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Can Good Events Lead to Bad Outcomes? Endogenous Banking Crises and Fiscal Policy Responses

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Abstract

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In this paper, we study the impact of labor market restructuring and foreign direct investment on the banking sector, using a dynamic general equilibrium model with a financial sector. Numerical simulations are performed using stylized Chinese data, and banks failures are generated through increases in the growth rate of the labor force, a revaluation of the exchange rate or an increase in debt issue to finance the government deficit, as compared to a benchmark scenario in which banks remain solvent. Thus bank failures can result from what might seem to be either beneficial economic trends, or correct monetary and fiscal policies. We introduce fiscal policies that modify relative factor prices by lowering the capital tax rate and increasing the tax rate on labor. Such policies can prevent banking failures by raising the return to capital. It is shown that such fiscal policies are, in the short run, welfare reducing.

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I. INTRODUCTION

Why do countries experience systemic banking failures, and what can be done to avoid these failures, or at least to mitigate their negative consequences? There is an extensive literature on endogenous banking crises, on both the theoretical and the empirical level. In the real world, banking crises have occurred with some frequency for many years. The financial and exchange rate crises that erupted in East Asia in mid-1997 and spread to Russia, Brazil, and many other emerging and developed countries have intensified the need to understand the conditions under which banking crises are likely to arise. Many theoretical and policy studies have concentrated on the characteristics of financial systems as possible causes of failures. In addition, the international financial upheaval of 1997-98 has generated strong interest in the analysis of the connections between financial sector soundness and macroeconomic stability. What are the mechanisms through which the interaction between financial distress and macroeconomic instability could explain the “contagion” phenomena?

Suppose that a country carries out “prudent” macroeconomic policies. Will these be sufficient to avoid financial panics? This paper develops a formal macroeconomic framework to analyze the contagion phenomena in the context of a country in which there are no apparent macroeconomic instabilities at the outset and no obvious shocks that might provoke a run on bank deposits. In addition, the banking system is solvent at the beginning of the period, and there is apparent economic progress, as reflected, for example, in increases in employment or a strong currency. Such a situation might reflect the current reality in a number of East Asian countries that are experiencing strong growth, rapid reserve accumulation, and rising foreign direct investment (FDI).

Consider the following scenario: suppose that a country’s banking system has been lending to support rapid economic expansion. Borrowers, in turn, have taken out loans based upon the anticipation of high future rates of return as well as currently low interest rates. At the same time, FDI has increased due to the country’s undervalued exchange rate, which has made domestic assets inexpensive. The resulting decline in the returns to existing capital could cause past borrowers to be unable to pay their debts, leading them to default on bank loans.

Another scenario, in which an apparently healthy economic situation could lead to bank failures, might be the following. A rapid increase in the work force, attracted from rural labor, would lower the cost of capital. There would be a corresponding increase in both domestic investment and FDI, again leading to possible declines in the return to capital and future insolvencies. Another possible route to such insolvency outcomes might arise if the government, which had previously monetized its budget deficits, shifts to debt financing. A resulting rise in interest rates may cause short-term borrowers to be unable to service their

suddenly more expensive loans, and insolvencies may again occur.

These are precisely the type of apparently healthy economic situations that have characterized a number of high growth economies of East Asia. Our aim in this paper is to develop a model that can generate these sorts of outcomes, in which an apparently good set of policies and ongoing real outcomes can lead to endogenous failures. We use a numerical simulation of this model to derive certain fiscal policies that can be used to avoid these failures. These policies, which involve shifting the burden of taxation from capital to labor, can be carried out within the context of a balanced budget.³ In addition, they do not require the abandonment of the earlier policies that have led to the failures. Thus, for example, if a revaluation of the currency has led to insolvencies among borrowers, we do not require that the revaluation be reversed.

We will use stylized Chinese data for our simulations, as China has certain characteristics that are relevant for us. On the other hand, we do not claim that we have created an accurate model of China, or that our simulations offer concrete policy advice for that country. In addition, we should note that there have been no recent bank failures of any significance in China, nor is there evidence that any are imminent.

The next section provides an intuitive outline of our model, while Section II gives the model details. Section III discusses the parameterization of the model, gives a benchmark calibration as well as demonstrates how failures can be generated. Section IV derives fiscal counter measures and analyzes the welfare implications. The final section concludes.

Model Intuition

We consider an economy with certain characteristics that typify some high growth Asian countries. There is a fixed nominal exchange rate which tends to be undervalued, as reflected in large current account surpluses and rapid reserve accumulation. The cost of capital is therefore low for the foreign investor, and hence foreign direct investments (FDI) tends to be high. An additional feature of such economies is a large pool of unemployed labor, which puts downward pressure on wages, increasing the marginal productivity of capital.⁴ At the same time, the price of consumption is high, due to the undervalued exchange rate, leading to high savings, high investment, and low interest rates.

³It should be noted that this policy, to be discussed in Section IV, would be only a temporary measure that could eventually lead to further problems if additional measures were not taken.

⁴Some countries undergo a persistent downward pressure on wages stemming from a lack of mobility between sectors.

An economy with such a profile may have a strong interest in maintaining an undervalued real exchange rate so as to induce export-driven growth and increased FDI. The following sequence of events might be observed: a decrease in unemployment (through an exogenous increase in the supply of labor) puts downward pressure on wages, creating deflation. This increases the relative return to capital and leads to overinvestment. Eventually, the return to capital falls, and borrowers become insolvent, as their existing debt obligations surpass their incomes. Either banks fail, in which case the interest rate increases and investment decreases, or bad debt is monetized and the exchange rate collapses. The fear of default, as perceived by the agents, may lead to a change in the interest rate policy as the agents change their portfolio composition.

To model labor migration from the rural to the urban labor market, we impose an increase in the urban work force. This will eventually lead to a full employment equilibrium with falling wages, thus attracting FDI. In our model, FDI is endogenous and specified as an increasing function of the ratio of foreign to domestic interest rates.

If a collapse occurs due to labor market pressures or to other possible scenarios we describe, then there may be a money flight from the foreign investors and a corresponding decline in FDI, leading to a decline in the real growth rate. Equivalently, the fear of a collapse may simply halt capital from flowing in, also leading to a decline in real growth. As rates of return on capital become smaller than the cost of borrowing in the home country, there will be a decline in foreign investment. There might thus be an initial inflow of capital driven by interest rate differentials. At some point in time, the return to capital will decline due to rapid investment. The initial phase of low wages, rapid capital accumulation, and low returns to investment may lead to failures.

