Financial Liberalization and Volatility in Emerging Market Economies

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Abstract

The recent East Asian crisis has highlighted the relationship between …nancial development and output volatility. In this essay we develop a simple model of a small open economy producing a tradeable good using a non-tradeable input and where …rms access to borrowings and investment depends on current cash ‡ows. We then show, …rst that macroeconomic volatility only occurs at intermediate levels of …nancial development; second, that whilst full …nancial liberalization, including an unrestricted opening to foreign lending, can destabilize an emerging market economy, in contrast output volatility can be avoided if the same economy opens up to foreign direct investment only. We also draw several policy conclusions regarding the adequate responses to …nancial crises.

1 Introduction

The world in recent months has been captivated by the sight of the "miracle" economies of a few months ago tumbling …rst into a …nancial crisis and then into a full-scale macroeconomic collapse. Not surprisingly, several potential explanations for why this happened are already in the air: some argue that it was pure happenstance (a "panic")[1]; others blame the peculiarities of the …nancial sector in these economies ("crony capitalism")[2].

This essay takes a somewhat contrarian position with respect to this debate. Specifically it argues that what happened in East and Southeast Asia is not necessarily an aberration requiring a special explanation. In the years before the crisis hit, these economies had been going through a process of rapid change. The …nancial sector was being liberalized, making it easier for domestic …rms to borrow. Partly as a result of this liberalization, capital was ‡owing into these economies in large quantities, causing a real currency appreciation, rapid growth in lending and a boom in investment. When the crisis came it is these forces that got reversed - capital ‡owed out, the currency fell, lending stopped and investment collapsed.[3]

This pattern of a boom accompanied by capital in‡ows and a real appreciation followed by a dramatic collapse with capital out‡ows and rapid depreciation, is by no means unknown in other middle-income countries. Very much the same thing happened in Mexico in 1994 and in the Southern Cone in the early 1980s.[4]

[1] See for example, Sachs and Radelet (1998).

[2] Krugman (1998), for example.

[3] For evidence of what happened in East Asia, see Corsetti, Pesenti and Roubini (1998), Dornbusch (1998), or Sachs and Radelet (1998).

[4] For a description of the 1994 Mexican crisis which brings out this kind of picture see Edwards (1997). For the Southern Cone crises see Corbo, de Melo, and Tybout (1986). See also World Bank (1997) and Milesi-Ferretti and Razin (1998) for more systematic descriptions of capital ‡ows reversals and currency crises. In several cases, consumption growth is also observed in boom periods.

Perhaps more importantly, this pattern of growth and collapse may be a natural feature of economies at an intermediate level of …nancial development, especially those with a liberalized …nancial sector. The primary objective of this essay is to substantiate this claim. To this end, it develops a simple model of a small open economy with a tradeable good produced using a non-tradeable input (which may be thought of as real estate or skilled labor). To this it adds the assumption that the capital markets are imperfect, in the sense that a …rm's creditworthiness and therefore the amount it can borrow and invest, depends on its current cash ‡ow situation.[5]

In such a model the process of growth is driven by a combination of two forces: on one side, more investment leads to more output and ceteris paribus, to higher pro…ts. Higher pro…ts improve creditworthiness and fuel more borrowing, which leads to more investment. Capital ‡ows into the country to …nance this boom. At the same time, the boom in investment increases the demand for the non-tradeable input and raises its price relative to the tradeable good (unless the supply of the non-tradeable input is extremely elastic). This rise in prices leads to lower pro…ts in the tradeable goods sector and therefore, reduced creditworthiness, less borrowing and less investment. Of course once investment falls all these forces get reversed and eventually the price of non-tradeable inputs may fall enough to raise pro…ts and start o¤ another boom.

The interplay of these two forces, we show, can under certain conditions lead the economy to have stable cycles where the economy alternates between investment booms with high prices of non-tradeable inputs and large capital in‡ows and slumps where non-tradeable inputs are cheap and capital in‡ows are sharply reduced or even reversed.

[5] The fact that …rm-level cash ‡ows are a key determinant of aggregate investment is now widely recognized even for advanced economies like the U.S. (see Bernanke et al., 1997). Macroeconomic models which emphasize the role of …rm-level cash ‡ow in determining investment, include Bernanke and Gertler (1989), Gertler and Rogo¤ (1990), and Aghion, Banerjee and Piketty (1997). Gertler and Rogo¤ (1990) introduce credit constraints into an open economy model. However, they consider neither business cycle ‡uctuations nor relative prices movements. The emphasis on cash ‡ows distinguishes this whole literature from models based on the e¤ect of collateral on investment (e.g., Kiyotaki and Moore, 1997).

Moreover, even in the case where the economy does not permanently cycle, in a wide class of cases the economy will respond to a shock (such as the liberalization of the domestic capital market) by going through several booms and slumps before converging to its steady state.[6]

When a monetary dimension is added to this model, the variations in the relative price of the non-tradeable input are mirrored by movements either in the nominal exchange rate or in the level of central bank's reserves. With a …xed exchange rate, the phase of capital in‡ows and high investment is also a phase of reserves accumulation and when the economy collapses, reserves may be depleted and the …xed exchange rate policy abandoned.

We examine a liberalization of capital movements and show that an economy that was hitherto completely stable can become volatile and start to go through cycles of explosive booms and deep slumps. These results however do not apply to foreign direct investment (FDI). FDI di¤ers from foreign lending in not depending on the creditworthiness of the domestic …rms. When, in a slump, cash ‡ow is low in the domestic economy, foreign direct investors may actually prefer to come in to pro…t from the low price of non-tradeable inputs.

Our results are not inconsistent with alternative explanations of the crisis. Indeed it is hard to deny that corruption played a role in the recent vicissitudes of the …nancial sector in East and South Asia. It is also likely that panic selling had something to do with the speed with which the currencies crashed. The question that remains however is whether a crisis would have hit these economies even in the absence of these factors. Our model suggests that it probably would have.[7] Recognizing this possibility does more

[6] The key condition for output volatility is that cash ‡ow should be important for investment but not excessively so. We view this as a typical situation of economies which are at an intermediate level of …nancial development. Better …nancial sector insitutions like better credit-rating facilities, better bankruptcy laws and better disclosure laws presumably make borrowing easier and therefore cash ‡ow less important for investment.

[7] Direct evidence on the basic mechanism we analyze is thin since data on pro…ts and relative prices

than change our perspective on the current crisis: it also informs what our response to the crisis ought to be. Discussion of these policy issues is postponed to the concluding section.

