falling sharply after the trough.

In general, the drop in credit expansion and the rise in credit contraction exhibited little persistence in the 1980 and 1981-82 recessions. In the 1990-91 recession, however, the decline in credit expansion and the increase in contraction were persistent, lasting for two years into the recovery (there was also a fair amount of persistence of low expansion and high contraction after the 2001 recession). In part, this change was due to the savings and loan crisis, which began roughly five years before the 1990-91 recession and was not fully resolved until four years later. During this crisis, more than 1,000 U.S. thrift institutions with combined assets of over $500 billion (in current dollars) failed (Curry and Shibut, 2000). In the 1990-91 recession, the increase in credit contraction accounted for approximately 50 percent of the reduction in net credit, whereas in previous recessions credit contraction displayed little change in absolute terms.

Figure 9 plots the cyclical components of the levels of credit expansion and credit contraction around NBER-dated recessions. Qualitatively, the cyclical behavior of the credit expansion series during the 2007-09 recession (darker line) appears remarkably similar to those series for the 1981-82 and 1990-91 recessions. During the savings and loan crisis (which ended in 1994), the negative cyclical component of the credit expansion series was large and persisted for several quarters after the end of the recession; the positive cyclical component of the credit contraction series followed a similar pattern. At the time, the increase in credit contraction accounted for most of the negative change in net credit, generating a so-called creditless recovery. Conversely, the cyclical components of the contraction and the expansion series around the 2001 recession display a profile more similar to that of the 1980 recession, when the cyclical component of contraction exceeded the expansion component for only four quarters. During the 1990-91 recession, there was also a large and persistent increase in excess credit reallocation—up to 4.2 percent at the time of the trough in economic activity (1991:Q1) that remained in the 4 percent range through 1992. The persistent aggregate excess reallocation during the 1990-91 recession may have been driven by changes in the regulatory and market structure of the banking system. During the 2001 recession, by contrast, excess credit reallocation was as high as 6.2 percent at the trough in economic activity (2001:Q4), but it returned to its average in 2002:Q3. In the 2007-09 recession, excess credit reallocation was slightly above average but not as high as during the 2001 recession. Further quarterly data reveal a creditless recovery similar to that following the savings and loan crisis.

CAVEATS

Our study is subject to various caveats. (i) The diffusion of securitization necessitates caution in interpreting our results: The observed flows may appear as loan expansion simply because they can no longer be redistributed and transformed from regular loans to securities. An even larger credit contraction may have occurred in the nonregulated banking sector without visibly affecting our data on insured banks and thrifts. (ii) Regulated commercial banks provide about one-third of the total credit to firms in the U.S. economy (Feldman and Lueck, 2007). Thus, the fact that we do not observe unusual distress in the regulated banking sector until 2008:Q4 does not imply that firms had easy access to credit before that period. (iii) Our measures of loan activity are likely affected by other programs implemented by the Treasury and the Federal Reserve and may have been quite different without these interventions. (iv) Although we use comprehensive balance-sheet data to determine measures of credit contraction and expansion, we cannot account for cases of expansion and contraction of individual banks within the same quarter. Moreover, our basic measures do not take into account loan commitments. (v) We try to docu-

ment a series of facts, not explain them. Further research is necessary to understand the causes and consequences of such observations. In particular, we neither analyze the changes in the cost of borrowing, nor do we disentangle demand from supply effects. (vi) Our comparison of the current crisis with previous recessions may be distorted by the many changes over the past 30 years as banks moved beyond their traditional role of providing loans to their customers. Because the Gramm-Leach-Bliley Act of 1999 allowed nonbanking financial institutions to freely merge and compete for loans, our sample is affected by this activity more so than the sample before 1999.

CONCLUSION

We describe the gross credit lending activity of U.S. commercial banks and thrifts during the crisis that began in 2007. Our analysis focuses on the distinction between the Capital Purchase Program (CPP) and non-CPP beneficiaries during the financial crisis, which we introduce after creating a novel database that matches CPP data released by the U.S. Treasury with the Call Reports for commercial banks and the Thrift Financial Reports for savings and loan institutions.

Because of the small number of data points (only the four quarters since the CPP was introduced), we cannot formally test for differences in lending behavior. However, we show that the depository institutions that received CPP assistance exhibited less lending contraction than non-CPP beneficiaries. We emphasize that the better performance of CPP beneficiaries may be due to any combination of the following factors: (i) the fact that the CPP actually slowed the decline in lending, (ii) a selection problem that cannot be addressed in our study but which we attempt to analyze in related research, and (iii) the fact that what appears as relatively larger lending growth (or lower lending decline) masks a postponement of bad loan write-downs.

REFERENCES

Aubuchon, Craig P. and Wheelock, David C. "The Geographic Distribution and Characteristics of U.S. Bank Failures, 2007-2010: Do Bank Failures Still Reflect Local Economic Conditions?" Federal Reserve Bank of St. Louis *Review*, September/October 2010, *92*(5), pp. 395-415; http://research.stlouisfed.org/publications/review/10/09/Aubuchon.pdf.

Avery, Robert B. and Samolyk, Katherine A. "Bank Consolidation and Small Business Lending: The Role of Community Banks." *Journal of Financial Services Research*, April 2004, *25*(2), pp. 291-325.

Cebenoyan, A. Sinan and Strahan, Philip E. "Risk Management, Capital Structure and Lending at Banks." *Journal of Banking and Finance*, 2004, *28*(1), pp. 19-43.

Chang, Su-Hsin and Contessi, Silvio. "Capital Injections and Lending Contractions: Evidence from the TARP." Unpublished manuscript, Federal Reserve Bank of St. Louis, 2011.

Chari, Varadarajan V.; Christiano, Lawrence J. and Kehoe, Patrick J. "Facts and Myths about the Financial Crisis of 2008." Working Paper No. 666, Federal Reserve Bank of Minneapolis, October 2008; www.minneapolisfed.org/research/wp/wp666.pdf.

Coates, John C. and Scharfstein, David S. "The Bailout Is Robbing the Banks." *New York Times*, February 17, 2009; www.nytimes.com/2009/02/18/opinion/18scharfstein.html.

Congressional Oversight Panel. "February Oversight Report. Valuing Treasury's Acquisitions." February 6, 2009, http://cop.senate.gov/documents/cop-020609-report.pdf.

Contessi, Silvio and Johanna Francis. "U.S. Commercial Bank Lending through 2008:Q4: New Evidence from Gross Credit Flows." *Economic Inquiry* (forthcoming); preview at http://onlinelibrary.wiley.com/doi/10.1111/j.1465-7295.2010.00356.x/pdf.

Curry, Timothy and Shibut, Lynn. "The Cost of the Savings and Loan Crisis: Truth and Consequences." *FDIC Banking Review*, 2000, *13*(2), pp. 26-35; www.fdic.gov/bank/analytical/banking/2000dec/brv13n2_2.pdf.

Davis, Steven J.; Haltiwanger, John C. and Schuh, Scott. *Job Creation and Destruction*. Cambridge, MA: MIT Press, 1996.

Dell'Ariccia, Giovanni and Garibaldi, Pietro. "Gross Credit Flows." *Review of Economic Studies*, July 2005, *72*(3), pp. 665-85.

Den Haan, Wouter J.; Sumner, Steven W. and Yamashiro, Guy M. "Data Manual for Bank Loan Portfolios and the Monetary Transmission Mechanism." Unpublished manuscript, University of San Diego, 2003.

Den Haan, Wouter J.; Sumner, Steven W. and Yamashiro, Guy M. "Bank Loan Portfolios and the Monetary Transmission Mechanism." *Journal of Monetary Economics*, April 2007, *54*(3), pp. 904-24.

El-Ghazaly, Hoda and Gopalan, Yadav. "A Jump in Consumer Loans?" Federal Reserve Bank of St. Louis *Economic Synopses* No. 18, July 1, 2010; http://research.stlouisfed.org/publications/es/10/ES1018.pdf.

Feldman, Ron J. and Lueck, Mark. "Are Banks Really Dying This Time? An Update of Boyd and Gertler." Federal Reserve Bank of Minneapolis *The Region*, September 2007, pp. 6-9, 42-51; www.minneapolisfed.org/publications_papers/pub_display.cfm?id=1139.

Hoshi, Takeo and Kashyap, Anil K. "Will the U.S. Bank Recapitalization Succeed? Eight Lessons from Japan." *Journal of Financial Economics*, September 2010, *97*(3), pp. 398-417.

Kishan, Ruby P. and Opiela, Timothy P. "Bank Capital and Loan Asymmetry in the Transmission of Monetary Policy." *Journal of Banking and Finance*, January 2006, *30*(1), pp. 259-85.

Lown, Cara; Peristiani, Stavros and Robinson, Kenneth J. "Financial Sector Weakness and the M2 Velocity Puzzle." *Economic Inquiry*, October 2006, *44*(4), pp. 699-715.

Special Inspector General for the Troubled Asset Relief Program (SIGTARP). "Emergency Capital Injections Provided to Support the Viability of Bank of America, Other Major Banks, and the U.S. Financial System." Office of Special Inspector General for the Troubled Asset Relief Program, Audit of October 5, 2009a; www.sigtarp.gov/reports/audit/2009/Emergency_Capital_Injections_Provided_to_Support_the_Viability_of_Bank_of_America..._100509.pdf.

Special Inspector General for the Troubled Asset Relief Program (SIGTARP). "SIGTARP Survey Demonstrates that Banks Can Provide Meaningful Information on Their Use of TARP Funds." Office of Special Inspector General for the Troubled Asset Relief Program, Report of July 20, 2009b; www.sigtarp.gov/reports/audit/2009/SIGTARP_Survey_Demonstrates_That_Banks_Can_Provide_Meaningful_Information_On_Their_Use_Of_TARP_Funds.pdf.

U.S. Treasury. "Troubled Asset Relief Program Transaction Report for the Period Ending November 25, 2009." U.S. Department of Treasury, November 25, 2009.

APPENDIX

Mergers and Acquisitions

To aggregate our data from individual CRs and TFRs, we need to correct loan flows for mergers and acquisitions. For example, if depository institution (DI) i (the surviving bank) acquires DI j (the non-surviving bank or thrift) in period t, then the loan portfolio for DI j is zero or $l_{j,t} = 0$, while the loan portfolio for the surviving DI includes the previous balances of the acquired DI plus its net loan changes, or $\Delta l_{i,t} = l_{i,t-1} + \Delta l_{i,t} + l_{j,t-1} + \Delta l_{j,t-1}$. Thus, we need to adjust the change in DI i's loans by subtracting the loans of DI j in $t-1$ from the change in DI i's loans and add them to the difference for DI j. The adjusted change in the loan portfolios should then be

$$\tilde{\Delta} l_{i,t} = \Delta l_{i,t} - \sum_{k=1}^{N} \varphi_{ik}(t) l_{k,t-1} - \psi_i(t) \Delta l_{i,t},$$

where $\varphi_{ik}(t)$ is an indicator function that takes a value of 1 if DI i acquires DI k between $t-1$ and t and the value 0 otherwise. Thus, if DI k is acquired by DI i, its loans from the previous period are subtracted from the raw change in DI i's loan portfolio. Similarly, $\psi_i(t)$ is an indicator function—that is, its value is 1 if DI i is itself acquired (by some other DI) between period $t-1$ and t. Thus, we keep the changes in an acquired DI's loan portfolio with the acquired bank for the period of acquisition and remove them from the acquiring DI. There are two exceptions to this rule: If the non-surviving DI was divided among several DIs, unless we could otherwise determine what share of the loans the acquiring DIs received, we divided the changes in lending of the acquired DI by the number of acquiring DIs and removed part of the new credit from each of the acquiring DIs. The second exception involves the original bank's survival of a merger or acquisition (i.e., the original bank keeps its own charter); in that case, we leave all the changes in credit with the original DI and none with the newly formed DI.

We used data from the National Information Center to identify the dates when DIs experienced a transformation—for example, a merger or acquisition (either as the acquirer or acquiree) with discontinuation of one of the involved entities' charter, a split, sale of assets, merger without a charter discontinuation, or a failure. These data were matched with CR and TFR data on bank balance sheets and used to adjust loan totals (and subcategories of loans).