The extensive literature on currency crises suggests various explanations for understanding the mechanisms behind such events. Some focus on the government's role and fiscal policy (Krugman, 1979; Flood and Garber, 1984), others on self-fulfilling prophecies (Obstfeld, 1986, 1996; Jeanne, 1997; Jeanne and Masson, 2000). Burnside, Eichenbaum, and Rebelo, (2001, 2004) provide another fiscal approach to crises. In their papers, the collapse is linked to expectations and fundamentals: Large prospective deficits and implicit bailout guarantees by the government lead to crises. In this paper, we offer an explanation that also finds its roots within the banking sector, although it is not based on bailout policies.

We build a dynamic general equilibrium model reflecting the phenomena discussed above.⁵ We then use it to study stylized Asian data. We do this by

⁵The literature on applied macroeconomic general equilibrium models with a financial sector includes, among others, Labadie (1994), Diaz-Gimenez and others (1992), Altig, Carlstrom and Lansing (1995), Chari, Christiano and Eichenbaum (1995), and Feltenstein (1992).

presenting simulations. First, a benchmark generates a solvent banking system. A simulation then assumes a 10 percent per year increase in the work force as compared to the benchmark. This generates a rapid increase in investment and an eventual falling rate of return to capital. By the final period of the simulation, there are some defaults on loans and bank failures. The next simulation assumes that the government revalues the exchange rate by 10 percent per year. This scenario leads to similar results with bank failures. The last simulation assumes an increase in debt issue to finance the government budget deficit. Again, one observes bank failures, this time because the resulting interest rate increase has caused borrowers to default on their loans.

In the final part of the paper, we consider a fiscal policy that involves an increase in the tax rate on labor income, combined with a decrease in the corporate tax rate. We show that such a policy eliminates or dampens bank failures and endogenous runs on the banking system at the expense of domestic consumer welfare.

Let us now turn to a description of our model.

II. THE MODEL

There are n discrete time periods. Agents optimize in each period over a two-period perfect foresight time horizon with expectations about the future periods thereafter: Agents optimize given prices for periods t and $t + 1$ and expectations for period $t + 2$ and subsequent periods. In period $t + 2$, agents re-optimize for periods $t + 2$ and $t + 3$ based on new information about period $t + 2$.⁶ This behavior is motivated by the fact that some unexpected event may have occurred in period $t + 2$ (a policy change, a shock) that may lead the agents to review their plans for optimal decision making in the following periods. The updating of expectations is adaptive rather than perfect foresight over the entire time period as the latter framework would prevent bank failures and default to occur and, more important, would not take into account the implicit uncertainty within the model. Adaptive expectations describe in a simple way, without recourse to stochastic models, an important feature of crises, namely their unpredictability. They provide an approximation that is here revised every two periods, for as long as the crisis has not occurred but may occur. The timing of crises in a world with uncertainty⁷ is an important issue that is not included in our framework, but will be considered as an extension in further studies.

The details of the model are given below. Market clearing for goods and financial markets in each period will determine an equilibrium of the model.

⁶Strotz (1956), Ball and Feltenstein (2001), Blejer, Feldman, and Feltenstein (2002).

⁷Chamley (1999, 2003); Rochon (2006).

A. Production

There are κ capital types, that correspond to κ aggregate nonagricultural productive sectors, two types of labor (urban and rural), and land, which form the factors of production. There are three types of financial assets: domestic currency, interest-bearing foreign currency, and interest-bearing domestic bank deposits. Each of these factors and assets is replicated in each period and has a price in each period. Period 1 domestic currency is the numeraire.

An input-output matrix A_i is used to determine intermediate and final production in period i . Sector-specific value added is produced using capital and skilled labor for the nonagricultural sectors, and land and low-skilled labor in agriculture.

Let $y_{K_i}^j$ and $y_{L_i}^j$ be the inputs of capital and skilled labor to the j th nonagricultural sector in period i . Let Y_{G_i} be the stock of government infrastructure in period i . The production of value added in sector j in period i is⁸

$$va_{ij} = va_{ij}(y_{K_i}^j, y_{L_i}^j, Y_{G_i}). \quad (1)$$

Sector j pays income taxes on inputs of capital and labor, $t_{K_{ij}}, t_{L_{ij}}$ in period i . Agriculture is taxed on its use of labor. The effective price for labor and capital paid by sector j in period i is

$$\tilde{P}_{L_{ij}} = (1 + t_{L_{ij}})P_{L_{ij}}, \quad \tilde{P}_{K_{ij}} = (1 + t_{K_{ij}})P_{K_{ij}}.$$

Let $P = (\tilde{P}_{L_{ij}}, \tilde{P}_{K_{ij}})$ be the prices of labor and capital in period i . The prices charged by firms, P_i , are

$$P_i = va(P, Y_{G_i})(1 + t)(I - A_i)^{-1} \quad (2)$$

with $va(P, Y_{G_i})$ the vector of cost-minimizing value-added per unit of output.

Each type of sectoral capital is produced via a sector-specific investment technology using inputs of capital and labor to produce new capital. Investments are realized by the private sector and financed by domestic borrowing. The investor may receive an investment tax credit and a depreciation allowance. He pays a

⁸In practice, the coefficients for each sector's value-added function, va_{ij} , are derived from an actual input-output matrix based upon country data. In the observed input-output matrix, sectoral value-added is divided between wages of labor and returns to capital. We assume that the production of value-added in each sector is given by Cobb-Douglas functions with the shares of capital and labor determining the shares, $\alpha_j, (1 - \alpha_j)$ of the value-added function in sector j . Accordingly, every time our computational algorithm changes relative factor prices, sector j cost minimizes its value-added function to determine inputs of capital and labor needed to produce one unit of output. Nominal value added per unit of output is then determined, which leads to the computation of output prices in Eq.#2.

capital tax on the returns to his investment.

Notation: In period i , let k_i be the investment tax credit, d_i be the depreciation allowance, t_{ki} the profit tax rate, C_{Hi} the cost of producing the quantity H_i of capital, r_i the interest rate, P_{Ki} the return to capital, P_{Mi} the price of money, and δ the rate of depreciation of capital. Let P_1 be the rental price of capital in period 1 (or in the current period).