2 A Simple Framework

We consider a small open economy with two goods, respectively tradeable and non-tradeable. Whilst the tradeable good can serve both as a capital input and as a consumption good, the non-tradeable good can only serve as an input in the production of the tradeable good. One should typically think of the non-tradeable good in this economy as input services such as real estate, (skilled) labor,... Until we introduce monetary considerations into the analysis, we take the tradeable good as the numeraire and we denote by p the price of the non-tradeable input when expressed in units of the tradeable good. We assume that the non-tradeable input is not used for consumption.[8]

There are two distinct categories of individuals in the economy. First, the lenders who cannot directly invest in production, but yet can lend their initial wealth endowments at the international market-clearing interest rate r. Second, the investors (or borrowers) who also have the opportunity to invest in production. The production function for the tradeable good is given by:

$$y_T = f(K; z_N); \tag{1}$$

where K (resp. z_N) denotes the current tradeable (resp. non-tradeable) investments and y_T denotes the current domestic flow of tradeable output. [The production function f obeys the usual concavity assumptions.]

is scarce. However, several papers show that profits in the tradeable sector sharply deteriorated with the increase in the price of non-tradeables in the Southern Cone experience (see Galvez and Tybout, 1985, Petrei and Tybout, 1995, or De Melo, Pascale and Tybout, 1985). Moreover, there is also clear evidence of a strong correlation between capital inflows and real estate prices (e.g. see Guerra de Luna, 1997).

[8] Allowing for consumption of the non–tradeable will not substantially affect the analysis as long as it is not a strong substitute for the tradeable good.

Credit-market imperfections: Due to standard agency (moral hazard) considerations, an investor with initial wealth W can invest at most $\frac{1}{\theta}W$; where $\frac{1}{\theta} > 1$ is a credit multiplier which reflects the degree of capital market imperfections.[9] Credit constraints vanish as θ tends towards 0, while $\theta = 1$ corresponds to the polar case where the credit market collapses and investors can only invest their own wealth. As we shall argue below, volatility is most likely to occur for intermediate values of the parameter θ, in other words for intermediate degrees of financial development.

Production decision: Investors with total initial wealth W_B will choose a non-tradeable investment z_N [with corresponding tradeable investment $K = \frac{W_B}{\theta} - p \cdot z_N$] to maximize current profits, i.e. to solve:

$$\max_{z_N} f\left(\underbrace{\frac{W_B}{\theta} - p \cdot z_N}_{K}; z_N\right) - p \cdot z_N;$$

where $z_N \leq y_N$ (endowment of non-tradeable good). The equilibrium price of the non-tradeable input, p; will then be simply determined as the price such that the demand for non-tradeable input z_N (defined as the solution to the above maximization program) is equal to the fixed supply y_N of non-tradeable good. This equilibrium price is the key variable whose movements over time will produce output cycles.

The Timing of Events: The timing of events within each period t is depicted in Figure 1. Investment, borrowing and lending takes place at the beginning of the period (which we denote by t^i); investors also pay the non-tradeable good services $p \cdot z_N$ to the owners of non-tradeable goods. Everything else occurs at the end of the period (which we denote by t^+): first, the returns to investments are realized; second, the debt-repayment $r\left(\frac{W_B}{\theta} - W_B\right)$ from borrowers to lenders; third, the consumption and the savings decisions which in turn will determine the initial wealth of borrowers at the beginning of next period (i.e. at $(t+1)^i$):

[9] See Aghion-Banerjee-Piketty (1997) for an explicit microeconomic derivation of this credit-multiplier based on a simple model of moral hazard in the credit market.

Savings Behavior: For simplicity, we assume a linear savings behavior: all agents save a …xed fraction $(1 - \beta)$ of their total end-of-period wealth and consume a …xed fraction β:[10]

Now that the basic model has been laid out, we can analyze the dynamics of the economy and in particular try to understand why open economies with imperfect credit markets may experience macroeconomic volatility. As we focus on output, it is su¢cient to examine the evolution of investors' behavior. Let W_B^{t+1} denote the disposable wealth of investors (borrowers) at the beginning of period $(t + 1)$: The dynamic evolution of W_B (and therefore of investment and total output) between two successive periods, is simply described by the equation:

$$W_B^{t+1} = (1 - \beta)[f(\frac{W_B^t}{o} - \overbrace{p^t \cdot z_N}^{\text{cost of non-tradeable services}}; z_N) - \overbrace{r(\frac{W_B^t}{o} - W_B^t)}^{\text{debt-repayment}}]; \qquad (2)$$

where p^t is the market-clearing price of the non-tradeable input at time t. The expression in bracket is the net end-of-period t revenue of investors: The net disposable wealth of investors at the beginning of period $(t + 1)$ is what is left of this net end-of-period return after consumption, hence the multiplying factor $(1 - \beta)$ on the RHS of equation (2).

Looking at equation (2) one can immediately see that an increase in investors' last period wealth W_B^t has an ambiguous e¤ect on their current wealth W_B^{t+1}. On the one hand, for a given price of the non-tradeable good p^t; a higher wealth W_B^t means a higher level of investment $\frac{W_B^t}{o}$ in period t which, everything also remaining equal, should produce higher revenues and therefore generate higher wealth at the beginning of period $(t + 1)$. (This we might call a wealth e¤ect.) On the other hand, more investment in period t also implies a bigger demand for the non-tradeable good and therefore an increase in the

[10] Such a saving behavior can be "rationalized" by bequest models with Cobb-Douglas "warm-glow" preferences that have been used by the recent theoretical literature on income distribution and credit constraints. The intertemporal decisions of lenders are of no consequence for input in such an open economy since investors can borrow in international capital markets. It will, however, a¤ect net capital ‡ows.

price p^t of that good during that period, which in turn will have a detrimental e¤ect on period t revenues and therefore on period $(t+1)$ wealth W_B^{t+1}. And the less substitutable the two inputs are in the production of tradeable output; the stronger this latter price e¤ect turns out to be.[11]

Figure 2 below depicts the evolution of W_B^{t+1} as a function of W_B^t in the Leontief case where $f(K; z_n) = \min(\frac{K}{a}; z_N)$: (Similar patterns can be derived by simulating the CES case: $f(K; z_N) = (K^{\frac{1}{2}} + z_N^{\frac{1}{2}})^{\frac{1}{\frac{1}{2}}}$). On the left-hand part of the curve (part 1) the wealth e¤ect dominates the price e¤ect: the middle-part of the curve (part 2) corresponds to the price e¤ect becoming stronger than the wealth e¤ect; …nally the right-hand part of the curve (part 3) follows from the fact that investors will eventually choose to become lenders when, as a result of the price e¤ect, production becomes insu¢ciently pro…table compared to lending all their wealth at rate r. In that case the evolution of investors' wealth is simply given by:

$$W_B^{t+1} = (1 - \beta)rW_B^t: \tag{3}$$

Now, when the overall curve $W_B^{t+1}(W_B^t)$ intersects the 45^0 line on its downward sloping part (part 2) in which the price e¤ect dominates and yet investors choose to borrow and produce, one can obtain output cycles in which a debt-build up period - during which the price of non-tradeable input increases - eventually leads to a credit-crunch and thereby to a recession. Figure 3 depicts an endogenous cycle driven by endogenous ‡uctuations in the price of the non-tradeable input. Intuitively, the story goes as follows: during a boom the domestic demand for non-tradeable input goes up as (high yield) investments build up, and thus so does the price of non-tradeables relative to that of tradeables. This, together with the accumulation of debt that still goes on

