WP/03/203

IMF Working Paper

Macro Effects of Corporate Restructuring in Japan

Se-Jik Kim

INTERNATIONAL MONETARY FUND

 WP/03/203

IMF Working Paper

Research Department

Macro Effects of Corporate Restructuring in Japan

Prepared by Se-Jik Kim[1]

Authorized for distribution by Ashoka Mody

October 2003

Abstract

This paper presents a framework for quantitatively evaluating the macroeconomic effects of corporate restructuring and applies it to Japan. Using firm-level financial statement data, it estimates total factor productivity (TFP) of individual Japanese firms. Given the estimated distribution of productivity across firms, the paper simulates the effect of optimal restructuring, that is, reallocation of resources from less-productive firms to more-productive ones, on the dynamic path of aggregate output. The results show that the benefits of restructuring could substantially exceed the costs.

JEL Classification Numbers: G33, G34, E60

Keywords: Corporate restructuring, total factor productivity, macro effects, Japan

Author's E-Mail Address: skim@imf.org

[1] I am very grateful to David Burton, Peter Clark, Kenneth Kang, Young Jin Kim, Takuo Komori, Charles Kramer, Sergio Leite, Saul Lizondo, Tae-Jung Lee, Ashoka Mody, Masahiko Takeda, and Robert Townsend, as well as to seminar participants at the IMF Research Department, and the IMF Office for Asia and the Pacific, for valuable comments.

Contents Page

I. Introduction

This paper develops a framework for quantitatively assessing the effects of corporate restructuring on aggregate output and applies it to Japan. In particular, it explores whether the long-run output gain from corporate restructuring in Japan can be large enough to outweigh its short-run costs. Using firm-level financial statement data, it estimates total factor productivity (TFP) of individual Japanese firms. Given the estimated cross-firm distribution of productivity, it simulates the effect of an optimal restructuring—reallocation of resources from less-productive firms to more-productive ones—on the dynamic path of aggregate output. The results show that the benefits of restructuring could substantially exceed the costs.

Having suffered stagnation for more than a decade since the bursting of the asset bubble, a broad consensus has emerged in Japan that the economy's malaise largely reflects deep-seated structural problems in the corporate and financial sector (e.g., Peek and Rosengren, 2003; Kashyap, 2002, Hamao, Mei, and Xu, 2003; Sakakibara, 2001; Dell'Ariccia, 2003). The recognition of serious structural weaknesses prompted the Koizumi cabinet to vow to press strongly ahead with structural reform (see, e.g., Cabinet Office, 2001). However, there is still an ongoing debate about the optimal pace of reform.

Different views on the appropriate pace of reform could be attributed partly to insufficient information on the macroeconomic consequences of restructuring. With large uncertainty about the end result, policymakers can easily become hesitant or reluctant to push hard for reforms and public support for reform can easily wane. This underlines the importance of knowledge about the macro-effects of corporate restructuring.

There are some existing studies estimating possible effects of restructuring in Japan, but most of these focus on the short-run costs, particularly the adverse short-run effect on employment (e.g., Atkinson, Ishida, Ishii, and Tanaka, 2001; Young, Fujii, Murashima, and Packer, 2002; Japan Cabinet Office, 2001). Atkinson and others (2001) examine the impact on the economy of eliminating potential problem loans (which they estimate at ¥237 trillion as of FY2000). Assuming that 43 percent of the job losers get new jobs, the study concludes that restructuring could generate 2 million unemployed, representing a 3.2 percentage point rise in the unemployment rate. Young and others (2002) study the disposal of ¥40 trillion of nonperforming loans. Based on the assumptions that the ratio of employment to corporate liabilities is constant and that 60 percent of the firms with bad loans are liquidated, they suggest that restructuring would increase the jobless rate by 2 percentage points. Despite the growing literature on the cost effects, however, there have been few studies quantitatively evaluating the benefits of restructuring.

To fill this gap, this paper conducts a quantitative assessment of macroeconomic effects, including both benefits and costs, of restructuring in Japan.[2] A key idea is that structural reform

[2] In Asian countries hit by recent financial crises as well, structural weaknesses were blamed as a key culprit of the crises, and consequently structural reform in the corporate and financial (continued…)

or, more specifically, corporate restructuring can raise aggregate output by raising the average productivity of the corporate sector. Restructuring in the corporate sector induces the reallocation of physical capital and labor across firms. Such restructuring, if optimally carried out, can facilitate the reallocation of resources from *less-productive* firms to *more-productive* firms, which raises average productivity of capital and labor in the economy, and consequently the aggregate output (see Kim, 2002; Kim and Izvorski, 2002).

Based on this idea, this paper presents a simple empirical framework to quantitatively evaluate dynamic output gains from restructuring in any country. Using Cobb-Douglas production functions, together with firm-level financial statement data, it derives the total factor productivity of individual firms and the distribution of productivity across those firms. The productivities of individual firms are then used to simulate the effect of an optimal restructuring (or reallocation of resources from less-productive firms to more-productive ones) on aggregate output.

The framework also incorporates the cost of restructuring. Restructuring entails loss of firm- or industry-specific capital and skills when resources are redeployed to other firms. Based on the result of previous studies on this subject, I assume that the value of capital, after restructuring, drops by 72 percent of its replacement cost, and that laid-off workers permanently lose their earning abilities by 30 percent (see, e.g., Ramey and Shapiro, 2001). Costs also arise because output is lost during the time it takes to reallocate resources. Particularly when aggregate demand is weak, a large portion of laid-off workers and released capital could remain unemployed for more than a year (OECD, 2002; Ramey and Shapiro, 2001). The framework incorporating both the benefits and the costs of reallocation, together with plausible values for key parameters, allows us to trace the dynamic response of aggregate output to a restructuring shock.

From the simulation, based on the financial statement data of 1,555 Japanese firms from the *Worldscope* database, the paper derives several important findings in the case of Japan. First, restructuring could reduce the country's aggregate output to below its initial level in the very short run, but raise it above its initial level in the medium term. In a benchmark case where the least-productive firms representing 5 percent of total labor are liquidated and the freed-up resources are reallocated to more-productive firms, aggregate output declines by 0.8 percent below the initial level in the year of restructuring, largely reflecting the short-run output loss

---

sectors was considered as a key element of the IMF rescue program for those countries (see, e.g., Fischer,1998; Krueger and Yoo, 2002; Mody,1999; Chopra and others, 2002). However, the effect of structural reform on aggregate output has not been formally incorporated in the macro model of the IMF programs for the crisis countries.

due to the closure of the least-productive firms.[3] But aggregate output exceeds its initial level starting from the third year after restructuring, and converges to a level 1.6 percent above its initial level, as a larger portion of labor and capital released from the least-productive firms are reemployed by more productive firms over time.

Second, the medium-term output gain from restructuring in Japan could substantially exceed the short-term output loss. Under a 5 percent discount rate, for example, the present value of net output gain over 20 years after restructuring amounts to 15 percent of the initial output in the benchmark case. The large net gain reflects a large productivity gap between less-productive firms and more-productive firms.

Third, the main results of this paper are robust against various changes in proxies and key parameters. The size of the effect of restructuring is altered only marginally in a vast majority of cases. Furthermore, different choices of parameters and proxies are more likely to raise the net gain from restructuring.

The framework used in this study can be adapted to accommodate four slightly varied situations: (1) a case of more-aggressive or more-gradual restructuring; (2) a case in which resources are reallocated only within the same industry; (3) a case in which accurate identification of the least-productive firms is not possible; and (4) a case in which restructuring is limited to heavy borrowers from banks. However, these variations do not alter the main results of this study.

This paper relates to previous work on restructuring activities of Japanese firms (e.g., Kang and Shivdasani, 1995, 1997; Kaplan, 1994; Kaplan and Minton, 1994; Hoshi, Kashyap, and Scharfstein, 1990). Kang and Shivdasani (1997) find that Japanese corporations that experience a substantial decline in operating performance implement various downsizing measures including asset sales, plant closures and employee layoffs, but to a lesser extent than do U.S. firms with a similar decline in performance. Kaplan (1995) finds that poor firm performance raises the probability of top management turnover in Japan as in the United States, while the fortunes of Japanese executives are more sensitive to low income than those of the U.S. executives. Hoshi and others (1990) also find that main banks play a crucial role in restructuring Japanese firms in financial distress. All of these studies focus on microeconomic features of Japanese corporate restructuring. The current paper extends this literature by

[3] This paper focuses on corporate liquidation as a key measure of corporate restructuring, while there are other measures of corporate restructuring such as asset sales and employee layoffs (see, e.g., Kang and Shivdasani, 1995). A reason I focus on liquidation is that variation in productivity across firms in the Japanese corporate sector appears so large (as shown in Section II.B) that liquidation of the least-productive firms may be more effective in generating output gains than just downsizing of those firms. Of course, within the current framework we could easily analyze the macro-effect of downsizing (nonliquidation) measures of corporate restructuring.

examining the effect of firm-level restructuring on macro-variables, particularly aggregate output in Japan.

This paper is also related to recent studies investigating the relationship between institutions and macroeconomic performance (e.g., Johnson, McMillan, and Woodruff, 2002; Friedman, Johnson, and Mitton, 2002; Rajan and Zingales, 1998; Acemoglu, Johnson, Robinson, and Thaicharoen, 2002). Johnson and others (2002) find that weak institutions for property rights discourage firms from reinvesting their profits in post-communist countries. Acemoglu and others (2002) find that countries that inherited more extractive institutions from their colonial past tend to have higher volatility in macroeconomic activity during the postwar period. Most of these studies focus on empirically establishing evidence of positive relationship between institutions and aggregate economic activity. The current paper can be viewed as contributing to the literature by developing a framework within which one can simulate macro-effects of institutional changes (or structural reform) in the corporate sector.

The remaining sections of the paper are organized as follows. Section II and III present a basic framework to quantify the effect of restructuring and the results. Section IV conducts sensitivity analyses, and Section V discusses some extensions of the framework. Section VI concludes the paper.

II. Productivity Distribution

This section estimates the distribution of productivity across Japanese firms, which is crucial to simulating the macro-effect of restructuring (or reallocation of resources to more productive firms).

A. Estimation Method and Data

To estimate the distribution of productivity across corporations, I use standard Cobb-Douglas production functions, which have been widely used in the economic growth literature to measure the rate of technology progress (e.g., Slow, 1957). There is also evidence that the Cobb-Douglas production function fits Japan well (e.g., Kamada and Masuda, 2001).

Assume that the production technology of each firm is represented by:

$$y_i = A_i \, l_i^{(1-\alpha)} k_i^{\alpha}, \tag{1}$$

where y_i is output, A_i is total factor productivity, l_i is labor, k_i is capital, and α is the capital income share of the i-th firm, respectively.

Then a firm's total factor productivity is

$$A_i = \frac{y_i}{l_i^{(1-\alpha)} k_i^{\alpha}}, \tag{2}$$

which suggests that information on output, labor, capital, and capital's share of income from the firm are needed to derive its total factor productivity.

To estimate total factor productivity at the firm level, I use *Worldscope* financial statement data of Japanese firms for the period 2000-2002. *Worldscope* originally provides data for 3,918 Japanese firms, but the number of firms that have the information amounts to 1,555 (representing around 20 percent of total corporate liabilities in the economy).