If C_{H1} is the cost-minimizing cost of producing the quantity of capital H_1 , the cost of borrowing is

$$C_{H1}(1 - k_1 - d_1) = \sum_{i=2}^n \left[\frac{(1 - t_{Ki})P_{Ki}(1 - \delta)^{i-2}H_1}{\prod_{j=1}^{i-1}(1 + r_j)} \right]. \quad (3)$$

It is the present value of the return on new capital, with r_j the interest rate in period j . One normally defines r_j as

$$r_j = 1/P_{Bj}$$

where P_{Bj} is the price of a bond in period j .

The firm optimizes over a two-period time horizon for which it knows all prices. After the second period, it assumes that future interest rates and returns to capital will remain the same as in period 2.

We assume that if the present value of investment in Eq.#3 falls below the value of debt service in some period, then the sector is unable to pay the debt obligations incurred to finance this investment. The bank that holds these assets then holds bad debts. This would be the case for example if the rate of return to capital fell once the investment was made. Additionally, we assume that all borrowing is short term so that debt is rolled over each period. Hence an unexpected increase in interest rates could also cause borrowers to default.

B. Banking

We assume that there is one bank for each nonagricultural sector of the economy. Each bank lends mainly to the sector with which it is associated: We assume each one holds 50 percent of the outstanding debt of its particular sector and an equal percent of the debt of each of the other $\kappa - 1$ sectors.

Let C_{Hij} be the demand for borrowing by sector j in period i , and assume bank k has DEF_{ik} percent of its total asset in default in period i . Let δ_k be a parameter specific to bank k (a measure of its risk aversion), and β_{jk} be the share of borrowing by sector j taken by bank k . The loans received by sector j are

$$L_{ij} = \sum_{k=1}^{\kappa} \beta_{jk}(1 - \delta_k DEF_{ik})C_{Hij}. \quad (4)$$

If there are no bank assets in default, no credit rationing takes place. If assets are in default, then the credit demanded by sector j for investment is reduced by each bank proportionally to the share of that bank's defaulted assets in total assets.

We impose a solvency requirement on the banking system. If α percent of a bank's assets are in default, caused by an insolvency among its borrowers, then the bank is declared insolvent and a fraction of the bank's deposits are seized by the government. With DEF_{ik} being the share of bank k 's assets in default in period i , we assume that a fraction $\omega_k DEF_{ik}$ of the bank's deposits are seized by the government, where ω_k is a bank-specific parameter.

The bank's supply of loans is determined by the demand for loans from the productive sectors, the risk imputed to potential borrowers and the loan supply is restricted by the bank's existing capital. The demand for loans is determined by the investment equations of the productive sectors. The banks' deposits and liabilities are determined by the consumers' saving behavior derived from the intertemporal optimization of consumption.

C. Consumption

There are two types of consumers, representing urban and rural labor, each type with a specific Cobb-Douglas demand and with specific initial allocations of factors and financial assets. Consumers maximize intertemporal utility functions depending on the levels of consumption and leisure in each of the two periods, subject to intertemporal budget constraints. There is rural-urban migration which depends on the relative rural and urban wage rates. Consumers save by holding money, domestic bank deposits, and foreign currency. They require money for transactions purposes, the demand for money being sensitive to changes in the interest rate. The consumer's demand for bank deposits depends on his perception of the solvency of the banking system.

Let x denote a demand variable and y a supply variable. We use 1 to refer to period i and 2 to refer to period $i + 1$. The consumer's problem is

$$\max U(x), \quad x = (x_1, x_{Lu1}, x_{Lr1}, x_2, x_{Lu2}, x_{Lr2}), \quad (5)$$

such that

$$C_i = N_i \quad (6)$$

where

$$(1 + t_i)P_i x_i + P_{Lui} x_{Lui} + P_{Lri} x_{Lri} + P_{Mi} x_{Mi} + P_{Bi} x_{Bi} + e_i P_{BFi} x_{BFi} = C_i$$

$$P_{K1}K_0 + P_{A1}A_0 + P_{Lu1}L_{u1} + P_{Lr1}L_{r1} + P_{M1}x_{M0} + r_0x_{B0} \\ + P_{B1}x_{B0} + e_1P_{BF1}x_{BF0} + TR_1 = N_1$$

$$P_{K2}(1 - \delta)K_0 + P_{A2}A_0 + P_{Lu2}L_{u2} + P_{Lr2}L_{r2} + P_{M2}x_{M1} + r_1x_{B1} \\ + P_{B2}x_{B1} + e_2P_{BF2}x_{BF1} + TR_2 = N_2$$

$$\log P_{Bi}x_{Bi} - \log e_i P_{BFi}x_{BFi} = \alpha + \beta(\log r_i - \log \frac{e_{i+1}}{e_i} r_{Fi}) \quad (7)$$

$$\log\left(\frac{L_{ui}}{L_{ri}}\right) = a_1 + a_2 \log \frac{P_{Lui} - P_{Lri}}{P_{Lui} + P_{Lri}} \quad (8)$$

$$\log P_{Mi}x_{Mi} = a + b \log(1 + t_i)P_i x_i - c \log \pi_i, \quad c = c(DEF/ASSET) \quad (9)$$

if $P_{Lui} \geq P_{Lri}$; otherwise $\log(L_{ui}/L_{ri}) = 0$

$$P_{B2}x_{B2} = d_0 + d_1(1 + t_2)P_2x_2 + d_2\left(\frac{r_2 - \pi_2}{1 + \pi_2}\right). \quad (10)$$

Notation: In period i :

P_i is the price vector of consumption goods,

x_i is the vector of consumption,

C_i is the value of aggregate consumption,

N_i is the aggregate income,

t_i is the vector of sales tax rates,

P_{Lui} is the price of urban labor,

L_{ui} is the allocation of total labor to urban labor,

x_{Lui} is the demand for urban leisure,

P_{Lri} is the price of rural labor,

L_{ri} is the allocation of total labor to rural labor,

x_{Lri} is the demand for rural leisure,

a_2 is the elasticity of rural-urban migration,

P_{Ki} is the price of capital,

K_0 is the initial holding of capital,

P_{Ai} is the price of land,

A_0 is the initial holding of land,

δ is the rate of depreciation of capital,

P_{Mi} is the price of money,

x_{Mi} is the holdings of money,
 P_{Bi} is the discount price of a certificate of deposit,
 π_i is the domestic rate of inflation,
 r_i, r_{Fi} are the domestic and foreign interest rates,
 x_{Bi} is the quantity of bank deposits,
 e_i is the exchange rate in terms of units of domestic currency per unit of foreign currency,
 x_{BFi} is the quantity of foreign currency,
 TR_i is the transfer payments from the government,
 a, b, α, β are estimated constants,
 d_i are constants estimated from model simulations,
 DEF is the value of nonperforming assets in the banking system,
 $ASSET$ is the total assets of the banking system,
 c is a functional form that depends negatively upon the ratio of nonperforming assets to total assets in the banking system.