[11] In particular, whilst p^t remains proportional to W_B^t in the case where the technology f is Cobb-Douglas (so that in this case $W_B^{t+1}=W_B^t$ remains constant and therefore no output cycles can occur over time), in the case where the production function f is CES (or a fortiori Leontief) the price p^t becomes a non-linear function of W_B^t. We show in Appendix A that whilst the wealth e¤ect of an increase in W_B^t dominates for small values of W_B^t; the price e¤ect dominates for higher values of W_B^t:

during booms, will eventually squeeze investors' borrowing capacity and therefore the demand for non-tradeable goods. At this point, the economy experiences a slump and two things occur: the price of non-tradeable collapses (i.e. it falls relative to that of tradeables), while a fraction of the non-tradeable assets on o¤er is not purchased as there are not enough investment funds. The collapse in the price of non-tradeables thus corresponds to a contraction of the tradeable goods sector and of the level of real output.

Of course, the low price of non-tradeables will eventually lead to higher pro…ts in the tradeable sector and therefore more investment. A new boom and new cycle then begins.

Even where such a stable endogenous cycle is not a possible outcome, the convergence to the steady state after a shock may exhibit cycle-like behavior in the sense there may be several booms and slumps before the economy settles down. In this case, as well as where there are genuine limit cycles, slumps are the result of booms which are in a sense too successful and raise the price of the non-tradeable too high. In this sense the model is suggesting that a tendency towards occasional slumps may be inevitable in a certain type of economy.

In Appendix A we analyze in more details this model in the case where the production technology takes the Leontief form. For this special case we derive necessary conditions for long-run macroeconomic volatility. Interestingly, these conditions involve the parameter º (which measures the degree of credit market imperfection) being neither too small nor too close to 1. In other words, long-run output volatility of the kind analyzed above, is inconsistent both with full …nancial development (º » 0) and also with the total absence of credit markets (º » 1): in the former case the increasing price of non-tradeable inputs will not a¤ect borrowing (and therefore investment) capacity; and in the latter case, the absence of credit-opportunities will maintain an upper bound on the demand for (and therefore the price of) non-tradeable inputs. It is thus not so

surprising that …nancial ‡uctuations with real output e¤ects have been primarily experienced by middle-income countries (e.g. in Latin America or in South-East Asia) with intermediate degrees of …nancial development.

3 Financial Liberalization and Macroeconomic Volatility

While an easier access to foreign capital should in principle favor sustained growth, we show in this section that opening an emerging market economy to unrestricted foreign lending and borrowing (i.e. to foreign "indirect" investment) may actually be destabilizing.[12] We also show that this is not the case for FDI. The experiment we consider is simply the opening up to foreign borrowing and lending of a closed economy where saving equals investment. Assume that the quantity of domestic saving $W_B + W_L$ is initially lower than the demand for investment $\frac{W_B}{o}$. The opening up of the economy will then result in net capital in‡ows as investors can satisfy their excess demand in international capital markets. The corresponding increase in borrowings will increase the scope for bidding up the price of the non-tradeable input, thereby inducing permanent ‡uctuations in p, W_B and aggregate output.[13]

While other con…gurations are also possible, the situation depicted in Figure 4 …ts very well the stylized facts mentioned in the introduction. After a liberalization capital in‡ows increase, leading to an investment boom and/or consumption boom. After several periods of expansion, the price of the non-tradeable input experiences substantial increases, which in turn is re‡ected in a real exchange rate appreciation. This change in relative prices eventually squeezes out investors' net worth and thereby leads to a re-

[12] In a di¤erent context, Bacchetta and van Wincoop (1998) also show that a liberalization leads to volatility when there are installation costs to capital and imperfect information about return properties of …rms.

[13] See Appendix B where we construct an explicit example of an economy, which, in the absence of foreign investments and lending, converges to a permanent boom with $p' > 0$; but which experiences permanent ‡uctuations in p, W_B and aggregate output once fully open to foreign borrowing and lending.

cession. At that point, aggregate lending drops, capital ‡ows out and the real exchange depreciates. The resulting gain in competitiveness allows …rms to rebuild their net worth so that growth can eventually resume.

We should stress that the dynamics in Figure 4 occurs only for intermediate levels of …nancial development. As we mentioned earlier when º is too low there is no volatility.[14] When º is high, investment capacity is likely to be smaller than saving in the closed economy (i.e. $\frac{W_B}{º} < W_B + W_L$). In this case, a …nancial opening will not help investment and no capital in‡ow will occur, so that there will be no upward pressure on relative prices.[15] It is obviously desirable for a country to lower its º, i.e. to liberalize the domestic …nancial sector before fully opening up to foreign lending.

Whilst a full …nancial liberalization can have destabilizing e¤ects on economies with intermediate levels of …nancial development, those economies are unlikely to become volatile as a result of opening up to foreign direct investments alone. We distinguish FDI from other ‡ows by assuming that it is part of …rms' equity and that FDI investors have full information about …rms.[16] Furthermore, we restrict our analysis to the benchmark case where the supply of FDI is in…nitely elastic at some …xed price greater than the world interest rate, r.[17]

Then, starting from a situation in which domestic cash ‡ows are small and therefore domestic investment cannot fully absorb the supply of non-tradeable inputs, foreign direct investors are likely to come in to pro…t from the low price of the non-tradeable inputs. This price will eventually increase and it may even ‡uctuate as a result of FDI.

[14] When several developed countries did liberalize their capital movements in the 1970s and 1980s periods of high instability could not be observed. However, in some countries with initially protected …nancial systems, such as Spain in the late 1980s, dynamic evolutions similar to that depicted in Figure 4 could be observed.

[15] This may be the case in some of the poorer African and Asian countries.

[16] Typically, measured FDI implies participations of more than 10% in a …rm's capital so this appears to be a reasonable assumption. Razin et al (1998) make a similar distinction about FDI.

[17] This, in turn, implies that in our model FDI is a substitute to domestic investment. Analysing the e¤ects of FDI on macroeconomic volatility when domestic and foreign investments are complementary, is the subject of further research.