Worldscope data does not provide information that exactly matches the concept of output and physical capital. As a proxy for output of individual firms, y_i, I use *gross income*, which is the difference between total sales and the cost of goods sold. Existing studies often use *total sales* as a proxy for output (e.g., Khatri, Leruth, and Piesse, 2002). Nevertheless, gross income approximates "value-added," a standard concept of output in economics, better than does total sales. As a proxy for physical capital, k_i, I use *fixed assets* as a proxy. Some existing studies use *total assets* (e.g., Khatri, Leruth, and Piesse, 2002), but fixed assets is conceptually closer to physical capital such as machinery, plant and equipment. Regarding labor input of each firm, l_i, I use the number of employees reported by *Worldscope.*

Worldscope does not provide information on the capital and labor income shares of individual firms. I use the labor income share of the industry to which a company belongs as a proxy for that of the firm. Based on 2002 data reported by the Japan Department of Statistics of the Ministry of Finance, I assign 0.78 to the parameter of labor income share for manufacturing, 0.77 for retail and wholesale trade, 0.76 for services, 0.85 for construction, 0.53 for mining, 0.39 for real estate, and 0.85 for agriculture.

Using Eq. (2) and the yearly data on y_i, l_i, k_i, and α, I calculate the total factor productivity of each firm for each of the three years, 2000, 2001, and 2002. To reduce potential measurement errors generated by year-specific idiosyncratic shocks, I use a three-year-average productivity for each firm, that is, $A_i = \frac{\sum_{s=2000}^{2002} A_{i,s}}{3}$, where $A_{i,s}$ represents productivity of the i-th firm in year s.

The three-year-average productivity (A_i) may represent the underlying long-run productivity of each firm well, given that there is a strong persistence in productivity of each individual Japanese firm over time. According to *Worldscope*, the three-year-average productivity of each firm is highly correlated to its long-run average productivity.[4] For the 1,251 firms whose financial data is available for 1993-2002, the three-year-average productivity for 1993-1995 is a good predictor of the ten-year-average productivity for 1993-2002: for example, the

---

[4] I may instead use the ten-year-average productivity for 1993-2002. However, it would reduce the number of sample firms substantially (by about 20 percent). Moreover, it may create substantial survivorship bias, given that firms that closed due to low productivity during the ten-year period are excluded when deriving productivity distribution in the corporate sector.

regression of the latter on the former yields 0.9 for R^2. Furthermore, a firm that had belonged to the most productive 10 percent during 1993-1995 had a 75 percent chance of remaining in the same group and 20 percent chance of moving to the most productive 10-20 percent during 1996-2003. This suggests that the three-year average productivity for 2000-2002 that I use in this study could be a good predictor of the long-run productivity of each firm for the next 10-20 years.

B. Productivity Distribution

By ranking the firms in order of the calculated total factor productivity, I derive the distribution of A_i across 1,555 firms. Figure1 illustrates the estimated productivity distribution among the 1,555 firms.[5] It suggests that there is a large dispersion in productivity across the 1,555 firms.

While the average productivity $\left(\mu(A_i)=\frac{\sum_{i=1}^{N}A_i}{N}\right)$ is 6.9, the standard deviation is 8.5.

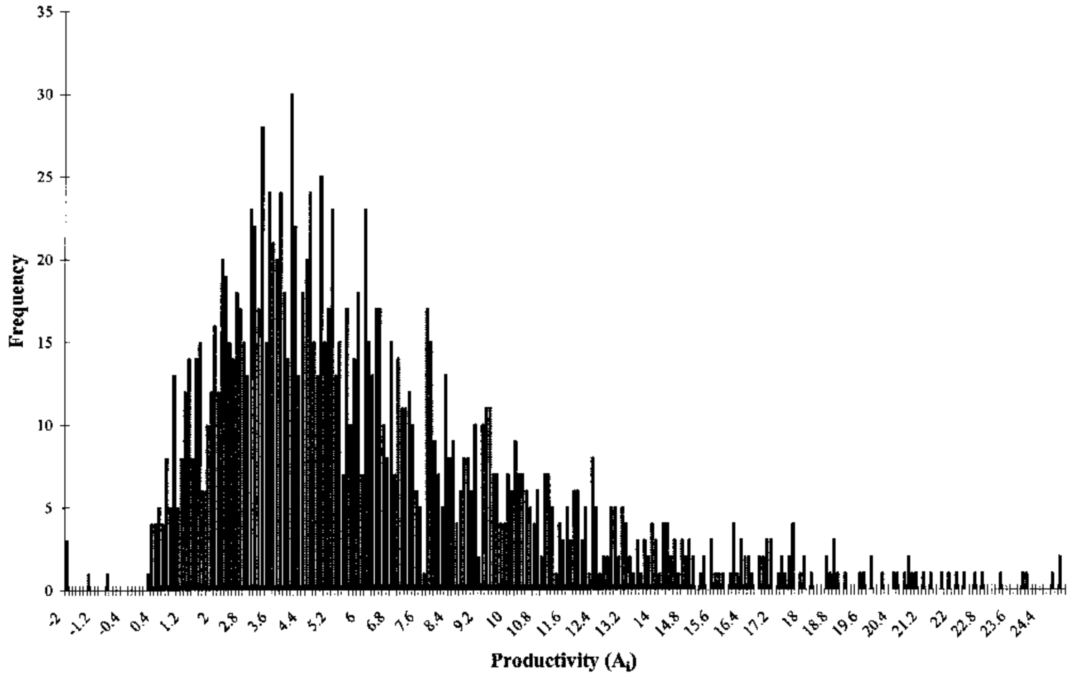
In the rest of this paper, we interpret the result in Figure1 as representing the distribution of productivity for the Japanese corporate sector as a whole. Given that the 1,555 firms analyzed here constitute about 20 percent of total corporate liabilities in the economy, we may well assume that the 1,555 firms stand for the Japanese corporate sector. Of course, *Worldscope* covers most large firms but not many small and medium-sized firms, which could generate a bias. Inclusion of data on more small and medium-sized enterprises (SMEs), however, would not alter the main result of this paper (i.e., the positive net effect of structural reforms in Japan). It would make even larger the positive net effect of restructuring given that SMEs in Japan are considered to be less productive than larger firms.

Note that the extent of cross-firm difference in productivity is crucial to determining the benefit of structural reform. The greater the productivity difference in an economy, the larger the benefit of restructuring. In the extreme case of identical productivity across firms, the reallocation of resources would not generate any benefits but only costs.

---

[5] Given that *Worldscope* provides information on the proxies for output and capital in a monetary unit (more specifically, million yen) and for labor in persons, the unit of $A_{i,s}$ is (million yen/man)$^{(1-\alpha)}$. However, the unit of $A_{i,s}$ could be interpreted also as a pure number if we represent labor in a monetary unit. For example, the unit of productivity reported here can be interpreted as a pure number that would be obtained if we assume that a unit of labor is equivalent to million yen. Of course, there can be other ways to convert the unit of labor into a monetary unit, including the multiplying of labor by per-worker wages. It can be shown, however, that the modification would not substantially alter the effect of restructuring on aggregate output (see Section IV.A).

Figure 1. Productivity Distribution



III. Simulation: Benchmark Case

This section quantifies the effect of reallocation of resources from less-productive firms to more-productive firms based on the productivity distribution derived in the previous section.

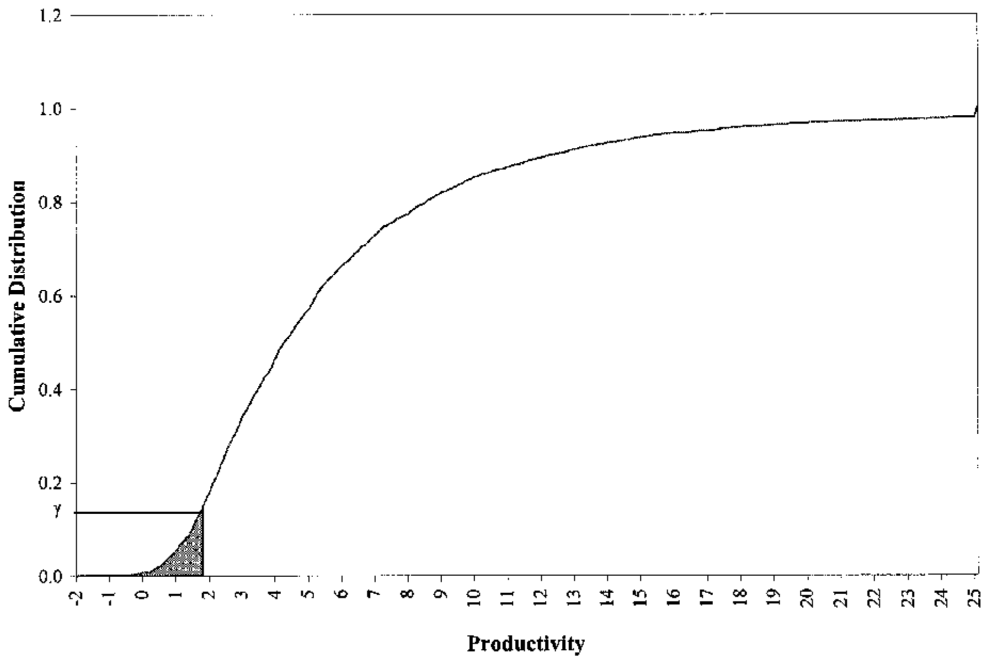
A. Basic Simulation Framework

To simulate the effect of restructuring on aggregate output, I consider the case of restructuring the least-productive firms that represent fraction γ of total number of workers, that is, those with the lowest values of A_i, starting with the least productive and adding firms until those representing γ fraction of total workers are cumulated. Based on the calculation of productivity of individual firms, we can identify the least-productive firms representing fraction γ of total number of workers, as illustrated in Figure 2.

Assume that restructuring occurs in the beginning of the year t =1. Therefore, the least-productive firms cannot produce from the first year of restructuring (t = 1) on. Let i^B and i^G denote the set of the least-productive firms and the rest of the firms (i.e., more-productive firms), respectively.

Restructuring reduces the amount of capital and labor employed by the least-productive firms. Let K_t^B and L_t^B be the total amount of capital and labor of those firms at t, respectively. Then capital and labor employment by those firms is positive before restructuring (K_0^B, $L_0^B > 0$), but zero after restructuring ($K_t^B = L_t^B = 0$ for $t = 1, 2, \ldots$).

Figure 2. Cumulative Distribution Function of Productivity



Capital and labor released from closed firms create new supply in factor markets. The amounts of new supply in effective terms, however, are lower than K_0^B and L_0^B, because of some restructuring costs. As discussed earlier, restructuring entails a permanent reduction in the value of capital and labor, caused by the loss of firm- or industry-specific capital and skills. Let θ_k and θ_l denote the discount in the value of capital and labor after reallocation as fractions of their original values, respectively. Restructuring may also keep some laid-off workers out of job permanently. Let ψ_l be the portion of laid-off workers that become permanently unemployed or out of labor force. In the presence of such costs, restructuring raises the new supply of effective capital and labor by $K_0^B(1- \theta_k)$ and $L_0^B(1- \theta_l)(1- \psi_l)$, respectively.

