Banking Performance and Speculative Attacks Under Asymmetric Information

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Abstract

The Asian financial crisis of 1997 evolved through many stages. Although there is a consensus among economists on its "ingredients", a disagreement still exists about the exact mechanisms. This paper proposes a model explaining the triggering event of the crisis as represented by the abandon of Thailand and Korea of their fixed exchange rate.

The model suggests that an external negative shock to the price of tradable goods can be the detonator of a currency crisis if some ingredients already exist. In this context, I show that the efficiency of the banking system and the speculators-government interaction play crucial roles. Under certain conditions, an efficient banking system enables the economy to resist to even high magnitudes of the shock, while an inefficient one leads to a currency crisis.

In this model, abandoning the fixed parity implies a cost to the government and characterizes its type. Speculators infer the government's type when deciding to attack the currency. The paper has the following innovation: it shows that a slight variation in speculators' inference precision causes a sudden change in their sentiment, a speculative attack and the abandon of the parity.

Keywords: Banking, speculative attacks, currency crisis, asymmetric information

JEL Classification: F31, F32, F34, G15, G18

1 Introduction

As Paul Krugman said the Asian crises events was not only a shock to the region but a shock for the economics profession. We can identify three schools attempting to explain what happened:

- "Fundamentalists" who emphasized macroeconomic and particularly exchange rate mismanagement,
- "Internationalists" who focused on the inherent volatility of international financial markets, self-fulfilling speculative attacks, and contagion,
- "New fundamentalists" who underlined regulatory and structural problems, particularly in the financial sector.

"Fundamentalists" and "Internationalists" developed papers based, respectively, on two types of monetary crises models:

- "First-generation" models, as those of Krugman (1979) and Flood and Garber (1984), explain monetary crises as the product of budget deficits: the government's need for seignorage to cover its deficits ensures the eventual collapse of a fixed exchange rate. Anticipating this collapse, investors act to avoid suffering from capital losses (or to achieve capital gains). Their action consist in a speculative attack when foreign reserves fall below a critical level.
- "Second-generation" models, exemplified by Obstfeld (1994), instead explain crises as the result of a conflict between a fixed exchange rate and an expansionist monetary policy. Investors' suspect that the government will abandon the parity, will make high pressure on interest rates which can itself validate the investor's suspicion.

Both first- and second-generation models, as Paul Krugman say : "have considerable relevance to particular crises in the 1990s - for example, the Russian crisis of 1998 was evidently driven in the first instance by the perception that the weak government was about to be forced to finance itself via the printing press, while the sterling crisis of 1992 was equally evidently driven by the perception that the UK government would under pressure choose domestic employment over exchange stability"[1] .

For the Asian currency crises of 1997, however, the story was different. In fact, at the beginning of 1997, growth had slowed but there was neither government's deficit nor a clear tradeoff between employment and exchange stability. Moreover, some signs of excess capacity appeared in 1996. Therefore, "New

[1] Krugman, Paul. 1999. Balance Sheets, the Transfer Problem, and Financial Crisis. http://web.mit.edu/krugman/www/Flood.pdf, p. 2

fundamentalists" began to develop "third-generation" crisis models supporting the fact that a different sort of fundamentals instead of macroeconomic policies was responsible for the Asian crises.

For "New fundamentalists" the distortions in the financial structures of the Asian countries is an important cause of the crisis (Krugman (1998); Goldstein, Kaminsky, and Reinhart(2000)). In fact there was a period of bank-financed investment booms with rapid lending growth (despite low and declining returns on capital), high corporate leveraging, excessive risk-taking, and bank balance sheets deterioration. Krugman (1998) and others focused on moral-hazard in the business-government relations. Meanwhile, an alternative line of work (Chang and Velasco (1998)) attempts to explain the currency crises as the result of a bank run, modeled a la Diamond and Dybvig (1983) as a self-fulfilling loss of confidence that forces financial intermediaries to liquidate their investments prematurely. Several economists as Calvo (1998), Goldstein, Kaminsky, and Reinhart (2000) have observed that the crises evolve through complicated interactions between domestic financial sectors, international lenders and national governments.

This paper propose a "third-generation" crisis model attempting to explain what mechanisms led to the abandon of the fixed parity by Thailand and Korea. I think that analyzing this first stage of the Asian financial crises is necessary to understand next stages including its contagion to the other countries of the region.

Between 1990 and 1997, Thailand registered growing current account deficits and large capital inflows. Meanwhile, the exchange rate appreciated significantly in real terms exceeding 25 percent especially when the U.S. dollar began to appreciate against other major world currencies. This provoke exports to fall sharply. Thailand's exports were lower by 2 percent in nominal dollar terms in 1996 than they had been in 1995. "This slowdown was ultimately a critical factor in the reversal of expectations in mid-1997 that launched the crisis". (Radelet Sachs) In the other hand, credit to the private sector expanded rapidly, with much of it financed by offshore borrowing by the banking sector. Much of this credit was used to speculative investments in real estate markets rather than into increasing productive capacity for manufactured exports.

The model underlies some mechanisms that can be at the origin of the abandon of the fixed parity by the Thai government. The economy is characterized by a tradable sector constituted by a continuum of firms with different productivity levels. The firms' productivity is a private information. The second source of asymmetric information is the cost of abandoning the parity which characterize the government type.

The problem began when the competitiveness of domestic tradable goods fall sharply. Depending on the efficiency of domestic banking system this shock can be absorbed by the economy or degenerate to a currency crisis where the speculators-government interaction plays a crucial role. Following Drazen [5], the economy's fundamentals send a signal to speculators who update their rational expectations, about the probability of an abandon of the parity, by Bayesian updating. To do so they have to infer the government type. In case

of speculative pressure, the government faces a trade-off between the cost of abandoning the parity and the negative impact of defending the parity by rising the interest rate.

I show that, under certain conditions, a slight variation of speculators' inference may trigger the exchange rate from its fixed parity to a high devaluated rate. This happens because the speculators' expectations changes suddenly. This is an innovation of the model that provides an explanation for the traditional sudden change of investors' expectations in self-fulfilling crises models.

The remainder of this paper is organized as follows. Section 2 presents a general equilibrium model of a small open economy which is populated by households, firms, banks and the government. Speculators and international bankers are the two other actors. Section 3 presents the main results of numeric simulations and summarize the important features of the model.

2 The Model

2.1 General Framework

I consider a small open economy framework with price rigidities. Within the model there exist both households and firms. Firms produce a tradable good. Households work, consume the tradable goods (T) and need the service of a real estate good which is initially owned by households and can be purchased by firms at any date. Tradable goods are produced both at home (H) and abroad (F). Domestically produced and foreign produced tradables are imperfect substitutes.

Firms are uniformly located along a continum $[0, 1]$. They have the same production technolgy but different productivity levels.

Firms borrow from domestic banks to pay its workers' wages. Domestic banks borrow in foreign currency from international banks.

The government is committed to maintain the domestic currency's exchange rate ε at a fixed level ε^*. However, speculators may attack the domestic currency and cause the abandonment of the peg.

Initially, exports of tradable have good competitivness relative to the foreign tradable exports, so that

$$\frac{\varepsilon^* \overset{*}{p}{}_0^F}{p_0^H} > 1$$

where p_0^H is the price of the domestic tradable good in domestic currency and $\overset{*}{p}{}_0^F$ is the price of the foreign tradable good in foreign currency at the beginning of the first period ($t = 0$). ε is the price in domestic currency of one unit of the foreign currency.

The good (H) price is determined at the beginning of each period and remained fixed for the entire period.

2.2 The Timing of Events

At the date t which corresponds to the end of a period t and the beginnng of period $t+1$ the timing of actions is the following

1. Domestic banks repay its foreign loans if it realised a positive profit.
2. If they are paid their loans, international banks decide the maximum amount of loans, on the base of the period t economic performance.
3. The good (H) price is fixed.
4. Wages are determined through a competitive labor market.
5. Firms ask for loans from domestic banks to finance its salarial mass.
6. Domestic banks ask for loans from international banks.
7. Firms begin producing.
8. Conditional to the country economic performance and to their beleifs about the government type, speculators may attack the currency.
9. If any speculative pressure, the government reacts and chooses to maintain or to abandon the peg.

2.3 The Household

2.3.1 Consumption

Let C_t be a composite of the household consumption goods. Then the following CES index defines the households preferences over tradables produced at home, C_t^H, and tradables made by foreigners, C_t^F :

$$C_t = \left[(\gamma)^{\frac{1}{\rho}} \left(C_t^H\right)^{\frac{\rho-1}{\rho}} + (1-\gamma)^{\frac{1}{\rho}} \left(C_t^F\right)^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}}$$

The corresponding consumer price index, P_t is given by

$$P_t = \left[(\gamma) \left(P_t^H\right)^{1-\rho} + (1-\gamma) \left(P_t^F\right)^{1-\rho} \right]^{\frac{1}{1-\rho}}$$

2.3.2 The Household's Decision Problem

The household preferences are given by

$$U = E_0 \sum_{t=0}^{\infty} \beta^t \left[\ln C_{t+1} + \chi \ln \left(\frac{M_{t+1}}{P_{t+1}} \right) - \frac{k}{\eta} \left(L_{t+1}^s \right)^{\eta} \right]$$

Where L_t^s is the labor supply, M_t the nominal money balances , β the time preference factor and the final term, $-\frac{k}{\eta} \left(L_{t+1}^s \right)^{\eta}$, captures the disutility of working .