But these price fluctuations will only affect the distribution of profits between domestic and foreign investors, not aggregate output. For example, in the Leontief case, with FDI aggregate output will stabilize at a level equal to the supply of non-tradeable resources y_N, whereas the same economy may end up being distabilized if fully open to foreign indirect investment (i.e. to foreign lending).

4 Monetary and Exchange Rate Policy

Our analysis so far has focused on the real sector of the economy. However, nominal and monetary factors are often an integral part of financial crises and volatile environments. For example, policies of pegged nominal exchange rates and subsequent speculative attacks are often blamed as being responsible for the crises. The impact of devaluations on firms' finances and the optimal policy response after a crisis are also crucial issues.

Our basic framework can be easily extended to incorporate a nominal sector. Here we sketch a simple model with money neutrality. We show that a flexible exchange rate would mirror fluctuations in the relative price of the non-tradeable input, p. With a fixed exchange rate, it is the level of central bank's foreign exchange reserves that mirrors fluctuations in p. We first introduce nominal prices: p_T for the output good and p_N for the non-tradeable input good. The relative price of the non-tradeable input is $p = p_N/p_T$.

We assume that money must be held in advance to buy either the tradeable good or the non-tradeable input and that the seller's currency is used by convention. If the aggregate quantity of money is M, in equilibrium we simply have

$$M = p_T y_T + p_N y_N \tag{4}$$

(the cash-in-advance constraint is binding since interest rates are positive). Let s be the nominal exchange rate, defined as the quantity of domestic currency per unit of

the foreign currency. Assuming Purchasing Power Parity (PPP) on traded goods and foreign prices for that good equal to unity, i.e. $p_T = s$, a flexible exchange rate is given by (using (4), the PPP assumption and the definition of p):

$$s = \frac{M}{y_T + py_N} \tag{5}$$

In the Leontief case, y_T and y_N are constant so that s only depends on M and p. Movements in the relative price of the non-tradeable input are then fully reflected in the nominal exchange rate (a decrease in s reflecting an appreciation of the domestic currency).

Consider now a fixed exchange rate policy. In this case, s is fixed at $\bar{s}$ and M is endogenously determined by money demand. What is most interesting is the evolution of foreign exchange reserves at the central bank. The central bank's balance sheet is described by the equation: $M = DC + IR$, where DC represents domestic credit and IR international reserves. Assume that DC consists exclusively of existing government debt and is fixed at $\overline{DC}$. From (4), the evolution of IR is given by

$$IR = \bar{s}(y_T + py_N) - \overline{DC} \tag{6}$$

International reserves move in parallel with the non tradeable's price p, so that periods of capital inflows (outflows) are reflected by increases (decreases) in both p and IR. In particular, the fall in p during slumps will correspond to a decline in international currency reserves. This decline in international reserves may in turn become critical: in line with the speculative attack literature, there may typically be a lower limit of reserves at which the central bank is forced to abandon the fixed exchange rate. Consequently, downturns in lending at the end of booms will be associated with a depletion of reserves and the abandonment of the fixed exchange rate policy. Interestingly, the kind of currency crisis we are describing is not caused by inconsistent policies as argued in most of the speculative attack literature, but rather by the endogenous changes in firms'

…nancial health.[18]

5 Policy Conclusions

What is our model telling us about what should be done ex post, for example, in the Asian economies that are currently in crisis? A …rst implication of our model is that slumps should be seen as part of the normal process in economies like these which are both at an intermediate level of …nancial development and in the process of liberalizing their …nancial sectors. This clearly warns us against seeing these emerging market economies as ones which have lost their way and are beyond repair and therefore must undertake in haste a radical overhauling of their economic system.[19]

Second, policies which allow …rms to rebuild their credit worthiness quickly, will at the same time contribute to a prompt recovery of the overall economy. In this context it is worth considering the role for monetary policy and, more generally, for policies which

[18] The optimal monetary policy response to …nancial crises cannot be directly analyzed using the above model where money is neutral. However, if prices were rigid and money demand depended negatively on the interest rate, it would be possible to analyze the impact of unexpected monetary shocks. Such a model is developed in Aghion, Bacchetta, and Banerjee (1998). Using our framework we can get the standard textbook result that an expansionary monetary policy decreases the nominal interest rate and make the currency depreciate. A decline in the nominal interest rate i clearly has a positive impact on pro…ts as it has the direct e¤ect of increasing …rms' creditworthiness. We assume that interest rates are ‡exible. This appears a realistic assumption in emerging markets, where debt tends to be short run. On the other hand, it may also induce a currency depreciation with opposite e¤ects on investors' wealth W_B. Assume for example that the monetary expansion takes place just before …rms' debt is to be repaid. This obviously induces a loss for domestic borrowers who borrow in foreign currency as the value of the debt increases. To assess the overall real e¤ect of an expansionary monetary policy, it is therefore important to take into account the proportion of foreign currency debt in …rms' balance sheets. Unexpected devaluations can also have important e¤ects, as emphasized by Mishkin (1996). We need, however, to introduce uncertainty in the model; this is left for future research.

[19] Indeed, if our model is right, the slump sets in motion forces which, even with little interference, should eventually bring growth back to these economies. The risk is that by trying to overhaul the system in a panic, one may actually undermine those forces of recovery instead of stimulating them. This is not to deny that there is a lot that needs changing in these economies, especially on the institutional side with the establishment and enforcement of disciplinary rules in credit and banking activities. For example, as argued by Aghion-Armendariz-Rey (1998), unregulated banks often try to to preempt potential competitors in booming sectors by investing excessively and too early, that is before they have acquired the necessary information and expertise, into those sectors. In the context of our model, banks may typically engage in preemptive lending to speculators in non-tradeable inputs and/or to tradeable good producers during booms. This in turn will further increase output volatility whenever inadequate monitoring and expertise acquisition by banks increases aggregate risk and therefore the interest rate imposed upon domestic producers.

a¤ect the credit market. Whilst our model in its present form cannot be directly used for this purpose since money is neutral and in any case the interest rate is …xed by the world interest rate, it is not hard to extend this model to allow for both monetary non-neutrality and a less in…nitely elastic supply of foreign loans. Once we take the model in this direction it quickly becomes clear that a low interest rate policy is not necessarily the right answer even in a slump that is induced by a credit crunch. The problem is that while such an interest rate reduction may be good in the sense that it will help restore the …nancial health (and therefore the investment capacity) of enterprises, if at the same time it leads to a devaluation of the domestic currency, the net obligations of those who have borrowed in foreign currency will also go up. Therefore, the optimal interest rate policy ex post during a …nancial crisis, cannot be determined without knowing more about the details of the currency composition of the existing debt obligations of domestic enterprises.