Eq.#6 says that aggregate consumption must equal aggregate income. Eq.#7 says that the proportion of savings in domestic and foreign interest-bearing assets depends on relative domestic and foreign interest rates, deflated by the change in the exchange rate. Eq.#8 says that the change in the consumer's relative holdings of urban and rural labor depends on the relative wage rates. Eq.#9 is a money demand equation. The inflation elasticity c depends on the share of nonperforming bank assets in total assets, and is inversely related to the nonperforming assets. Eq.#10 defines a savings rate based on adaptive expectations in period 2.

At the beginning of period $t + 2$, the consumer's holdings of financial assets may differ from those specified in the above problem, as defaults may have occurred. The consumer optimizes again for periods $t + 2$ and $t + 3$ based on his new and unexpected holdings of financial assets at the beginning of period $t + 2$.

D. The Government

The government collects personal income, corporate profit, sales taxes and import duties. It pays for the production of public goods and for subsidies. It must also cover domestic and foreign interest obligations on public debt. Its deficit in period 1 is

$$D_1 = G_1 + S_1 + r_1 B_0 + r_{F1} e_1 B_{F0} - T_1 \quad (11)$$

where S_1 denotes subsidies,⁹ G_1 is spending on goods and services, $r_1 B_0$ and $r_{F1} e_1 B_{F0}$ are domestic and foreign interest obligations of the government based on its initial stocks of debt, and T_1 are tax revenues.

⁹These subsidies could potentially include interest rate subsidies.

The deficit is financed by monetary expansion and domestic and foreign borrowing. If Δy_{BG1} is the face value of domestic bonds sold by the government in period 1 and C_{F1} is the dollar value of its foreign borrowing, its budget deficit in period 2 is

$$D_2 = G_2 + S_2 + r_2(\Delta y_{BG1} + B_0) + e_2 r_{F2}(C_{F1} + B_{F0}) - T_2, \quad (12)$$

where $r_2(\Delta y_{BG1} + B_0)$ is the interest obligations on its initial domestic debt plus borrowing from period 1, and $e_2 r_{F2}(C_{F1} + B_{F0})$ is the interest payment on the initial stock of foreign debt plus period 1 foreign borrowing.

The government finances its budget deficit by monetization, domestic borrowing, and foreign borrowing. We assume that foreign borrowing in period i , C_{Fi} , is exogenously determined by the lender. The government determines the face value of its bond sales in period i , Δy_{BGi} , and finances the remainder of the budget deficit by monetization:

$$D_i = P_{Bi}\Delta y_{BGi} + P_{Mi}\Delta y_{Mi} + e_i C_{Fi}. \quad (13)$$

E. The Foreign Sector

We assume aggregate demand for exports is determined by domestic and foreign price indices and world income:

$$\Delta X_{no} = \sigma_1 \left[\frac{\pi_i}{\Delta e_i + \pi_{Fi}} \right] + \sigma_2 \Delta y_{wi} \quad (14)$$

where ΔX_{no} is the change in the dollar value of exports in period i , π_i is inflation in the domestic price index, Δe_i is the percentage change in the exchange rate, π_{Fi} is the foreign rate of inflation, Δy_{wi} is the percentage change in world income, denominated in dollars, and σ_1, σ_2 are elasticities.

Demand for imports is endogenous and derived from the domestic consumers' maximization problems. Foreign lending is exogenous. Gross capital inflows are exogenous, but the overall change in reserves is endogenous. The exchange rate is fixed.

The supply of foreign reserves, y_{FGi} , available to the government in period i , is

$$y_{FGi} = y_{FG(i-1)} + X_i - M_i + x_{F(i-1)} - x_{Fi} + C_{Fi} + C_{FPi}. \quad (15)$$

Here x_{Fi} represents the demand for foreign assets by citizens of the home country, and so $x_{F(i-1)} - x_{Fi}$ represents private capital flows. C_{Fi} represents exogenous foreign borrowing by the home government, while C_{FPi} represents private capital inflows. We will suppose that C_{FPi} is determined entirely as FDI. This FDI is, in turn, a function of relative domestic and foreign interest rates, deflated by the

expected rate of change in the exchange rate. Our underlying notion is that foreign funds seek out low-cost investment opportunities, and the cost of investment is reflected in the interest rate.¹⁰

We assume that there is an initial steady-state value of FDI, given by the historical level of FDI in the period prior to the start of the simulation exercise. FDI then varies from this historical value, FDI_o , based upon expected changes in the exchange rate as well as in relative domestic and foreign interest rates. These changes are given by

$$\Delta FDI = \left[\frac{1 + r_{Fi} e_{i+1}}{1 + r_i e_i} \right]^{\epsilon_{FDI}} - 1$$

where ϵ_{FDI} is the elasticity of FDI with respect to changes in exchange rates, deflated by relative domestic and foreign interest rates.¹¹ Accordingly, a devaluation or a decline in the domestic interest rate will tend to attract FDI.

The new value of FDI in period i , $FDI_i = FDI_o(1 + \Delta FDI_i)$, is then distributed across each capital type, j , according to the nominal share of the end of period $i - 1$ capital of type j in the nominal value of the total end of period $i - 1$ capital stock, valued at period i prices. Unlike domestic investment, this FDI is not financed by borrowing, but can be viewed as a helicopter drop of new capital. Hence it does not cause a direct impact upon domestic interest rates, although it does affect the rate of return to capital.

F. Money Supply

Changes in the money supply in period i , ΔM_{Si} , are

$$\Delta M_{Si} = \Delta y_{Mi} + \Delta OMO_i + e_i y_{FGi} - e_{i-1} y_{FG(i-1)} \quad (16)$$

where Δy_{Mi} is determined by the government financing its budget deficit and ΔOMO_i represents money created via open market operations. The domestic currency value of the balance of payments is $e_i y_{FGi} - e_{i-1} y_{FG(i-1)}$.

III. CALIBRATION AND SIMULATIONS

Since our model does not permit an analytical solution, we use a numerical solution method to derive certain qualitative conclusions about the effect of alternative paths for the economy, corresponding to different assumptions about the

¹⁰We assume that all goods are traded and that the country is small so that the law of one price holds. Accordingly, expected profitability of investment is dependent only upon factor costs.