The supply of capital and labor released from closed firms needs to be met by demand from more-productive firms, whose measure is $(1- \gamma)$.[6] The demand for capital and labor critically depends on aggregate demand conditions. Particularly when aggregate demand is weak, the

[6] Though for simplicity I do not explicitly introduce the mechanism for reallocating resources, it must be a standard market mechanism. Consequently, price variables in the markets (i.e., wages and costs of capital) play a key role in reallocating resources. In particular, new supply of labor and capital freed up from closed firms would reduce wages and costs of capital, which encourages more-productive firms to raise their demand for them (and consequently the supply of their products). Of course, how effectively such a market mechanism functions is affected by various factors including labor market rigidities and underdevelopment of markets for M&A and used capital.

freed-up capital and labor would not be reemployed rapidly by more-productive firms. The dynamic path of demand for capital and labor also depends on adjustment costs that increase rapidly with the pace of adjusting capital and labor (e.g., Lucas, 1967; Ogawa, 2003). Under convex adjustment cost functions for capital and labor, firms gradually raise their factor demand over time rather than achieve a jump at a moment. As capital and labor released from closed firms cannot be met immediately by the equal amount of demand increase from other firms, restructuring entails time costs: output is lost during the time it takes to reallocate resources.

Let ω_k and ω_l denote the portion of capital and labor that is demanded (and consequently reemployed) by more-productive firms within the first year of restructuring ($t = 1$). I assume that fraction ω_k of capital and fraction ω_l of labor are reemployed evenly from the beginning to the end of the year, so that more-productive firms use fraction $\frac{\omega_k}{2}$ of capital and fraction $\frac{\omega_l}{2}$ of labor on average in the year of the restructuring. From the second year on, the fraction ω_k of capital and the fraction ω_l of labor that were reemployed in the first year will be fully used for production through the whole year.

Let $\acute{\omega}_k$ and $\acute{\omega}_l$ be the fraction of the remaining capital and labor that is reemployed in each year ($t = 2, 3, \ldots$). Similar to the case of capital and labor reemployed in the first year, I assume that fraction $\frac{\acute{\omega}_k}{2}$ of capital and fraction $\frac{\acute{\omega}_l}{2}$ of labor, on average, are used in the year when they are reemployed, while the fraction $\acute{\omega}_k$ of capital and the fraction $\acute{\omega}_l$ of labor are fully used from the second year of their reemployment.

For simplicity, assume that capital and labor of the least-productive firms (K_0^B and L_0^B) are reallocated to more-productive firms in proportion to their initial amount of capital and labor.[7] Therefore, the increase in capital and labor of more-productive firms are proportional to k_0^i/K_0^G and l_0^i/L_0^G, respectively, where k_0^i and l_0^i are the amount of capital and labor of a more-productive firm before restructuring ($t = 0$), respectively, and K_0^G and L_0^G are total amount of capital and labor employed by more-productive firms in the initial period $t = 0$, respectively.

Then the amount of capital reallocated from the least-productive firms to a more-productive firm through year t, denoted by $\delta_t^{k,i}$, is

[7] I may instead assume that among the more-productive firms, the most-productive reemploy a higher proportion than k_0^i/K_0^G and l_0^i/L_0^G. In this case, the net output gains from restructuring would be larger than the benchmark case, which further strengthens the main result of the paper (i.e., positive net output gains from restructuring).

$$\delta_t^{k,i} = \begin{cases} \left(\dfrac{k_0^{\,i}}{K_0^{\,G}}\right) K_0^{\,B}\left(1-\theta_k\right)\left(\dfrac{\omega_k}{2}\right) & \text{for t=1} \\ \left(\dfrac{k_0^{\,i}}{K_0^{\,G}}\right) K_0^{\,B}\left(1-\theta_k\right)\left[\omega_k + (1-\omega_k)\left(\dfrac{\acute{\omega}_k}{2}\right)\right] & \text{for t=2} \\ \left(\dfrac{k_0^{\,i}}{K_0^{\,G}}\right) K_0^{\,B}\left(1-\theta_k\right)\left[\omega_k + (1-\omega_k)\acute{\omega}_k \sum_{s=0}^{t-3}(1-\acute{\omega}_k)^s + (1-\omega_k)(1-\acute{\omega}_k)^{t-2}\left(\dfrac{\acute{\omega}_k}{2}\right)\right] & \\ & \text{for t=3,4...} \end{cases} \tag{3}$$

and the amount of labor reallocated to a more-productive firm through year t, denoted by $\delta_t^{l,i}$, is[8]

$$\delta_t^{l,i} = \begin{cases} \left(\dfrac{l_0^{\,i}}{L_0^{\,G}}\right) L_0^{\,B}\left(1-\theta_l\right)(1-\psi_l)\left(\dfrac{\omega_l}{2}\right) & \text{for t=1} \\ \left(\dfrac{l_0^{\,i}}{L_0^{\,G}}\right) L_0^{\,B}\left(1-\theta_l\right)(1-\psi_l)\left[\omega_l + (1-\omega_l)\left(\dfrac{\acute{\omega}_l}{2}\right)\right] & \text{for t=2} \\ \left(\dfrac{l_0^{\,i}}{L_0^{\,G}}\right) L_0^{\,B}\left(1-\theta_l\right)(1-\psi_l)\left[\omega_l + (1-\omega_l)\acute{\omega}_l \sum_{s=0}^{t-3}(1-\acute{\omega}_l)^s + (1-\omega_l)(1-\acute{\omega}_l)^{t-2}\left(\dfrac{\acute{\omega}_l}{2}\right)\right] & \\ & \text{for t=3,4...} \end{cases} \tag{4}$$

After restructuring, the amount of capital used by each more-productive firm ($i \in i^G$) at year t, denoted by k_t^i, then increases as

$$k_t^i = k_0^i + \delta_t^{k,i} \ . \tag{5}$$

Similarly, the amount of capital used by a more-productive firm at year t, denoted by l_t^i, increases as

$$l_t^i = l_0^i + \ \delta_t^{l,i} \ . \tag{6}$$

Using the dynamic path of capital and labor employed by more-productive firms (Eqs. (3)-(6)), together with their productivity derived earlier, I derive the dynamic path of output for each of those firms from the production function: $y_{i,t} \ = \ A_i \ l_{i,t}^{\ 1-\alpha} \ k_{i,t}^{\ \alpha}$.

Given that the least-productive firms produce nothing after restructuring ($Y_t^B = 0$, for $t = 1,2,\ldots$), aggregate output of the economy is given by

[8] In the case of Japan, Ogawa (2003) derives and estimates a dynamic path of labor based on quadratic adjustment cost of hiring/firing.

$$Y_t = Y_t^G = \sum_{i \in i^G} y_{i,t} \tag{7}$$

B. Benchmark Case

To quantify the effect of restructuring on aggregate output, I assign plausible but rather conservative values to each of the key parameters of the basic framework. Therefore the estimate obtained in this benchmark case can be viewed as a lower bound on the level of aggregate output after restructuring.

For the discount of capital due to redeployment, I choose $\theta_k = 0.72$, so that capital loses 72 percent of its value after reallocation, following the estimate suggested by Ramey and Shapiro (2001). Ramey and Shapiro obtain this estimate using equipment-level data from U.S. aerospace plants that closed during the 1990s, and suggest that given the low demand for aerospace equipments, their estimate could be an upper bound on the discount. In light of this, adopting their estimate is a conservative assumption. For the parameter of loss in labor skills of a laid-off worker, I choose $\theta_l = 0.3$, so that displaced workers lose 30 percent of their skills. The chosen value is also conservative, as Ruhm (1991) obtains 0.13 for the parameter based on U.S. household panel data for 1962-1982 (while longer tenure of average Japanese workers could imply higher firm-specific human capital and therefore larger skill losses in the event of labor reallocation). I also make another conservative assumption that $\psi_l = 0.25$, indicating that 25 percent of laid-off workers cannot get a new job again.

For the rate of the first-year reallocation of capital and labor that reflects aggregate demand conditions, I choose $\omega_k = 0$ and $\omega_l = 0$, indicating that factors of production are not redeployed within a year. In addition, the reallocation rates of capital and labor in the second year and consecutive years (t=2, 3, …) are assumed to be $\acute{\omega}_k = \acute{\omega}_l = \frac{1}{2}$. The assumption that no laid-off workers are reemployed and no capital is bought by other firms for a year after restructuring is also conservative. It implies that during the first year of restructuring there would be no demand for workers and capital released from closed firms. One may expect *weak* demand for labor and capital in Japan, which currently suffers from prolonged stagnation, continuing excess capacity and weak aggregate demand. Nevertheless, assuming *no* demand is rather extreme. Indeed, high-productivity firms in Japan actively hire new workers, invest in capital, and therefore absorb a large percentage of laid-off workers and capital, even in a time of very weak aggregate demand.[9] The data on 1,555 firms in our sample shows that the 200 most-productive firms have raised their employment and fixed assets by 35 percent and 16 percent, respectively, during the period 2000-2002. This suggests that reallocation of resources to more-productive firms could proceed faster than assumed here.

---

[9] The analysis of sensitivity against different parameters (in Section IV.B) shows to what extent the main result is affected by different assumptions on aggregate demand.

For the size of the restructuring shock in the benchmark case, I choose $\gamma = 0.05$. That is, I consider the case of restructuring the least-productive firms that represent 5 percent of total workers. These firms also represent 5 percent of total debt outstanding and 5.5 percent of total capital.[10] However, these firms produce only 0.8 percent of the aggregate output, reflecting their low productivity.

C. Results

Figure 3 shows the simulation result in the benchmark case. To simplify the exposition, I here normalize the initial level of aggregate output (the level of aggregate output before restructuring) at unity ($Y_0 = 1$). In a baseline scenario without restructuring, aggregate output would then remain constant at the initial level: $Y_t = 1$ for $t = 1, 2, \ldots$. With restructuring, however, output deviates from the baseline over time as shown in Figure 3, where I express the effect of restructuring as a deviation of aggregate output from the baseline.