Initially the real estate good is owned by the household. The latter can sell it at any date s at q_s and save this amount to pay a rent $(CF_t)_{t>s}$. The fundamental price q_s of the real estate is the present value of future cash-flows evaluated at the gross interest rate $1 + i$, where i is the home deposit return rate

$$q_s = \sum_{t=s+1}^{\infty} \frac{CF_t}{(1+i)^{t-s}} \tag{1}$$

Let $t < s$ and A_t denotes the deposit at the domestic bank (net of the occasional deposit of q_t) , Π_t the total profit of firms and domestic banks at the beginning of period $t+1$ (i.e. at date t). The Household's budget constraint is given by

$$C_{t+1} + \frac{A_{t+1} - (1+i)A_t}{P_t} = \frac{W_{t+1}}{P_t} L_{t+1} + \frac{\Pi_{t+1}}{P_t} + T_{t+1} - \frac{M_{t+1} - M_t}{P_t}$$

$P_t\, T_t$ denotes nominal transfers from the government which is assumed to rebate all lump-sum transfers in the form of money:

$$P_t\, T_{t+1} = M_{t+1} - M_t$$

For dates $t > s$, we can specify budgent constraints that include the amount q_s^F and the periodic rent of CF_t, but since this terms will disappear in the intertemporel budget constraint , there is no need to do so.

2.3.3 Consumption Allocation, Labor Supply and Saving

At the beginning of period $t + 1$, which correspond to date t, we have the following optimality conditions:

for consumption

$$\frac{C_{t+1}^H}{C_{t+1}^F} = \frac{\gamma}{1-\gamma}\left(\frac{P_t^H}{P_t^F}\right)^{-\rho} \tag{2}$$

for labor allocation

$$\frac{W_{t+1}}{P_t C_{t+1}} = k(L_{t+1})^{\eta-1} \tag{3}$$

for consumption/ saving

$$\frac{1}{P_t C_{t+1}} = \frac{\beta(1+i)}{P_{t+1}C_{t+2}} \tag{4}$$

for holding money

$$M_{t+1} = \frac{\chi(1+i)}{2+i} P_t C_{t+1}$$

2.4 Firms

Firms are uniformly distributed along $[0,1]$. Because of the productivity heterogeneity and the existence of a fixed cost, producing the good (H) may be no more profitable for some firms when prices decrease and the interest rate raise.

At the beginning of period $t+1$,a fraction n_t of firms continue producing . Firms that produce in period t and for which it is no more profitable to produce, will try to survive by purchasing the real estate good at date t and selling it at date $t+1$.

For a firm $n \in [0, n_t]$ the production function is given by

$$Y_{t+1,n} = A_n \left(L_{t+1,n}\right)^{\varkappa} \qquad \varkappa < 1$$

and

$$A_n = A \exp[2\left(1-n\right)^2] \text{ for } n \in [0,1]$$

Firms finance wages by borrowing from banks. Whenever positive, profits are distributed to the household. A firm ($n \in [0,1]$) submit a demand for labor ($L_{t+1,n}^d$) in order to maximize their expected profit

$$\Pi_{t+1,n} = p_t^H Y_{t+1,n} - R^a(i_{t-1}) W_{t+1} L_{t+1,n} - c$$

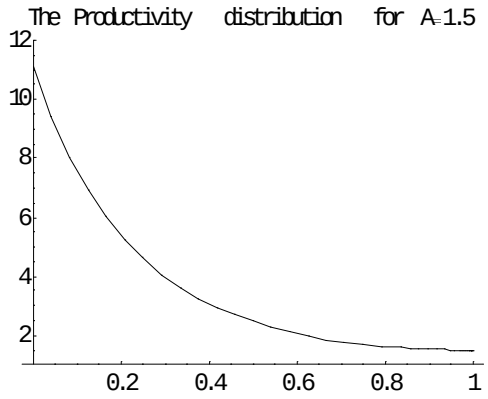


Figure 1:

where c is a fixed production cost and $R^a(i_t)$ is the gross interest rate for borrowing from domestic banks. It is a function of the nominal interest rate i_t

$$R^a(i_t) = 1 + ai_t \quad \text{with} \quad a > 1$$

The nominal interest rate, i_t , is decided by the government and satisfy

$$\begin{aligned} i_t &\geq i_0 \qquad t \geq 0 \\ i_{-1} &= i_0 = i \end{aligned}$$

The demand for labor is given by the first order condition and we obtain:

$$L^d_{t+1,n} = \left(\frac{\varkappa p^H_t A}{R^a(i_{t-1}) W_{t+1}} e^{2(1-n)^2} \right)^{\frac{1}{1-\varkappa}} \quad \text{for } n \in [0, n_t]$$

The total demand for labor is

$$\begin{aligned} L^d_{t+1} &= \tfrac{1}{n_t} \int_0^{n_t} (L^d_{t,n}) dn \qquad (5) \\ &= \left(\frac{\varkappa p^H_t A}{R^a(i_{t-1}) W_{t+1}} \right)^{\frac{1}{1-\varkappa}} \tfrac{1}{n_t} \int_0^{n_t} e^{\frac{2(1-n)^2}{1-\varkappa}} dn \\ &= \left(\frac{\varkappa p^H_t A}{R^a(i_{t-1}) W_{t+1}} \right)^{\frac{1}{1-\varkappa}} \tfrac{1}{n_t} I(\varkappa, n_t) \end{aligned}$$

Where $I(x,y)$ is defined by

$$I(x,y) = \sqrt{\frac{1-x}{2}} \int_{(1-y)\sqrt{\frac{2}{1-x}}}^{\sqrt{\frac{2}{1-x}}} e^{u^2} du$$

2.4.1 The firms' production from the Government Perspective

The total output produced at period $t+1$ is given by

$$\begin{aligned} Y_{t+1} &= \frac{1}{n_t} \int_0^{n_t} (Y_{t+1,n}) dn \\ &= \frac{1}{n_t} \int_0^{n_t} A_n \left(L_{t+1,n}\right)^{\varkappa} dn \\ &= \left(\frac{\varkappa p_t^H}{R^a(i_{t-1}) W_{t+1}}\right)^{\frac{\varkappa}{1-\varkappa}} \frac{1}{n_t} \int_0^{n_t} A_n (A_n)^{\frac{\varkappa}{1-\varkappa}} dn \end{aligned}$$

Replacing A_n by its expression we obtain

$$Y_{t+1} = A \left(\frac{A\varkappa p_t^H}{R^a(i_{t-1}) W_{t+1}}\right)^{\frac{\varkappa}{1-\varkappa}} \frac{1}{n_t} I(\varkappa, n_t)$$

The productivity A_n is the firm n private information, and the government associates a gross productivity $\bar{A}$ to the production technology. The government ignore the possibility of a declining fraction n_t and chooses its monetary policy (here represented by the choice of the interest rate i_t) on the basis of the following production function, as if the output level reacts without any delay to the interest rate variations :

$$Y_{t+1}^G(i_t) = \bar{A} \left(\frac{\bar{A}\varkappa p_t^H}{R^a(i_t) W_{t+1}}\right)^{\frac{\varkappa}{1-\varkappa}} \tag{6}$$

Initially $n_0 = 1$, and the output level realised at the first period is assumed to coincide with the government prevision

$$Y_1 = Y_1^G(i_0)$$

This impose the following condition on the gross productivity

$$\bar{A} = A \left(I(\varkappa, 1)\right)^{1-\varkappa}$$

2.4.2 The operating firms

In this section I derive the fraction n_t of firms operating in the traded sector. A firm (n) that produced the good (H) until the end of period t (i.e. $n \in [0, n_{t-1}]$), stops producing during period $t+1$ if the expected profits are negative. In this case, the firm will try to survive for another period by purchasing the real estate and selling it at date $t+1$. I assume that the trade of the real estate good allow just to realize a zero profit, otherwise there is an incentive to stop producing even if expected profits from production are positive.

Since the decision to continue producing or not takes place at the beginning of period $t+1$ (i.e. at date t), the firm, (n), doesn't wait for the setting of the new wage level, it observes the new price of good (H) and stops producing if the following condition is satisfied

$$p_t^H A e^{2(1-n)^2} \left(L_{t+1,n}^d\right)^{\varkappa} - R^a(i_{t-1}) W_t L_{t+1,n}^d - c < 0 \qquad \forall \quad L_{t+1,n}^d > 0$$

which means a loss for any labor demand level.

Hence, we can derive the fraction, n_t, of firms that will continue producing during the period $t+1$. Note that, n_t, is also the position on $[0,1]$ of the indifferent firm.

$$n_t = \begin{cases} 1 - \sqrt{\frac{1}{2} \ln [Z_t]} & \text{if} \quad Z_t > 1 \\ n_{t-1} & \text{else} \end{cases}$$

Where $Z_t$has the following expression

$$Z_t = \frac{\left(W_t R^a(i_{t-1})\right)^{\varkappa}}{p_t^H A} \left(\frac{c}{1-\varkappa}\right)^{1-\varkappa} \varkappa^{-\varkappa}$$

The condition $(Z_t > 1)$ will be realized if the price of the domestically produced traded good will satisfy the following inequality

$$p_t^H < p_{t\,\min}^H = \frac{1}{A} \left(\frac{c}{1-\varkappa}\right)^{1-\varkappa} \left(\frac{W_t R^a(i_{t-1})}{\varkappa}\right)^{\varkappa}$$

meaning that for a new price level below a bound, $p_{t\,\min}^H$, there will be firms that stop producing the good (H).

In case of $(Z_t \leq 1)$, all firms that produced in period t will continue producing in period $t+1$. Note that $p_{t\,\min}^H$ is an increasing function of the production costs : the fixed cost (c), wages (W_t) and the gross interset rate $R^a(i_{t-1})$.