Table A1

Variables List and Correspondence from CRs and TFRs

Call Reports	Thrift Financial Reports
rcfd2170 Total assets	svgl2170 Total assets (SC60)
rcfd2200 Total deposits	svgl2339 Deposits and escrows: Total (SC71)
rcfd1410 Real estate loans	svgl0446 Mortgage loans (SC26)
rcfd1766 Commercial and industrial loans—Other	svgl0655 Commercial loans: Total (SC32)
rcfd1975 Loans to individuals	svgl0656 Consumer loans: Total (SC35)
rcfd0010 Cash	svgl0626 Cash and non-interest-earning deposits (SC110)
rcfd3210 Equity	svgl3491 Total equity capital (SC84)
rcfd3815 Credit card lines, unused commitments	
rcfd3814 Revolving, open-end lines secured by 1-4 residential properties, unused commitments	
rcfd3423 Unused commitments, total	

Corporate Response to Distress: Evidence from the Asian Financial Crisis

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This paper provides a comprehensive examination of corporate responses to financial distress during an economy-wide crisis, specifically through the restructuring of assets (through asset sales, mergers, or liquidations) and/or liabilities. Using firm-level data from five countries hardest hit by the East Asian financial crisis of 1997-98, this study contrasts the effects that financial and corporate governance variables have on restructuring choices. The study finds that, during a crisis, financial constraints and corporate governance each have a large effect on restructuring choices. (JEL G33, G34)

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BACKGROUND

Financial crises are widely believed to have long-lasting effects. Typically, recovery involves deleveraging from significant increases in debt incurred during the buildup to the crisis. On the one hand, widespread defaults on household debt may be at center stage of such crises, as in the ongoing financial crisis in the United States. On the other hand, as Reinhart and Rogoff (2009, p. 251) point out, "it may be worthwhile to consider widespread corporate default as yet another variety of crisis." Such crises manifest as large-scale corporate defaults, as happened during the East Asian financial crisis of 1997-98. This paper studies corporate responses to economy-wide and firm-level distress, specifically efforts to restructure (deleverage) in the aftermath of a financial crisis.

Understanding the determinants of firms' responses in the wake of a financial crisis is important for reducing the costs of a financial crisis. Deleveraging can be a costly, laborious process by which firms repay or draw down debt. It not only has adverse effects on employment and economic growth, but also can significantly forestall innovation and entrepreneurship. Typically, deleveraging involves creditor workouts and/or asset sales. In the former, a firm renegotiates repayment of its obligations; in the latter, a firm uses the proceeds from divestiture to repay debt. Firms often use multiple means to successfully reduce financial distress.

We use company-level data from the East Asian crisis of 1997-98 to study the deleveraging process and the determinants of corporate responses to distress. This example is relevant for several reasons. First, it allows us to study a large sample of distressed firms in different countries affected by the crisis. Second, as elaborated below, it allows us to study both the financial and nonfinancial determinants of corporate responses. Third, with the benefit of hindsight, it allows us to study firms that have experienced significant financial distress (both economy-wide and firm-level) followed by a strong recovery. Such success is in contrast to the experience of some countries recurrently affected by crises, especially those in Latin America, which have relapsed into economic distress.

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A firm in financial distress typically cannot meet its debt repayment obligations using its liquid assets. Unless its performance recovers, the distressed firm is likely to default on its debt, which could lead to a formal bankruptcy filing, a dismissal of management personnel, and possibly liquidation of the firm (e.g., see Gilson, 1989). To avoid such actions, firms typically respond by restructuring their assets (by fire sales, mergers, acquisitions, or capital-expenditure reductions), liabilities (by restructuring bank loans or public debt and through injections of new capital from outside sources), or both. Although corporate responses to economy-wide and firm-level distress are essentially the same, it is possible that the determinants of these responses differ under the two conditions.

Although firms have several restructuring options, most of the literature on firms in distress has focused on a given type of response to distress (and the costs thereof), primarily for U.S. firms.[1] We could find only two exceptions. The first is a paper by Asquith, Gertner, and Scharfstein (1994) in which the authors provide a comprehensive analysis of several different forms of financial restructuring. They find that the structure of a firm's liabilities is the most important determinant of its response to financial distress, while performance-related variables have no explanatory power. Their paper focuses on corporate responses under firm-level rather than economy-wide financial distress. The second exception is a recent paper by Atanassov and Kim (2006). They take a broader approach—across several countries—and look at the determinants of asset sales, layoffs, and managerial turnover in response to firm-specific distress. Their study focuses primarily on regulatory variables; they argue that the restructuring option chosen depends largely on the degree of investor protection and labor laws in a given country.

Despite the macroeconomic implications of an economy-wide financial crisis, we know of no comprehensive study that explores the specific ways firms—including U.S. firms—try to avoid liquidation during an economic downturn. This is an important distinction between our paper and other related work on corporate restructuring under financial distress.[2] In particular, we focus on the aftermath of the East Asian crisis of 1997-98 in the economies of Indonesia, Malaysia, the Philippines, South Korea, and Thailand. These five countries are widely believed to be those most affected by that crisis (Radelet and Sachs, 1998). This particular focus allows us not only to study corporate responses when all companies face an economy-wide crisis but also to compile and compare the determinants of corporate responses for companies that face firm-level distress during a period of economy-wide distress.

An important distinction of this study is that we contrast two sets of determinants of corporate responses to financial distress: (i) governance variables and (ii) capital structure and performance variables. We specifically investigate the role of business groups and family ownership, which represent the prevalent form of corporate control outside Anglo-Saxon systems. In East Asia, most large firms are closely held conglomerates—structured as business groups—as opposed to the widely held corporations that prevail in the United States and United Kingdom (La Porta, Lopez-de-Silanes, and Shleifer, 1999; and Claessens, Djankov, and Lang, 2000). Given that during our study period the control of corporate assets was concentrated in the hands of a few wealthy families (organized as groups), it would be instructive to know whether group affiliation and ownership type played any role in the resolution of the financial distress of these firms. For example, earlier work by Lang, Poulsen, and Stulz (1995) shows that, absent financial distress, entrenched U.S. managers engage in suboptimal divestiture decisions when such practice allows them to pursue their personal goals. More recently, Faccio, Masulis, and McConnell (2006) show that

[1] This literature includes work by Brown, James, and Mooradian (1993) on public debt and bank debt restructurings; Gilson (1990) on bank debt restructurings; Brown, James, and Mooradian (1994) on asset sales; Erwin and McConnell (1997) on piecemeal voluntary liquidations; Tashjian, Lease, and McConnell (1996) on prepackaged bankruptcies; and Ang, Chua, and McConnell (1982), Franks and Torous (1989), and Hotchkiss (1994) on bankruptcy filings.

[2] In work related to but different from ours, Claessens, Djankov, and Klapper (2003) analyze the likelihood of formal (versus informal) bankruptcy filings during the East Asian crisis. They find that bankruptcy filings are less common for bank-owned and group-affiliated firms.

politically connected (typically family) firms are especially likely to receive a bailout from their home government during a crisis.

An important consideration in the resolution of distress involves the negotiations between the distressed firm and its creditors. Banks are often part of business groups and known to give firms affiliated with the group, particularly firms in distress, preferential access to capital. This is partly because group affiliation lessens capital-market frictions.[3] This makes bank-led creditor workouts easier for group-affiliated firms.[4] Moreover, conglomerates often provide sufficient cross guarantees to bail out troubled members within their group.[5] Group affiliation therefore dilutes the information available to an outside creditor. In a crisis situation, this opacity may help group-affiliated firms by creating a greater likelihood of creditor bailouts. Kim (2004) specifically argues that conglomeration is a device designed by firms to maximize the chance of bailout in the event of a default on their bank loans. His model demonstrates that a bank has more difficulty inferring the quality of members within a business group than that of stand-alone firms because intergroup loan guarantees prevent a bank from knowing whether a payment is from the borrower or from other firms in the group. Consequently, the bank is more likely to liquidate a freestanding firm than an otherwise identical group-affiliated firm. Our study provides an opportunity to determine whether this theoretical hypothesis holds true in practice.

Regarding capital structure, it is known that debt has been the primary source of external financing in East Asia and that some corporations were highly leveraged. In a world of unavoidable bankruptcy costs, the characteristics of a firm's capital structure influence the likelihood of bankruptcy and the magnitude of the costs incurred (Senbet and Seward, 1995). An additional feature of Asian economies is that firms had incentives to delay debt, operational restructuring, and even repayment of loans because of weak foreclosure and bankruptcy laws in their given countries. Bankruptcy reforms were necessary not only to ensure actual firm failures but also to enable creditors and debtors to reach out-of-court settlements (see Claessens, Djankov, and Mody, 2001, for details).

We examine financial responses to economy-wide distress for 622 firms from the five Asian countries most severely affected by the East Asian financial crisis of 1997-98. The responses were recorded over a six-year period from 1998 to 2003. Of the total responses, restructuring liabilities through creditor workouts emerges as firms' most-favored response (21.86 percent), followed by asset sales (14.63 percent), which include the selling of divisions and the reduction of property, plant, and equipment holdings. Mergers and acquisitions are third (3.9 percent). Only 10 firms in our sample were liquidated over the sample period.

We use duration analysis to examine the determinants of three responses to distress: (i) asset sales, (ii) creditor workouts, and (iii) mergers and acquisitions. In particular, we adopt a stratified Cox relative risk hazard model using time-varying covariates to determine the hazard of each response. There are several advantages to adopting this framework for our regression analysis. First, unlike more commonly used discrete-outcome models, hazard models use data more efficiently by explicitly incorporating information about the timing of alternative responses. Second, this framework allows a firm to have multiple responses, even within the same year, as seen in the data. Third, this method allows covariates, especially financial variables, to vary with time. Fourth, our estimation procedure allows us to

[3] The literature on relationship banking documents that asymmetric information problems make it difficult for a firm to initiate a lending relationship with a bank while hold-up problems make it difficult for firms to switch banks. Such problems are mitigated if both the bank and firm are part of the same conglomerate.

[4] Morck, Wolfenzon, and Yeung (2005) argue that pyramid firms can also enjoy cheaper access to capital than freestanding firms even when banks are not part of the pyramid group. This could occur either because apex firms of the group can serve as banks or because the superior bargaining power of such conglomerations reduces rent-seeking by outside banks.

[5] Friedman, Johnson, and Mitton (2002) record instances of controlling shareholders propping up distressed firms in their group (to the benefit of public shareholders) to attract external financing. While Hoshi, Kashyap, and Scharfstein (1991) view such interfirm transfers as enhancing economic efficiency by reducing bankruptcy costs, Morck and Nakamura (1999) present evidence that such transactions also include bailouts of inefficient firms.

check for robustness using data conditional on firm-level distress. In addition, stratifying our sample by country allows us to control for countrywide differences in institutions (i.e., the rules, practices, and organizations that govern the economy).

Our results are as follows. We find that financial and governance variables influence the response hazard but their influence varies with each response. The creditor workout hazard decreases with increases in the proportion of intangible assets or the interest coverage ratio. The asset sale hazard increases with firm size, while the merger hazard increases with a firm's earning potential (return on equity [ROE]). In addition, the asset sale hazard decreases but the merger hazard increases with higher concentrations of ownership. However, both effects are largely attributable to large blockholders *not* involved with management. Finally, political connections and group affiliation each increase the hazard ratios for all three responses. Notably, group affiliation has the largest effect on the merger hazard. Moreover, group affiliation increases the hazard of creditor workouts, which supports the theory of conglomeration advanced in Kim (2004).

DATA SOURCES AND DEFINITIONS OF VARIABLES

Financial Data and Corporate Distress

This paper uses firm-level data for the five countries most severely affected by the East Asian financial crisis of 1997-98: Indonesia, Malaysia, the Philippines, South Korea, and Thailand. Firms in these countries were selected on the basis of three criteria. First, the financial data for each firm had to be reported in the *Worldscope* database, which is the primary source for accounting data. Unless otherwise noted, we use company financial reports from the *Worldscope* database between 1993 and 2002. Second, each firm had to be included in the ownership dataset compiled by Claessens, Djankov, and Lang (2000) (further detailed below). Third, the primary business segment of each firm could not be in financial services—that is, not in the Standard Industrial Classification (SIC) 6000-6999. Excluding all unleveraged companies, the final sample consists of 622 firms. In general, the sample is representative of larger firms that trade on the major stock exchanges in each country.