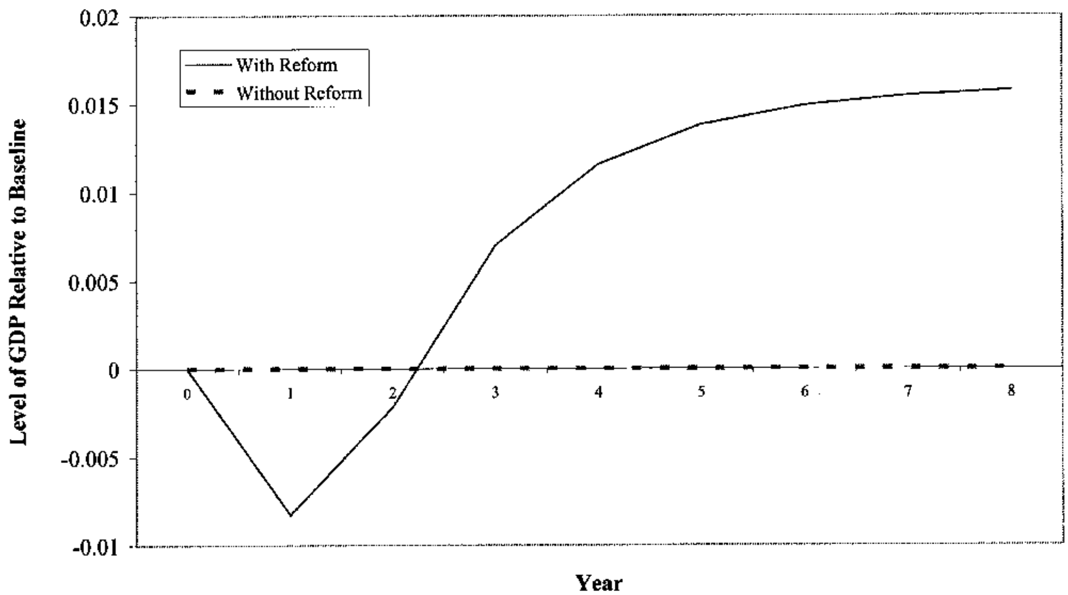
The simulation in the benchmark case provides interesting results on both short-term and medium-term effects of restructuring. First, aggregate output in the first year of restructuring falls to $Y_1 = 0.992$ (or 0.8 percent below the baseline), while in the second year the level of the aggregate output rises compared to that of the first year, but still 0.2 percent below the baseline. The negative short-run effect largely reflects the output decline due to the closing of the least-productive firms.[11]

---

[10] In the benchmark case, I choose $\gamma = 0.05$ because restructuring of 5 percent of the corporate sector could generate a substantial output effect while perhaps still within a politically feasible range. Of course, I can simulate the effect of any γ, that is, any size of restructuring (see Section V.A for the case of $\gamma = 0.1$).

[11] The 0.8 percent output decline at $t=1$ in the benchmark case implies equivalent declines in both aggregate supply and demand. Closing of the least-productive firms, which used to produce 0.8 percent of aggregate output, would reduce aggregate supply by 0.8 percent. It would also affect aggregate consumption demand by reducing aggregate wage income as workers lose their jobs (while it would little affect aggregate investment given that investment by the least-productive firms has been negligible according to *Worldscope* data). Under a strong assumption that workers in the least-productive firms used to receive double of their marginal product (for 2000-2002), closure of the least-productive firms, whose labor income shares were around 75 percent on average, would reduce aggregate wage income by 1.2 percent of the initial aggregate output. Under another conservative assumption that workers reduce their consumption by two thirds after being laid off, aggregate demand would then decline by 0.8 percent of the initial aggregate output, the same as aggregate supply. This indicates that under less conservative assumptions, decline in aggregate demand could be smaller than the benchmark case. For example, suppose that laid-off workers reduce their consumption by one thirds, which could be more realistic given consumption theories such as permanent income hypothesis. In this case, aggregate demand would decline by 0.4 percent of the initial aggregate output, leading to an output decline lower than the benchmark case.

Figure 3. Effect of Restructuring on the Level of GDP: Benchmark Case



From the third year on, however, aggregate output exceeds its baseline level (for example, by 0.7 percent, and 1.2 percent in the third and fourth year, respectively). The positive medium-term effect reflects that the increase in output of more-productive firms outweighs the output loss from the closure of the least-productive firms as the former reemploys labor and capital released from the latter.

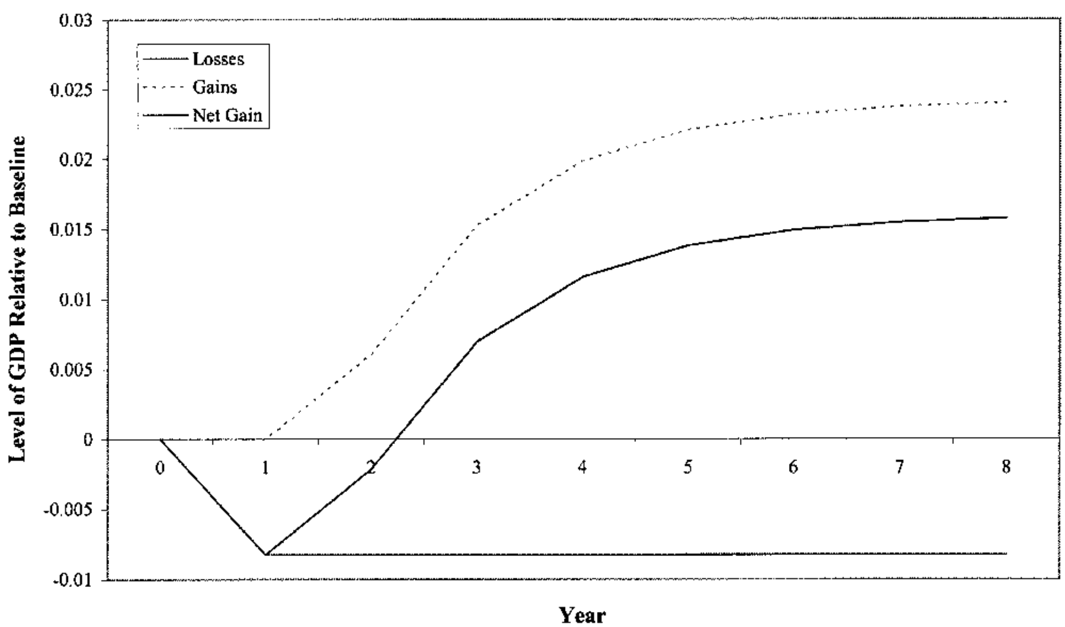
Finally and most importantly, the medium-term output gain from restructuring exceeds the output loss in the first and second year. Aggregate output converges to a level 1.6 percent above the baseline, double its initial decline. As a result, the present value of net output gain is always positive, as long as the rate of discount is below 65 percent. Under 5 percent discount rate, for example, the present value of net output gains over 20 years after restructuring amounts to 15 percent of the initial output. The larger medium-term gain reflects a large productivity gap between the least-productive firms and more-productive firms.

To examine the factors contributing to the above results, we can decompose aggregate output, denoted by Y_t, into the output by the least-productive firms, Y_t^B, and by more productive firms, Y_t^G, that is, $Y_t = Y_t^B + Y_t^G$. Restructuring has a negative effect on aggregate output because it reduces output of the least productive firms (Y_t^B). As the least-productive firms close, their employment of capital and labor drops to zero, and so does their output from the first year on ($Y_t^B = 0$, for t=1, 2,...). Therefore, the cost of restructuring in each period (t=1, 2,...) can be measured by $Y_0^B - Y_t^B$. Restructuring has also a positive output effect given that it raises output of more productive firms (Y_t^G). Therefore, the benefit of restructuring in each period is

$Y_t^G - Y_0^G$. Then the net gain from restructuring in terms of the aggregate output is: $Y_t - Y_0 = (Y_t^G - Y_0^G) + (Y_t^B - Y_0^B)$.

Figure 4 illustrates the decomposition of $(Y_t - Y_0)$ into $(Y_t^G - Y_0^G)$ and $(Y_t^B - Y_0^B)$. The figure shows that the restructuring cost in terms of decline in the output of the least-productive firms is modest. The initial output of the least-productive firms (Y_0^B) amounts to 0.8 percent of aggregate output, and therefore the loss of output by closing those unproductive firms is 0.8 percent of aggregate output. The figure also indicates that the effect of restructuring on more-productive firms' production can be substantial. When more-productive firms reemploy almost all the labor and capital released from less-productive firms, their output rises to a level 2.4 percent above its initial level. Furthermore, the figure shows the net effect of restructuring that adds up the costs and the payoffs. For example, the sum of -0.8 percent (for output loss due to closures of the least-productive firms) and 2.4 percent (for output gain of more-productive firms) generates net medium-term output gain of 1.6 percent above the baseline.

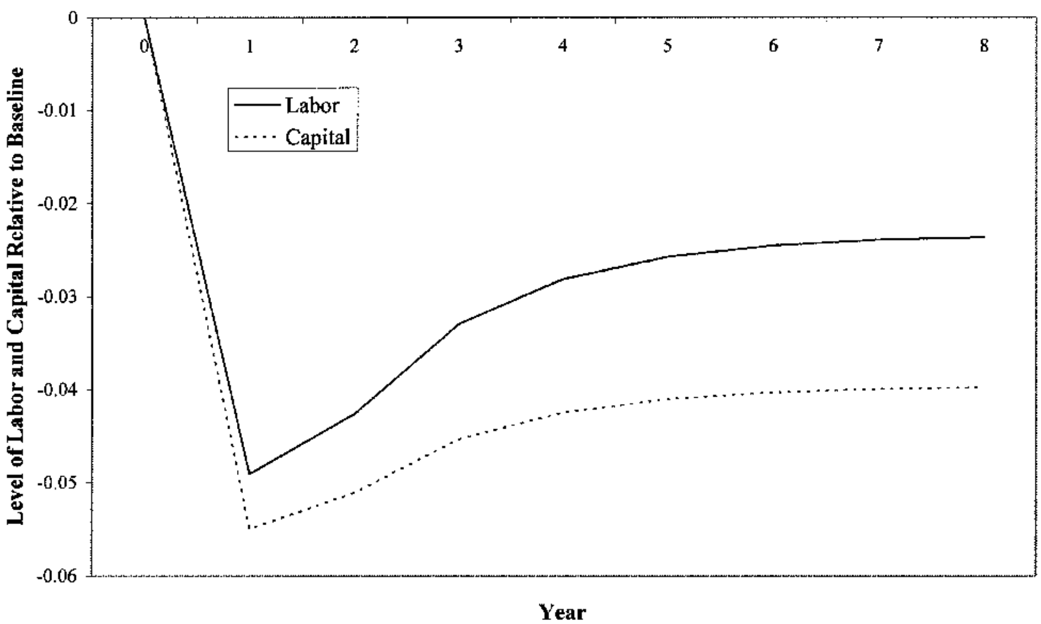
Figure 4. Decomposition of the Effect of Restructuring



The large medium-term output gain and moderate short-term output loss reflect a large difference in productivity between less-productive and more-productive firms. The displaced capital and labor, despite value losses generated by reallocation, can be used by more-productive firms three times (= 2.4/0.8) as efficiently as by less-productive firms. In particular, the productivities of the least-productive firms are very low (several firms in this group even have negative productivity).

The short-term output loss is modest despite a substantial drop in capital and labor employed (Figure 5). Particularly in the first year of restructuring, aggregate use of labor and capital drop by 5 percent and 5.5 percent, respectively. From the second year, more-productive firms employ an increasing amount of resources released from less-productive firms, but new steady state levels of aggregate labor and capital remain below their initial levels, reflecting substantial loss of firm- or industry-specific capital and skills, together with some permanent unemployment. This suggests that restructuring can improve the average productivity of the corporate sector substantially enough to outweigh the decline in inputs.

Figure 5. Effect of Restructuring on Capital and Labor



IV. Sensitivity Analysis

This section tests the sensitivity of the results obtained in the previous section. I first check the robustness of the results against different proxy variables for output, capital and labor, and then I test the sensitivity to the choice of key parameters of the model.