2.4.3 The trade of the Real Estate Good

Firms that decide to stop producing the good (H) will use the real esate good to survive for a new period[2].

Initially, the real estate good is owned by the household. Let t be the first date such that $n_t < 1$, which means that the fraction $1 - n_t$ of firms will try to purchase the real estate good from the household. Because the latter will not be the owner of the real estate, he will have to pay $(CF_{t+1}, CF_{t+2}, ...)$ at dates $(t+1, t+2, ...)$.

Assume that the fraction, $1 - n_t$, of firms can borrow to buy the real estate good at a rate $R^a(i_{t-1})$. This same fraction of firms will sell the asset at date $t+1$ at a price q'_{t+1} that permits a non negative gain

$$q'_{t+1} + CF_{t+1} - R^a(i_{t-1})q_t \geq 0 \tag{7}$$

but we have from eq (1)

$$CF_{t+1} = (1+i)q_t - q_{t+1}$$

so that

$$q'_{t+1} \geq q_{t+1} + (a * i_{t-1} - i)q_t \tag{8}$$

Since $(a > 1)$ and $(i_{t-1} \geq i_0 = i)$, we note that even if we assume a zero profit from the real estate good trade, its price, q'_{t+1}, is superior to its fundamental price, q_{t+1}.

So much there are firms that purchase the real estate good ($n_{s+1} < n_s$ $s \geq t$) the bubble will inflate until a date T when there are no firms to purchase the good. In that case the owner firms cannot repay its loan and the bank will take the good realizing a loss of

$$\Gamma = R^a(i_{T-1})q'_{T-1} - q_T - CF_T$$

When deriving the fraction, n_t we assumed that the gain from trading in the real estate good is zero which means that we have an equality in (8).

We assume, further, that the cash-flows are constant

$$CF_t = CF$$

[2] Here the trade of the real estate good permits to nonproductive firms to survive for only one period. A generalisation would be to include the possibility of real estate good production.

Which means that

$$q_s = \frac{CF}{i} \qquad s \geq t$$

and

$$q'_{t+1} = (1 + a * i_{t-1} - i)\frac{CF}{i}$$

.

2.5 The Traded Good Price and Wages

2.5.1 The Traded Good Price

Prices of the traded good (H) are determined at the beginning of each period. It can not respond instantly to a demand shock. It does adjust at the end of the period in response to the demand variations. Hence, if

$$Y_t(p^H_{t-1}) < C^H_t(p^H_{t-1}) + \overset{*}{C}{}^H_t(p^H_{t-1})$$

then p^H_t will be fixed such that the market clear

$$Y_t(p^H_{t-1}) = C^H_t(p^H_t) + \overset{*}{C}{}^H_t(p^H_t)$$

Where the foreign home consumption of the good (H), $\overset{*}{C}{}^H_t$, is given by

$$\overset{*}{C}{}^H_t(.) = \left(\frac{.}{p^F_{t-1}}\right)^{-\xi} \overset{*}{Y}_t$$

With the assumption of frictionless trade in goods, implying that the law of one price must hold both for domestic and foreign produced tradables,

$$\begin{aligned} p^H_t &= \varepsilon_t \overset{*}{p}{}^H_t \\ p^F_t &= \varepsilon_t \overset{*}{p}{}^F_t \end{aligned}$$

Note that an unexpected fall of the good (F) price will cause a decrease in home exports to the foreign countries. This in turn, will lead to a home deflation, since the domestic price of good (H) will adjust at the end of the period. We will turn back to this point later.

2.5.2 The Wages setting

Wages are determined through a competitive labor market. The total firm demand of labor is given by equation (5). Whereas, the household supply of labor is given by

$$L^s_{t+1} = \left(\frac{1}{\beta(1+i)}\frac{W_{t+1}}{W_t}\right)^{\frac{1}{\eta-1}} L^s_t \tag{9}$$

derived from equations (3) and (4).

Equations (5) and (9) gives us the equilibrium $\left(\overset{*}{L}_{t+1}, \overset{*}{W}_{t+1}\right)$. The total amount of loans requested by firms, L^r_{t+1}, will be

$$\mathrm{L}^r_{t+1} = \overset{*}{W}_{t+1}\overset{*}{L}_{t+1} + c$$

If firms can not borrow all the amount it requested, a new equilibrium $\left(\overset{*\prime}{L}_{t+1}, \overset{*\prime}{W}_{t+1}\right)$ takes place as shown in figure (2). It is derived with the following demand function for labor

$$L^{\prime d}_{t+1} = \frac{\bar{\mathrm{L}}_{t+1} - c}{\overset{*}{W}_{t+1}}$$

where $\bar{\mathrm{L}}_{t+1}$ is the maximum loanable amount.

2.6 The Banking Sector

Domestic banks are perfectly competitive and their actions are publicly obsevable. They borrow funds from domestic residents at a gross deposit rate of $(1+i)$, borrow foreign currency at a gross interest rate R^b, and issue loans to domestic firms. These loans to firms are to be repaid in local currency units at a gross interest rate $R^a(i_t) = 1 + ai_t$. All loans are of short-term (one period).

We assume that there is government guarantees to foreign creditors so that it is not optimal for domestic banks to hedge the exchange rate risk (This is prooved in Burnside, Eichenbaum, Rebelo [2]). Banks default on their loans when their profits are negative.

International banks decide at each period the maximum amount of loans . They consider the output level as a good indicator of the economy's wealth. Thus, domestic banks can borrw at most λ times the value of the output (the output level multiplied by the international price of the tradable good) realized at the last period.

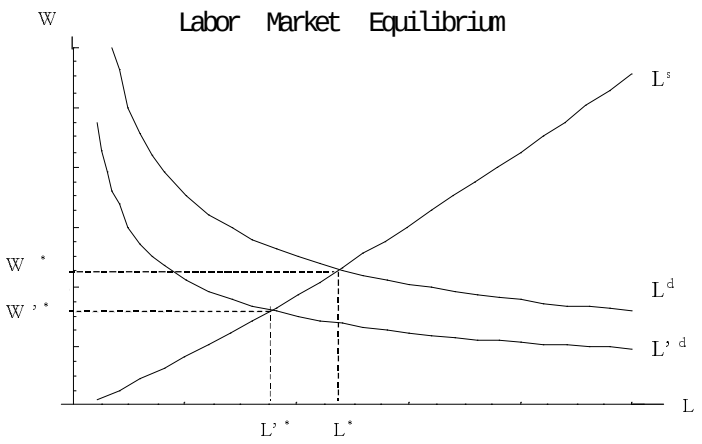


Figure 2:

There is two types of domestic banks: non performant ($j = 0$) and performant ($j = 1$).

At the beginning of period $t+1$ (at date t), all firms of $[n_{t-1}, 1]$ will disappear after a one extra-surviving period . However, productive as well as non productive firms of $[0, n_{t-1}]$ request a loan. Let $\mathrm{L}_{t+1}^{r,n}$ denote the loan requested by a firm $n \in [0, n_{t-1}]$, the loan it effectively got depend on the type of domestic banks and is given by

$$\mathrm{L}_{t+1}^{l,n} = f_j\left(\mathrm{L}_{t+1}^{r,n}\right)$$

Domestic banks decide the level of foreign loans to borrow (L_{t+1}^{f}) on the base of the following problem

$$\begin{cases} \max\limits_{\mathrm{L}_{t+1}^{f}} E\Pi_{t+1}^{B} = R^{a}(i_{t-1}) \int_{0}^{n_{t-1}} \mathrm{L}_{t+1}^{l,n} \frac{dn}{n_{t-1}} - R^{b} \varepsilon_{t} \mathrm{L}_{t+1}^{f} - RA_{t+1} \\ \mathrm{L}_{t+1}^{f} \leq \bar{\mathrm{L}}_{t}^{f} = \lambda \overset{*}{p}_{t}^{F} Y_{t}^{H} \end{cases}$$

Let denote L_{t+1}^{r} the total amount of loans requested by firms at period $t+1$:

$$\begin{aligned} \mathrm{L}_{t+1}^{r} &= \int_{0}^{n_{t-1}} \mathrm{L}_{t+1}^{r,n} \frac{dn}{n_{t-1}} \\ &= \int_{0}^{n_{t}} \mathrm{L}_{t+1}^{r,n} \frac{dn}{n_{t-1}} + \int_{n_{t}}^{n_{t-1}} \mathrm{L}_{t+1}^{r,n} \frac{dn}{n_{t-1}} \\ &= \mathrm{L}_{t+1}^{r,P} + \mathrm{L}_{t+1}^{r,S} \end{aligned}$$

Where $\mathrm{L}_{t+1}^{r,P}$ is the total amount of loans requested for production and $\mathrm{L}_{t+1}^{r,S}$ is that requested for the purchase of the real estate good. We have also

$$\begin{aligned} \mathrm{L}_{t+1}^{r,n} &= W_{t+1}L_{t+1}^{n} + c \qquad \text{for } n \in [0, n_t] \\ \mathrm{L}_{t+1}^{r,S} &= q_t^{'} \end{aligned}$$

2.6.1 Inefficient Domestic Banks

Domestic banks are said to be inefficient ($j = 0$) when they are anaware of the shift of some firms from production to the trade of the real estate good. At the beginning of period $t+1$, they beleive that a fraction $\hat{n}_t = n_{t-1}$ are productive and thus, lend to the productive as well as the nonproductive firms.