Using firm-level financial data, we classify a firm as "financially distressed"[6] if the company had *any* year with (i) earnings before interest and taxes (EBIT) less than its reported interest expense or (ii) operating income less than its reported interest expense.[7] Accordingly, we define a dummy variable at the firm level, distress, that takes the value 1 if for *any* year either of these two conditions is satisfied. Using this definition, 458 of 622 firms are classified as distressed.

At first glance, it appears that such a strong selection condition could impose a bias in our sample selection and classify most of the firms in our sample as distressed. However, it is important to understand that, while our criterion for classification captures a firm's inability to make its interest payments for a given year, it does not include criteria that would measure its potential to pay down its stock of debt. This becomes relevant when comparing distressed versus nondistressed firms because distressed firms appear to be highly leveraged. Table 1 shows that both measures of leverage—the debt-to-asset ratio and the debt-to-equity ratio—are significantly higher for distressed firms. The debt-to-asset ratio is the ratio of a firm's total liabilities to its total assets, and the debt-to-equity ratio is the ratio of a firm's total liabilities to its common equity. That distressed firms are more highly leveraged can be viewed as reaffirmation of the distinction between distressed and nondistressed firms.

Following the abundant literature on responses to financial distress, we list the finan-

[6] Any measure of distress would need to use a financial metric and is likely to be arbitrary. However, this distinction at the firm level is largely to select a subset of firms to make a distinction between economy-wide distress and firm-level distress. As our robustness check results reveal later, the distinction does not appear to be important in our sample.

[7] Operating income is the difference between operating revenues and operating expenses, as opposed to nonoperating income, which is attributed to the portion of an organization's income that is derived from activities not related to its core operations. EBIT is the sum of an organization's operating and nonoperating income.

Table 1

Firm Summary Statistics

Variables		All firms	Distressed firms	Nondistressed firms
Number of firms		622	458	164
Firm size (USD thousands)	Mean	1,105.39	1,163.78	373.53
	Median	239.50	247.11	168.33
Debt-to-asset ratio	Mean	0.68	0.71	0.33
	Median	0.62	0.64	0.32
Debt-to-equity ratio	Mean	6.45	6.91	0.71
	Median	1.30	1.44	0.47
Group affiliation	Percent	59.00	62.01	50.61
Political connection	Percent	13.34	11.14	19.51
Management ownership	Percent	66.72	63.74	75.00
Pyramid ownership	Percent	32.79	35.16	26.22
Firms in group	Mean	9.70	9.15	11.76
	Median	8	8	9
Banks in group	Mean	2.65	2.59	2.88
	Median	2	2	2
Largest blockholder ownership	Mean	27.40	26.21	31.15
	Median	23.53	21.57	27.93

NOTE: A firm is classified as financially distressed if for any year between 1998 and 2002 the company had earnings before EBIT or operating income less than its reported interest expense. Firm size is the log of a firm's total assets measured in thousands of U.S. dollars (USD). The debt-to-asset ratio is a firm's total liabilities divided by its total assets. The debt-to-equity ratio is a firm's total liabilities divided by its total common equity. These three financial variables are calculated for all financial years between 1998 and 2002. The dummy variable group affiliation indicates whether a company is part of a major business group (Claessens, Djankov, and Lang, 2000). Political connection indicates that at least one of a firm's top directors (CEO, president, vice president, or secretary) or large shareholders (any blockholder controlling at least 10 percent of shareholder votes) is a member of parliament, a government minister, or closely related to a top politician or party official (Faccio, Masulis, and McConnell, 2006). The dummy variable management ownership takes the value 1 if a firm's CEO or board chairman or vice chairman is part of the controlling ownership and 0 otherwise (Claessens, Djankov, and Lang, 2000). The dummy variable pyramid ownership takes the value 1 if the firm is controlled through a pyramid structure (Claessens, Djankov, and Lang, 2000). Firms in group is the total number of firms in a group (to which a firm is affiliated) when group affiliation = 1. Banks in group is the total number of banks and financial companies in a group (to which a firm is affiliated) when group affiliation = 1. Largest blockholder ownership is the holdings percentage of the largest shareholder.

cial variables (ratios) deemed important determinants of responses to distress. A significant indicator of distress is the interest coverage ratio (Asquith, Gertner, and Scharfstein, 1994). It is computed as EBIT divided by the total interest payable. The interest coverage ratio is a measure of a company's ability to honor its debt payments.[8] In addition, Brown, James, and Mooradian (1994) show that performance is the most important predictor of bankruptcy and reorganization. As a proxy for the company's accounting performance,

[8] Notably, we have used the interest coverage ratio both as a determinant of responses and as a selection criterion for firm-level distress, which undoubtedly raises some obvious concerns about selection bias. However, it is important to mention that our estimation procedure extends to *all* firms and not just those in distress. The selection bias assumes importance when we repeat our estimation for companies that experience firm-level distress as a check for robustness of our results.

we use a standard financial ratio, ROE. We also control for market expectations of recovery through the variable market value/book ratio (MB ratio), which is the market value of equity (ordinary and preferred) plus the book value of total debt divided by the book value of total assets (Gilson, Kose, and Lang, 1990; and Asquith, Gertner, and Scharfstein, 1994). The book value of total assets is the sum of total current assets, long-term receivables, investments in unconsolidated subsidiaries, other investments, net property, plants, equipment, and other assets. Finally, we also include the variable firm size, which is the log of the company's market capital or total assets measured in thousands of U.S. dollars (USD). We include this variable because (i) the choice for a workout is likely to depend on a company's size and its borrowing capability and (ii) it is widely believed that larger firms have better access to credit markets even when they are constrained (Beck, Demirgüç-Kunt, and Maksimovic, 2008).

Lastly, we include an additional variable, the intangible assets ratio. Gilson, John, and Lang (1990, p. 323) argue that "creditor consent is harder to obtain when there is greater asymmetry in the information used by the stockholders and creditors to value the firm." They also point out that the information asymmetry regarding the value of the firm increases with the proportion of intangible assets because such assets, by their nature, are difficult to value. Therefore, a greater proportion of intangible assets relative to total assets is likely to reduce the willingness of creditors to enter into debt restructuring with the firm. For this reason, we hypothesize that the intangible asset ratio is an important determinant of creditor workouts.

Event Data

As mentioned earlier, both economy-wide distress and firm-level distress can lead firms to make similar responses. We consider only the financial responses listed below and denote these as "events" and "responses" interchangeably. Event data collected for each firm are from the publicly available Asia Pacific News Archives of the *Troubled Company Reporter* (*TCR*) on the website of the InterNet Bankruptcy Library (IBL).[9] The *TCR* reports information related to the financial distress of publicly traded companies worldwide, including regulatory filings, court pleadings, judicial rulings, and press reports. The event data cover the period February 1, 1998 (the date the *TCR* starts covering distress), to December 31, 2003. The financial responses are classified as (i) creditor workouts, also known as debt restructuring, (ii) asset sales, which include property sales and sales of divisions, (iii) mergers, and (iv) liquidations. In each case, the date (year) of the event is also noted.

We define creditor workouts as agreements between a firm and its creditors to modify any terms of outstanding financial claims (either public or private) currently held against the firm. Common workout methods include one or more of the following: an exchange offer (debt for equity), covenant modification, maturity extension, or interest rate adjustment. The creditor workouts category also includes injections of capital by creditors.[10] In fact, the *TCR* news archives reveal that workouts were often packaged to include a combination of rescheduling, debt-equity swaps, and capital injections by creditors. Also, creditor workouts are the most prevalent event in our sample: 136 companies (21.86 percent) used creditor workouts to successfully restructure their liabilities during the sample period.

Firms also use asset sales to resolve financial distress. Brown, James, and Mooradian (1994) point out that distressed firms primarily use asset sales because of pressure from creditors, often to the detriment of stockholders.[11] In particular, they argue that the probability that asset sales are used to repay debt increases with a firm's leverage and decreases with its operating performance. They also find that firms using asset sales have this distinguishing characteristic: They operate

[9] The *TCR* lists data by date; see www.bankrupt.com/TCRAP_Public/index.html.

[10] Some authors, such as Senbet and Seward (1995), have treated capital injections by creditors as a separate category.

[11] However, Lang, Poulsen, and Stulz (1995) find that asset sales used to retire debt result in an abnormally high (positive) average stock return compared with sales proceeds retained by the firm.

multiple divisions and subsidiaries. As a result, diversified groups are more likely than freestanding firms to use asset sales. Moreover, managers that respond favorably to creditor pressure to undertake asset sales are more likely to retain control of the firm. We find that 91 distressed firms in our sample (14.63 percent) sold part or all of their assets.

In addition, 24 firms (3.9 percent) either merged with another company or were acquired. Only 10 firms were liquidated. This may be largely because our sample includes mostly larger firms with better access to capital markets. However, there is an additional reason for the fewer liquidations: Forbearance by creditors is often more likely during an economic crisis (Peek and Rosengreen, 2003). Naturally, a firm exits our sample if it undergoes a merger, liquidation, or both. The appendix includes articles from the *TCR* archive for each noted financial response.

Governance Variables

In addition to financial and response variables, this study includes another set of determinants of financial responses—governance factors. We specifically investigate the role of business groups, political connections, and ownership concentration (the prevalent form of corporate control outside Anglo-Saxon systems). For business group affiliation, we use data from Claessens, Djankov, and Lang (2000), who compile several data sources to identify whether a company is part of a major business group. Following their paper, group affiliation is a dummy variable that takes the value 1 for all companies that are a part of a business group and 0 otherwise. We use the group affiliation variable to study the effect of group affiliation on each response to corporate distress. As mentioned before, Kim (2004) predicts a higher likelihood of a debt workout for group-affiliated than stand-alone firms.

Earlier work by Faccio, Masulis, and McConnell (2006) shows that many Asian firms were owned by key politicians (or people close to them) and frequently received government aid during the crisis. Therefore, we control for a given company having political ties. Following their paper, political connection is a dummy variable that takes the value 1 if at least one of a firm's top directors (CEO, president, vice president, or secretary) or large shareholders (any blockholder controlling at least 10 percent of votes) is a member of parliament, a government minister, or closely related to a top politician or party and 0 otherwise. If these companies receive indirect aid from the government, we would expect not only a higher incidence of workouts, but also more-frequent asset sales (particularly if politicians can exert pressure on prospective buyers).[12]

Finally, we include two variables to study measures of ownership concentration largely following Claessens, Djankov, and Lang (2000) and Mitton (2002), respectively. The first variable is largest blockholder ownership, defined as the ownership percentage (in terms of cash flow rights) of the largest shareholder in the firm. The second variable is summed ownership concentration, defined as the total holding of all shareholders that own 5 percent or more stock, which identifies when ownership is not concentrated with an individual but with a group. To differentiate between ownership blocks held by those involved in management and those held by others, Mitton (2002) uses largest management blockholder concentration and largest nonmanagement blockholder concentration. We also use these governance measures to explain the differences in the modes of each response.

SUMMARY STATISTICS

Tables 1 to 4 report summary statistics. We use annual financial data from 1998 through 2003 to calculate financial variables for each firm over all years for which data are available. In contrast, we calculate governance and ownership variables using pre-crisis data and treat these variables as time invariant due to data limitations.[13] These

[12] We refine some of these variables further to distinguish between the types of controlling shareholders (for example, families or governments) and determine whether a firm is part of a group that includes a bank. However, these variables do not explain the likelihood of any of the responses.

[13] For the observation dates for the governance and ownership data, see the sources in Claessens, Djankov, and Lang (2000); Mitton (2002); and Faccio, Masulis, and McConnell (2006).

Table 2

Distribution of Responses by Country

	Indonesia	Malaysia	Philippines	South Korea	Thailand	Total
Panel A: Full sample						
Number of firms	102	151	69	212	88	622
Response						
Creditor workouts	30	27	13	33	33	136
Asset sales	7	42	6	21	15	91
Merger	3	3	5	9	4	24
Liquidation	0	1	2	7	0	10
Total responses	40	73	26	70	52	261
Ownership structure						
Group affiliation (mean)	0.71	0.58	0.74	0.53	0.50	0.59
Largest blockholder ownership (%)	47.21	30.89	36.76	15.99	39.88	27.40
Panel B: Distressed firms						
Number of firms	92	66	56	180	64	458
Response						
Creditor workouts	30	13	11	32	31	117
Asset sales	7	19	6	19	12	63
Merger	2	2	2	8	3	17
Liquidation	0	1	1	7	0	9
Total responses	39	35	20	66	46	206
Ownership structure						
Group affiliation (mean)	0.74	0.59	0.73	0.58	0.48	0.62
Largest blockholder ownership (%)	46.65	31.30	36.76	15.97	35.46	26.21

NOTE: Creditor workouts include agreements between a firm and its creditors to modify any terms of outstanding financial claims currently held against the firm (for both public and private loan agreements). Asset sales include the sales of assets and divestitures in subsidiaries or divisions to retire debt. Mergers includes firms that merged or were taken over during 1998-2003. Liquidations include firms liquidated during 1998-2003. A given company may have multiple responses at the same time. See note for Table 1 for additional definitions.