A. Sensitivity to Proxies

To check the sensitivity to the choice of proxies for key variables such as output, capital and labor, I use different proxy variables. First, I use *(gross income)/capital income share* as another proxy for output. This variable could be a better proxy if most of labor costs are included in the cost of goods sold (rather than other operating expenses) in the financial statement data. The rational for using this proxy is that in this case, under the assumption of a Cobb-Douglas production function, we have y = *gross income* / α, where y is output or value-added and α is the capital income share.[12] Figure 6 illustrates the effect of restructuring on aggregate output when *(gross income)/capital income share* is used as a proxy for output. The dynamic path of aggregate output in this case is similar to that in the benchmark case, with a slight increase in the output gain from restructuring. Aggregate output declines to 0.5 percent below its initial level in the first year, and it converges to a level 1.9 percent above its initial level.

I also use *operating income* as a third proxy for output. Figure 7 shows that the positive effect of restructuring in this case is substantially larger than the benchmark case. Aggregate output rises to the level 1.0 percent above its initial level even in the first year, and converges to a level 2.9 percent above its initial level. The reason for the large effect is that about 8 percent of the firms in the data had negative operating profits on average for 2000-2002. Therefore, just closing those firms with negative operating income would substantially raise aggregate output (measured by aggregate operating income) even without reallocating released resources to more-productive firms.

As another proxy for capital, I use *total assets* instead of fixed assets. As illustrated in Figure 8, the effect of restructuring on the aggregate output in this case is also similar to that in the benchmark case, with a slightly larger gain. Note that the simulation generates a similar result even with a poorer proxy for physical capital (given that total assets, which includes liquid assets unrelated to production, is likely to be a poorer proxy than fixed assets).[13]

I also use *the number of employees multiplied by per employee wage* as a proxy variable for labor input. In this case, labor input is measured by a monetary unit, and therefore the unit of TFP becomes a pure number. Figure 9 shows that the dynamic path of aggregate output in this case is also similar to that in the benchmark case. The restructuring reduces aggregate output to the level 0.6 percent below its initial level in the first year, but raises it thereafter to a level 1.8 percent above its initial level.

---

[12] It is derived from *gross income* $= y - w = y - (1-\alpha)\, y = \alpha\, y$, where w is wage cost.

[13] This suggests that the main result of this paper could be robust to various types of measurement errors at individual firm level. As long as measurement errors are independent across individual firms, they will offset each other in the aggregate level and therefore affect the result on output gains of restructuring only marginally.

Figure 6. Sensitivity (I)

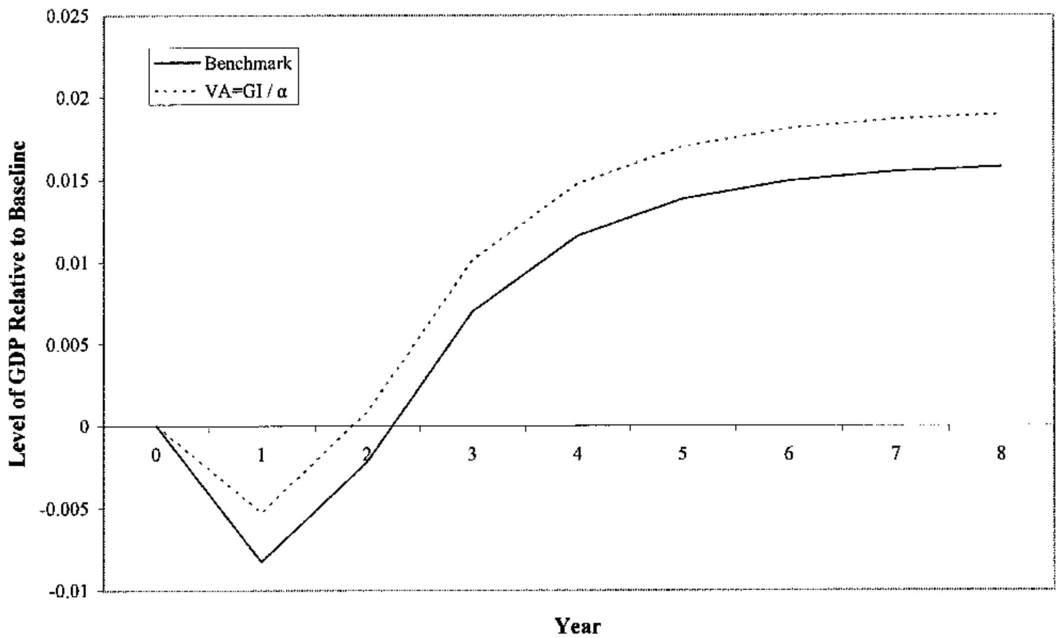


Figure 7. Sensitivity (II)

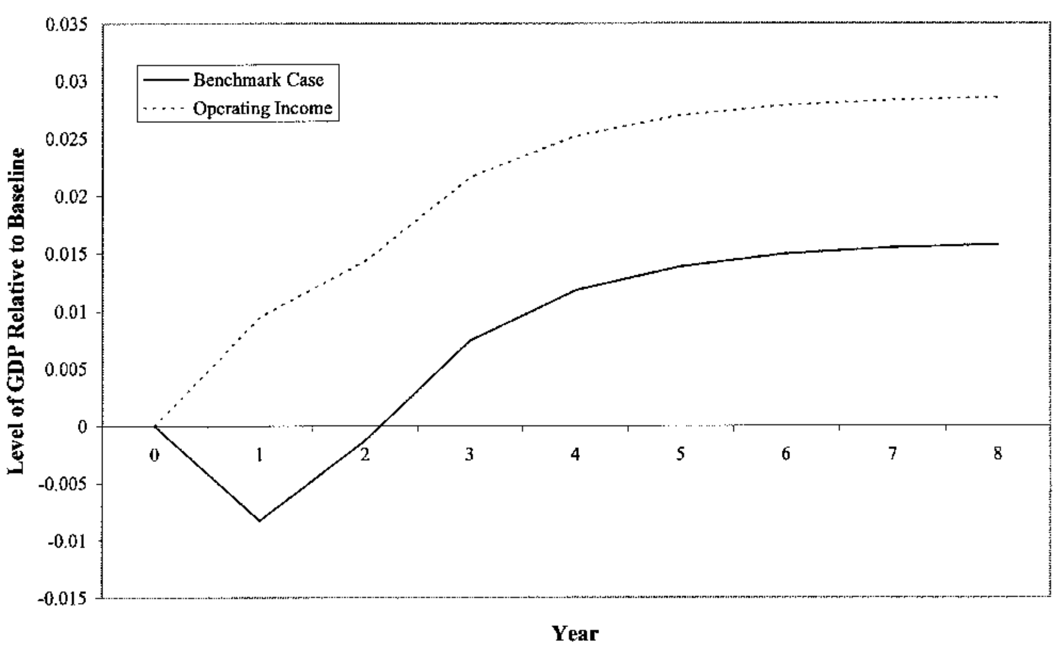


Figure 8. Sensitivity (III)

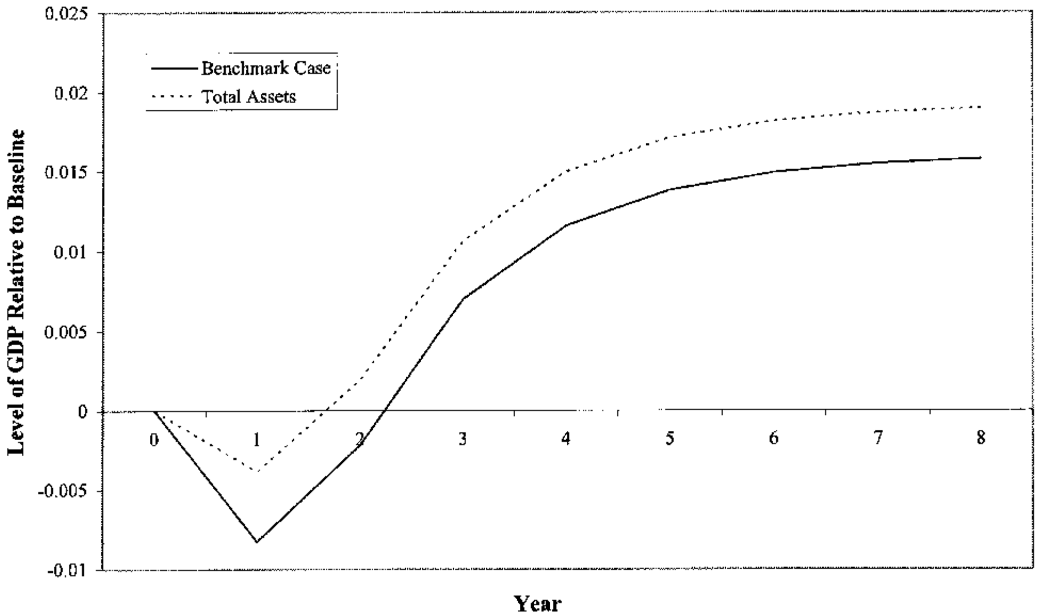
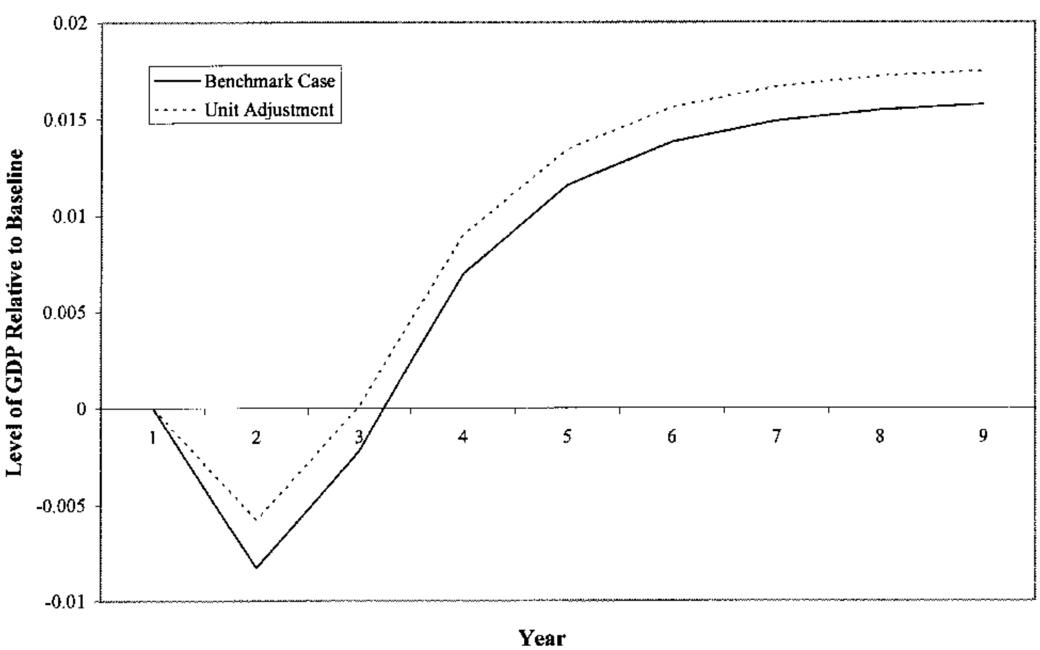


Figure 9. Sensitivity (IV)



B. Sensitivity to Parameters

I assess the sensitivity of our results to changes in key parameter values. The benchmark values taken for some parameters may be biased to some degree, particularly given conservative assumptions, and therefore an examination to see how changes in parameter values affect the results is required.

