The Effects of Capital Inflows in Thailand, 1980-96

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This paper examines the effects of private financial (non-FDI) capital inflows in Thailand in the pre-crisis period (1981:I-96:IV). Private capital inflows are found to be associated with higher asset prices, lower lending rates, surges in bank lending to the private sector, surges in domestic spending driven by higher investment, higher output, modest inflation, and modest real exchange rate appreciation. Inflows are also associated with greater macroeconomic and financial vulnerabilities. However, current account deficits are temporary, thus sustainable, as exports catch up with higher imports within two years. Consequently, the Thai crisis appears to be more of a liquidity crisis than an external solvency crisis.

JEL Classification Numbers: F30, F40, E44, O53
Keywords: Asian crisis, capital flows, lending boom, investment boom

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1. Introduction

One of the most remarkable developments of the 1990s has been the return of private capital flows to developing countries, which was followed by a retreat in the wake of the collapse of the baht-dollar exchange rate in July 1997. In the late 1980s net long-term private capital flows to developing countries amounted to 40 billion dollar annually, while in 1996 these had increased to 240 billion dollar. However, in the first half of 1998 private capital flows were 40% below their level a year earlier (World Bank 1998). Due to their structural reforms in the 1980s and strong fundamentals East Asian countries were able to attract large amounts of foreign capital until 1997.¹ Large capital inflows may benefit the recipient country because they allow a faster build-up of the capital stock. However, they also pose the challenge of channeling the external funds to productive projects and avoiding macroeconomic overheating. Moreover, as the Mexican crisis of 1994-95 and the Asian crisis of 1997-98 illustrate, they may also make a country vulnerable to the serious disruptive effects of sudden and large capital outflows. The East Asian economies suffered a capital flow reversal of 100 billion dollar within a year.

The conventional story about how private capital inflows may have increased vulnerabilities to financial shocks and losses of investor confidence runs like this. If a country maintains an exchange rate peg, the central bank has to purchase the foreign exchange that is flowing into the country to avoid nominal appreciation of the exchange rate. As a result, the base money supply rises, leading to an expansion of monetary aggregates, lower interest rates and higher asset prices. The central bank may attempt to sterilize its interventions in the foreign exchange market, but this may lead to additional capital inflows neutralizing the sterilization attempt. Lower real interest rates and the loosening of credit constraints stimulate investment by firms and spending on new houses and durables by households. Part of the capital inflows, directly or indirectly, flows into the stock market, driving up equity prices. The ensuing wealth effect further enhances aggregate demand.
Domestic banks are considered to play a crucial part in the transmission mechanism because they play a dominant role in the financial intermediation process. Firms, smaller banks and other financial institutions usually have access to foreign funds via the larger domestic banks. Large banks, and firms sometimes too, operate under implicit government guarantees and poor supervision. Moreover, banks have poor credit quality assessment and monitoring capabilities, and are undercapitalized. Moral hazard thus creates powerful incentives for external borrowing (which is also stimulated by the stable exchange rate policy) and for lending to domestic parties that engage in excessively risky projects. Large capital inflows, in part directly initiated by banks, give rise to a credit boom. The easing of liquidity constraints stimulates aggregate demand, which may be biased towards the nontradable sectors. The real estate sector, in particular, is prone to overinvestment. The lending boom fuels a stock market and property market boom, leading to increases in collateral values, which then may further sustain the credit boom.

Although output may rise, aggregate demand rises faster causing the current account to deteriorate. Later on prices start to rise causing a real appreciation because the nominal exchange rate is pegged. In the end, the country may find itself with a current account deficit, an overvalued exchange rate, and a financial system and corporate sector whose balance sheets are excessively vulnerable to declines in asset prices, including the exchange rate and property prices. When adverse shocks occur, the boom starts to fizzle out, marked by declines in share prices and real estate prices. Concerns about the fragility of the financial system start to mount, and translate into a maturity shortening of capital inflows. Ultimately, foreign investors lose confidence in the sustainability of the exchange rate peg, and start withdrawing their funds from

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1 In the period 1990-96 East Asia, which includes China, received 43% of total net private capital flows to developing countries, while in the early 1980s this was only 12% (Alba et al. 1998).

2 Negative shocks that seem relevant to the East Asian crisis are the prolonged slump in Japan, the strong appreciation of the dollar, adverse terms of trade changes, the emergence of China, the slowdown in world trade, and a regional productivity slowdown. See Corsetti, Pesenti and Roubini (1998a,b) and Bhattacharya, Ghosh and Jansen (2000).
the country, thereby triggering the collapse of the exchange rate peg and a full-blown financial crisis.³

The empirical analysis of the Asian financial crisis is still in its infancy. This is partly a reflection of data availability problems. This paper aims at increasing our understanding of the background of the crisis by investigating the effects of private financial capital inflows in Thailand in the period 1981:I-96:IV, that is, the pre-crisis period. We trace the effects on both macroeconomic and financial variables by means of Vector Autoregression (VAR) analysis. An analysis of the Thai experience would seem especially interesting, since it was the breakdown of the baht-dollar peg that touched off the Asian financial crisis in July 1997. In addition, Thailand has had a lot of experience with private capital inflows as it has received sizable amounts of foreign capital, much of it of a short-term nature, since the early 1980s. The explanation of the crisis outlined above may also more fully apply to the Thai case, since the experience of the other countries in the region is probably tainted by contagion effects of the Thai baht crisis (Baig and Goldfajn 1999).