¹¹In order to simulate our model, we have taken $\epsilon_{FDI} = 1$ in this admittedly ad hoc specification.

structure of fiscal decentralization. We derive a fixed point that corresponds to an intertemporal equilibrium. This equilibrium thus represents a set of prices in each period at which all factor and financial markets clear in each period.

A. Chinese Data Sources¹²

In order to develop our model for a specific country, we have chosen to use China as a very stylized example. We use a variety of Chinese sources to parameterize our model. We will describe these sources by type.

Production

Intermediate and final production is given by the 1995 Chinese input-output matrix. This is taken from the 1998 China Statistical Yearbook and represents 1995 technology. The matrix has 17 sectors:

- | | |
|--|-----------------------------|
| 1. Agriculture | 10. Metal Products |
| 2. Mining | 11. Machinery and Equipment |
| 3. Foodstuff | 12. Construction |
| 4. Textiles | 13. Transport and Telecom |
| 5. Other Manufacturing | 14. Commerce |
| 6. Production of electricity | 15. Public Utilities |
| 7. Gas, Coal, and Petroleum | 16. Banking and Insurance |
| 8. Chemicals | 17. Other Services |
| 9. Building materials and nonmetallic minerals | |

We have assumed that these 17 sectors are grouped into 5 aggregate groups ($\kappa = 5$ and hence there are five banks).

We derive indirect taxes from the input-output matrix. In order to derive import coefficients for the input-output matrix, as well as import tariff rates, we take a somewhat involved approach which is described in Feltenstein and Nsouli (2003).

We need to derive the effective rates of direct taxation for enterprises. The China Statistical Yearbook gives total revenues transferred to the government from state and collectively owned enterprises (COE). The Yearbook also gives total income from industry, and from this we derive a tax rate of 4.8 percent that is levied upon inputs of capital and labor to all nonagricultural sectors. We also need government current and capital expenditures, as percentages of GDP. Nominal government expenditure divided by nominal GDP gives a figure for capital expenditures of 2.9 percent of GDP, and for current expenditures on goods and services of 8.6 percent of GDP. We should note that this does not include interest

¹²This section is largely taken from Feltenstein and Nsouli (2003). Appendix tables with actual values for estimated parameters may be found in that paper.

payments, which are generated endogenously by the model.

In order to parameterize the consumers' problem, we need several types of data. We need utility weights for the different consumers' demand functions, as well as initial allocations of factors and financial assets. In order to derive utility weights, we use the final part of the IO matrix. This gives expenditures on each of the 17 sectors by agricultural and nonagricultural households. From these, we obtain utility weights for the two consumer categories.

Initial allocations of capital are given by the sectoral operation surpluses, that is, returns to capital, from the IO matrix. Similarly, allocations of labor are given by "compensation of laborers" across sectors. Thus we define a physical unit of capital and labor as that which earned one yuan in 1995.

Initial allocations of money are taken from International Financial Statistics (IFS) as M1 for 1994. Initial allocations of bank deposits are also derived from IFS as 1994 holdings of quasi-money. Finally, we assume that there are no holdings by the two domestic consumer types of foreign currency. The initial holding of foreign currency by the rest of the world, that is, the foreign consumer is taken to be the 1994 value of exports from the Yearbook.

B. Calibration

We first generate an equilibrium using benchmark policy parameters, as we want to use our model for counterfactual simulations. As a first example we carry out a simple exercise in which we take initial allocations to have their historical Chinese values for 1995. All exogenous policy parameters, such as tax rates, are taken as described above. We assume that the exchange rate remains fixed for the entire simulation. We run our model for eight periods to determine endogenous outcomes. We should note, again, that we do not claim that our model is an accurate replica of China. Nonetheless, it is useful to compare the outcomes, given in Table 1, with historical values.

We use the benchmark to draw qualitative conclusions about the impact of various shocks and also to study the scope of various policies.

A sector is unable to repay its debt, as in Section II-A, when the present value of the future stream of earnings from the investment becomes less than the corresponding debt obligations. We assume that the bank solvency requirement, as defined in Section II-B, is 8 percent: If a bank's nonperforming assets are greater than 8 percent of its total assets, then a portion of the bank's deposits are seized and depositors are unable to retrieve that share of their assets.

As in Section II-B, if the banks' borrowers default on their loans, then the bank

loses $\omega_k DEF_{ik}$ of its deposits, resulting in a wealth shock to depositors. We let $\omega_k = 1$ for each bank k . For this benchmark simulation, we assume that banks do not optimize: They do not ration credit when their borrowers begin to default.

Table 1. Base Case

Period	1	2	3	4	5	6	7	8
Nominal GDP 1/	100.0	131.5	150.5	199.0	212.6	280.8	289.8	382.4
Real GDP 1/	100.0	107.1	115.0	123.1	132.9	142.2	153.0	163.8
Price Level	100.0	122.8	130.8	161.8	159.9	197.5	189.4	233.5
Interest rate	10.3	11.5	11.2	14.9	11.6	16.9	11.4	17.6
Budget deficit 2/	7.7	6.8	8.8	7.8	9.6	8.6	10.5	9.3
Trade balance 2/	10.1	9.8	6.1	5.3	3.7	2.8	2.1	1.2
Domestically produced capital 3/, end of period 8			Percent bank assets in default at end of period			FDI deviation 4/ from initial level		
			4	6	8	Period		
Sector 1	100.0	Bank 1	0.0	0.0	0.0	2	18.0	
Sector 2	100.0	Bank 2	0.0	0.0	0.0	4	16.2	
Sector 3	100.0	Bank 3	0.0	0.0	0.0	6	15.2	
Sector 4	100.0	Bank 4	0.0	0.0	0.0	8	13.8	
Sector 5	100.0	Bank 5	0.0	0.0	0.0			

1/ All indices are normalized for this base simulation.

2/ As a percentage of GDP.

3/ Capital stocks are normalized to levels of the benchmark case.

4/ This is the percent difference between the FDI in the given period and FDI in the base year, that is, the historical period prior to period 1.

The simulation generates average annual real growth rates of 7.3 percent over the eight year period, which is slightly lower than the actual Chinese average. At the same time, average inflation rates are 12.8 percent, higher than the Chinese average. The trade surplus slowly declines, due to the fixed exchange rate and inflation. The budget deficit also rises and, correspondingly, so does the domestic interest rate. Because domestic interest rates are rising, the increase in FDI over its initial 1995 value slows over time. There are no bank failures and domestic capital formation (not including FDI) is normalized to 100. Thus we would claim that our parameterized model bears at least some resemblance to Chinese reality and can be used for counterfactual policy simulations.