This emphasis on creditworthiness as the key element in the recovery from the slump, also suggests that a policy of never bailing out insolvent banks (or that of closing down a large number of banks), runs the danger of making …rms less able to borrow (because of the comparative advantage of banks in monitoring …rms' activities[20]) and of thereby prolonging the slump.[21]. If banks are to be shut down, there should be an e¤ort to preserve

[20] See Diamond (1984).

[21] The conservative view among policy makers, is precisely that governments should commit to a no bail-out policy towards insolvent banks as a way to overcome moral hazard problems in the banking sector, the argument being that it is the very prospect of future bail-outs that encourages investors and banks to indulge in excessive risk-taking. Aghion, Bolton and Fries (1998) argue instead that when banks have private information about the proportion of non-performing loans in their portfolios, then strict bank closure rules requiring the closure of any insolvent bank, may be counterproductive. For such rules may simply induce bank managers to hide the true size of their loan losses for as long as they can. Such behavior will in turn result: (a) in huge misallocations of investments: bank managers will typically roll over a positive fractions of bad loans in order to conceal the extent of their loan losses (thereby softening the …rms' budget constraints!), and: (b) in a magni…ed banking crisis with massive banks failures down the road. On the other hand, an unconditional soft bail-out policy would also be undesirable, …rst because it might lead bank managers to underinvest ex ante into evaluating and monitoring the …nancial health of their debtor …rms and into structuring their loan portfolios e¢ciently; second, because it would encourage bank managers to exaggerate their recapitalization requirements ex post. The optimal bail-out policy will thus lie somewhere between no-bail-out and unconditional bail-out. It turns out that a conditional bail-out scheme can be designed, which can achieve the same ex

their expertise and monitoring experience about the relevant …rms and industries.

Our model also delivers policy implications ex ante for emerging market economies which are not yet in the middle of a …nancial crisis. First, our analysis suggests that an unrestricted …nancial liberalization may actually destabilize the economy and bring about a slump that would not have happened otherwise. If a major slump is likely to be costly even in the long-run (because, for example, it sets in process political forces which are destabilizing - as in Indonesia in recent months), fully liberalizing foreign capital ‡ows and fully opening the economy to foreign lending may not be a good idea at least until the domestic …nancial sector is su¢ciently well-developed (i.e. º becomes su¢ciently small).

Second, in our model, foreign direct investment does not destabilize. Indeed, as we have argued above, FDI is most likely to come in during slumps when the price of the non-tradeable input is low; furthermore, even if this price ends up ‡uctuating when the economy is open to FDI, these ‡uctuations will only a¤ect the distribution of pro…ts between domestic and foreign investors but not aggregate output. Therefore there is no cost a priori to allowing FDI even at low levels of …nancial development.[22]

Third, what brings about …nancial crises in our model, is precisely the rise in the price of non-tradeables. If one speci…c non-tradeable good (say, real estate) could be identi…ed as playing a key role in the emergence of a …nancial crisis, there could be an argument for controlling its price, either directly or though controlling the speculative demand for that good using suitable …scal deterrents.

ante incentives as a tough bail-out policy whilst minimizing the scope for ine¢cient liquidations or bad-loan re…nancing ex post: the scheme is one that involves conditional bail-out, with the carving out of bad loans by the government being made at a suitable non-linear transfer price. In particular, Aghion-Bolton-Fries (1998) suggest that the recapitalization of insolvent banks should be performed by buying out non-performing loans rather than through capital injections by buying subordinated bonds. The key insight in that paper is that a non-linear transfer pricing mechanism for bad loans can be used to avoid over-reporting of non-performing loans by healthier banks at the time of bail-out.

[22] This strategy of allowing only FDI at early stages of …nancial development is in fact what most developed countries have done, in particular in Europe where restrictions on cross-country capital movements have only been fully removed in the late 1980's whereas FDI to - and between - European countries had been allowed since the late 1950's.

Finally, there may be a role for monetary policies ex ante to prevent the occurrence of a …nancial crisis, i.e. to avoid slumps. One option is to sterilize capital in‡ows whilst maintaining a …xed exchange rats so as to keep the prices of non-tradeables down. The problem is that such a sterilization may also increase the interest rate to an extent which may again result in domestic …rms' net cash revenues being squeezed down, thereby also leading to an investment slump. This, and other important aspects in the design of stabilization policies for emerging market economies, await future elaborations of the framework developed in this essay.

Appendix A:
Solving the Model in the Leontief Case

In this appendix we analyze the model of Section 2 in the special case where the production technology for the tradeable good is Leontief, given by:

$$y_T = \min\{\frac{K}{a}; z_N\}; \tag{A1}$$

where K is the investment in tradeable input, z_N is the investment in non-tradeable input, ($z_N \cdot y_N$; where y_N is the endowment ‡ow of non-tradeable good), and $a < 1$. We thus assume a maximum degree of complementarity between the two kinds of investments.[23]

Since total investment at the beginning of period t is equal to $\frac{W_B^t}{o}$; then the investment in tradeable input is simply equal to:

$$K^t = \frac{W_B^t}{o} ¡ p^t ¢ z_N^t; \tag{A2}$$

In the Leontief case p^t and z_N^t are simply determined as follows:

1. (a) If $\frac{W_B^t}{o} < ay_N$; the demand for non-tradeable inputs under the Leontief technology, is strictly less than the supply of non-tradeable input y_N ($z_N^t = \frac{K^t}{a} = \frac{1}{a} ¢ \frac{W_B^t}{o} \cdot y_N$): The equilibrium price for the non-tradeable input, p^t; is consequently equal to 0; it follows from (A2) that $K^t = \frac{W_B^t}{o}$ and $z_N^t = \frac{K^t}{a} = \frac{1}{a}\frac{W_B^t}{o}$:

   (b) If $\frac{W_B^t}{o}$ ¸ ay_N there is full-employment of the non-tradeable input, namely $z_N^t = y_N$: Now, since $z_N^t = \frac{K^t}{a}$ and K^t always satis…es the above equation (A2), the equilibrium price of the non-tradeable input p^t is now positive and equal to:

$$p^t = \frac{W_B^t = o ¡ ay_N}{y_N}: \tag{A3}$$

[23] The less extreme case of a CES production technology is much harder to solve analytically, although it can be simulated; our simulations indicate that the main conclusions in this Appendix carry over to the CES case whenever there is not too much substitutability between the two kinds of inputs.