The remainder of the paper is organized as follows. Section 2 presents some data on private capital flows to Thailand during 1980-96. In section 3 we discuss the financing of investment and consumption in Thailand, and the roles commercial banks, finance companies and capital markets play in this process. Section 4 goes into some econometric issues. Section 5 reports the results of the VAR analysis, which take the form of the impulse response functions of a range of macroeconomic and financial variables to a shock in private capital inflows. Section 6 contains a summary and the conclusions.

2. Capital inflows in Thailand

Until the crisis broke in 1997, Thailand was very successful in attracting private capital flows, as is evident from Figure 1. During the recent inflow period 1988-96, private capital inflows averaged 10% of GDP per year. However, substantial inflows were also recorded in the first half of the eighties. Thailand needed the capital inflows to finance its persistent and large current account deficits, which since 1988 are largely driven by an investment boom rather than a consumption boom (World Bank 1997). Investment as a percentage of GDP increased from an average of 26% in the mid-1980s to an average of 41% in 1990-96. National saving also sharply increased, but not enough to prevent a steep increase in the current account deficit. Since 1987 more capital has flown into Thailand than was needed to finance the current account deficit, translating into a growing stock of international reserves. Between 1986 and 1996 Thailand’s international reserves increased from 7% of GDP to 21% of GDP.

Table 1 contains data on the composition of the capital flows. Although measured as a share of GDP foreign direct investment has risen after 1987, its share in the total flow has been on a declining trend since the mid-1980s. The importance of portfolio capital has sharply increased,
accounting for about a quarter of total flows during 1993-96. Loans have always been the most important component of the capital inflow, and since 1987 a shortening of maturity has occurred. Between 40 and 50% of the inflows are short-term debt flows during 1988-96. The composition of the Thai inflows and that of worldwide private capital flows exhibit remarkably different trends. Over the past 15 years global long-term private capital flows have been increasingly dominated by foreign direct investment and portfolio flows, while the share of loans has declined greatly.\(^4\)

### Table 1. Net private capital flows to Thailand, 1980-96

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In the 1990s commercial banks have become much more active as importers of capital as a result of capital account liberalizations and the relaxation of foreign exchange controls.\(^5\) In particular, the establishment of the Bangkok International Banking Facilities (BIBF), Thailand’s offshore banking system, in March 1993 was a milestone. The BIBF system meant better access to international finance for the less well-known Thai firms, which could not directly borrow in overseas markets due to information costs. These firms were now able to borrow indirectly via Thai BIBF institutions which were in a better position to evaluate credit risks of

\(^{4}\) For example, World Bank (1997) found that FDI constituted 17% of long-term private capital flows to developing countries during 1980-82, but 48% during 1995-96. The corresponding numbers for long-term loans are 78% and 46%, and for portfolio flows, 5% and 36%.

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these firms. BIBF institutions also enjoyed substantial tax advantages, which were passed through to their customers. The improved access to and the reduced cost of foreign borrowing combined for a dramatic expansion of foreign bank loans.⁶

3. The financing of economic activity

Financial institutions rather than capital markets dominate the Thai financial system. Figure 2 plots total assets of commercial banks and finance companies and total stock market capitalization (as a share of GDP) during the period 1980-96. Total assets of both banks and finance companies increase steadily throughout the sample period, reflecting in part a continuing process of financial deepening. The two groups of institutions accounted for about 90% of total credit extended to the private sector at the end of 1996.⁷ Stock market capitalization was in the first half of the 1980s very small, but grew spectacularly from 7% of GDP at the end of 1986 to 105% of GDP at the end of 1993. This increase was caused by an enormous hike in the share price index as well as a steep increase in the number of companies listed on the Stock Exchange of Thailand. In 1986 only 98 companies were listed, while in 1993 this had risen to 347. Since then the share price index has nosedived, especially in 1994 and 1996, due to increasing anxiety about weaknesses of domestic financial institutions and the sustainability of the baht-dollar peg, and macroeconomic uncertainty. Total stock market capitalization stood at 55% of GDP at the end of 1996. However, the number of listed companies has continued to grow to 454 at the end of 1996.