Our next exercise is to suppose that the Chinese workforce increases by 10 percent per year. This is an arbitrary number, but is meant to reflect the actual increase in the urban workforce in China, caused by migration from rural areas. All other parameters stay the same as in Table 1. The results are given in Table 2.

Table 2. 10 Percent Annual Increase in the Workforce

Period	1	2	3	4	5	6	7	8
Nominal GDP 1/	100.0	131.5	149.5	197.7	209.2	276.8	283.6	375.0
Real GDP 1/	100.0	107.1	124.8	133.3	155.7	166.3	195.2	208.6
Price Level	100.0	122.8	119.8	148.3	134.4	166.4	145.3	179.8
Interest rate	10.3	11.5	11.1	14.4	10.9	15.3	10.9	15.8
Budget deficit 2/	7.7	6.8	8.8	7.6	9.8	8.6	10.5	9.3
Trade balance 2/	10.1	9.8	4.7	5.5	4.0	3.1	2.5	1.4
Domestically produced capital 3/, end of period 8			Percent bank assets in default at end of period			FDI deviation 4/ from initial level		
			4	6	8	Period		
Sector 1	124.1	Bank 1	0.0	0.0	21.6	2	18.0	
Sector 2	127.8	Bank 2	0.0	0.0	67.4	4	16.5	
Sector 3	125.9	Bank 3	0.0	0.0	18.7	6	15.0	
Sector 4	127.5	Bank 4	0.0	0.0	32.7	8	15.0	
Sector 5	126.4	Bank 5	0.0	0.0	22.0			

1/ All indices are normalized for this base simulation.

2/ As a percentage of GDP.

3/ Capital stocks are normalized to levels of the benchmark case.

4/ This is the percent difference between the FDI in the given period and FDI in the base year, that is, the historical period prior to period 1.

As might be expected, the average annual rate of growth of real GDP rises to 11.1 percent. There is significant deflation, caused by the increase in the workforce. The budget surplus increases slightly, as exports are cheaper than in the base case, and nominal interest rates decline due to lower factor costs. As a result, domestic capital formation rises, as does FDI. However, by period 8, banks are holding large quantities of nonperforming assets. The reason for these failures is that there has been a dramatic decline in the return to capital. Hence, despite the decline in interest rates, firms are no longer able to service their debts.¹³ Thus the workforce increase, despite generating an investment boom and increase in GDP growth, also generates bank failures.

Thus we see that downward pressure on wages, caused by a rapid increase in the workforce, can lead to economic collapse even though there are no changes in exogenous macroeconomic parameters. In reality, the rural migration takes place gradually and hence might well not lead to such severe consequences as the other policy induced distortions that we will discuss. In particular, rising wages for certain scarce labor categories could dampen investment.

¹³This outcome depends on the assumption of two-period perfect foresight, so that firms are essentially surprised by the rapid decline in returns to capital.

As a third example, let us suppose that the government decides to revalue the exchange rate in order to compensate for a large trade surplus.¹⁴ We arbitrarily assume that they revalue the exchange rate by 10 percent every year for the eight periods of the simulation. That is, if the exchange rate were RNB 8 per USD in the previous period, then in this period it would be 7.2. All other parameters, including the rate of growth of the work force, stay the same as in Table 1. The results are given in Table 3.

Table 3. 10 Percent Annual Revaluation (Compared to Benchmark)

Period	1	2	3	4	5	6	7	8
Nominal GDP 1/	97.4	111.1	131.4	150.9	168.0	202.3	167.6	197.6
Real GDP 1/	99.8	106.0	113.9	121.5	130.6	139.4	150.6	160.9
Price Level	97.6	104.8	115.3	124.2	128.6	145.1	111.2	120.9
Interest rate	3.5	5.1	3.6	10.6	5.5	13.1	14.6	33.4
Budget deficit 2/	7.8	7.6	9.3	9.1	11.0	10.2	15.7	15.1
Trade balance 2/	10.7	7.9	3.7	1.5	-0.6	-3.8	-0.7	-2.7
Domestically produced capital 3/, end of period 8			Percent bank assets in default at end of period			FDI deviation 4/ from initial level		
			4	6	8	Period		
Sector 1	86.3	Bank 1	0.0	22.4	23.3	2	4.6	
Sector 2	97.3	Bank 2	0.0	68.7	69.3	4	3.5	
Sector 3	90.4	Bank 3	0.0	20.4	20.9	6	0.3	
Sector 4	95.4	Bank 4	0.0	34.2	39.1	8	-6.8	
Sector 5	94.1	Bank 5	0.0	22.5	23.5			

1/ All indices are normalized for this base simulation.

2/ As a percentage of GDP.

3/ Capital stocks are normalized to levels of the benchmark case.

4/ This is the percent difference between the FDI in the given period and FDI in the base year, that is, the historical period prior to period 1.

We see that the revaluation causes a sharp decrease in FDI, as compared to the base case in Table 1. The trade balance moves to a deficit by the end period because the revaluation generates fewer export revenues.

There is almost a 50 percent decline in the price level by the end period as compared to Table 1. Even though the nominal interest rates are lower, the real interest rates are higher in all periods. Real interest rates rise dramatically in

¹⁴This should not be taken to indicate that a revaluation of China's current fixed exchange rate should be recommended. Rather, this is a simulation that simply extends the recent small revaluations in the exchange rate. It could very well be claimed that a flexible rate, combined with financial sector reform, needs to be implemented for long-term stability.

the last two periods, bringing about failures by the end as borrowers are unable to repay their loans.

FDI has declined as the revaluation has made the domestic assets more expensive. There has been an overall decline in capital formation as compared to the benchmark due to the increase in the real interest rate. The extent of the increase in the real interest rate is such that existing borrowers are unable to service their loans. As a result, by the final period, banks are in default.

As a final example, we consider the possibility of an increase in debt issue to finance the government budget deficit. In the previous three simulations, we have assumed that 90 percent of the deficit is financed by monetization, after accounting for any foreign debt financing. The remainder is domestic debt issue. Suppose now that these ratios are changed to 80 percent monetization and 20 percent debt. Such a policy change might be made in order to reduce inflationary pressure and to slow the decline in the trade surplus under the fixed exchange rate regime. All other parameters remain as in Table 1. The outcomes are given in Table 4.