The loans $\mathrm{L}_{t+1}^{l,n}$ for a firm (n) is a proportional share of the total loans

$$\mathrm{L}_{t+1}^{l,n} = f_0(\mathrm{L}_{t+1}^{r,n}) = \frac{\mathrm{L}_{t+1}^{r,n}}{\mathrm{L}_{t+1}^{r}} \min(\mathrm{L}_{t+1}^{r}, \mathrm{L}_{t+1}^{f} + A_t) \qquad \text{for } \; n \in [0, n_{t-1}]$$

In this case, the optimal demand for foreign loans is given by

$$\mathrm{L}_{t+1}^{f} = \begin{cases} \min(\mathrm{L}_{t+1}^{r} - A_t, \bar{\mathrm{L}}_{t+1}^{f}) & \text{if } R^a(i_{t-1}) \geq R^b \\ 0 & \text{else} \end{cases}$$

We assume that $R^a(i_0) > R^b$ which assure that $R^a(i_{t-1}) \geq R^b$.

2.6.2 Efficient Domestic Banks

Domestic banks are said to be efficient ($j = 1$) when they are able to know nonproductive firms at the beginning of each period. The loans $\mathrm{L}_{t+1}^{l,n}$ for a firm (n) satisfy:

$$\mathrm{L}_{t+1}^{l,n} = f_1(\mathrm{L}_{t+1}^{r,n}) = \frac{\mathrm{L}_{t+1}^{n}}{\mathrm{L}_{t+1}^{r,P}} \min\left(\mathrm{L}_{t+1}^{r,P}, \mathrm{L}_{t+1}^{f} + A_t\right) \qquad \text{if } n \in [0, n_t]$$

In this case, the optimal demand for foreign loans is given by

$$\mathrm{L}_{t+1}^{f} = \min(\mathrm{L}_{t+1}^{r,P} - A_t, \bar{\mathrm{L}}_{t+1}^{f})$$

2.7 The Speculators-Government's Interaction

In this section I follow the model of Drazen [5] where a speculators-government's interaction is developed without a link to a general equilibrium model . Here, all aspects of this interaction are endogenized.

I suppose that speculators borrow domestic currency short-term and use the borrowed funds to buy foreign exchange reserves from the central bank. The government raises interest rates to dampen speculation and stem reserve outflows.

But high interest rates has negative impact on the domestic economy through raising the cost of borrowing (we assume that the lending interest rates adjusts with one period delay to the interest rate fixed by the government). Moreover, speculators realize that these costs may make a government unwilling to raise interest rates high enough to defend the currency.

Hence, when the currency is attacked the government faces a tradeoff and has to weigh the relative benefits of maintaining the fixed exchange rate against the benefits of maintaining low interest rates. In our model, in the case of nonperformant banking system, what plays a key role, is that the government is unaware of inefficient firms' trade of the real estate good.

2.7.1 The Speculators' Behavior

Speculators use a range of information in deciding whether to attack a currency. First, they observe the current acount deficit and the level of foreign loans to the economy. Second, they use their beleifs about the unobservable government type modeled by (x).

I assume that speculators are atomistic and the representative speculator can fully adjust his position at the beginning of a period. Hence, to derive their optimal positions, risk-neutral speculators need consider only the probability of devaluation in the current period.

The cost of borrowing is an increasing, convex function $C(.)$ of the quantity, $i_t S_t$, where S_t is the demand to borrow domestic currency in order to buy foreign exchange reserves. The representative speculator's problem is

$$\max_{S_t} \Pi_t^S = p_t \delta_t S_t - C(i_t S_t)$$

The expected profit depends on the interest rate i_t , speculators' beliefs p_t about abandoning the fixed parity and the rate δ_t of depreciation. The first-order condition implies

$$p_t \delta_t = i_t C'(i_t S_t)$$

For $C(x) = \frac{1}{2}x^2$, the speculators' demand for foreign reserves is given by

$$S_t(i_t, p_t, \delta_t) = \frac{p_t \delta_t}{(i_t)^2}$$

Speculators submit a schedule of demand $S_t(i_t, p_t, \delta_t)$. The government then decides on its policy and on the interest rate i_t^S it will charge if it decides to defend the peg. The minimum level of interest rate i_t^S which limits speculation at a maximum level of $\frac{\bar{S}_t}{\varepsilon^*}$is

$$i_t^S = \sqrt{\frac{p_t \delta_t}{\bar{S}_t}} \tag{10}$$

Note that i_t^S is increasing with p_t and δ_t and decreasing with $\bar{S}_t$. We will determine $\bar{S}_t$ in section 2.8.

2.7.2 The Governement's Behavior

At the beginning of the first period $(t = 0)$, the government announces a commitment to a fixed exchange rate. At the end of each period, the government chooses either to maintain the fixed parity (denoted as the policy $P = M$) or to abandon it (denoted as the policy $P = A$).

If there is a speculative pressure, the government have to raise the interest rate to maintain the fixed parity,which cause a future decline of the output level. If the government chooses to abandon the fixed parity, it needs not raise interest rates. However, abandoning the fixed parity has costs :

- an increase of the home foreign debts valued in domestic currency,
- a fixed cost x.

The fixed cost can be related to the future effect on the economy of a decline in capital flows. For a country in competitivness with countries having a fixed exchange rate, this cost can be important. If the government abandon the fixed exchange rate, there will be a flexible regime where the new level of the exchange rate $\tilde{\varepsilon}_t$ is determined by the equilibrium of the balance of paiement

$$\frac{CA_t}{\tilde{\varepsilon}_t} + \mathrm{L}_t^f = 0$$

The government weigh the net cost of abandoning the fixed parity against that of maintaining it. I represent this tradeoff by a single-period loss function of the form:

$$\Omega(P, i_t) = \Psi(i_t) + 1_{\{P=A\}} \left((\tilde{\varepsilon}_t - \varepsilon^*) \mathrm{L}^f_{t+1} + x \right)$$

$$\Psi(i_t) = 1_{\left\{ Y^G_{t+1}(i_t) < Y_{\min} \right\}} \left(Y^G_{t+1}(i_t) - Y_{\min} \right)$$

Where $Y_{\min} = Y^G_1(i_0) = Y_0$ is the lower admissible output level in case of no speculative pressure.

The loss function Ψ represents the cost of raising the interest rate as evaluated by the government. Whereas, the term $1_{\{P=A\}} \left((\tilde{\varepsilon}_t - \varepsilon^*) \mathrm{L}^f_{t+1} + x \right)$ represents the cost of abandoning the fixed parity. Hence, the government problem is the following[3]

$$\begin{cases} \min \quad \Omega(P, i_t) \\ P \in \{M, A\} \\ i_t \in \left\{ i_0, i^S_t \right\} \\ F_t \geq F_m \end{cases}$$

Where F_t represents the country foreign assets at date t, F_m their minimum admissible level and i^S_t is given by equation (10)

The government will choose to abandon $(P = A)$ if the cost of defending the parity $\Psi(i^S_t)$ is higher than that of floating the exchange rate $\left\{ (\tilde{\varepsilon}_t - \varepsilon^*) \, \mathrm{L}^f_{t+1} + x \right\}$.

Given speculative pressures and and the situation of foreign reserves the government's optimal policy is summarized by a cut-off type $\hat{x}_t$ who is just indifferent between abandoning and maintaining the parity . If the type x is less than $\hat{x}_t$ than the government will certainly abandon the fixed exchange rate. Whereas, if the type x is equal to or greater than $\hat{x}_t$ than the government will maintain the fixed parity. Hence, allowing the interest rate to rise to i^S_t signals that the government type is above $\hat{x}_t$, which may discourage future speculation.

The cut-off type $\hat{x}_t$ is given by the following equation

$$\Psi(i^S_t) = (\tilde{\varepsilon}_t - \varepsilon^*) \, \mathrm{L}^f_{t+1} + \hat{x}_t$$

[3] In Drazen[5] the government's behavior is modeled by a dynamic minimisation of a loss function. However, I assume that the government consider only the immediate effect represented by its loss function at the date *t*, when deciding to defend or to abandon the peg. This simplification enables us to modelize the under optimal reaction of the Thai government for example.

2.7.3 The speculators' inference and the rational abandonment beliefs

The optimal behavior of speculators was derived on the basis of their beliefs about the probability of an abandon of the peg. On the basis of speculators behavior, the government decide whether or not to defend the fixed exchange rate.

To close the model, we have to calculate the true probability of devaluation, π_t, based on the beliefs p_t and equate them. Hence, we ensure that the beliefs of speculators are rational and consistent with government optimal behavior.