SOURCE: Data on responses of distressed firms are from the publicly available archives of the IBL website.

statistics are calculated across all firms as opposed to all firm-years.

Table 1 shows how firms in distress differ from their nondistressed peers. Our sample includes 622 firms: 458 classified as distressed (according to our definition) and 164 that failed to enter distress at any point during our sample period. As evident from Table 1, distressed firms tend to be much larger in size—measured in terms of total assets in USD. Not surprisingly, they also tend to be more highly leveraged. On average, a greater proportion of distressed firms are affiliated with business groups or have pyramid ownership. Conversely, a smaller proportion of distressed firms have a political connection or management ownership. Distressed firms with a group affiliation have, on average, fewer firms and banks in those groups. In addition, the average holdings of a firm's largest shareholder are higher for nondistressed than for distressed firms.

Table 2 provides country-level summary statistics for the full sample of firms (Panel A) and

Table 3

Distribution of Responses by Year

	Creditor workouts	Asset sales	Mergers	Liquidations	Total
Panel A: Full sample					
1998	19	15	3	0	37
1999	26	13	6	4	49
2000	42	12	5	2	61
2001	22	24	5	3	54
2002	19	19	4	0	43
2003	8	8	1	1	17
Total	136	91	24	10	261
Panel B: Distressed firms					
1998	17	10	3	0	30
1999	26	8	5	4	43
2000	38	7	1	1	47
2001	20	20	4	3	47
2002	12	12	3	0	27
2003	4	6	1	1	12
Total	117	63	17	9	206

NOTE: See notes for Tables 1 and 2 for definitions.

SOURCE: Data on responses of distressed firms are from the publicly available archives of the IBL website.

distressed firms only (Panel B). The number of firms in each country ranges from 69 in the Philippines to 212 in South Korea. In the full sample, there are a total of 261 responses. The number of firms recording responses was fewer than 261, however, because a single firm could have multiple responses. Interestingly, the distribution of each response (as a proportion of total firms) appears to be evenly spread across the countries. The sole exception is Malaysia, which has a disproportionately large number of firms using asset sales. However, when one conditions on distressed firms, this difference is no longer as large. For the full sample, the average largest blockholder ownership is 27.40 percent. The lowest average is in South Korea, with a mean of 15.99 percent, and the highest is in Indonesia, with a mean of 47.21 percent. For the full sample, 59 percent of firms are part of a business group, with a high of 74 percent in the Philippines and a low of 48 percent in Thailand. Interestingly, for distressed firms, group affiliation and largest blockholder ownership are only marginally different on average than for all firms in the sample.

Table 3 shows the distribution of responses to distress by year for all firms (Panel A) and distressed firms only (Panel B). The onset of the crisis in East Asia was largely during 1997-98. The majority of responses occurred two to three years after the crisis. Not surprisingly, responses peak around the years 2000 and 2001 and decline thereafter. However, we recorded responses through 2003 to include those (such as creditor workouts) that undergo multiple, possibly lengthy rounds of negotiations to reach an agreement (see Appendix A for such an example).

Table 4 shows for the full sample (Panel A) and distressed firms only (Panel B) the distribution of the four responses based on firm characteristics. The columns labeled "1" and "0" indicate firms with and without responses, respectively.

Table 4

Summary Statistics by Response Type

		Creditor workouts		Mergers		Asset sales		Liquidations	
		1	0	1	0	1	0	1	0
Panel A: Full sample									
Number of firms		136	486	24	598	91	531	10	612
Firm size (USD thousands)	Mean	1,613.64	944.70	1,751.37	1,080.15	1,735.83	1,010.51	2,949.69	1,072.54
	Median	393.74	212.37	845.90	229.73	729.54	213.11	326.45	238.95
Group affiliation	Percent	61.80	58.23	75	58.36	68.10	57.44	50	59.15
Political connection	Percent	18.40	11.93	12.50	13.38	22	11.86	0	13.56
Management ownership	Percent	62.20	67.98	79.20	66.22	68.90	66.35	50	67
Pyramid ownership	Percent	37.80	31.41	41.70	32.44	36.70	32.14	30	32.84
Firms in group	Mean	8.41	10.09	8.69	9.76	10.75	9.50	9.20	9.71
	Median	7	9	8	8	9	8	9	8
Banks in group	Mean	2.42	2.72	3.44	2.61	2.81	2.62	2.20	2.66
	Median	2	2	3	2	2	2	1	2
Largest blockholder ownership	Mean	26.91	27.59	29.58	27.29	23.26	28.45	11.68	27.67
	Median	23.55	23.53	26.68	22.71	21.28	23.88	9.72	23.81
Panel B: Distressed firms									
Number of firms		117	341	17	441	63	395	9	449
Firm size (USD thousands)	Mean	1,535.82	980.26	2,051.38	1,101.91	1,931.58	1,006.39	3,230.57	1,089.89
	Median	399.12	255.43	1,151.20	275.59	804.30	255.51	355.13	287.25
Group affiliation	Percent	62.39	61.88	76.47	61.45	69.84	60.76	55.56	62.14
Political connection	Percent	18.80	8.50	5.88	11.34	17.46	10.13	0	11.36
Management ownership	Percent	60.34	64.90	76.47	63.24	59.68	64.38	55.56	63.90
Pyramid ownership	Percent	38.79	33.92	47.06	34.70	38.71	34.61	33.33	35.20
Firms in group	Mean	8.24	9.47	10	9.11	9.97	9	9.20	9.15
	Median	7	9	8	8	9	8	9	8
Banks in group	Mean	2.32	2.69	3.91	2.53	2.95	2.53	2.20	2.60
	Median	1.50	2	3	2	2	2	1	2
Largest blockholder ownership	Mean	27.82	25.45	29.34	26.02	22.93	26.86	11.68	26.54
	Median	22.10	21.26	26.24	21.21	20.58	22.01	9.72	22.01

NOTE: The column headings "1" and "0" indicate firms with and without a response, respectively. See notes for Tables 1 and 2 for definitions.

SOURCE: Data on responses of distressed firms are from the publicly available archives of the IBL website.

In Panel A, firm size (measured as total assets in USD) is greater for firms with a response than for those without. The group of firms that responds with mergers has the highest percentage of firms with a group affiliation, management ownership, and pyramid ownership. Firms in this group also tend to have more banks in their business groups on average and the largest average largest blockholder ownership. In contrast, the group of firms that liquidate has the lowest percentage of firms with a group affiliation, political connection, management ownership, and pyramid ownership. Firms in this group also have the lowest percentage of banks in their business groups and the lowest average largest blockholder ownership.

Panel B has few qualitative differences from Panel A. Firm size is still larger for firms with a response than those without. The differences between the two panels for group affiliation, political connection, management ownership, and pyramid ownership are around 5 percentage points. One exception is the percentage of firms with management ownership that use asset sales, which decreases 9.22 percentage points, from 68.9 percent for the full sample to 59.68 percent for distressed firms only.

METHODOLOGY

Our aim is to examine the hazard of corporate responses to financial distress. To understand the determinants of a particular event (response), we estimate a semiparametric hazard regression for the event. The hazard function $\lambda(t)$ is the (instantaneous) probability of the occurrence of the event at year t and is given by

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{\Pr(t \le T < t + \Delta t | T \ge t)}{\Delta t}.$$

We assume that the causal processes are different for each event. Our starting point is the relative risk model developed in Cox (1972),

$$(1) \quad \lambda(t|\boldsymbol{x}) = \lambda_0(t)\exp \boldsymbol{x}'\beta,$$

where $\boldsymbol{x}$ is a vector of measured covariates and β is a vector of parameters.[14] The hazard $\lambda(t|\boldsymbol{x})$ gives the rate of response per unit time period at time t. This model assumes a baseline hazard, $\lambda_0(t)$, which is identical for all firms in the sample. The covariates in $\boldsymbol{x}$ influence the overall hazard for each firm through the exponential term in equation (1). The baseline hazard is of unspecified form and, hence, is nonparametric. Along with the parametric exponential form in equation (1), we estimate a semiparametric model. The hazard specification in equation (1) makes it sufficiently flexible to adapt to our problem of corporate responses to financial distress.

First, the model allows a firm to make multiple responses even within the same year. Moreover, the occurrence of one such event does not preclude others, except in the case of a merger or liquidation, whereupon the firm exits our sample.[15] We consider three responses to financial distress: creditor workouts, asset sales, and mergers.[16] Liquidations and mergers denote a firm's exit from our sample but, given their obvious differences, we classify them separately. However, we do not analyze liquidations because few occur in our sample; thus, their information content is low and unbiased estimates are unlikely (Hsieh, Manski, and McFadden, 1985).

Second, the baseline hazard can be allowed to vary in specific subsets of data. Typically, such stratification is useful when some explanatory

[14] The object of interest in a Cox proportional hazard regression model is the hazard ratio, which can be interpreted as a multiplicative change in the instantaneous probability of delinquency for a marginal change in a particular risk characteristic. It seems that the hazard ratio is analogous to the odds ratio in logistic regressions. Let $\lambda(t|\boldsymbol{x})$ be the instantaneous probability of delinquency at year t conditional on other characteristics given by vector $\boldsymbol{x}$. We can define the estimated hazard ratio (HR) for marginal change in risk characteristic x_i as

$$\widehat{HR}(t|x_i = x_i + \Delta x_i) = \frac{\lambda_0(t)\exp\left(x_1\hat{\beta}_1 + x_2\hat{\beta}_2 + \cdots + (x_i + \Delta x_i)\hat{\beta}_i + \cdots\right)}{\lambda_0(t)\exp\left(x_1\hat{\beta}_1 + x_2\hat{\beta}_2 + \cdots + x_i\hat{\beta}_i + \cdots\right)} = \exp\left(\Delta x_i\hat{\beta}_i\right).$$

This gives us

$$h(t|\boldsymbol{x}, x_i = x_i + \Delta x_i) = \lambda(t|\boldsymbol{x}) * \widehat{HR}(t|x_i = x_i + \Delta x_i).$$

[15] The case of alternative modes of failure, where the occurrence of a single event removes a bank from risk of the alternative event, is modeled in Wheelock and Wilson (2000). Our case differs from that of the competing-risk framework used in their study because in our study individual firms can have multiple responses to distress.

[16] Given the few liquidations, our estimation does not yield any explanatory power for liquidations per se.

variables do not appear to have a multiplicative effect on the hazard function. We take advantage of this feature and stratify by country. In doing so, the population of firms is divided into r strata and the hazard $\lambda_k(t|\boldsymbol{x})$ in the kth stratum depends on an arbitrary hazard function, $\lambda_{0k}(t)$, and can be written for $k = 1,2,\ldots,r$ as

$$(2)\quad \lambda_k\left(t|\boldsymbol{x}\right) = \lambda_{0k}\left(t\right)\exp \boldsymbol{x}'\beta.$$

A stratified Cox hazard model allows us to control for countrywide differences in institutions (i.e., the rules, practices, and organizations that govern the economy). Notably, this estimation technique allows each country to have its own baseline hazard, $\lambda_{0k}(t)$, $k = 1,\ldots r$, where r is the number of countries in our sample. In this respect, our estimation technique allows us to control for the evolution of such institutional features over time.

Third, the model allows covariates to depend on time. With such time-varying covariates, $\boldsymbol{x}(t)$, the relative risk model is of the form

$$(3)\quad \lambda_k\left(t|\boldsymbol{x}(t)\right) = \lambda_{0k}\left(t\right)\exp \boldsymbol{x}(t)'\beta$$

for $k = 1,2,\ldots,r$, where $\mathbf{x}(t)$ is the set of covariates. In our case, financial covariates are time varying but governance variables are time invariant. We estimate equation (3) and provide the results below.