First, I use $\omega_l = 0.25$ for the rate of labor reemployment reflecting aggregate demand conditions in the first year, instead of $\omega_l = 0$ in the benchmark case. The assumption $\omega_l = 0$ can be considered a conservative assumption as discussed in Section III. Furthermore, in Korea, 40 percent of newly unemployed workers found new jobs within a year even at the peak of the recent financial crisis. Figure 10 shows that under a less conservative assumption ($\omega_l = 0.25$), the medium-term output gain from restructuring is unaltered. But the initial output loss shrinks from 0.8 percent to 0.6 percent. This suggests that with less conservative assumptions on aggregate demand conditions, the accumulated net output is higher than the benchmark case.

Next, I simulate less conservative assumptions on the loss of labor. For the parameter representing loss of laid-off workers' skills, I use $\theta_l = 0.13$ (instead of $\theta_l = 0.3$ in the benchmark case) based on Ruhm (1991)'s estimate. For the ratio of permanent unemployment among laid-off workers, I use 0.1 instead of the benchmark case's 0.25. Figure 11 shows that when using these two new parameter values, the medium-term output gain is substantially larger than in the benchmark case.

Finally, I check the sensitivity of the results to the choice of labor income share parameters. The estimates of labor income shares used in the benchmark case are calculated based on data for 2002 when the rate of interest was close to zero, and therefore the estimates may be systematically biased upward. To check the robustness against possible systemic measurement errors on the parameters, I assume that labor income shares of all industries are over-estimated by 20 percent. From the experiment, I find that the aggregate output path in this case is similar to that in the benchmark case (Figure 12).[14]

In sum, the above sensitivity analysis suggests that the main result of this paper—that the medium-term gain of restructuring exceeds the short-run cost - is robust against various changes in proxies and key parameters. The size of the effect of restructuring is altered only marginally in a vast majority of cases. Furthermore, different choices of parameters and proxies are more likely to raise the net gain from restructuring. This, combined with conservative choice of parameter values, suggests that our estimate in the benchmark case can be a lower bound on the net output gain of restructuring.

---

[14] This suggests that even in the presence of systemic measurement errors, the main result of the paper would not be affected substantially.

Figure 10. Sensitivity (V)

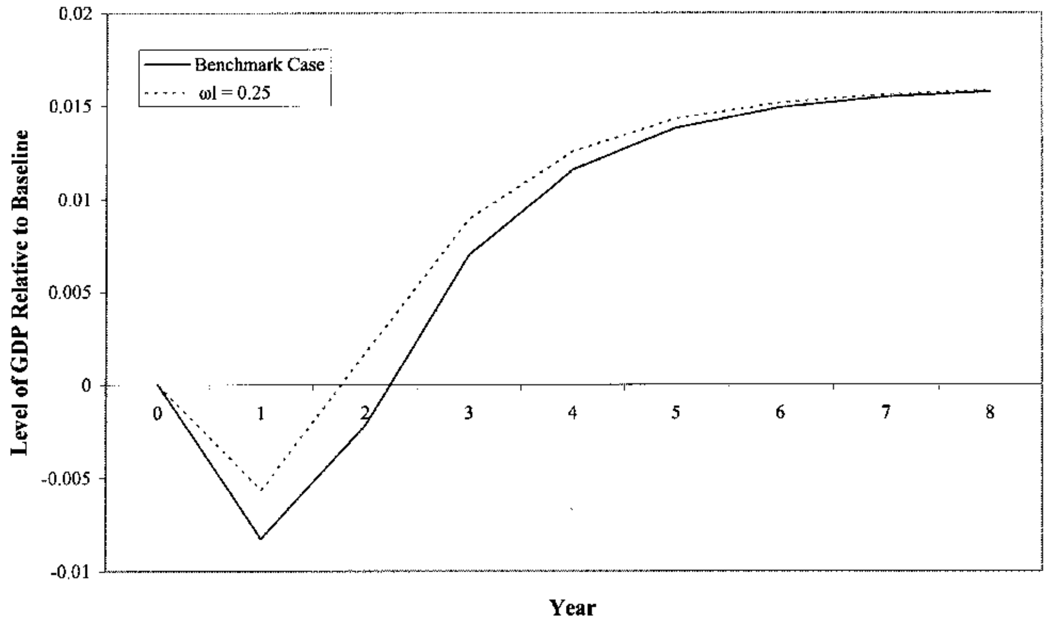


Figure 11. Sensitivity (VI)

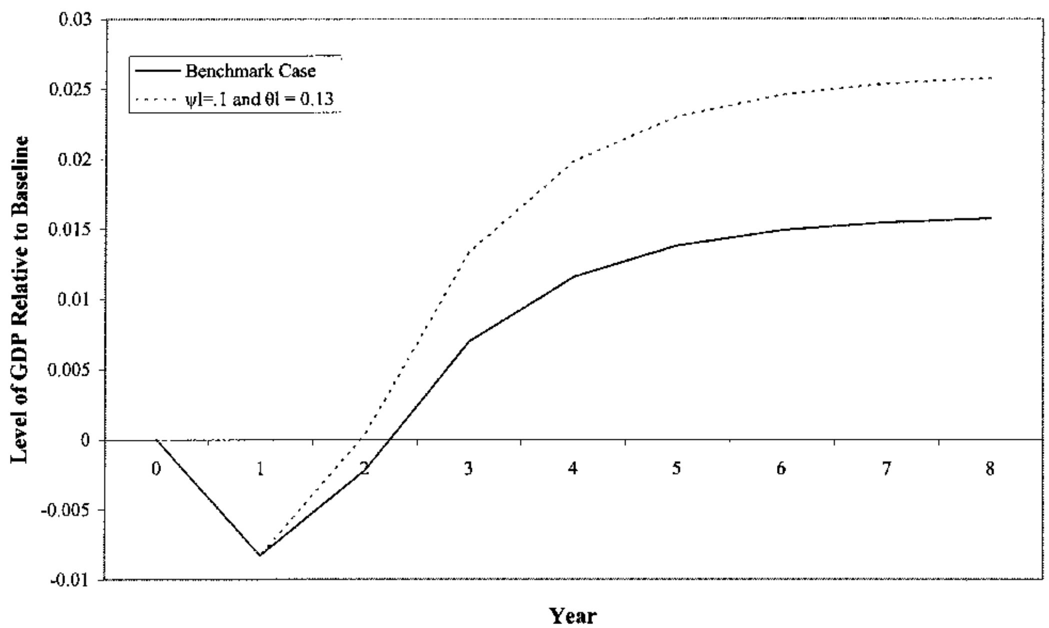
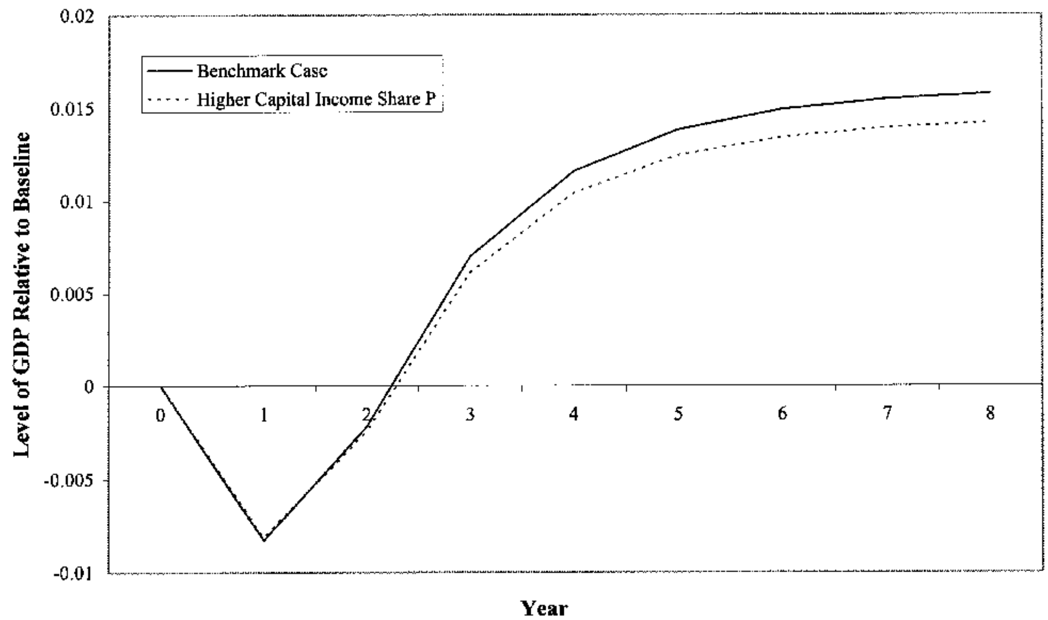


Figure 12. Sensitivity (VII)



V. Further Discussions

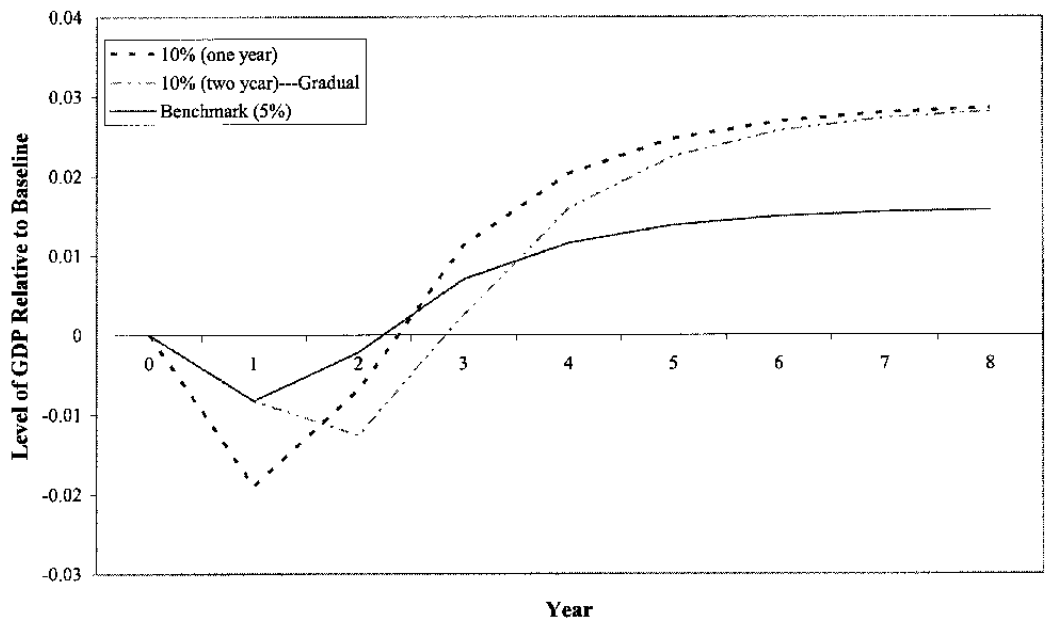
This section explores how the path of output is affected by the pace of restructuring, and by assuming that restructuring involves resource reallocation only within industries. It also discusses obstacles to efficient restructuring, macro-effects of restructuring based on inaccurate identification of the least productive firms, and output effects of bank-led restructuring through NPL disposal.