Speculators' beleif about the government type are represented by the distribution of possible types x, as summarized by an initial distribution $G(x)$, initially defined over $[\ \underline{\mathrm{x}}_0\ ,\ \bar{\mathrm{x}}\ ]$, where $\underline{\mathrm{x}}_0 > 0$ is the lowest possible type $\mathrm{x} > 0$ at the beginning of the first period. At the beginning of period $t+1$ (at date t), beleifs are represented by the set of possible types $[\underline{\mathrm{x}}_t, \bar{\mathrm{x}}]$, and the conditional cumulative distribution associated with this set, denoted $G(x \mid \underline{\mathrm{x}}_t)$. Beleifs are updated as follow

$$\underline{\mathrm{x}}_t = \begin{cases} \hat{x}_t & \text{if} \quad P_t = M \\ \underline{\mathrm{x}}_{t-1} & \text{if} \quad P_t = A \end{cases}$$

The true probability of devaluation, at date $t+1$, can then be calculated using the relevant distribution based on information up to period $t+1$, $G(x \mid \underline{\mathrm{x}}_t)$ and the cut-off type $\hat{x}_{t+1}$:

$$G(\hat{x}_{t+1} \mid \underline{\mathrm{x}}_t) = \begin{cases} 1 & \text{for states where } \hat{x}_{t+1} > \bar{\mathrm{x}} \\ \frac{G(\hat{x}_{t+1}) - G(\underline{\mathrm{x}}_t)}{1 - G(\underline{\mathrm{x}}_t)} & \text{for states where } \underline{\mathrm{x}}_t < \hat{x}_{t+1} < \bar{\mathrm{x}} \\ 0 & \text{for states where } \hat{x}_{t+1} \leq \underline{\mathrm{x}}_t \end{cases}$$

Taking the distribution $G(x)$ be uniform over $[\underline{\mathrm{x}}_0, \bar{x}]$, the rational probability π_{t+1} of an abandonment of the peg is

$$\pi_{t+1} = \begin{cases} 1 & \text{for states where } \hat{x}_{t+1} > \bar{\mathrm{x}} \\ \frac{\hat{x}_{t+1} - \underline{\mathrm{x}}_t}{\bar{\mathrm{x}} - \underline{\mathrm{x}}_t} & \text{for states where } \underline{\mathrm{x}}_t < \hat{x}_{t+1} < \bar{\mathrm{x}} \\ 0 & \text{for states where } \hat{x}_{t+1} \leq \underline{\mathrm{x}}_t \end{cases}$$

In that case $\hat{x}_{t+1}$ is obtained by solving the following equation

$$\hat{x}_{t+1} = \Psi\left(\sqrt{\frac{(\hat{x}_{t+1} - \underline{\mathrm{x}}_t)\delta_{t+1}}{(\bar{\mathrm{x}} - \underline{\mathrm{x}}_t)\bar{S}_{t+1}}}\right) - \varepsilon^* \delta_{t+1} \mathrm{L}^f_{t+2}$$

2.8 The Current Account and Reserves

The period $t+1$ current account satisfies

$$CA_{t+1} = p_t^H \overset{*}{C}{}_{t+1}^H - p_t^F C_{t+1}^F + i^* \varepsilon^* (F_t - \mathrm{L}_{t+1}^f)$$

where i^* is the foreign deposit return rate and F_t denote the country foreign assets at the beginning of the period.

The evolution of reserves depends on both the change in reserves due to current account deficit not covered by private capital flows (here foreign loans) and to speculative pressure.

Before the actions of speculators and the government, the country foreign assets satisfy

$$F_{t+1} = F_t + \frac{CA_{t+1}}{\varepsilon^*} + \mathrm{L}_{t+2}^f$$

After the decisions of speculators and the government, the forign assets satisfy the following:

- If there is no speculative attack,

$$F_{t+1} = F_t + \frac{CA_{t+1}}{\varepsilon^*} + \mathrm{L}_{t+2}^f$$

- If there is a speculative attack and the government abandons the fixed parity,

$$\begin{aligned} F_{t+1} &= F_t + \frac{CA_{t+1}}{\tilde{\varepsilon}_{t+1}} + \mathrm{L}_{t+2}^f \\ &= F_t \end{aligned}$$

- If there is a speculative attack and the government defends the parity,

$$\begin{aligned} F_{t+1} &= F_t + \frac{CA_{t+1}}{\varepsilon^*} + \mathrm{L}_{t+2}^f - \frac{\bar{S}_{t+1}}{\varepsilon^*} \\ &= F_m \end{aligned}$$

This is defines $\bar{S}_{t+1}$

$$\bar{S}_{t+1} = \varepsilon^* \left(F_t + \mathrm{L}_{t+2}^f - F_m \right) + CA_{t+1}$$

2.9 The Eonomy Response to a Fall of the Foreign Good Price : Some Scripts

No closed form solution exists for the competitive equilibrium because of the non lnear speculators-government's interaction. We try to solve numerically for some characteristics of the domestic economy and precisely we look for some currency crisis scripts.

The domestic and international prices for the traded good are preset and entrepreneurs invest. However, during the first period, an anticipated fall of the foreign good price (F) occurs. We analyze the economy response to this shock during the three first periods.

The first period:

Domestic and international prices for the traded good are preset and entrepreneurs invest. Then, an anticipated fall of the foreign good price (F) provoke a decrease in exports which may provoque speculative pressures. We will see, in section 3, if this shock can constraints the government to abandon the fixed parity at date $t = 1$. Depending on the shock magnitude, it can occurs that for some firms, it is no more profitable to continue operating in the traded sector and decide to buy the real estate good. In their turn, domestic banks repaid foreign-currency denominated loans for international bankers. The latters decrease the maximum amount of loans they are ready to lend for the second period by

$$\lambda Y_1 \left(\overset{*}{p}_1^F - \overset{*}{p}_0^F \right)$$

Figure 3 summarize the basic mecanisms that can take place at $t = 1$.

If the parity is maintained at date $t = 1$, we look for possible situations at date $t = 2$. But here we have to consider cases of efficient and inefficient domestic banks.

The Second Period:

Inefficient domestic banks : lend to all firms including firms $n \in]n_1, 1]$ that use loans to purchase the real estate good. Meanwhile, many effcient firms, $n \in]0, n_1]$ would raise their production. However, in case of insufficient loans, this will be impossible and a sharp decrease in the output level and exports can occur. In response to the fall of production, the international bankers decrease, again, the amount of loans they are ready to lend by

$$\lambda \overset{*}{p}_1^T \left(Y_1 - Y_2 \right)$$

The fall of exports and foreign loans cause a rise of the current account deficit. This is a negative signals to speculators who update their beleifs about the probability of a successful attack and may effectively attack the currency. In addition, if the fraction (n_1) of firms decide to continue producing for the next period which corresponds to $n_2 = n_1$, then the fraction $(1 - n_1)$ can't sell the real estate good and defaults on its loan. This will distress the domestic banks which in turn may default on its foreign loans aggravating the current account deficit (because the government guarantee foreign loans).

In case of a speculative attack, the government reacts. It can defend the parity by raising the interest rate or abandon it if it is less costly to do that. Figure (4) summarize the possible situations at $t = 2$.

Efficient domestic banks: don't lend to the fraction $(1 - n_1)$ of firms that disappear and the real estate good remain the property of the houshold. Only the fraction n_1 of firms are borrowed loans to produce. Despite the decline of the foreign loans amount, the amount of loans to most efficent firms increase which encourage them to produce more. But, domestic prices decreased in response to the export's decrease and this may limit the production increase. We will see that in section 3, that the output level don't decrease sharply or may even increase.

Observing the good reaction of the economy, speculators will infer that the fixed parity is credible and that the probability of a successful attack of the currency is zero. In this case, there is no speculative pressure, the exchange rate is maintained and the exogenous shock served to clean the economy from inefficient firms. Figure (5) summarize the economy reaction in the case of efficient banks.

The Third Period:

Suppose that the parity is maintained at date $t = 2$ and let us describe what may happens during the third period.

Case of inefficient domestic banks :

- If $n_2 = n_1$ this means that domestic banks are not paid an important share of their loans and realize that they were inefficient because of their risky loans. In this case, there may be a credit crunch and even most efficient firms can't find sufficient funds.

- If $n_2 < n_1$ this means that the price of the real estate good increase, and domestic banks continue lending to inefficent firms. Thus, the share of risky loans may increase.

In the two cases loans to the productive firms are lowered because of foreign loans decrease. The production and exports levels are worsen. Speculators attack the currency since the probability of abandoning the parity has increased. For some types of government, the parity will be abandoned and will depreciate largely.

We will see in section 3 how dangerous is the cocktail of increased risky loans and decreased foreign loans and how it becomes more and more harmful with time if the financial fragility continue to be ignored.

Case of efficient domestic banks :

The economy situation goes better in all cases but one that should be noted: if there was speculative pressure at date $t = 1$ and the government decided to maintain the parity using the interest rate arm, then the cost of this choice is felt during the third period. This is because only at the beginning of the third period that banks adjust its interest rate on loans. We will give an example of this situation in next section.

I analyzed what may happens during the third first periods. The most important mechanisms that can trigger a currency crisis were described and will occur next periods if the parity was not abandoned. Now let us pass to the numeric illustration of what was theoritically analyzed.

3 The Numeric Simulations

Whether domestic banks are efficient or not, the type of the government and speculators' beleifs about it, the internaioanl lenders' behavior and the productivity distribution of domestic firms caracterise the financial fragility of the economy and its vulnerability to a negative shock in the foreign good price. I numerically find very interesting features confirming that the currency crises evolve through complicated interactions between domestic banks, international lenders, speculators and the government.

3.1 The Model Parametrization

The parameters'values are exposed in appendix A. They was chosen so that the date $t = 0$ have the following caracteristics:

- Foreign capital as represented by foreign loans covers the current account deficits
- The fixed exchange rate is credible because it corresponds exactly to that which would be established in case of flexible exchange regime,
- The initial price of domestic good clear the market of the traded good,
- The government foreign assets are largely superior to the minimum required level,

3.1.1 The Government type and speculators beleifs

As described in 2.7.1 the speculators' beleif about the government type is represented by a uniform distribution initially defined over $[\ \underline{x}_0\ ,\ \bar{x}\ ]$. In this section, we suppose that for a given type (x) we have

$$\begin{aligned} \underline{x}_0 &= x - \tau x \\ \bar{x} &= x + \tau x \end{aligned}$$

So that (τ) can be viewed as the precision of speculators' inference of the government type. When τ decrease speculators become more precise. (I varied τ beetwin 0% and 50%)

I varied the magnitude of the negative good (F)-price shock and determine the impact of the government type and speculators' inference precision on the abandon of the fixed parity. The following proposition summarize the most important results :

Proposition 1 *: For a given shock magnitude Δ, speculators may overvalue or undervalue the probability of abandoning the peg. Thus, they may attack the currency but the government maintains the peg. The difference (in absolute value) between the subjective and real probabilities is increasing with τ (i.e. decreasing with the inference precision).*

The real probability of abandoning the peg is the probability ex-post. It takes two values: zero or one. It is one when the speculative attack sucesses and zero if not. Proposition 1, underly the role of speculators' inference precision. If speculators infer the government type with a good precision then their expectations about the government's reaction to their attack will be realized in most cases. In the contrary case, their action is suboptimal since they can lose money if their speculative attack fails or lose the occasion to make high profits because their lower speculative pressure constraints the government to abandon the peg.