Finally, our estimation procedure allows us to check for robustness using data for distressed firms only. Stated differently, we can condition on financial variables to determine whether a firm is in distress and only then include it in our regression sample. Therefore, a firm enters the sample when, at any year within our sample period, the financial condition of the firm indicates distress. Thereafter, the firm remains in our sample unless it disappears because of a merger or liquidation. In this way, we try to ensure that the responses included are only those from distressed firms. It is important to note that these four generalizations do not substantially complicate the estimation of the coefficients (see Wheelock and Wilson, 2000, for details).

To formalize our estimation procedure, we describe the methodology as follows. Each firm in the sample is observed at J_i different times, $t_{i1} < t_{i2} < \ldots < t_{iJ_i}$, with either failure (exit due to merger or liquidation) or censoring occurring at time t_{iJ_i}. Here, time refers not to calendar time but to time relative to the date (year) a firm first becomes distressed (the entry of the firm into the sample), so that $t_{i0} = 0$, where t_{i0} is the first date of distress for the ith firm. Financial data used in $\boldsymbol{x}(t)$ corresponding to time t_{ij}, $j = 0,\ldots,(J_i - 1)$, are assumed to reflect the financial position of the firm i over the interval $[t_{ij} < t_{i(j+1)})$. Although the financial data are assumed constant over the given interval, they may vary across the different intervals, making this estimated model time varying. In addition, the set of covariates include governance and ownership variables assumed to be unchanged throughout the sample period.

ESTIMATION RESULTS

As mentioned, the literature on corporate distress includes the study of several financial variables that are important determinants of responses to distress. In this section, we include all relevant financial variables as regressors in our baseline regression specification. To account for systematic variations of financial ratios across industries, we normalize the financial variables for each financial year using their two-digit SIC industry mean (Asquith, Gertner, and Scharfstein, 1994). Therefore, all movements of financial variables in our estimation should be interpreted as standard deviations (SDs) from their industry means. In addition to financial variables, we use different controls for governance, affiliation, and ownership concentration variables.

The regression results in Tables 5 through 7 report the hazard ratios for the six different specifications considered in this study. Each specification includes the financial variables firm size, MB ratio, ROE, and interest coverage ratio. Table 5 also includes the intangible asset ratio, which is an important proxy for asymmetric information in our regressions for creditor workouts. In addition, each specification also includes additional governance variables: Columns 1 and 2 also include the political connection and group affiliation variables, respectively. Columns 3 through

Table 5

Determinants of Creditor Workouts

	Stratified Cox hazard ratios: Creditor workouts					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm size	0.991 (–0.14)	0.987 (–0.21)	0.927 (–0.98)	0.936 (–0.83)	0.917 (–1.14)	0.927 (–0.94)
Intangible asset ratio	0.720 (–2.98)***	0.731 (–2.84)***	0.586 (–3.25)***	0.583 (–3.10)***	0.596 (–3.26)***	0.586 (–3.19)***
MB ratio	0.733 (–1.46)	0.748 (–1.35)	0.850 (–0.68)	0.852 (–0.64)	0.858 (–0.65)	0.862 (–0.64)
ROE	1.097 (0.74)	1.090 (0.65)	1.153 (1.10)	1.137 (1.06)	1.141 (1.05)	1.147 (1.08)
Interest coverage ratio	0.583 (–3.85)***	0.583 (–3.83)***	0.605 (–2.12)**	0.609 (–2.00)**	0.592 (–2.29)**	0.591 (–2.21)**
Political connection	1.688 (1.49)					
Group affiliation		1.580 (3.06)***				
Largest blockholder ownership			0.985 (–1.33)			
Summed ownership concentration				0.990 (–0.85)		
Largest management blockholder concentration					0.980 (–0.92)	
Largest nonmanagement blockholder concentration						0.994 (–0.52)
Log pseudo-likelihood	–299.11	–298.59	–152.47	–152.80	–152.85	–153.00
Number of firms	452	452	181	181	181	181
Number of responses (events)	71	71	42	42	42	42
Number of observations	2,672	2,672	1,171	1,171	1,171	1,171

NOTE: The intangible asset ratio is the book value of intangible assets divided by the book value of total assets. The MB ratio is the market value of equity (ordinary and preferred) plus book value of total debt divided by the book value of total assets. ROE is shareholder net income divided by the year-end book value of shareholder equity (%). The interest coverage ratio is EBIT divided by the total interest expense. Summed ownership concentration is the sum of all shareholders owning 5 percent or more of the company. Largest management blockholder concentration indicates the largest blockholder is an officer of the firm (Mitton, 2002). Largest nonmanagement blockholder concentration indicates the largest blockholder is not an officer of the firm. See notes for Tables 1 and 2 for additional definitions. Numbers in parentheses are *z*-statistics; *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

6 also include the ownership concentration variables: largest blockholder ownership, summed ownership concentration, largest management blockholder, and largest nonmanagement blockholder concentration, respectively.

Column 1 of Table 5 reports regression results for the noted financial variables and the political connection dummy variable. For the interest coverage ratio, the point estimate of the regression coefficient is –0.539 and the hazard ratio—reported in Table 5—is obtained by exponentiating the coefficient as $e^{-0.539} = 0.583$. The negative coefficient implies that an increase in the interest coverage ratio from its annual industry (two-digit SIC) mean significantly reduces the hazard of creditor workouts. Stated differently, the 0.583 hazard ratio implies that a 1-SD increase in the interest coverage ratio from its annual SIC two-digit industry mean reduces the creditor workout hazard by 41.7 percent. A similar interpretation can be made for the dummy variable group affiliation. As shown in column 2 of Table 5, the point estimate of the hazard ratio for group affiliation is 1.580. This means that the creditor workout hazard for a firm with a business group affiliation is 1.580 times (58 percent) greater than that for a firm without a group affiliation.

Creditor Workouts

As shown in Table 5, two of the five financial variables have significant explanatory power for the hazard of creditor workouts. A 1-SD increase in the intangible asset ratio from its industry mean decreases the hazard of creditor workouts by 0.583 to 0.731 times the hazard of its (industry) mean value. Arguably, creditors were less likely to restructure terms of debt for firms with a greater proportion of intangible assets because there is greater asymmetry in the information stockholders and creditors use to value the firm (Gilson, John, and Lang, 1990). Not surprisingly, a 1-SD increase in the interest coverage ratio from its industry mean reduces the hazard of creditor workouts by 0.583 to 0.609 times the hazard of its (industry) mean value. Clearly, the greater the ability of a firm to honor its debt payments, the less likely it will restructure its debt. Notably, however, neither firm size (total assets), ROE (earning potential), nor the MB ratio (growth prospects) are significant determinants of creditor workouts.

Governance variables do have significant explanatory power for a firm's decision to restructure its liabilities during financial distress. Group affiliation significantly increases the likelihood of creditor workouts. Firms in a business group are substantially more likely to undertake creditor workouts than their unaffiliated peers. Interestingly, this result provides strong support for the arguments in Kim (2004). As shown in column 1 of Table 5, firms with a political connection are 1.688 times more likely than firms without a political connection to engage in creditor workouts. Although these results are in line with earlier studies, such as Faccio, Masulis, and McConnell (2006), they are not statistically significant in our sample. We also use two measures of ownership concentration. Since these measures are expressed in percentage terms, the variables are scaled by 100. Largest blockholder ownership and summed ownership concentration each decrease the likelihood of creditor workouts, but the results are not statistically significant in our sample.

Asset Sales

Not surprisingly, our results in Table 6 also show that firm size is an important determinant of asset sales. A 1-SD increase in firm size from its annual industry (two-digit SIC) mean increases the hazard of asset sales by 1.466 times the hazard of its (industry) mean value. Interestingly, however, other financial variables, such as the proxies for earning potential (ROE), growth prospects (the MB ratio), and debt repayment capacity (the interest coverage ratio), seem to adversely affect the hazard of asset sales.

Although the effects of these financial variables are not statistically significant, the governance variables have significant explanatory power. The hazard of asset sales for firms with a group affiliation or political connection is roughly 1.8 times that of firms without such an affiliation or connection. However, the point estimate for the group affiliation dummy variable is significant at the 10 percent level, whereas that for the political connection is significant at the 5 percent

Table 6

Determinants of Asset Sales

	Stratified Cox hazard ratios: Asset sales					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm size	1.466 (6.18)***	1.473 (5.36)***	1.428 (2.96)***	1.432 (2.92)***	1.392 (2.46)**	1.464 (3.09)***
MB ratio	0.961 (–0.27)	0.988 (–0.08)	0.753 (–1.23)	0.751 (–1.25)	0.773 (–1.16)	0.754 (–1.24)
ROE	1.061 (0.29)	1.030 (0.14)	0.777 (–1.65)*	0.799 (–1.56)	0.817 (–1.38)	0.783 (–1.60)
Interest coverage ratio	0.764 (–2.66)***	0.761 (–2.68)***	0.947 (–0.23)	0.889 (–0.48)	0.831 (–0.82)	0.908 (–0.41)
Political connection	1.817 (2.02)**					
Group affiliation		1.815 (1.80)*				
Largest blockholder ownership			0.955 (–2.65)***			
Summed ownership concentration				0.982 (–0.72)		
Largest management blockholder concentration					1.014 (0.45)	
Largest nonmanagement blockholder concentration						0.962 (–2.43)**
Log pseudo-likelihood	–160.59	–160.22	–68.90	–71.25	–71.78	–69.68
Number of firms	453	453	181	181	181	181
Number of responses (events)	41	41	20	20	20	20
Number of observations	2,693	2,693	1,176	1,176	1,176	1,176

NOTE: Numbers in parentheses are *z*-statistics; *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. See notes for Tables 1, 2, and 5 for definitions.

level. Importantly, ownership concentration reduces the hazard of asset sales. A 1 percent increase in largest blockholder ownership reduces the hazard of asset sales by 0.955 times the hazard of its (industry) mean value. Perhaps of greater significance are the differences in the effects of the largest management blockholder and largest nonmanagement blockholder variables. While the former increases the hazard of asset sales, the latter reduces it. Stated differently, we find that the decreased hazard of asset sales from high concentrations of ownership is largely attributable to large blockholders *not* involved with management.

Mergers

As shown in Table 7, unlike for credit workouts and asset sales, ROE has strong explanatory power for mergers, indicated by the statistically (and economically) significant point estimate of the merger hazard ratio for ROE. A 1-SD increase in ROE from its mean value increases the hazard of a merger by twice the hazard of its (industry) mean value. Since mergers tend to occur among firms with higher operating performance, this finding seems to indicate that the mergers in our sample were not necessarily in response to distress.

Table 7

Determinants of Mergers

	Stratified Cox hazard ratios: Mergers					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm size	1.223 (2.17)**	1.167 (1.65)*	0.896 (–0.83)	0.835 (–0.85)	0.963 (–0.45)	0.813 (–1.60)
MB ratio	0.607 (–1.56)	0.563 (–2.19)**	0.759 (–0.83)	0.828 (–0.53)	0.424 (–1.36)	0.686 (–1.26)
ROE	1.974 (7.88)***	1.998 (9.52)***	2.112 (4.94)***	2.312 (5.04)***	1.963 (5.20)***	2.108 (5.17)***
Interest coverage ratio	0.523 (–2.06)**	0.543 (–1.88)*	0.388 (–1.08)	0.306 (–1.32)	0.449 (–0.96)	0.408 (–1.00)
Political connection	1.548 (0.56)					
Group affiliation		3.978 (1.66)*				
Largest blockholder ownership			1.055 (2.96)***			
Summed ownership concentration				1.067 (2.15)**		
Largest management blockholder concentration					0.934 (–0.87)	
Largest nonmanagement blockholder concentration						1.068 (3.63)***
Log pseudo-likelihood	–49.11	–47.40	–25.97	–24.88	–26.95	–24.92
Number of firms	453	453	181	181	181	181
Number of responses (events)	13	13	8	8	8	8
Number of observations	2,693	2,693	1,176	1,176	1,176	1,176

NOTE: Numbers in parentheses are *z*-statistics; *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. See notes for Tables 1, 2, and 5 for definitions.