Table 4. Increase in Debt Financing of Budget Deficit

Period	1	2	3	4	5	6	7	8
Nominal GDP 1/	103.2	136.5	156.3	206.2	222.0	292.7	231.5	308.1
Real GDP 1/	99.9	106.7	114.9	122.5	132.6	141.1	153.7	163.2
Price Level	103.3	127.9	136.0	168.3	167.4	207.4	150.6	188.8
Interest rate	11.3	14.6	14.7	24.0	17.8	31.3	36.9	62.0
Budget deficit 2/	7.4	7.1	9.5	9.5	11.9	11.8	18.8	19.0
Trade balance 2/	9.2	8.7	5.1	4.3	2.6	1.7	7.1	5.5
Domestically produced capital 3/, end of period 8	92.5		Percent bank assets in default at end of period			FDI deviation 4/ from initial level		
			4	6	8	Period		
Sector 1	92.5	Bank 1	0.0	21.5	22.0	2	17.0	
Sector 2	97.9	Bank 2	0.0	67.2	67.2	4	12.1	
Sector 3	95.4	Bank 3	0.0	18.6	18.5	6	8.3	
Sector 4	97.7	Bank 4	0.0	32.6	37.2	8	-9.0	
Sector 5	96.4	Bank 5	0.0	22.0	22.6			

1/ All indices are normalized for this base simulation.

2/ As a percentage of GDP.

3/ Capital stocks are normalized to levels of the benchmark case.

4/ This is the percent difference between the FDI in the given period and FDI in the base year, that is, the historical period prior to period 1.

We notice a number of changes, as compared to Table 1. The interest rate increases rapidly over the last four periods, as does the government budget deficit, due to increased interest obligations. Accordingly, FDI growth slows as compared to the benchmark and the change, relative to the steady state, has become negative. Additionally, the rapid increase in the interest rate has caused banks to fail by period 6, so that there has been a sharp deflation in period 7. Capital formation has slowed and there has been a moderate decline in real GDP. Thus, increased debt issue has highly negative consequences for the economy.

IV. POLICY

We observed in the previous section that an increase in the growth rate of the work force, an increase in debt issuance by the public sector, and a revaluation of the exchange rate can all contribute to bank failures. Accordingly, failures can come about not only from adverse shocks, but also from apparently positive economic developments, such as increases in the work force, that attract FDI. They may also be caused by the government carrying out reasonable policies, such as revaluing an undervalued exchange rate, which may lead to increases in the real interest rate.

What could be done to avoid these failures? A simple answer would be to reverse the policies that can cause the failures. Hence, for example, no revaluation, keep monetizing the public deficit, and try to slow the rate of increase in the workforce. This would not be very useful policy advice, either in the context of the model or in the real world. An undervalued exchange rate leads to its own problems, as does rapid monetization. It is also not clear how one slows rapid growth in the workforce purely by the use of economic instruments.

A. Fiscal Approach

We now show that introducing a very simple tax change can help to avoid the bank failures and economic difficulties generated in the previous simulations. This change involves increasing the tax on labor while lowering the tax on capital. The resulting relative factor price change will tend to increase the return to capital, thereby preserving the solvency of investors. This type of fiscal policy can be carried out within the context of a balanced budget. Additionally, the general policy regime of our model economy dictates a fiscal approach. More specifically, the exchange rate regime dictates the choice of policy. Under fixed rate regimes, monetary policy is largely ineffective, whereas fiscal policy can be implemented effectively. Suppose then that the tax rate on capital income is lowered to 0 percent, while that on wage income is raised to 35 percent. This is a significant change from the original rate of 4.8 percent on both capital and labor and should

not be viewed as having any more than an illustrative significance. Table 5 shows the results of combining the continuous revaluation of the exchange rate with the tax change. All other parameters remain as in Table 3.

As compared to Table 3, we observe that the nominal interest rates have dropped as the tax on capital is lower. The budget deficit has decreased following the implementation of the wage tax, implying a decrease in public borrowing and debt issuance by the government, and hence less pressure on the banking system. The trade balance has improved as the tax on wages has decreased consumption levels. GDP has slightly declined as compared to Table 3. We observe that FDI has increased, as the cost of capital has declined (the tax on capital has decreased). The increase in FDI tends to lower the return on capital, but interest rates have fallen even more so that agents can still repay their loans. Hence the failures are eliminated. The tax rate on labor is implausibly high, but this example nonetheless indicates how changes in the structure of direct taxation can help to alleviate what is apparently a monetary phenomenon, namely bank failures.

Table 5. Combination of Revaluation and Wage Tax

Period	1	2	3	4	5	6	7	8
Nominal GDP 1/	93.4	103.3	117.8	131.2	140.9	161.2	160.7	190.4
Real GDP 1/	97.0	104.8	111.4	120.6	128.3	138.9	147.8	159.9
Price Level	96.3	98.6	105.8	108.7	109.8	116.1	108.7	119.1
Interest rate	0.2	6.3	0.7	10.8	1.7	13.0	3.9	15.8
Budget deficit 2/	3.9	4.7	2.6	3.5	1.5	0.3	0.2	1.8
Trade balance 2/	12.0	10.6	6.9	5.6	3.9	1.6	1.7	-0.9
Domestically produced capital 3/, end of period 8								
				4	6	8	Period	
Sector 1	95.3	Bank 1	0.0	0.0	0.0	2	6.8	
Sector 2	99.5	Bank 2	0.0	0.0	0.0	4	6.7	
Sector 3	97.5	Bank 3	0.0	0.0	0.0	6	4.7	
Sector 4	98.5	Bank 4	0.0	0.0	0.0	8	3.9	
Sector 5	98.7	Bank 5	0.0	0.0	0.0			

1/ All indices are normalized for this base simulation.

2/ As a percentage of GDP.

3/ Capital stocks are normalized to levels of the benchmark case.

4/ This is the percent difference between the FDI in the given period and FDI in the base year, that is, the historical period prior to period 1.

An important caveat should be made here. Note that domestic capital formation, as well as FDI, have risen as compared to Table 3 when the revaluation alone was

imposed. Solvency has been maintained by increasing the returns to capital, but the resulting increase in investment may well lead to an eventual return to insolvency. The rate of investment and FDI inflows are less than in the benchmark simulation, but possibly still too high for long-run stability. Hence the tax shift imposed here and in Table 6 should be viewed as only a temporary measure.