Proposition 2 *: For given shock magnitude Δ and inference precision τ, the real and subjective probabilities of abandoning the peg are decreasing with the government type x.*

Proposition 2 means simply that when the cost of abandoning the peg increases (x increases) speculators' expectations about a successful speculative attack decreases and so does the real probability.

Proposition 3 *: For a given magnitude shock Δ*

i) there exist some government types for which the parity is abandoned (and others for which the parity is maintained) for any inference precision, τ.

ii) For some government types, the speculators' inference precision condition the abandon or the maintain of the peg.

Some governments may take advantage from their type's private information. This is the case when speculators' inference is not precise and the speculative pressure they make can be attenuated by the government. Case ii) of proposition 3 means that the government would abandon the parity if the speculative pressure is more severe or equivantly speculators'inference more precise.

In the other hand, case i) tells us that for a given shock magnitude , the cost of abandoning the parity is so lower that the government abandon the peg even if the speculative pressure is low. On the opposite, when the type x is high, even high speculative pressure don't lead to the abandon of the peg.

3.1.2 The magnitude of the shock and the banking system type

Proposition 4 *: For given government type x and speculators' inference precision τ, there exists a magntude of shock Δ^* such that*

i) For a shock $\Delta > \Delta^*$ speculators attack the currency and the parity is abandoned at date $t = 1$, no matter the type of domestic banks.

ii) For a shock $\Delta = \Delta^*$ speculators attack the currency and the government defends the parity by raising the interest rate.

iii) For a shock $\Delta < \Delta^*$ there is no speculative attack and the parity is maintained at date $t = 1$.

Case i) of this proposition means that the shock can be the only cause of abandoning the parity at date $t = 1$. This happens because exports falls sharply which affects the current account and lowers reserves to their minimum permitted level. Aware of this situation, speculators attack the currency and the government can't defend the parity.

In case ii) the shock magnitude is such that the government defends the parity against speculative attacks by raising the interest rate.

Proposition 5 *: For given government type x and speculators' inference precision τ, let's consider a shock $\Delta < \Delta^*$ where Δ^* is defined in proposition 4, then*

i) if domestic banks are efficient the economy resists to the shock: the parity is maintained (for $t \geq 1$) and the macroeconomic indicators are good.

ii) if domestic banks are inefficient the parity will be abandoned. The date of the parity abandon depends on the price of the real estate good and the magnitude of the shock. For a low price of the real estate good, the parity will be maintained at date $t = 2$ and abandoned later. Whereas, for high price of the real estate good, the parity is abandoned at date $t = 2$.

iii) if case ii) the magnitude of the currency crises (measured as the rate of devaluation of the currency) and its negative impact on the economy increases with the date of its occurence.

4 Conclusion

The paper presents a general equilibrium model suggesting some scripts for the triggering event of the Asian financial crises of 1997 as represented by the abandon of Thailand and Korea of their fixed echange rate.

The model shows that there are different possible scripts that lead to the abandon of the fixed parity, with different distress levels to the economy. Hence, the parity can be abandoned at the first period as a result of a high negative shock of the traded good price which damage the foreign asset reserves and constraints the government to capitualte in the face of even low speculative pressure.

The second script corresponds, to the case where the parity is maintained at the end of the first period but abandoned at the end of the second period. This occurs when domestic banks are inefficient and the share of risky loans increases sharly during the second period limiting the access of the exports sector to loans and causing the fall of exports and increasing speculative pressure.

The third script corresponds, to the case where the parity is maintained until date $t = 2$ but abandoned at the end of the third period. I showed that in this case, the currency crises is more severe since the devaluation is greater than that of the two other cases. This script occurs, when the share of the risky loans is not very important during the second period but raises widely during the third period, causing a sharp decrease in the production level, exports and foreign assets reserves. This suits the most to what happened in Thailand where the financial fragility of the economy was ignored for many years.

The model underlies the crucial role of the banking system in some currency crises scripts. In fact, we showed that, under certain conditions, an efficient banking system enables the economy to resist to the shock. Whereas, an inefficient one triggers it to a currency crises.

The innovant result of our model articulates on the speculators-government's interaction. I find a possible explanation for the sudden change of investors' expectations which is assumed in the self-fulfilling models of currency crises. In fact we showed that speculators' expectations about the abandon of the fixed parity may suddenly change in response to a slight variation of their inference's precision about the government type triggering the economy to a currency crises.

In this model, there is only one real estate good with an exogenous price. An extension of the model is to include a technology production and a market for real estate goods. This would enable us to consider a more realistic use of risky loans and to construct a speculative bubble in the real estate good price, permitting a better understanding the crises script of Thailand.

On the basis of this model's results, we will study the next stage of the Asian financial crises which is the contagion to the other asian countries.

References

1. Bacchetta Philippe and E.V. Wincoop (1998) "Caital Flows to Emerging Markets: Liberalization, Overshooting and Volatility", NBER Working Paper No. 6530.

2. Burnside. Craig, Martin Eichenbaum and Sergio Rebelo (2000) "On the Fundamentals of Self-Fulfilling Speculative Attacks", NBER Working Paper No. 7554.

3. Burnside. Craig, Martin Eichenbaum and Sergio Rebelo (1999) "Hedging and Financial Fragility In Fixed Exchange Rate Regimes", NBER Working Paper No. 7143.

4. Chang, Roberto and Velasco (1997) "Financial Fragility and the Exchange Rate Regime", NBER Working Paper No. 6469.

5. Drazen Allan (1999) "Interest Rate Defense Against Speculative Attack Under Asymmetric Information", www.bsos.umd.edu/econ/Drazen/defense.pdf

6. Flood. Robert and Peter Garber (1984) "Collapsing Exchange Rate Regimes: Some Linear Examples", Journal of International Economics. 17, 1-13.

7. Flood. Robert and Jeanne Olivier (2000) " An Interest Rate Defense of a Fixed Exchange Rate ", IMF Working Paper WP/00/159.

8. Flood. Robert and N.P. Marion (1998) "Perspectives on the Recent Currency Crisis Literature", NBER Working Paper No. 6380.

9. Haggard. Stephan (2000) "The Political Economy of the Asian Financial Crisis", Institute for International Economics, Washington.

10. Krugman. Paul (1999) "Balance Sheets, the Transfer Problem, and Financial Crisis", http://web.mit.edu/krugman/www/Flood.pdf

11. Krugman. Paul (1979) "A Model of Balance of Paiements Crises", Journal of Money, Credit and Banking, 11, 311-25.

12. Mishkin. Frederic S. (1998) "International Capital Movements, Financial Volatility and Financial Instability", NBER Working Paper No. 6390.

13. Morris. Stephen and H.S. Shin (1998) "Unique Equilibrium in a Model of Self-Fulfilling Currency Attacks", American Economic Review, 88, 587-597.

14. NBER (2000) "Currency Crises" Edited by Paul Krugman. The University of Chicago Press.

15. Obstfeld. Maurice (1986) "Rational and Self-Fulfilling Balance of Paiements Crises", American Economic Review, 76, 72-81.

16. Obstfeld. Maurice (1994) "The Logic of Currency Crises", NBER Working Paper No. 4640.

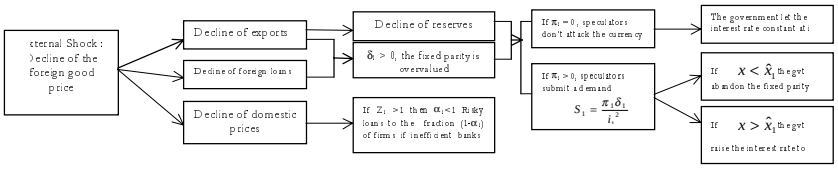
Appendix A

The following presents the values of different parameters of the model :

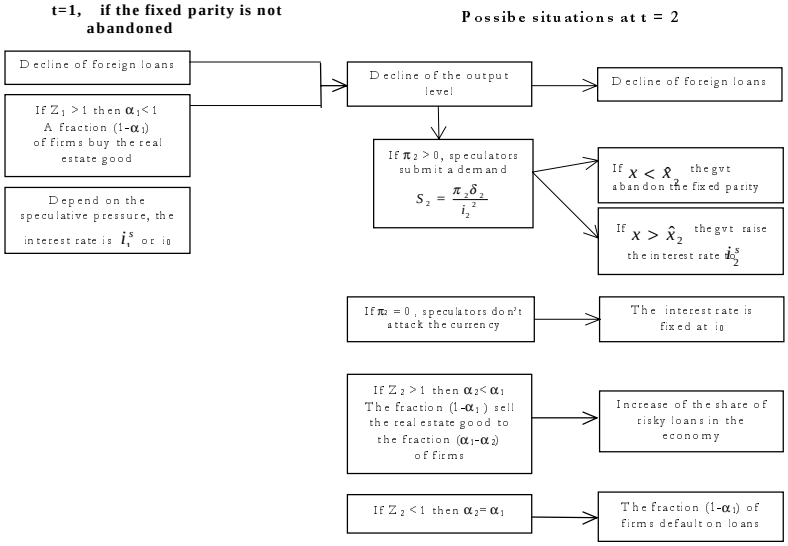
$A = 2.5$
$a = 1.5$
$\beta = 0.85$
$\lambda = 0.12$
$\varkappa = 0.75$
$\rho = 1.1$
$\gamma = 0.5$
$\eta = 1.5$
$\xi = 1$
$k = 0.06$
$c = 0.0174$
$\varepsilon^* = 1$
$i = 4\%$
$i^* = 3\%$
$p_0^H = 1$
$\overset{*}{p}{}_0^F = 2$
$W_0 = 4.59$
$L_0 = 4.437$
$Y_0 = 28.796$
$\overset{*}{Y}_0 = 5$
$\mathrm{L}_0^f = 6.957$
$A_0 = 15$
$F_m = \frac{\overset{*}{p}{}_0^F * Y_0}{5\varepsilon^*}$
$F_0 = 19.128$
$CF = 0.25;\ \ 0.50$