In addition, some of the governance variables have strong explanatory power for mergers as well. For example, the point estimate of group affiliation is significant at the 10 percent level; thus, group affiliation significantly increases the merger hazard. Both ownership concentration variables also increase the merger hazard by roughly the same amount. A 1 percent increase in either the largest blockholder ownership or the summed ownership concentration increases the merger hazard roughly by 1.06 times. Importantly, as they do for asset sales, largest management blockholder and largest nonmanagement blockholder have opposite effects. The former decreases the merger hazard and the latter increases it. Here, too, we find that the increase in the merger hazard from high concentrations of ownership is largely attributable to large blockholders *not* involved with management.

In summary, we find that financial and governance variables influence the response hazards but these effects depend largely on the type of response. The credit workout hazard decreases with increases in the intangible assets ratio or interest coverage ratio. The asset sale hazard increases with firm size, while the merger hazard increases with ROE. In addition, the asset sale hazard decreases but the merger hazard increases

with higher concentrations of ownership. However, both effects are largely attributable to large blockholders *not* involved with management. Finally, political connections and group affiliation increase all three response hazards. Notably, group affiliation has the largest effect on the merger hazard and group affiliation increases the creditor workout hazard even more.

ROBUSTNESS CHECK

Corporate Distress

Our analysis above characterizes corporate responses to economy-wide distress. In this section, we show that the results are robust to the inclusion of distress at the firm-level only. However, there is an important caveat to this analysis. Since our classification of distressed firms uses firm-level financial data, the use of such criteria imposes a selection bias on the regression analysis. It turns out that our earlier results are robust to this selection bias.

Based on our definition, we classify 458 firms as distressed during the sample period (Panel B of Table 2). Panel B of Tables 2 and 3 show the distribution of distressed firms and their responses by country and year, respectively. Not surprisingly, comparison with the distribution for the full sample (Panel A of Tables 2 and 3) shows that most of the responses in the full sample came from distressed firms.

Tables 8 to 10 show the determinants of the three hazards, respectively, for distressed firms only. In almost all cases, the results are similar to those for the full sample, which indicates little loss of generality by conditioning on distressed firms only.

Our definition of firm-level distress is not without limitations. First, it is dichotomous and does not characterize the *degree* of financial distress. Therefore, when multiple events are observed for a single firm, we do not differentiate between distress levels for each event. Second, we do not allow firms to switch between the distressed and nondistressed classifications: Per our definition, once a firm is classified as distressed in any given year, it is classified as distressed for all remaining years in our sample period. To the extent that our sample of distressed firms includes firms no longer in distress, our estimates could be biased.

Country-Level Variation

To control for variations in a country's institutions, legal codes, and social patterns of dealing with economic distress, we use a stratified Cox hazard model. This model allows the baseline hazard model to be different for each stratum. An alternative form of estimation is also used by using dummy variables for each country. The results are qualitatively similar and available upon request.

CONCLUSION

This study examines corporate responses to economy-wide and firm-level distress. We adopt a duration analysis framework to study determinants of such responses. We find that financial and governance variables influence the hazard of each response but that these effects depend largely on the type of response. Needless to say, the scope of this study can be broadened further to include countries where corporations did not experience economy-wide distress at the same time as firm-level distress. This would then provide us with a counterfactual to determine how responses to firm-level distress differ between normal times and times of economy-wide distress. Broadening the scope of this exercise to different countries could also allow us to examine how countrywide differences in legal structures and bankruptcy codes affect firm-level responses.

Table 8

Determinants of Creditor Workouts for Distressed Firms

	Stratified Cox hazard ratios: Creditor workouts					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm size	0.988 (–0.20)	0.988 (–0.21)	0.944 (–0.74)	0.962 (–0.46)	0.940 (–0.77)	0.950 (–0.63)
Intangible asset ratio	0.750 (–2.55)**	0.767 (–2.40)**	0.619 (–2.61)***	0.618 (–2.48)**	0.643 (–2.66)***	0.624 (–2.54)**
MB ratio	0.723 (–1.29)	0.736 (–1.20)	0.864 (–0.43)	0.822 (–0.53)	0.839 (–0.50)	0.864 (–0.43)
ROE	1.140 (1.08)	1.128 (0.95)	1.194 (1.33)	1.162 (1.22)	1.171 (1.22)	1.185 (1.29)
Interest coverage ratio	0.621 (–2.31)**	0.624 (–2.24)**	0.641 (–1.70)*	0.660 (–1.49)	0.623 (–1.76)*	0.627 (–1.74)*
Political connection	1.746 (1.55)					
Group affiliation		1.387 (2.11)**				
Largest blockholder ownership			0.978 (–1.63)			
Summed ownership concentration				0.984 (–1.33)		
Largest management blockholder concentration					0.983 (–0.76)	
Largest nonmanagement blockholder concentration						0.989 (–0.83)
Log pseudo-likelihood	–274.87	–275.18	–142.16	–142.55	–143.07	–142.95
Number of firms	404	404	166	166	166	166
Number of responses (events)	66	66	39	39	39	39
Number of observations	1,931	1,931	880	880	880	880

NOTE: Numbers in parentheses are *z*-statistics; *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. See notes for Tables 1, 2, and 5 for definitions.

Table 9

Determinants of Asset Sales for Distressed Firms

	Stratified Cox hazard ratios: Asset sales					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm size	1.453 (5.69)***	1.451 (5.10)***	1.532 (3.18)***	1.579 (3.57)***	1.456 (2.79)***	1.603 (3.47)***
MB ratio	0.978 (–0.13)	0.992 (–0.05)	0.620 (–1.68)*	0.603 (–1.65)*	0.643 (–1.49)	0.612 (–1.82)*
ROE	1.055 (0.24)	1.021 (0.09)	0.754 (–1.57)	0.782 (–1.55)	0.809 (–1.27)	0.765 (–1.51)
Interest coverage ratio	0.819 (–1.48)	0.824 (–1.40)	0.826 (–0.60)	0.777 (–0.87)	0.692 (–1.26)	0.766 (–0.86)
Political connection	1.521 (1.11)					
Group affiliation		1.635 (1.47)				
Largest blockholder ownership			0.935 (–2.96)***			
Summed ownership concentration				0.965 (–1.00)		
Largest management blockholder concentration					1.019 (0.61)	
Largest nonmanagement blockholder concentration						0.944 (–2.74)***
Log pseudo-likelihood	–139.71	–139.21	–56.34	–59.17	–60.63	–57.33
Number of firms	404	404	166	166	166	166
Number of responses (events)	36	36	17	17	17	17
Number of observations	1,944	1,944	882	882	882	882

NOTE: Numbers in parentheses are *z*-statistics; * and *** indicate statistical significance at the 10 and 1 percent levels, respectively. See notes for Tables 1, 2, and 5 for definitions.

Table 10

Determinants of Mergers for Distressed Firms

	Stratified Cox hazard ratios: Mergers					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm size	1.169 (1.95)*	1.115 (1.40)	0.904 (–0.78)	0.842 (–0.83)	0.971 (–0.35)	0.820 (–1.55)
MB ratio	0.643 (–1.27)	0.601 (–1.98)**	0.766 (–0.81)	0.871 (–0.39)	0.423 (–1.31)	0.689 (–1.30)
ROE	2.026 (7.08)***	2.087 (9.26)***	2.096 (4.81)***	2.319 (4.95)***	1.950 (5.12)***	2.094 (5.06)***
Interest coverage ratio	0.561 (–1.61)	0.599 (–1.39)	0.390 (–1.07)	0.307 (–1.31)	0.449 (–0.96)	0.410 (–0.99)
Political connection	2.064 (1.13)					
Group affiliation		4.368 (1.71)*				
Largest blockholder ownership			1.055 (2.96)***			
Summed ownership concentration				1.069 (2.15)**		
Largest management blockholder					0.934 (–0.85)	
Largest nonmanagement blockholder						1.067 (3.62)***
Log pseudo-likelihood	–45.20	–43.41	–25.81	–24.60	–26.84	–24.78
Number of firms	406	406	166	166	166	166
Number of responses (events)	12	12	8	8	8	8
Number of observations	1,944	1,944	882	882	882	882

NOTE: Numbers in parentheses are z-statistics; *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. See notes for Tables 1, 2, and 5 for definitions.

REFERENCES

Ang, James S.; Chua, Jess H. and McConnell, John J. "The Administrative Costs of Corporate Bankruptcy: A Note." *Journal of Finance*, March 1982, *37*(1), pp. 219-26.

Asquith, Paul; Gertner, Robert and Scharfstein, David. "Anatomy of Financial Distress: An Examination of Junk-Bond Issuers." *Quarterly Journal of Economics*, August 1994, *109*(3), pp. 625-58.

Atanassov, Julian and Kim, E. Han. "How Do Labor Laws and Investor Protection Affect Corporate Restructuring?" Working paper, University of Michigan, 2006.

Beck, Thorsten; Demirgüç-Kunt, Asli and Maksimovic, Vojislav. "Financing Patterns Around the World: Are Small Firms Different?" *Journal of Financial Economics*, September 2008, *89*(3), pp. 467-87.

Brown, David T.; James, Christopher M. and Mooradian, Robert. "The Information Content of Distressed Restructurings Involving Public and Private Debt Claims." *Journal of Financial Economics*, February 1993, *33*(1), pp. 93-118.

Brown, David T.; James, Christopher M. and Mooradian, Robert. "Asset Sales by Financially Distressed Firms." *Journal of Corporate Finance*, August 1994, *1*(2), pp. 233-57.

Claessens, Stijn; Djankov, Simeon and Klapper, Leora. "Resolution of Corporate Distress in East Asia." *Journal of Empirical Finance*, February 2003, *10*(1-2), pp. 199-216.

Claessens, Stijn; Djankov, Simeon and Lang, Larry H.P. "The Separation of Ownership and Control in East Asian Corporations." *Journal of Financial Economics*, October-November 2000, *58*(1-2), pp. 81-112.

Claessens, Stign; Djankov, Simon and Mody, Ashoka, eds. *Resolution of Financial Distress: An International Perspective on the Design of Bankruptcy Laws*. Washington, DC: World Bank, 2001.

Cox, D.R. "Regression Models and Life-Tables." *Journal of the Royal Statistical Society*, 1972, *34*(2), pp. 187-220.

Erwin, Gayle R. and McConnell, John J. "To Live or Let Die? An Empirical Analysis of Piecemeal Voluntary Corporate Liquidations." *Journal of Corporate Finance*, December 1997, *3*(4), pp. 325-54.

Faccio, Mara; Masulis, Ronald W. and McConnell, John J. "Political Connections and Corporate Bailouts." *Journal of Finance*, December 2006, *61*(6), pp. 2597-635.

Franks, Julian R. and Torous, Walter N. "An Empirical Investigation of U.S. Firms in Reorganization." *Journal of Finance*, July 1989, *44*(3), pp. 747-69.

Friedman, Eric; Johnson, Simon and Mitton, Todd. "Propping and Tunneling." *Journal of Comparative Economics*, December 2003, *31*(4), pp. 732-50.

Gilson, Stuart C. "Management Turnover and Financial Distress." *Journal of Financial Economics*, December 1989, *25*(2), pp. 241-62.

Gilson, Stuart C. "Bankruptcy, Boards, Banks, and Blockholders: Evidence on Changes in Corporate Ownership and Control When Firms Default." *Journal of Financial Economics*, October 1990, *27*(2), pp. 355-87.

Gilson, Stuart C.; Kose, John and Lang, Larry H.P. "Troubled Debt Restructurings: An Empirical Study of Private Reorganization of Firms in Default." *Journal of Financial Economics*, October 1990, *27*(2), pp. 315-53.

Greene, William H. *Econometric Analysis*. Fifth Edition. Upper Saddle River, NJ: Prentice Hall, 2003.

Hoshi, Takeo; Kashyap, Anil and Scharfstein, David. "Corporate Structure, Liquidity and Investment: Evidence from Japanese Industrial Groups." *Quarterly Journal of Economics*, February 1991, *106*(1), pp. 33-60.

Hotchkiss, Edith S. "Postbankruptcy Performance of Management Turnover." *Journal of Finance*, March 1995, *50*(1), pp. 3-21.

Hsieh, David A.; Manski, Charles F. and McFadden, Daniel. "Estimation of Response Probabilities from Augmented Retrospective Observations." *Journal of the American Statistical Association*, September 1985, *80*(391), pp. 651-62.

Kim, Se-Jik. "Bailout and Conglomeration." *Journal of Financial Economics*, February 2004, *71*(2), pp. 315-47.