The dynamics of borrowers' wealth can now be simply reexpressed in each of the above two cases (a) and (b). If we assume that all individuals in the economy receive a (small) endowment of tradeable good z at the beginning of each period,[24] then we have:

- in case (a) where $\frac{W_B^t}{o} < ay_N$:

$$W_B^{t+1} = (1 - \theta)[z + \frac{1}{a} \cdot \frac{W_B^t}{o} - r\frac{1-o}{o}W_B^t]: \qquad (I)$$

We implicitly assume that $\frac{1}{a} \cdot \frac{1}{o} - r\frac{1-o}{o} > r$ (or equivalently that $\frac{1}{a} > r$) otherwise investors would always choose not to produce and instead to lend all their inherited wealth at the international interest rate r. The curve $W_B^{t+1}(W_B^t)$ de…ned by (I) is upward-sloping. This is hardly surprising: insofar as there is an excess supply of non-tradeable input the price p^t remains equal to zero which in turn implies that a small increase in investors' wealth W_B^t will have no price e¤ect but only a positive wealth e¤ect on their disposable wealth in the following period W_B^{t+1}.

- in case (b) where $\frac{W_B^t}{o} \geq ay_N$ the wealth e¤ect disappears due to the fact that investment (and therefore output) is now constrained by the …xed supply of non-tradeable input and therefore can no longer increase with investors wealth W_B^t: The dynamics of borrowers' wealth is then determined by the downward-sloping curve:

$$W_B^{t+1} = (1 - \theta)[z + y_N - r\frac{1-o}{o}W_B^t] \qquad (A4)$$

The downward-sloping linear relationship between W_B^t and W_B^{t+1} when $\frac{W_B^t}{o} \geq ay_N$ implies also that for W_B^t su¢ciently large investors will choose not to produce but instead to lend their disposable wealth W_B^t on the international credit market at rate r: This in turn implies that for W_B^t su¢ciently large the dynamics of investors' wealth is simply determined by the upward-sloping relationship:

$$W_B^{t+1} = (1 - \theta)[z + r \cdot W_B^t] \qquad (III)$$

[24] This endowment is introduced for technical reasons so that wealth does not converge to zero if there is not production. This is due to our simplfying assumption that there no other source of income beside capital income. Since we can have z in…nitely small, in the main text we set it to zero.

Let $\underline{W}$, $\hat{W}$ and $\overline{W}$ denote the intersections of the downward-sloping curve (II) respectively with curve (I), the 45° line and curve (III).[25] (See Figure A1 below). A necessary condition for permanent cycles is simply that:

i. $\underline{W} < \hat{W} < \overline{W}$;

ii. $\left.\frac{dW_B^{t+1}}{dW_B^t}\right|_{(II)} = (1-\beta)(\frac{1}{\sigma}-1)r > 1$.

[The reader can indeed graphically verify that whenever (i) or (ii) is violated the economy converges to a steady-state level of investors' wealth W_B^{α} to which corresponds stationary levels of investment and aggregate output].

Condition (ii) is clearly violated when σ is close to 1, in other words when credit markets are too undeveloped: in that case the price effect of an increase in investors' wealth remains too small (due to the tight constraint imposed by the unavailability of credit on the demand for the non-tradeable input) to sustain permanent fluctuations in investors' wealth.

The second part of condition (i) is violated when σ is close to zero, i.e. when capital markets are (almost) perfect. (W ends up being less than $\hat{W}$ when $\sigma \to 0$): This also is not so surprising: when $\sigma \to 0$, the investors' wealth W_B^t must remain sufficiently small for the price of the non-tradeable input not to reach a prohibitive level that would discourage investors from producing. This means that except for small values of W_B^t the dynamics of investors' wealth is described by (III), which in turn rules out permanent fluctuations in W_B and aggregate output in the long run. That the economy should stabilize as $\sigma \to 0$; appears to be robust to the choice of production technology: either the tradeable and non-tradeable inputs are substitutable in the production of tradeable good, in which case we have already argued in Section 2 that the economy is quite unlikely

[25] More precisely, one can compute:

$$\underline{W} = \sigma a y_N; \hat{W} = \frac{(1-\beta)(z+y_N)}{1+(1-\beta)(\frac{1}{\sigma}-1)r}; \text{ and } \overline{W} = \frac{\sigma y_N}{r}.$$

to produce long-run sustained ‡uctuations; or the two kinds of inputs are complementary in which case the limited supply of non-tradeable input limits the fraction of borrowings $\frac{W_B}{o}$ that can be invested in production, which in turn implies that most savings will end up being lent on the international credit market when $º \; ! \; 0$, which also stabilizes the economy.

Appendix B: Why Full Financial Liberalization - unlike Foreign Direct Investment - may Destabilize an Emerging Market Economy

In this Appendix we construct an example of an emerging market economy (i.e. an economy with an intermediate degree of capital market imperfection) which, in the absence of foreign borrowing and lending, would be stable and actually converge to a permanent boom, but which becomes permanently volatile once fully open to foreign borrowing and lending. We then argue that such an economy would have remained stable had it been open to foreign direct investment only.

More formally, consider an economy whose …nancial markets are initially closed to foreign capital in‡ows so that the aggregate supply of funds available to domestic investors, I^t, is now equal to the min of the investment capacity $\frac{W_B^t}{o}$ and of total domestic savings $W_B^t + W_L^t$; where W_L^t denotes the disposable wealth of domestic lenders at the beginning of date t. That is:

$$I^t = \min\{\frac{W_B^t}{o}; W_B^t + W_L^t\}.$$

Following the same steps as before but with $K^t = I^t - p^t y_N$, we again have two cases:

(a) $I^t < a y_N$: then $p^t = 0$ and the dynamics of investors' wealth is given by:

$$W_B^{t+1} = (1 - \delta)[z + \frac{1}{a} I^t - \rho(I^t - W_B^t)]; \qquad (I)$$

where ρ is the domestic interest rate, equal to $\frac{1}{a}$ if $\frac{W_B}{o} > W_B + W_L$ (i.e. if investment capacity is greater than savings) and equal to the opportunity cost of lending (say $\rho = \frac{3}{4}$) if $\frac{W_B}{o} < W_B + W_L$:

(b) $I^t > a y_N$: then $p^t = \frac{I_t - a y_N}{y_N}$ and the dynamics of investors' wealth is expressed by the equation:

$$W_B^{t+1} = (1 - \delta)[z + y_N - \rho(I^t - W_B^t)]. \qquad (II)$$

Since total funds to investors I^t now depend on domestic lenders' wealth W_L^t; we need to specify the dynamic equation for W_L^t: If non-tradeable resources entirely belong to domestic lenders ($\iota = 0$); and taking $z = 0$ for simplicity, we have:

$$W_L^{t+1} = (1 - \theta)[p^t y_N + \varepsilon W_L^t].$$

Now, one can show the existence of parameter values for which this economy with closed financial markets converges to a permanent 'boom'[26] (with $\varepsilon = \frac{1}{a}$ and $p^t = 0$) even though the two necessary conditions (i) and (ii) are satisfied for the economy to experience persistent cycles once financial markets are fully liberalized, i.e. open to foreign borrowing and lending.