Appendix B

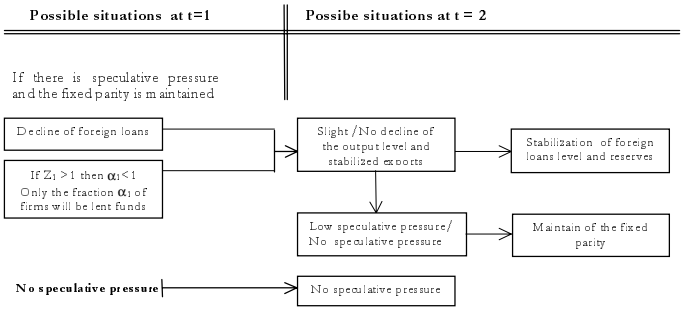
The First Period Effects of an Exogenous Fall in the Foreign Tradable Good Price

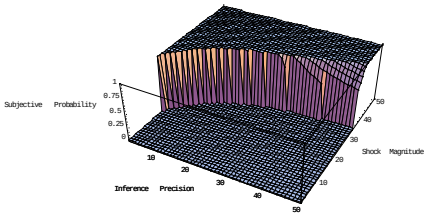


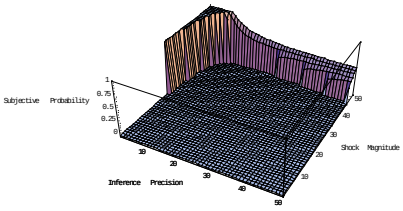
The Second Period Effects in the Case of Inefficient Domestic Banks

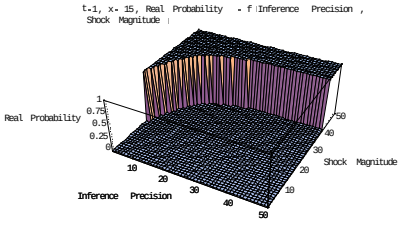


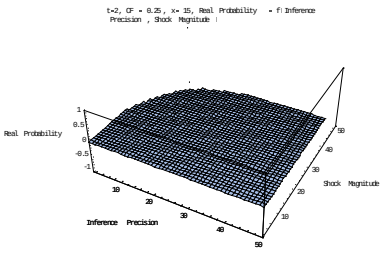
The Second Period Effects in the Case of Efficient Domestic Banks

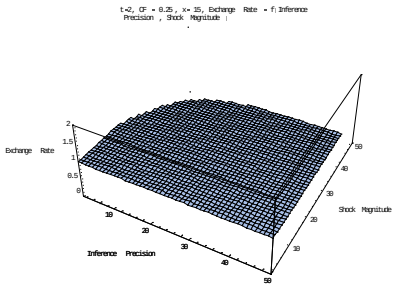


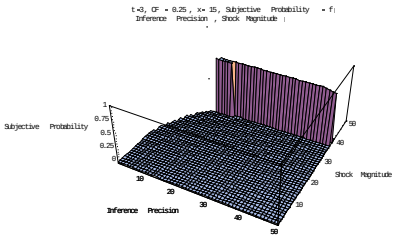


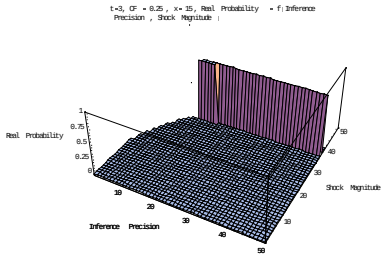


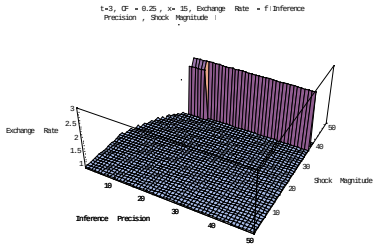


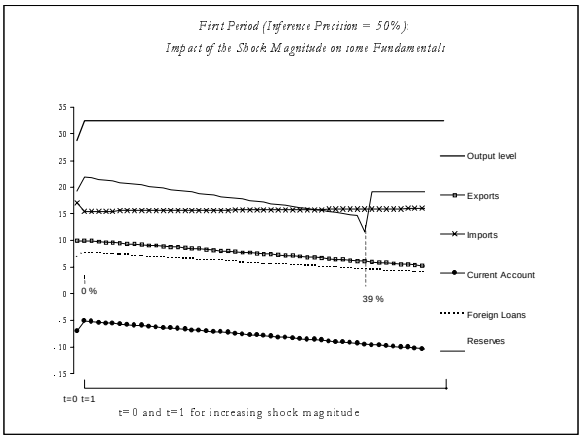

t=2, CF = 0.25 , x= 15, Real Probability = f(Inference Precision , Shock Magnitude)
Real Probability
Inference Precision
Shock Magnitude

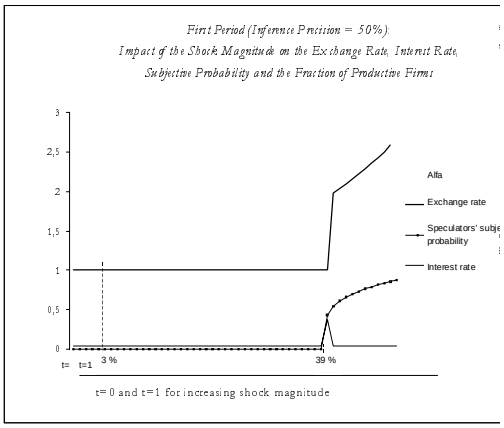

t=2, CF = 0.25 , x= 15, Exchange Rate = f(Inference Precision , Shock Magnitude)
Exchange Rate
Inference Precision
Shock Magnitude

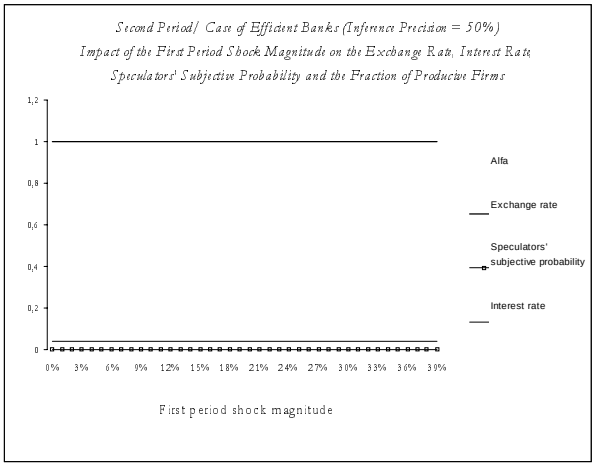

t=3, CF = 0.25 , x= 15, Subjective Probability = f(Inference Precision , Shock Magnitude)
Subjective Probability
Inference Precision
Shock Magnitude

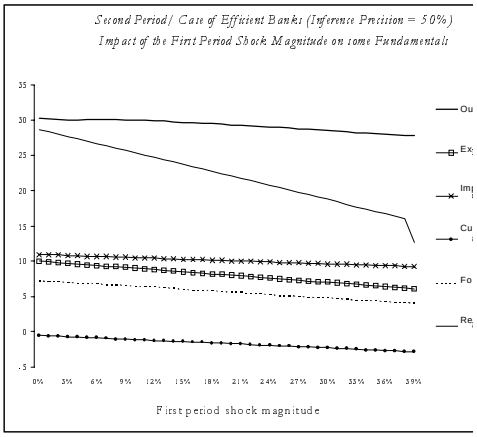

t=3, CF = 0.25 , x= 15, Real Probability = f(Inference Precision , Shock Magnitude)
Real Probability
Inference Precision
Shock Magnitude

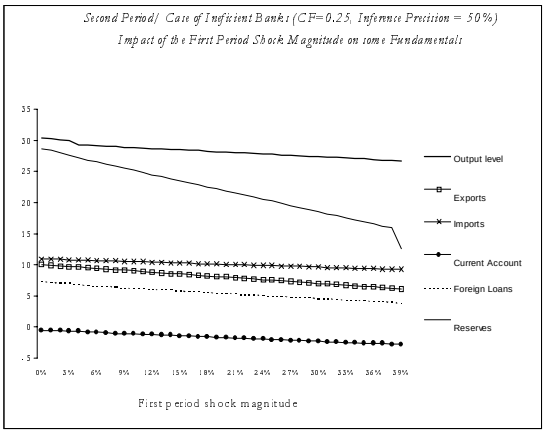

t=3, CF = 0.25 , x= 15, Exchange Rate = f(Inference Precision , Shock Magnitude)
Exchange Rate
Inference Precision
Shock Magnitude