A. Scale and Pace of Reform

First, consider the effect of more-aggressive restructuring. Figure 13 shows the effect of restructuring the least productive firms representing 10 percent of labor ($\gamma = 0.1$) in the beginning of the year t=1 (instead of 5 percent in the benchmark case). In this case, aggregate output falls by 1.9 percent in the first year, but eventually converges to a level 2.9 percent above its initial level. This suggests that more-aggressive restructuring would amplify both short-term output losses and medium-term output gains, resulting larger net gains.

Figure 13 also illustrates the effect of more-gradual restructuring. For this experiment, I assume that restructuring of the least productive10 percent firms is carried out over two years: restructuring of the least productive 5 percent firms in a year and the least productive 5 to 10 percent firms in the next year. In this case, aggregate output declines to 0.8 percent below its initial level (the same as in the benchmark case of swiftly restructuring the least productive 5 percent of firms), but converges to a level 2.9 percent above its initial level (as in the case of swift restructuring of the least productive 10 percent of firms). Furthermore, the results suggest that more gradual restructuring spreads out short-run output losses but also delays the pickup in aggregate output.

Figure 13. Effect of More-Aggressive/More-Gradual Restructuring



B. Intra-Industry Resource Reallocation

It is also useful to examine the effect of restructuring a fraction γ of firms in each industry under the assumption that resources released from those firms are reallocated only to other firms in the same industry. For this exercise, I assume that for each industry the least-productive firms representing 5 percent of the industry's labor are restructured. Note that if we add up the restructured firms across industries in this case, total restructured firms represent 5 percent of the economy's labor, the same as in the benchmark case ($\gamma = 0.05$), where the resources released from close firms can be reallocated to firms in different industries.

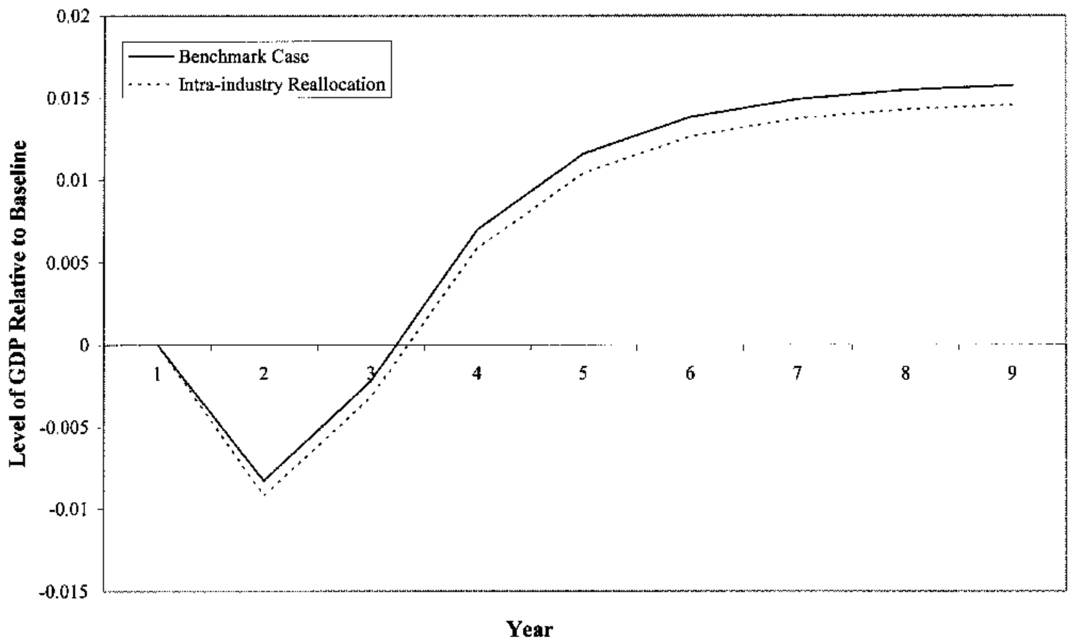
Figure 14 shows that the dynamic response of aggregate output is very similar to that of the benchmark case. In this case, aggregate output drops to a level 0.9 percent below its initial level in the first year, while it converges to a level 1.5 percent above its initial level. Therefore, restructuring in this case generates a short-run output loss and medium-term output gains that are almost the same as in the benchmark case. This result indicates that distributions of productivity within industries may be similar to the distribution across industries.[15] Indeed,

[15] In a hypothetical situation where each industry consists of only one firm and capital income shares differ across industries, reallocation of resources from a firm with lower A_i to others with

(continued...)

Worldscope data shows a large dispersion in productivity within each of major industries in Japan such as manufacturing, construction, and services as in the economy as a whole.[16]

Figure 14. Effect of Intra-Industry Reallocation



higher A_i would not always raise the aggregate output, and therefore we would not have a result as in Figure 14. However, if each industry has a number of firms whose productivities are not concentrated in a specific area (say left tail or right tale) of the productivity distribution of the economy, resource reallocation to more-productive firms within the same industry can substantially increase aggregate output as in the benchmark case.

[16] Note that the loss of firm- or industry-specific capital and skills in the case of intra-industry resource reallocation could be much lower than in the case of inter-industry reallocation. Therefore, if this is taken into account, the net output gain could be even larger. For example, suppose that the rate of reemployment-related skill loss is 20 percent instead of the benchmark case's 30 percent and the rate of redeployment-related capital loss is 60 percent instead of 72 percent. It can be shown that in this case aggregate output would converge to a level 1.9 percent above its initial level, higher than that of the benchmark case.

C. Obstacles to Restructuring and Accuracy in Identification

The above simulations illustrate the size of the potential gain from the most advantageous restructuring, that is, reallocation of resources from the least-productive firms to more-productive firms. In general, the market plays a key role in reallocating resources to more-productive firms, and the firm-level data supports such role of the market in Japan (as mentioned in Section III.B). However, such ideal restructuring driven by markets may be impeded or slowed in the presence of various institutional obstacles such as weak financial disclosure and corporate transparency, existence of business groups characterized by cross debt payment guarantees or cross shareholdings,[17] coordination failures among creditors on debt restructuring, perverse incentives of banks to provide credit to weak firms,[18] underdeveloped markets for mergers and acquisitions and used capital, and labor market rigidities.

Particularly under weak financial disclosure and corporate accounting practices, it may be hard even to accurately identify the lowest-productivity firms let alone to smoothly reallocate resources. As a result, restructuring carried out under such a situation would not generate as much gain as does the ideal restructuring based on accurate identification of the weakest firms.

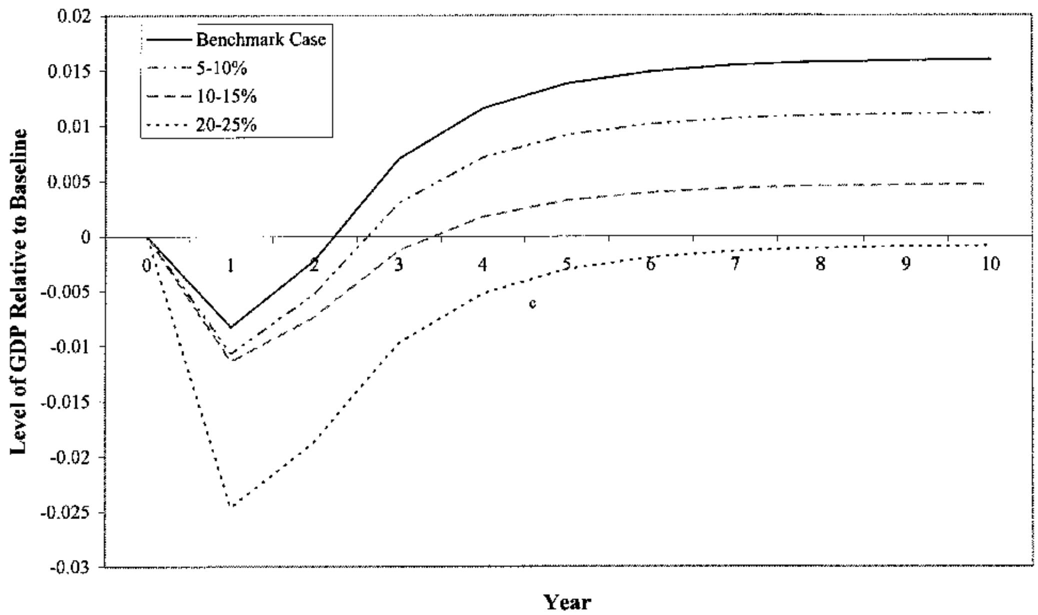
Figure 15 illustrates the consequence of a restructuring that is carried out based on inaccurate identification of the least-productive firms. First consider the case where, because of weak information disclosure, firms whose productivities rank between the least productive 5 percent and 10 percent are mistakenly selected for restructuring (instead of bottom-0-to-5 percent firms in the benchmark case). The figure shows that output gains from restructuring are still large enough to outweigh the cost, but the net gain is lower than the case of the best restructuring in the benchmark case. Now consider the case where the least productive10-15 percent of firms are restructured. In this case, the net output gain of restructuring becomes marginal. Finally, if the least productive 20-25 percent of firms are liquidated with their capital and labor being reallocated to others (including the least productive 0-20 percent of firms), restructuring generates output losses both in the short term and medium term. These results suggest that strong financial disclosure and corporate transparency is a prerequisite for successful corporate restructuring. Furthermore, corporate restructuring would generate better outcome when carried out by institutions that have expertise in gathering and processing accurate information on individual firms even under weak financial disclosure by the firms, most probably banks (Fama, 1985).

---

[17] Which obstacles are more important among those mentioned here depends critically on the situation of an economy. For Korea during a few years before the 1997 financial crisis, for example, business groups were often considered a key obstacle to efficient allocation of resources (Krueger and Yoo, 2002; Kim, 2003).

[18] Peek and Rosengren (2003), using Japanese firm-level data for 1993-1999, find that Japanese firms in poor financial conditions are far more likely to receive additional credit from banks, which try to avoid the realization of losses on their own balance sheets.

Figure 15. Effect of Inaccurate Selection



D. Bank-Led Restructuring

The impact of corporate restructuring carried out by banks (including through banks' disposal of nonperforming loans) also can be analyzed. Based on their expertise in distinguishing between the more productive and the less productive among borrower firms, banks may liquidate (or foster the reorganization of) less-productive firms and reduce debt burdens of more-productive firms (for example, through debt-equity swaps). As long as banks perform such a monitoring/allocation function properly, corporate restructuring led by banks can facilitate the reallocation of resources from less-productive firms to more-productive firms and induce a subsequent rise in aggregate output.