More formally, during a 'boom' (i.e. when $\frac{W_B^t}{o} > W_B + W_L$) with $p^t = 0$; the dynamics of domestic investors' and domestic leaders' wealth endowments, respectively W_B^t and W_L^t; is governed by the equations:

$$\begin{aligned} W_B^{t+1} &= (1 - \theta)[\frac{1}{a}(W_B^t + W_L^t) - \frac{1}{a}W_L^t] \\ W_L^{t+1} &= (1 - \theta)\frac{1}{a}W_L^t \end{aligned} \qquad \text{(B1)}$$

Notice that we need $(1 - \theta)\frac{1}{a} \leq 1$ to have a stationary value for W_L. If $q_t = \frac{W_B^t}{W_L^t}$ denotes the ratio between domestic investors' and lenders' wealth endowments at date t, then during 'booms':

$$q^{t+1} = q^t = q^0; \quad \text{where } (\frac{1}{o} - 1)q^0 > 1.[27]$$

During a 'slump' ($\frac{W_B^t}{o} < W_B^t + W_L^t$); the dynamic equations for W_B^t and W_L^t become:

$$W_B^{t+1} = (1 - \theta)[\frac{1}{a^o} - \gamma(\frac{1}{o} - 1)]W_B^t \qquad \text{(B2)}$$

[26] The terms 'boom' and 'slump' are borrowed from Aghion, Banerjee and Picketty (1997) who analyze the closed economy version of the model. It should be noticed, however, that in a closed economy 'boom' growth is usually smaller that in open economy boom.

[27] Indeed, during a boom:

$$\frac{1}{o}W_B^t > W_B^t + W_L^t;$$

which in turn can be reexpressed as:

$$\frac{1}{o}q^t > q^t + 1;$$

or equivalently: $(\frac{1}{o} - 1)q^t = (\frac{1}{o} - 1)q^0 > 1$.

$$W_L^{t+1} = (1 - \beta)\bar{\gamma}W_L^t.$$

Hence during slumps:

$$q^{t+1} = [\frac{1}{a^o\bar{\gamma}} - (\frac{1}{\sigma} - 1)]q^t$$

A sufficient condition for the economy to converge to a permanent boom is $\frac{1}{a\bar{\gamma}} > 1$; and for this permanent 'boom' to be consistent with $p^t \geq 0$ we need that

$$W_B^{t+1} + W_L^{t+1} = I^{t+1} < ay_N \quad \text{for all } t.$$

Consider an example where $1 - \beta = a = ((\frac{1}{\sigma} - 1)r + \varepsilon)^{-1}$; with $\varepsilon > 0$ and small, $\bar{\gamma} = 1$ and $r = \frac{1}{\sigma}$. The reader can check that in this example for z sufficiently small the closed economy converges to a permanent 'boom' with $p^t \geq 0$; whilst the same economy, once fully open to foreign lending and borrowing, satisfies the necessary conditions (i) and (ii) for permanent fluctuations.

Now, we want to show that the closed economy considered above cannot be destabilized by foreign direct investment (FDI) alone. Here, the argument is very simple: with its supply being infinitely elastic at a fixed price q between the world interest rate r and the rate of return on the domestic production technology $\frac{1}{a}$, foreign direct investment will automatically come in when non-tradeable resources are partly idle, i.e. when upon opening the closed economy to FDI, domestic investment $I^t = W_B^t + W_L^t < ay_N$. In other words, FDI will be attracted by the price of the non-tradeable input being low (equal to zero) and it will cease as soon as the non-tradeable resources become fully employed in domestic production activities, i.e. when aggregate production equals the supply of non-tradeable inputs y_N: This implies that, starting from a closed economy (with no FDI) in a permanent boom (i.e $\frac{W_B^t}{\sigma} > W_B^t + W_L^t$) and with $p^t = 0$; foreign direct investment cannot cause permanent fluctuations in aggregate output

This vindicates our claim that whilst an emerging market economy may be destabilized as a result of a full financial liberalization, it should not be destabilized as a result

of being open to FDI alone.

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- investment;
- borrowing and lending
- payment of non-tradeable services