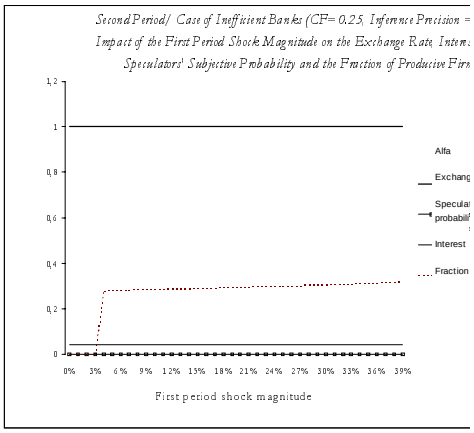

First Period (Inference Precision = 50%):
Impact of the Shock Magnitude on some Fundamentals
35
30
25
20
15
10
5
0
-5
-10
-15
0 %
39 %
Output level
Exports
Imports
Current Account
Foreign Loans
Reserves
t=0 t=1
t= 0 and t=1 for increasing shock magnitude

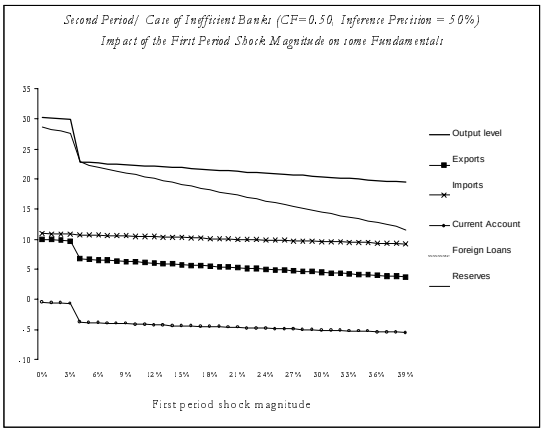

First Period (Inference Precision = 50%):
Impact of the Shock Magnitude on the Exchange Rate, Interest Rate,
Subjective Probability and the Fraction of Productive Firms
3
2,5
2
1,5
1
0,5
0
3 %
39 %
t= t=1
Alfa
Exchange rate
Interest rate
t= 0 and t=1 for increasing shock magnitude

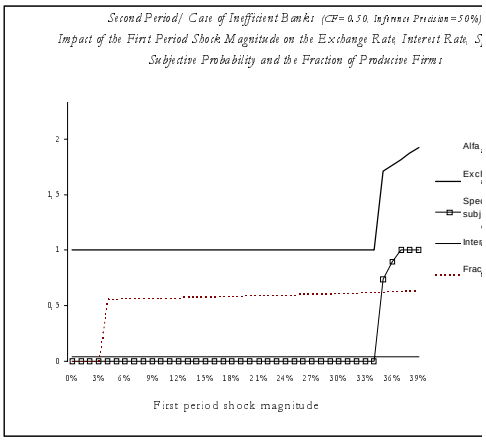

Second Period/ Case of Efficient Banks (Inference Precision = 50%)
Impact of the First Period Shock Magnitude on the Exchange Rate, Interest Rate,
Speculators' Subjective Probability and the Fraction of Productive Firms
1,2
1
0,8
0,6
0,4
0,2
0
0% 3% 6% 9% 12% 15% 18% 21% 24% 27% 30% 33% 36% 39%
Alfa
Exchange rate
Speculators' subjective probability
Interest rate
First period shock magnitude

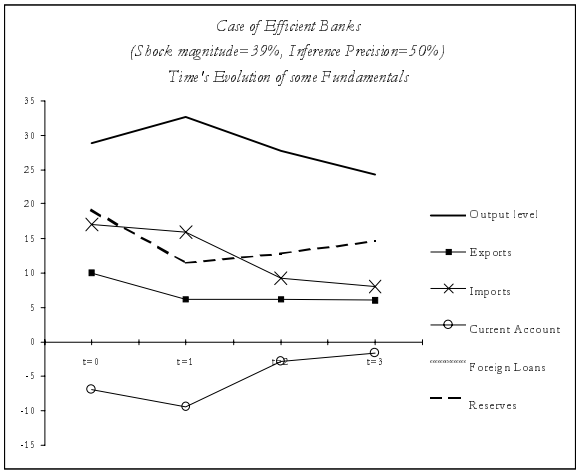

Second Period/ Case of Efficient Banks (Inference Precision = 50%)
Impact of the First Period Shock Magnitude on some Fundamentals
35
30
25
20
15
10
5
0
-5
0% 3% 6% 9% 12% 15% 18% 21% 24% 27% 30% 33% 36% 39%
First period shock magnitude

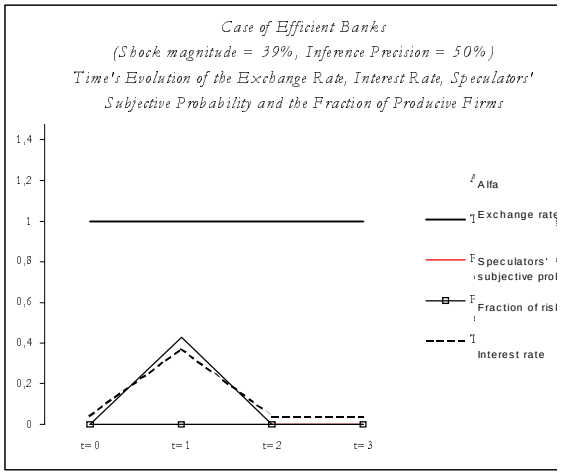

Second Period/ Case of Inefficient Banks (CF=0.25, Inference Precision = 50%)
Impact of the First Period Shock Magnitude on some Fundamentals
Output level
Exports
Imports
Current Account
Foreign Loans
Reserves
First period shock magnitude

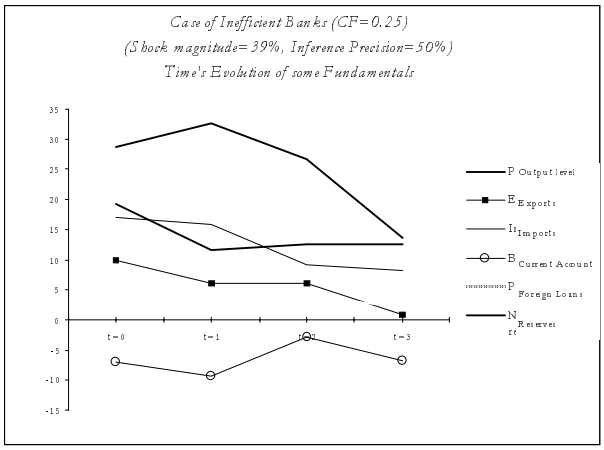

Second Period/ Case of Inefficient Banks (CF= 0.25, Inference Precision =
Impact of the First Period Shock Magnitude on the Exchange Rate, Interes
Speculators' Subjective Probability and the Fraction of Productive Firm
Alfa
Exchang
Specula
probabili
Interest
Fraction
First period shock magnitude

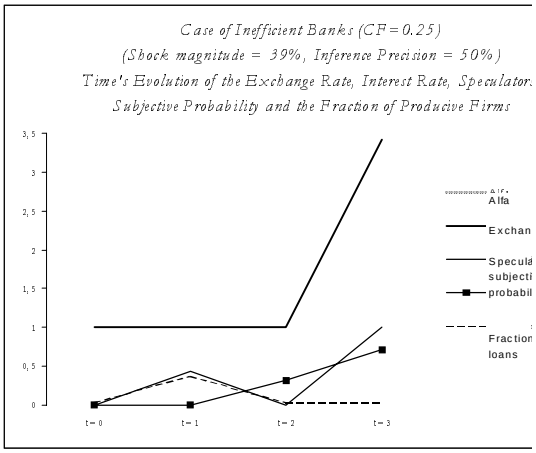

Second Period/ Case of Inefficient Banks (CF=0.50, Inference Precision = 50%)
Impact of the First Period Shock Magnitude on some Fundamentals
Output level
Exports
Imports
Current Account
Foreign Loans
Reserves
First period shock magnitude


Second Period/ Case of Inefficient Banks (CF= 0.50, Inference Precision=50%)
Impact of the First Period Shock Magnitude on the Exchange Rate, Interest Rate, S
Subjective Probability and the Fraction of Productive Firms
Alfa
Excl
Spec
subj
Inter
Frac
First period shock magnitude


Case of Efficient Banks
(Shock magnitude=39%, Inference Precision=50%)
Time's Evolution of some Fundamentals
35
30
25
20
15
10
5
0
-5
-10
-15
t=0
t=1
t=2
t=3
Output level
Exports
Imports
Current Account
Foreign Loans
Reserves


Case of Efficient Banks
(Shock magnitude = 39%, Inference Precision = 50%)
Time's Evolution of the Exchange Rate, Interest Rate, Speculators'
Subjective Probability and the Fraction of Producive Firms
1,4
1,2
1
0,8
0,6
0,4
0,2
0
t=0
t=1
t=2
t=3
Alfa
Exchange rate
Speculators'
subjective prob
Fraction of risk
Interest rate


Case of Inefficient Banks (CF=0.25)
(Shock magnitude=39%, Inference Precision=50%)
Time's Evolution of some Fundamentals
35
30
25
20
15
10
5
0
-5
-10
-15
t=0
t=1
t=2
t=3
Output level
Exports
Imports
Current Account
Foreign Loans
Reserves


Case of Inefficient Banks (CF=0.25)
(Shock magnitude = 39%, Inference Precision = 50%)
Time's Evolution of the Exchange Rate, Interest Rate, Speculator
Subjective Probability and the Fraction of Producive Firms
3,5
3
2,5
2
1,5
1
0,5
0
t=0
t=1
t=2
t=3
Alfa
Exchan
Specula
subjecti
probabil
Fraction
loans