Lang, Larry H.P.; Poulsen, Annette and Stulz, Rene M. "Asset Sales, Firm Performance, and the Agency Costs of Managerial Discretion." *Journal of Financial Economics*, January 1995, *37*(1), pp. 3-37.

La Porta, Rafael; Lopez-de-Silanes, Florencio and Shleifer, Andrei. "Corporate Ownership Around the World." *Journal of Finance*, April 1999, *54*(2), pp. 471-517.

Mitton, Todd. "A Cross-Firm Analysis of the Impact of Corporate Governance on the East Asian Financial Crisis." *Journal of Financial Economics*, May 2002, *64*(2), pp. 215-41.

Morck, Randall, and Nakamura, Masao. "Banks and Corporate Control in Japan." *Journal of Finance*, February 1999, *54*(1), pp. 319-39.

Morck, Randall; Wolfenzon, Daniel and Yeung, Bernard. "Corporate Governance, Economic Entrenchment, and Growth." *Journal of Economic Literature*, September 2005, *43*(3), pp. 655-720.

Peek, Joe and Rosengren, Eric S. "Unnatural Selection: Perverse Incentives and the Misallocation of Credit in Japan." *American Economic Review*, September 2005, *95*(4), pp. 1144-166.

Radelet, Steven and Sachs, Jeffrey D. "The East Asian Financial Crisis: Diagnosis, Remedies, Prospects." *Brookings Papers on Economic Activity*, 1998, Issue 1, pp. 1-90.

Reinhart, Carmen and Rogoff, Kenneth. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press, 2009.

Senbet, Lemma W. and Seward, James K. "Financial Distress, Bankruptcy and Reorganization," in R.A. Jarrow, V. Maksimovic, and W.T. Ziemba, eds., *Handbook of Operations Research and Managerial Sciences*. New York: Elsevier, 1995, pp. 921-61.

Tashjian, Elizabeth; Lease, Ronald C. and McConnell, John J. "Prepacks: An Empirical Analysis of Prepackaged Bankruptcies." *Journal of Financial Economics*, January 1996, *40*(1), pp. 135-62.

Wheelock, David C. and Wilson, Paul W. "Why Do Banks Disappear? The Determinants of U.S. Bank Failures and Acquisitions." *Review of Economics and Statistics*, February 2000, *82*(1), pp. 127-38.

APPENDIX

Examples of News Articles from the *TCR Asia Pacific* Archive from the InterNet Bankruptcy Library Website[17]

A.1 Example of a Lengthy Workout Process

WEMBLEY INDUSTRIES: Proposes Debt Restructuring
(*TCR Asia Pacific*: Thursday, December 16, 1999, Vol. 2, No. 245)

Wembley Industries Holdings Bhd (WIHB) has proposed a debt restructuring exercise involving an issuance of irredeemable convertible unsecured loan stocks (Iculs), a rights issue with warrants and an increase in authorized share capital.

The company said in a statement yesterday the proposed debt restructuring would involve an issuance of RM606mil nominal value of 1 percent Iculs at 100 percent of its nominal value as full and final settlement of loans owing by WIHB and two of its subsidiaries Plaza Rakyat Sdn Bhd and Wembley IBAE Sdn Bhd (IBAE) amounting to approximately RM606mil.

The proposed rights issue would involve 144.475 million new shares and the same number of detachable warrants on the basis of one new share with one detachable warrant for each existing share held, to be issued at RM1 per new share. The company's authorised share capital is proposed to be increased from RM500mil, comprising 500 million shares, to RM1.5bil.

The proposed debt restructuring involves the restructuring of the secured loans, unsecured loans and amounts owing to certain creditors of WIHB, Plaza Rakyat and IBAE. Included in the proposed debt restructuring are the loans and amounts owing by IBAE, a 99.9 percent owned subsidiary of WIHB that is being wound up.

"As WIHB acted as guarantor for the loans of IBAE, the said loans and amounts owing are being restructured together with WIHB and Plaza Rakyat's loans owing," the company said.

As full and final settlement of the loans and amounts owing, Wembley is proposing to issue RM606mil nominal value of Iculs to the secured and unsecured lenders of WIHB, secured lenders of Plaza Rakyat, unsecured lenders of IBAE and the major creditors of WIHB, Plaza Rakyat and IBAE. The RM606mil includes the capitalised interest in respect of the loans, as follows:

- Interest outstanding up to Dec 31, 1998, amounting to RM56mil; and
- Further interest accruing from Jan 1 to Dec 31, 1999, on the principal amount after adjusting for the capitalisation of the outstanding interest set out above at an annual interest rate of 7.25 percent, amounting to RM25mil. However, no interest will be capitalised in respect of the amounts owing to the creditors.

The WIHB group's total debts due to the lenders amounts to RM369mil including interest accrued as of Dec 31, 1998, and further interest accruing up to Dec 31, 1999, while the amount due to creditors is RM238mil. It said WIHB group's current prospects lied mainly in a mixed development project comprising a retail shopping complex, office tower, hotels and an integrated transport hub housing the central bus terminal and the Light Rail Transit station known as the Plaza Rakyat project. Plaza Rakyat, the company's wholly-owned subsidiary, is the sole developer of the project.

"The successful development of the Plaza Rakyat project will depend on the successful deployment of funds towards the Plaza Rakyat project which, in turn, is dependent on the successful implementation of the proposed debt restructuring," it said. (Star Online 15-Dec-1999)

WEMBLEY INDUSTRIES: Workout Scheme Under Revision
(*TCR Asia Pacific*: Monday, July 9, 2001, Vol. 4, No. 132)

Wembley Industries Holdings Berhad is currently working on a revised proposed debts restructuring scheme and discussions with the company's creditors which include financial institutions are still ongoing. However, as the revised proposed debt restructuring scheme has not been finalized yet, the company could not yet provide details of the scheme.

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In a separate announcement, pursuant to Section 5 of PN4, on 2 July 2001, the Company submitted an application to the Kuala Lumpur Stock Exchange (KLSE) for an extension of time to obtain all the approvals necessary to implement its plan to regularize its financial condition.

Background

The Wembley Group's present focus is the implementation of the Plaza Rakyat project. Following the liquidation and disposal of several of its principal subsidiaries in 1999 and 2000, the Group's financial viability hinges on the successful outcome of its proposed debt restructuring and rights issue, which was announced in December 1999.

Helmed by subsidiary Clifford Investments Ltd, construction works for the development of the Plaza Rakyat project are currently progressing at a slower pace. The Group is concentrating on the development of the inter-state bus and taxi terminal, the retail podium and the budget hotel while other components such as the office tower, service apartment and a 4-star hotel have been rescheduled and [are] to be undertaken in the near future.

Interim funding from its corporate proposals would enable the Group to expedite the completion of the terminal, podium and hotel and subsequently to generate development profit. As of November 2000, approvals from the SC and Wembley's shareholders are still pending.

WEMBLEY INDUSTRIES: Proposed Debt Plan Still in Works
(*TCR Asia Pacific*: Monday, October 8, 2001, Vol. 4, No. 196)

Wembley Industries Holdings Berhad is working on a revised proposed debts restructuring scheme and [is] in discussions with the Group's banks/creditors. The details of the proposed debts restructuring scheme have not been finalized.

Background

On 2 July 2001, the Company submitted an application to the Exchange pursuant to Section 5 of PN4 for an extension of time to obtain all the necessary approvals to implement the plan to regularize its financial position. Subsequently, on 3 August 2001, the Exchange approved the extension of two (2) months from 23 June 2001 to 22 August 2001 to the Company. In approving the extension, the Company is required, within the extension period, to carry out the following:

(i) revise its regularization plan;

(ii) make a revised requisite announcement to the Exchange;

(iii) submit its revised plan to the regulatory authorities for approval; and

(iv) upon submission of the revised plan to the regulatory authorities, make a separate application to the Exchange to seek an additional time for the Company to obtain all the necessary approvals from the authorities.

On 16 August 2001, the Company's financial adviser, Alliance Merchant Bank Berhad (AMBB), submitted an application to the Exchange for a further three (3) month extension from 22 August 2001 to 22 November 2001, to carry out the above requirements. On 21 September 2001, AMBB announced the Exchange had approved the further extension of time for a period of two (2) months from 23 August 2001 to 22 October 2001 to enable the Company to release the requisite announcement.

WEMBLEY INDUS.: Creditors OK Revised Debt Restructuring Plan
(*TCR Asia Pacific*: Wednesday, May 08, 2002, Vol. 5, No. 90)

Wembley Industries Holdings Berhad is an affected listed issuer pursuant to Practice Note No. 4/2001 as the Auditors of the Company had expressed a disclaimer opinion of the going concern of the Company and its subsidiaries. As an affected listed issuer, the Company has its obligations under PN4.

On 1 March 2002, Alliance Merchant Bank Berhad, on behalf of the Company announced that the Company was not able to make the Requisite Announcement by the deadline of 28 February 2002 laid down by the Exchange on 25 January 2002. The Exchange approved an application made to the Exchange on 1 March 2002 for a further extension of time to 30 April 2002 to make the Requisite Announcement on 18 April 2002.

An application was made to the Exchange on 26 April 2002 to further extend the date to make the Requisite Announcement from 30 April 2002 to 30 June 2002. This extension is pending the approval of the Exchange.

STATUS OF PROPOSED RESTRUCTURING

On 14 December 1999, AMBB, on behalf of the Board of Directors of the Company, announced the following:

(i) proposed debt restructuring involving the issue of approximately RM606 million nominal value of 1 percent irredeemable unsecured loan stocks (ICULS) at 100 percent of its nominal value as full and final settlement of the loans and amounts owning by the Company and its two subsidiaries namely, Plaza Rakyat Sdn. Bhd. and

Wembley I.B.A.E. Sdn. Bhd. amounting to RM606 million (inclusive of interests on loans) (Proposed Debt Restructuring);

(ii) proposed rights issue of 144,475,000 new ordinary shares of RM1.00 each together with 144,475,000 detachable warrants on the basis of one (1) new ordinary share with one (1) detachable warrant for every one (1) ordinary share held at an issue of RM1.00 per new rights share (Proposed Rights Issue); and

(iii) proposed increase in the authorized share capital of the Company from the existing RM500,000,000 comprising 500,000,000 ordinary shares of RM1.00 each to 1,500,000,000 comprising 1,500,000,000 ordinary shares of RM1.00 each.

Applications were submitted to the Securities Commission (SC) and the Foreign Investment Committee (FIC) on 16 December 1999. The FIC had on 26 February 2000 approved the Proposed Debt Restructuring subject to the approval of the SC and that the Bumiputra equity interest in the Company be increased to 30 percent before 31 December 2000. The Company is expected to seek an extension for the compliance upon receipt of the SC's approval for the proposals.

The above proposals are pending the approvals of the SC and the shareholders of the Company. Currently, the Company is working on a revised proposed debt restructuring scheme (Revised Proposed Debt Restructuring) and is in discussion with the Group's banks/creditors. As at the date of this announcement, the details of the proposed debts restructuring scheme have not been finalized yet.

As at to date, five (5) financial institutions, Pengurusan Danaharta Nasional Berhad and two (2) creditors have confirmed that they are agreeable to the Revised Proposed Debt Restructuring subject to, inter-alia, approvals of other creditors. The Company has yet to receive the outstanding approval or consent from a major creditor involved in the Revised Proposed Debt Restructuring.

OTHER MATTERS IN RESPECT OF PRACTICE NOTE N0. 10/2001

On 7 September 2001, the Company announced to the Exchange that the Company is deemed an affected issuer pursuant to paragraph 2.1(c) of the Practice Note No. 10/2001 (PN10). Under paragraph 2.1(c) of PN10, a listed issuer, who has an insignificant business or operations, is deemed to have [an] inadequate level of operations. Insignificant business or operations means business or operations [that generate] revenue on a consolidated basis that represents 5 percent or less of the issued and paid-up share capital of the listed issuer.

As an affected listed issuer under PN10, the Company must comply with the obligations set out in paragraph 6 of PN10. The Exchange has informed the Company that since the Company is also an affected issuer under PN4, the requirements and obligations of PN4 would prevail over those of PN10. It is expected that the Company's regularization plan would address both its financial condition (PN4) and the level of operations (PN10) to warrant a continuing listing on the Official List.

WEMBLEY INDUSTRIES: Finalizes Proposed Debt Restructuring Docs
(*TCR Asia Pacific*: Wednesday, September 04, 2002, Vol. 5, No. 175)

Wembley Industries Holdings Berhad had on 31 July 2002 via its financial adviser made the Requisite Announcement pursuant to PN4 to regularize the financial condition of the Company and its subsidiaries.