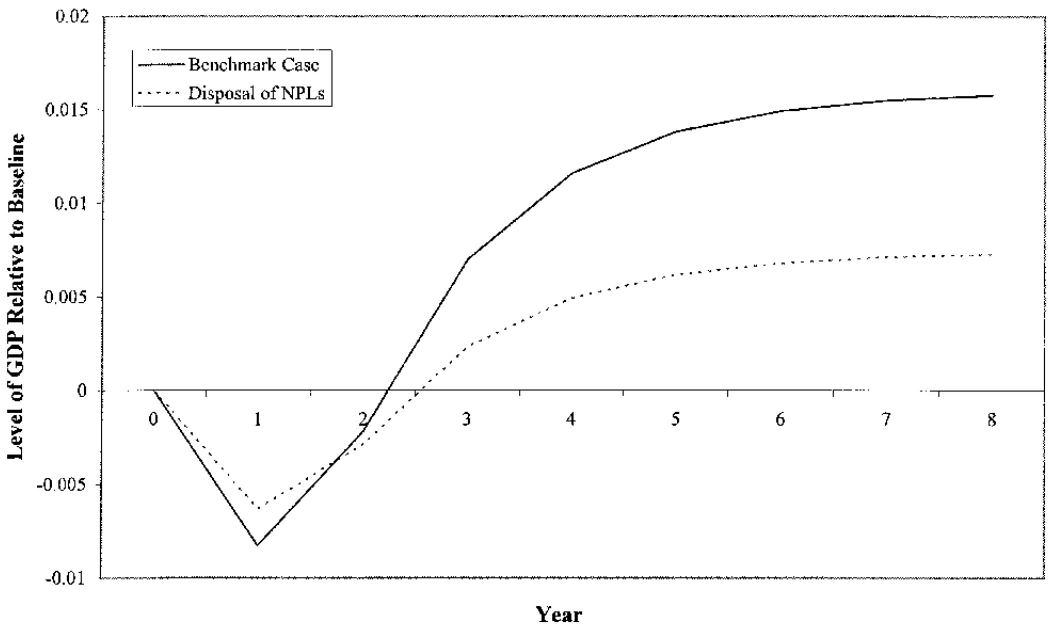
Figure 16 illustrates how banks' corporate restructuring through disposal of problem loans can affect the dynamic path of aggregate output. For this experiment, I assume that bank loans to the firms whose ratio of operating profits to debts are less than 5 percent (on average for 2000-2002) have potential to become bad loans.[19] I also assume that banks have capabilities to accurately measure the productivity of those firms. Further, suppose that among those firms, they liquidate the least productive (representing 5 percent of total corporate liabilities). Then

[19] This assumption is consistent with a study by Atkinson and others (2001). They classify potential bad loans into three types depending on the ratio of operating profits to debt: *effectively bankrupt* loans, for those with the ratio less than 1 percent; *bankruptcy risk* loans, with the ratio more than 1 percent but less than 3.5 percent; and *the watch list* loans, with more than 3.5 percent but less than 5 percent.

the resources freed up from closed firms are demanded by and reallocated to more-productive firms as described in Section III.A.

In this case, aggregate output declines by 0.6 percent in the first year but converges thereafter to a level 0.7 percent above its initial level. This suggests that corporate restructuring led by banks (including through banks' disposal of NPLs) can generate substantial net output gain. Unsurprisingly, the size of the net gain in this case is lower than the benchmark case where the least-productive among all the firms (including those without bank loans) are restructured.[20]

Figure 16. Effect of NPL Disposal



[20] Note that the scope of a bank's corporate restructuring is limited within its borrower firms whose debts can be classified as potential problem loans. Banks cannot restructure a firm with no or very limited amount of liabilities, even when it belongs to bottom 5 percent of firms in terms of productivity. Based on data on the U.S. trucking industry, Zingales (1998) finds that firms with higher debts are less likely to survive adverse shocks after controlling for efficiency. Also note that the difference between the macro-effect for the case of bank-led restructuring and the benchmark case in Figure 16 may capture the macro-effect of restructuring led by nonbanking sectors.

VI. Conclusion

This paper presented a framework for quantitatively evaluating both potential benefits and costs of corporate restructuring and applied it to Japan. Based on Cobb-Douglas production functions, together with financial statement data of 1,555 Japanese firms and industry-specific labor income share parameters, it calculated total factor productivity of individual firms and derived the distribution of productivity across those firms. Given the productivity distribution and law of motion for the reallocation of capital and labor, the paper traced the dynamic response of aggregate output to restructuring. It showed that well-designed restructuring in Japan could provide a medium-term output gain that substantially outweighs the short-run cost.

These results provide important policy implications. First of all, corporate restructuring in Japan may need to be pushed forward, given that its medium-term output gain substantially outweighs its short-run costs. In addition, corporate restructuring would most likely yield significant gains if accompanied by broader reform measures to achieve the most beneficial restructuring (for example, strengthening of financial disclosure, accounting practices and corporate transparency, and developing of more active mergers and acquisitions markets).

The empirical framework of this paper suggests some useful avenues for further research on measuring the macro-effect of corporate restructuring, and more generally institutional changes, in any country including Japan. It would be of particular interest to apply the same simulation exercise to many countries and to examine cross-country variations in the size of the macro-effect of corporate restructuring and the factors that affect the variations. While the current framework works nicely to generate plausible estimates of the effect of restructuring in various situations, it might not be the sole empirical approach. Therefore, further studies that adopt a different methodology would provide a useful complement to this paper.

REFERENCES

Akinson, David, Tonishi Ishida, Hideyuki Ishii, and Katsunori Tanaka, 2001, *Japanese Bank Asset Quality*, Goldman Sachs.

Acemoglu, Daron, Simon Johnson, James Robinson, and Yunyong Thaicharoen, 2002, "Institutional Causes, Macroeconomic Symptoms: Volatility, Crises and Growth"(unpublished; MIT, UC Berkeley, Bank of Thailand).

Chopra, Ajai, Kenneth Kang, Meral Karasulu, Hong Liang, Henry Ma, and Anthony Richards, 2002, "From Crisis to Recovery in Korea: Strategy, Achievements, and Lessons," In: Coe, David, and Se-Jik Kim (Eds.), *Korean Crisis and Recovery*, IMF and KIEP, pp.13-104.

Dell'Ariccia, Giovanni, 2003, "Banks and Credit in Japan," In: Callen, Tim, and Jonathan Ostry (Eds.), *Japan's Lost Decade: Policies for Economic Survival*, IMF, pp. 43–61.

Fama, Eugene, 1985, "What's Different About Banks?", *Journal of Monetary Economics*, Vol. 5, pp. 29–39.

Fischer, Stanley, 1998, "In Defence of the IMF: Specialized Tools for a Specialized Task", *Foreign Affairs*, July/August, 103-6

Friedman Eric, Simon Johnson, and Todd Mitton, 2002, "Corporate Governance and Corporate Debts in Asian Crisis Countries," In: Coe, David, and Se-Jik Kim (Eds.), *Korean Crisis and Recovery*, IMF and KIEP, pp.293–324.

Hamao, Yasushi, Jianping Mei, and Yexiao Xu, 2003, "Idiosyncratic Risk and the Creative Destruction in Japan," NBER Working Paper No. 9642 (Cambridge, Massachusetts: National Bureau of Economic Research).

Hoshi, Takeo, Anil Kashyap, and David Scharfstein, 1990, "The Role of Banks in Reducing the Costs of Financial Distress in Japan," *Journal of Financial Economics*, Vol. 27, pp. 67–88.

Japan Cabinet Office, 2001, "The Disposal of Non-Performing Loans and Its Potential Influence: Executive Summary," Director General for Economic Assessment and Policy Analysis. Available via the Internet at http://www5.cao.go.jp/keizai3/2001/0628furyousaiken-e.pdf.

Johnson, Simon, John McMillan, and Christopher Woodruff, 2002, "Property Rights and Finance," *American Economic Review*, Vol. 92, pp. 1335–1356.

Kamada, Koichiro, and Kazuto Masuda, 2001, "Effects of Measurement Error on the Output Gap in Japan," *Monetary and Economic Studies* (May 2001), Bank of Japan, pp. 109–154.

Kang, Joon-Koo, and Anil Shivdasani, 1995, "Firm Performance. Corporate Governance, and Top Executive Turnover in Japan," *Journal of Financial Economics*, Vol. 38, pp. 29–58.

Kang, Joon-Koo, and Anil Shivdasani, 1997, "Corporate Restructuring during Performance Declines in Japan," *Journal of Financial Economics*, Vol. 46, pp. 29–65.

Kaplan, Steven, 1994, "Top Executive Rewards and Firm Performance: A Comparison of Japan and the United States," *Journal of Political Economy*, Vol. 102, pp. 510–546.

Kaplan, Steven, and Bernadette Minton, 1994, "Appointment of Outsiders to Japanese Boards: Determinants and Implications for Managers," *Journal of Financial Economics*, Vol. 36, pp. 225–258.

Kashyap, Anil, 2002, "Sorting Out Japan's Financial Crisis," *Federal Reserve Bank of Chicago Economic Perspectives*, 42-55.

Khatri, Yougesh, Luc Leruth, and Jenifer Piesse, 2002, "Corporate Performance and Governance in Malaysia," IMF Working Paper WP/02/152 (Washington: International Monetary Fund).

Kim, Se-Jik, 2002, "Bailout and Conglomeration," *Journal of Financial Economics,* forthcoming.

Kim, Se-Jik, and Ivailo Izvorsky, 2002, "Aggregate Shock, Capital Market Opening, and Optimal Bailout" (unpublished; IMF, Institute of International Finance).

Krueger, Anne, and Jungho Yoo, 2002, "Falling Profitability, Higher Borrowing Costs, and Chaebol Finances During the Korean Crisis," ed. by David Coe and Se-Jik Kim, *Korean Crisis and Recovery*, IMF and KIEP, pp.157–196.

Lucas, Robert, 1967, "Adjustment Costs and the theory of Supply," *Journal of Political Economy*, Vol. 75, pp. 321–334.

Mody, Ashoka, 1999, "Asian Restructuring: From Cyclical Recovery to Sustainable Growth," Chapter 3 of *Global Economic Prospects 2000*, The World Bank.

OECD, 2002, *OECD Employment Outlook* (Paris: Organization for Economic Cooperation and Development).

Ogawa, Kazuo, 2003, "Financial Distress and Employment: The Japanese Case in the 90s," NBER Working Paper No. 9646 (Cambridge, Massachusetts: National Bureau of Economic Research).

Peek, Joe, and Eric Rosengren, 2003, "Unnatural Selection: Perverse Incentives and the Misallocation of Credit in Japan," NBER Working Paper No. 9643 (Cambridge, Massachusetts: National Bureau of Economic Research).

Ramey, Valerie, and Matthew Shapiro, 2001, "Displaced Capital: A Study of Aerospace Plant Closings," *Journal of Political Economy*, Vol. 109, pp. 958–92.

Rajan, Raghuram, and Luigi Zingales, 1998, "Which Capitalism? Lessons from the East Asian Crisis," *Journal of Applied Corporate Finance*, Vol. 11, pp. 40–48.

Ruhm, Christopher, 1991, "Are Workers Permanently Scarred by Job Displacements?" *American Economic Review*, Vol. 81, pp. 319–24.

Sakakibara, Eisuke, 2001, "Reforming Japan's Socialistic System," *Global Platform*, Japanese Institute of Global Communications.

Solow, Robert, 1957, "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics*, Vol. 39, pp. 312–320.

Young, Jeffrey, Tomoko Fujii, Kiichi Murashima, and Frank Packer, 2002, "Hard Landing: How Hard Is Hard?" *Economic and Market Analysis*, Nikko Saloman Smith Barney.

Zingales, Luigi, 1998, "Survival of the Fittest or the Fattest? Exit and Financing in the Trucking Industry," *Journal of Finance*, Vol. 53, pp. 905–938.