Let us now consider the impact of an increase in the labor income tax and a decrease in the capital tax when the economy is experiencing an increase in the growth of its work force, potentially due to rural-urban migration. This is thus the example of Table 2, with the tax rates on capital and labor changed to 0 and 35 percent, respectively. We should note that the tax rate on both urban and rural labor are the same, at 35 percent, so that the tax change is neutral with respect to rural-urban migration. The results are given in Table 6.

Table 6. Increase in Work Force Growth and Wage Tax

Period	1	2	3	4	5	6	7	8
Nominal GDP 1/	94.8	125.9	129.1	170.9	167.3	221.4	210.8	279.9
Real GDP 1/	97.0	105.4	122.3	132.4	153.7	165.8	193.2	208.6
Price Level	97.3	119.4	105.5	129.1	108.8	133.5	109.1	134.2
Interest rate	10.0	13.0	10.5	16.5	10.3	14.2	9.9	5.4
Budget deficit 2/	3.9	5.5	2.7	4.7	2.3	4.5	2.8	4.6
Trade balance 2/	11.8	11.2	10.4	9.5	10.1	8.9	10.4	8.8
Domestically produced capital 3/, end of period 8			Percent bank assets in default at end of period			FDI deviation 4/ from initial level		
				4	6	8	Period	
Sector 1	133.0		Bank 1	0.0	0.0	0.0	2	18.7
Sector 2	128.9		Bank 2	0.0	0.0	0.0	4	16.6
Sector 3	134.9		Bank 3	0.0	0.0	0.0	6	16.5
Sector 4	131.3		Bank 4	0.0	0.0	0.0	8	15.8
Sector 5	130.6		Bank 5	0.0	0.0	0.0		

1/ All indices are normalized for this base simulation.

2/ As a percentage of GDP.

3/ Capital stocks are normalized to levels of the benchmark case.

4/ This is the percent difference between the FDI in the given period and FDI in the base year, that is, the historical period prior to period 1.

As compared with Table 2, we see that GDP is approximately constant, but price levels have decreased following the introduction of the wage tax. The budget deficit has also decreased, as the government is collecting more revenues, and the trade balance has improved. We observe that the average of the interest rates in the last two periods is lower. There is a slight increase in FDI, as the

real exchange rate has declined. In Table 2, failures occurred at the end of the analysis. In this case, the increase in the wage tax affects the interest rates in such a way as to prevent bank failures. Thus we may conclude that the tax change has again helped to avoid bank failures, this time caused by an increasing work force and a declining return to capital.

B. Welfare Implications

We now analyze the welfare implications of the apparently beneficial tax changes that we have introduced. Accordingly, we carry out a present value calculation of each consumer's utility function under both the original scenarios and the corresponding scenario in which there is a tax change. The intertemporal utility function is calculated by taking the present discounted value of the product of the period utility function, given in Eq.#5, at equilibrium prices. The discount factor, that is, the rate of time preference, is assumed to be the same across domestic consumers. If we normalize so that utility levels at equilibrium in the base case of Table 1 are 100, then we obtain the following set of outcomes.

Table 7. Utility Level

Consumer	urban	rural	foreign
Simulation 1 - Base case	100.0	100.0	100.0
Simulation 2 - Workforce increase	161.9	159.7	168.3
Simulation 3 - Revaluation	83.1	101.2	70.0
Simulation 5 - Revaluation + tax	71.7	104.3	83.1
Simulation 6 - Workforce increase + tax	110.4	122.9	281.9

The welfare implications of the various policies are quite different across agents. The general increase in the workforce benefits all types of consumers, as the output increase more than outweighs the relative wage decline.¹⁵ The revaluation of the exchange rate, on the other hand, harms the urban consumer, compared to the base case. There are several reasons for this negative change. There has been a sharp increase in the real interest rate, comparing Tables 1 and 3, causing the urban consumer, who holds most of the domestic debt, to suffer a wealth loss. At the same time, manufactured exports, which are the bulk of exports in this case, decline sharply, further hurting the urban consumer. The welfare of the rural consumer improves slightly, as agricultural exports are only a minor portion of total exports. Also, the decline in the price of capital has raised the relative return to land, raising the rural consumer's income.

¹⁵Recall that there are single representative urban and rural consumers. Hence the workforce increase is equivalent to an endowment increase for each consumer.

In conjunction with the revaluation, the policy of raising the tax on labor while reducing the capital tax, continues to lower the welfare of the urban consumer. This apparently counterintuitive result comes from the fact that lowering the tax on capital increases the flow of FDI as the net return to capital initially rises. Over time, however, this increase causes the return to existing capital owners to fall, hence leading to an income loss for urban consumers. Rural consumers eventually see the return to their land holdings rise, and thereby experience a mild welfare improvement. The foreign consumer benefits from the reduction in the cost of capital as it lowers the cost of exports. This example illustrates the importance of incorporating endogenous FDI in our model.

The inclusion of the tax change with the workforce increase leads to a welfare decline for both domestic consumers, and to welfare gains for the foreign consumer. Thus the change in the structure of direct taxation has the positive effect of stopping the bank failures, but it does so at the cost of significant welfare losses on the part of at least some part of society. We have not incorporated the future welfare cost of the bank failures, but such losses might well overshadow the losses caused by the tax change.

V. CONCLUSION

In this paper, we use a dynamic general equilibrium model with a financial sector to study the impact of labor market restructuring and FDI on the banking sector. Simulations were performed using stylized Chinese data, and bank failures resulted from an increase in the growth rate of the labor force, a revaluation of the exchange rate, or an increase in debt issue to finance the government deficit, as compared to a benchmark scenario. Thus bank failures can result from what might seem to be either beneficial economic trends or correct monetary and fiscal policies.

We then introduce fiscal policies that modify the relative factor prices by lowering the capital tax rate and increasing the tax rate on labor. Such policies can prevent or at least dampen bank failures and crises essentially by raising the return to capital. In countries characterized by government-induced distortions in capital markets, a fixed exchange rate, a large number of unemployed, high savings, low interest rate, and export-led growth, the introduction of such fiscal policies may contribute to growth through the positive impact of such policies on the trade balance and by encouraging FDI. It should be noted, however, that there are welfare costs to these tax changes, as the urban sector suffers welfare losses, primarily because of the decrease in manufactured exports, as well as the increase in FDI, which eventually lowers the return on existing capital. Accordingly, policymakers might consider taxes and transfer payments as ways to mitigate these welfare losses.

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