On 9 August 2002, the Exchange approved the Company's application dated 31 July 2002 to extend the time from 1 August 2002 to 30 September 2002 to enable the Company to submit the Proposed Debt Restructuring, the Proposed Capital Reduction and Consolidation and the Proposed Rights Issue (which were announced on 31 July 2002) to the relevant authorities.

The Company is currently preparing and finalizing its applications for submission to the relevant authorities.

The Company is also an affected listed issuer under Practice Note 10/2001 (PN10) of the LR. As such, the Company must comply with the obligations set out in paragraph 6 of PN10. The Exchange has informed the Company that since the Company is an affected issuer under PN4, the requirements and obligations of PN4 would prevail over those of PN10. The proposals announced in the Requisite Announcement would enable the Company to address both its financial condition (PN4) and the level of operations (PN10) to warrant a continuing listing on the Official List.

WEMBLEY INDUSTRIES: FIC Grants Proposals Approval
(*TCR Asia Pacific*: Wednesday, January 15, 2003, Vol. 6, No. 10)

Further to the announcements dated 30 October 2002, Wembley Industries Holdings Berhad is pleased to announce that the Foreign Investment Committee has, by its letter dated 7 January 2003, approved the Proposals subject to the condition that the FIC would review the equity structure of WIHB three (3) years after the completion of the Proposals. The said letter of approval from the FIC was received on the 10 January 2003.

The Proposals entail:

i. Proposed Capital Reduction and Consolidation;
ii. Proposed Debt Restructuring;
iii. Proposed Rights Issue; and
iv. Proposed Increase in Authorized Share Capital

A.2 Examples of Workouts

ANAM GROUP: Anam Group's Workout Details
(*TCR Asia Pacific*: Monday, November 2, 1998, Vol. 1, No. 177)

The Korean Herald published more details on the restructuring program underway at the Anam Group, the 21st largest Korean corporation and the world's largest semiconductor packaging company. Anam, with 25 percent of the global market share in chip packaging, has reportedly been profitable until last year.

Three of the group's affiliates applied for a workout program on October 24th 1998. The three companies are Anam Semiconductor Company, Anam Electronics Company, and Anam Environment Company. Another arm of Anam, Anam Construction Company, applied for court receivership.

Anam is seeking $2.5 billion either from new loans or via the sale of assets. It has already agreed to sell $600 million in assets (specifically four chip packing plants) to the investors through Solomon Smith Barney and Boston Bank. This $600 million is earmarked to reduce cross debt guarantees amoung Anam's subsidiaries and to repay some debts.

KOREA EXPRESS: Court OKs Debt Rescheduling Plan
(*TCR Asia Pacific*: Thursday, June 14, 2001, Vol. 4, No. 116)

The Seoul District Court has approved the debt rescheduling plan of Korea Express Company, The *Asian Wall Street Journal* reported Tuesday.

The court-approved plan will call for the conversion of the bankrupt logistics company's debts totaling W271.3 billion into equity, while other debts amounting to W416.3 billion will be written off by creditor banks.

Moreover, the company will make repayments on debts worth W778.5 billion to creditor banks, the newspaper reports.

GREAT RIVER: Reaches Debt Workout Agreement With Creditors
(*TCR Asia Pacific*: Monday, January 14, 2002, Vol. 5, No. 9)

Garment maker PT Great River International Tbk has reached an agreement with its creditors for restructuring of debts worth US$172.5 million, IndoExchange reports, citing President Director Sunjoto Tanudjaja's letter to the Jakarta Stock Exchange (JSX).

The restructuring will be carried out through a debt-to-equity swap scheme. Part of the debt will be rescheduled for 8 years without any grace period, Tanudjaja added though declined to elaborate the composition of share ownerships after the restructuring.

TCR AP reported May last year that it planned to use its assets as collateral in its proposed debt-restructuring program, which has been signed with the company's creditors.

A.3 Examples of Asset Sales

APO CEMENT: JG Summit Finalizes Sale of Apo
(*TCR Asia Pacific*: Monday, February 22, 1999, Vol. 2, No. 36)

Publicly listed JG Summit Holdings, Inc. sold on Wednesday its entire shareholdings in cement subsidiary, Apo Cement Corp., to both local and foreign affiliates of Mexico-based Cemex S.A. de CV for $401.5 million.

In a disclosure to the local stock exchange, JG corporate secretary Emmanuel C. Rojas, Jr. said the buyers include Triple Dime Holdings, Inc., a Philippine-based affiliate of Cemex.

The Gokongwei-owned cement firm, which used to hold 99.9 percent stake in Apo, divested its equity and debt interests to Triple Dime for $191.5 million.

Analysts told BusinessWorld yesterday that the company might have been formed by Cemex as an acquisition vehicle since Philippine laws only allow 40 percent foreign ownership in public utilities.

Meanwhile, the rest of Apo's loans including its foreign currency denominated-debts worth $210 million were absorbed by a number of foreign affiliates which the company did not identify. (BusinessWorld 19-Feb-1999)

HYUNDAI ENGIN.& CONST.: Downsizing, Selling Off
(*TCR Asia Pacific*: Thursday, August 17, 2000, Vol. 3, No. 160)

Hyundai Engineering & Construction (HDEC) is striving to downsize and sell off securities and real estate.

An HDEC official said yesterday that the company is pushing to downsize the organization and realign personnel to improve efficiency. He said a substantial part of staff in the management department will be moved into [the] sales department.

The company has 7,000 employees with 250 directors and executives. The downsizing was part of the company's self-rescue plan submitted to main creditor Korea Exchange Bank Sunday. HDEC also formed a 15-member executive committee to carry out its self-rescue plan Monday.

The committee will coordinate repayment of 1.52 trillion won ($1.36 billion) out of the company's total 6 trillion won debt by the end of this year and sell a 6.1-percent stake in Hyundai Motor controlled by Hyundai founder Chung Ju-yung. HDEC also said it will sell its office building near Kwanghwamun to Hyundai Marine and Fire Insurance for 90 billion won with 18 billion won of that going to pay down debt.

WICAKSANA OVERSEAS: Shareholders OK Jakarana Stake Sale
(*TCR Asia Pacific*: Tuesday, July 3, 2001, Vol. 4, No. 129)

PT Wicaksana Overseas International Tbk, in its Annual General Meeting on Thursday, approved the 60 percent stake sale of subsidiary PT Jakarana Tama to Batavia Investment Ltd for US$6.43 million to comply with the company's debt restructuring deal with its creditors, AFX reports Thursday.

Deputy Finance Director Elys Karis said the company has not been able to make up for the losses brought about by the termination of its contract with Batavia Investment.

According to AFX, the company has previously said the termination of the BAT contract will hit earnings in the first half, with recovery expected in the third and fourth quarters as the company secures new contracts with other producers.

It has projected a net loss of Rp128.6 billion this year and sales of Rp2.341 trillion, against a net loss of Rp201 billion and sales of Rp2.541 trillion last year.

FIRST PHILIPPINE: Unit Sells 50% Stake in PPC to Claredon
(*TCR Asia Pacific*: Thursday, July 03, 2003, Vol. 6, No. 130)

In a disclosure to the Philippine Stock Exchange, First Philippine Holdings Corporation power generation unit First Generation Holdings Corporation sold on June 27 its 50 percent ownership interest in Panay Power Corporation to Claredon Towers Holdings, Inc. a wholly-owned subsidiary of First Metro Investment Corporation for P1,164,500,000. PPC owns and operates a 72 MW bunker diesel power plant in Barangay Ingore, Lapaz, Iloilo. Likewise, First Private Power Corporation which is 40 percent owned by First Gen, sold its 20 percent ownership stake in PPC to Claredon Towers for P465,800,000.

Panay Electric Company (PECO), the power distribution Company operating in Iloilo, also informed FPHC that it sold its 30 percent in PPC for P698,700,000 thus completing the acquisition by Claredon Towers of the interest of the shareholders of PPC for the total amount of P2,329,000,000. FPHC holds a 30 percent stake in PECO.

A.4 Examples of Mergers and Liquidations

LG IND. SYSTEMS: Two LG Subsidiaries Headed for Merger
(*TCR Asia Pacific*: Monday, December 14, 1998, Vol. 1, No. 206)

Digital ChosunIlbo reports LG Ind. Systems announced Friday that it has decided to merge with LG Metals to operate as a single new company from May 1 next year. The merger will increase the paid-in capital of the LG subsidiary up to W148.1 billion and yearly sales are expected to reach W3.7 trillion. The company will see its electric power systems and elevator divisions reinforced by the merger, a company official said.

KIA MOTORS: Kia Restructures Before Hyundai Assumes Control
(*TCR Asia Pacific*: Monday, January 4, 1999, Vol. 1, No. 1)

The Korea Herald reported details of the steps that Kia Motors Company and its sister bus and truck maker the Asia Motors Company will take before they are completely taken over by Hyundai Motors Company. The steps will involve the reduction of Kia's 37.8 billion won worth of capital by 90 percent prior to a later capital injection that will raise the company's capital to 1.5 trillion won. These moves will prepare Kia for Hyundai to amass a 51 percent stake in the auto maker.

According to sources in the Korea Stock exchange, old Kia shares will be converted into new shares at a ratio of 10 to 1 (i.e., ten old shares will be equivalent to one new share). Following this, a consortium of five Hyundai affiliated companies will buy 153 million shares of Kia at a price of 5,500 won per share. This will result in Hyundai having a 51 percent stake in the company. Creditor banks will also convert their debt into a total of 120 million shares (at a rate of 15,000 won per share) giving them 40 percent of the company.

Hyundai Motors Company, Korea's largest automobile manufacturer, was the winner of an international auction of the bankrupt Kia Motors Company and the Asia Motors Company.

Kia Motors became insolvent last July. Kia Motors and Asia Motors were granted protection from creditors under court receivership in October 1997.

MONALISA CO: Completes Liquidation Plan
(*TCR Asia Pacific*: Tuesday, February 16, 1999, Vol. 2, No. 32)

According to the Korean language Maeil Kyungje's Business Brief section, the Monalisa Company's liquidation plan was approved by the Seoul District Court.

This firm is a major toilet paper and tissue producer in Korea, and filed for court receivership on June 13, 1998. It was granted receivership on October 8th, 1998.

HANYANG CORP.: Court to Liquidate
WOOSUNG CONSTRUCTION: Court to Liquidate
(*TCR Asia Pacific*: Thursday, December 7, 2000, Vol. 3, No. 238)

The Seoul District Court has decided to liquidate Hanyang Corp. and Woosung Construction, both of which have been operating under court supervision.

The two construction firms had been healthy until the end of last year, with Hanyang ranking 18th nationally in terms of sales and Woosung 37th in 1999. The court said it decided to liquidate the two as both showed little hope of survival.

In the case of Hanyang, its two largest shareholders, state-run firms the Korea National Housing Corp. (KNHC) and the Korea Asset Management Co. (KAMCO) decided that they would no longer provide operational support and in the case of Woosung, its debts have continued to snowball since late last year. (Digital Chosun 05-Dec-2000)

AUTOWAYS HOLDINGS: KLESE Removing Securities Trading by Aug 11
(*TCR Asia Pacific*: Wednesday, July 30, 2003, Vol. 6, No. 149)

Autoways Holdings Berhad (In Liquidation) informed that the Kuala Lumpur Stock Exchange (KLSE) had written to the Official Receiver and the Company and advised that they, after having considered all the facts and circumstances of the matter and upon consultation with the Securities Commission, in the exercise of its powers under paragraph 16.17 of the KLSE's Listing Requirements has decided to de-list the securities of AUTOWAY from the Official List of the KLSE as AUTOWAY does not have an adequate level of financial condition to warrant continued listing on the Official List of the KLSE.

Accordingly, the securities of AUTOWAY will be removed from the Official List of the KLSE at 9:00 a.m. on Monday, 11 August, 2003.

The securities of AUTOWAY, which are deposited with the Malaysian Central Depository Sdn. Bhd. (MCD), may remain deposited with the MCD notwithstanding the de-listing of the securities of AUTOWAY from the Official List of the KLSE. It is not mandatory for the securities of AUTOWAY to be withdrawn from MCD.

Federal Reserve Bank of St. Louis
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