- returns;
- debt-repayment;
- consumption/savings

Figure 1: The Timing

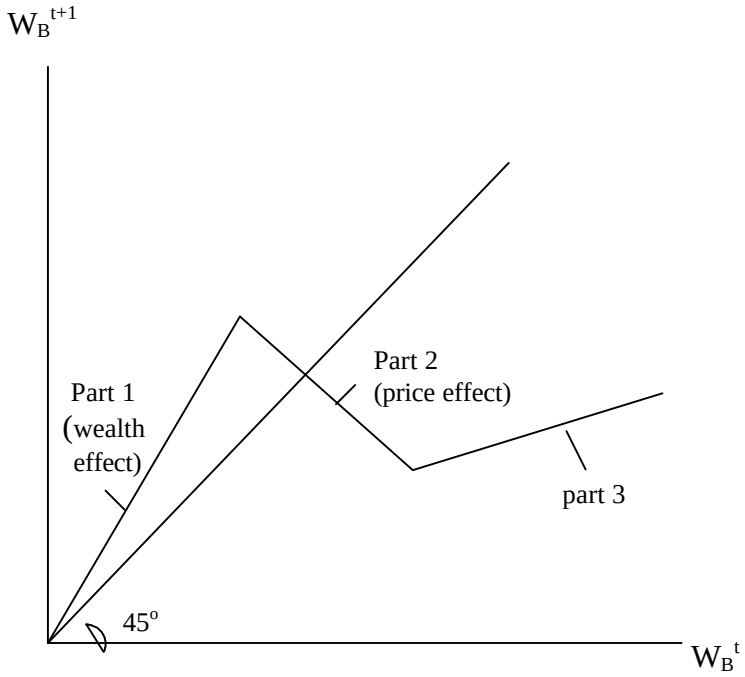

Figure 2: The Wealth and Price Effects

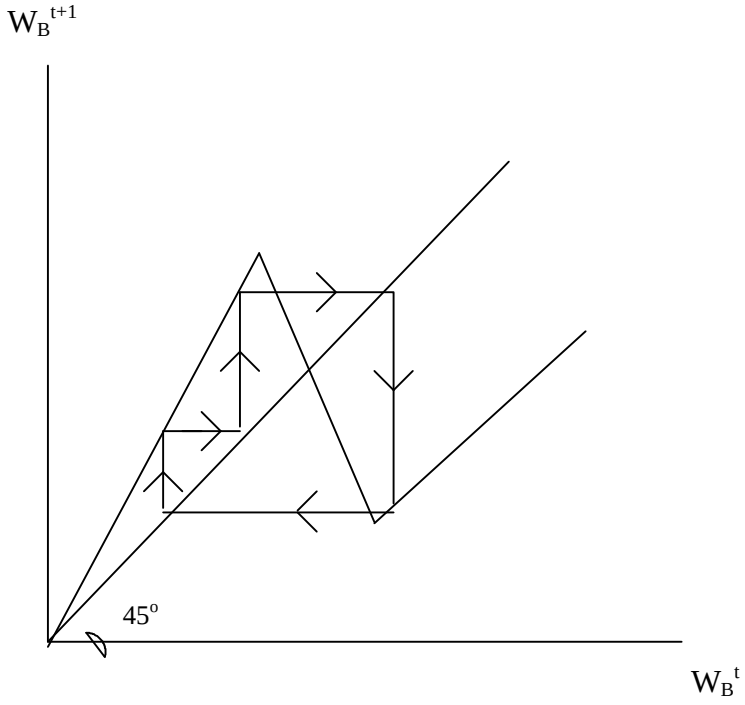

Figure 3: An Endogenous Cycle

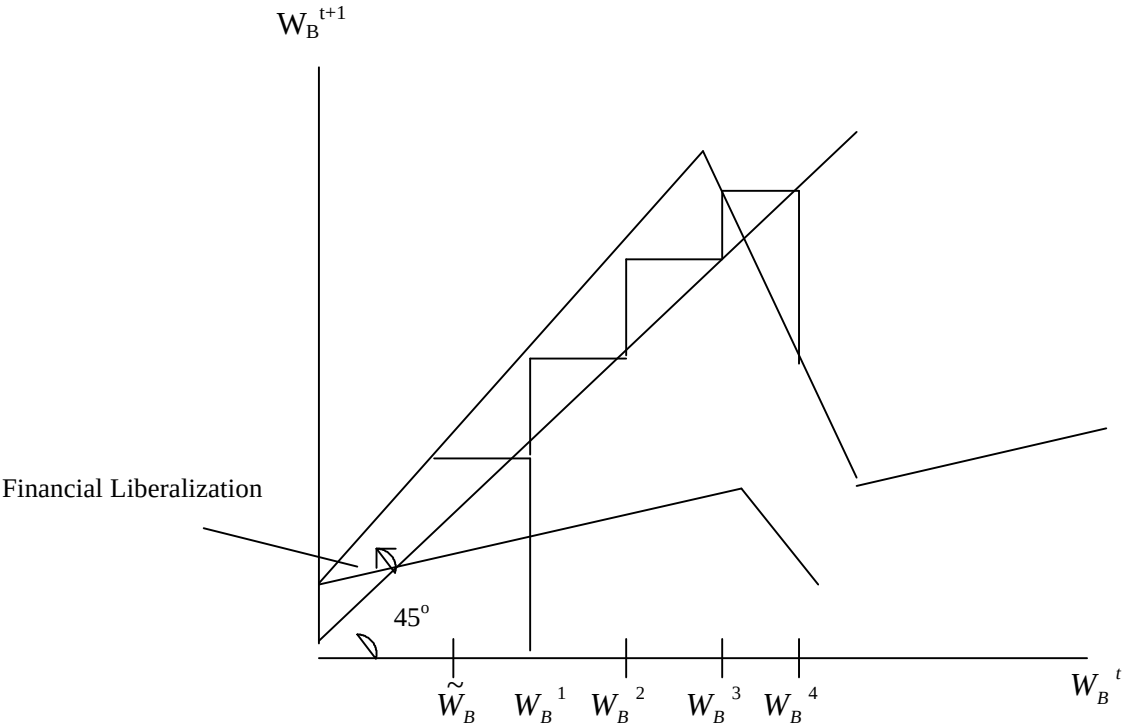

Figure 4

W_B refers to the stable steady-state level of borrowers' wealth *before* the economy opens up to foreign borrowing and lending. This initial value is assumed to be sufficiently small that the non-tradeable input is not fully employed in domestic production in the absence of borrowing and lending, so that *p=0* initially.

After the liberalization borrowers wealth W_B progressively increases as capital inflows allow investors to increase their borrowing, investments and profits. During the first two periods following the liberalization the demand for the non-tradeable input remains sufficiently low that *p=0*. In period 3 (at W^3_B) the non-tradeable input's *p* increases but we still have growth. However, in period 4 (at W^4_B) the *price effect* of the liberalization becomes sufficiently strong as to lead to a recession accompanied by a subsequent drop in the non-tradeable input price *p*. Thereafter, the economy ends up experiencing permanent fluctuations of the kind described in the previous section.

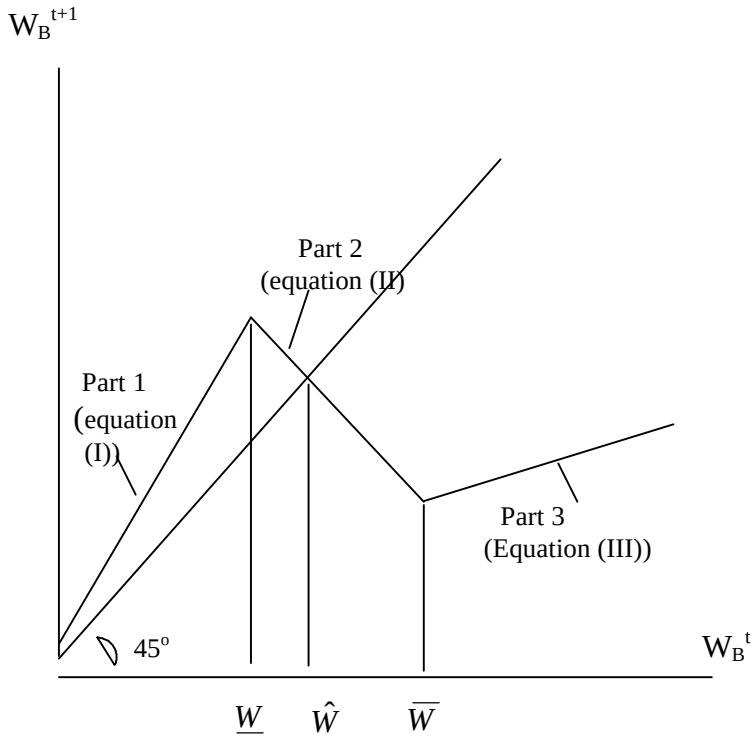
W_B^{t+1}
Part 2
(equation (II)
Part 1
(equation
(I))
Part 3
(Equation (III))
45°
W_B^t
$\underline{W}$
$\hat{W}$
$\overline{W}$

Figure A1