⁶ See Bank of Thailand (1996) and Alba et al. (1998) for more details on the BIBF.
⁷ Other financial institutions are the Government Saving Bank, the Government Housing Bank, the Bank for Agriculture and Agricultural Cooperatives, the Industrial Finance Corporation of Thailand, seven life insurance companies, and numerous very small savings and agricultural cooperatives. See Robinson et al. (1991), and Kirakul (1996) for an overview of the Thai financial system.
By contrast, the Thai bond market has always been small, although the market for corporate bonds has expanded in recent years following liberalizations. The outstanding stock of government bonds has been on the decline since 1987 as the result of sustained fiscal surpluses. Moreover, the lion’s share of the bonds was held by banks because of the branch-opening requirement. Only since 1990 have public sector enterprises issued bonds in significant amounts. Private companies were not allowed to issue bonds until 1992 (Duriyaprapan and Supapongse 1996). Bonds issued by private corporations have grown rapidly since 1993.

Callen and Reynolds (1997) combine data on loans and new issues of bonds and equity to calculate the relative importance of internal funds, capital markets and financial intermediaries for the financing of private investment. Table 2 shows that the contribution of internal finance has significantly declined in the period 1980-95. Although the share of investment that is internally financed varies considerably from year to year, it exhibits a clear downward trend. In the early 1980s 75% of investment was financed by internal sources, while during 1992-95 this had

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8 Until November 1990 domestic banks were required to hold at least 16% of deposits in government bonds to be eligible for opening new branches. Since November 1990 the percentage was reduced in several steps, and in May 1993 this requirement was abolished (see Kirakul 1996).

9 I am grateful to Tim Callen for providing me with the data that underlie the table.
decreased to about 30%. Callen and Reynolds give two possible explanations for this development. Firstly, informational asymmetries between borrowers and lenders have become less severe along with the development of capital markets and financial intermediaries (e.g. due to greater disclosure requirements). As a consequence, the cost of external finance has fallen. Secondly, the steep increase in desired investment forced firms to rely more heavily on external sources of funds, which was made possible by financial market development and capital account liberalization.

Table 2. The financing of investment by private and public enterprises, 1980-96

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International finance 1.2 7.3 2.6 1.2 1.0 1.7 2.5 4.4 4.6 16.6 13.5 7.4

Source: Data provided by Tim Callen, and Callen and Reynolds (1997).

Table 2 also shows that financial intermediaries, mainly banks and finance companies, are far more important as providers of external funds than capital markets for both private and public enterprises. In the early 1980s financial intermediaries supplied over 95% of external funds. This had declined to 82% by 1995. In the period 1980-90 the stock market was the other main source of external finance for private firms. The domestic bond market only begins to chip in
from 1991 onwards. Funds from international sources, which are largely intermediated by banks, are increasingly important, financing about 15% of investment in 1993 and 1994.

Table 3. Selected balance sheet items of Thai commercial banks, 1980-96

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(\% of total loans)

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<td>10.1</td>
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Commercial banks are the most important financial intermediaries, although their market share in the provision of external finance has declined from about 85% in the early 1980s to about 80% in 1993-95. Table 3 presents selected balance sheet items of commercial banks. For most of the period 1980-96 the banking system counted 15 domestic banks, which have extensive branch networks, and 14 foreign banks, which only have one office in Bangkok.\(^\text{10}\) New entry was severely restricted. The five largest domestic banks account for two-thirds of total bank assets (Robinson \textit{et al.} 1991). Domestic banks thus dominated the banking system, accounting for over 95% of total banking assets. The limited role of foreign banks inhibited the institutional development of the banking system. Banks mainly attract domestic funds by issuing deposits, mostly time and savings deposits. Their alternative source of funds was foreign borrowing.

\(^\text{10}\) Opening additional branches was prohibited. Foreign banks could not be quoted on the stock exchange, making them ineligible for concessional corporate tax rates, and they had to pay a withholding tax on their dividends transferred overseas (Robinson \textit{et al.} 1991).
especially since 1993, when the BIBF was established. Banks had to submit credit allocation plans to the Bank of Thailand every six months for monitoring purposes. In general the Bank of Thailand relied on moral suasion to discourage banks to lend to sectors that are prone to boom-bust cycles, like real estate and financial services, and to direct credit to the priority sectors (export, agriculture, small businesses). However, banks determined their lending portfolios under few formal constraints.\textsuperscript{11} About 20\% of the bank loans at the end of 1996 went to the real estate, construction and financial services sectors, which are relatively vulnerable to cyclical fluctuations of the economy. Loans to the real estate sector have sharply increased over time, from a share of 3\% in the early 1980s to more than 11\% in the early 1990s, when the property market boomed. The share in the loan portfolio for personal consumption purposes has risen steadily, from 8\% in the early 1980s to 12\% in the 1990s.

Table 4 presents selected balance sheet items of the finance companies, the other important group of financial intermediaries. There were some 90 finance companies in Thailand, which accounted for approximately 20\% of total credit extended to the private sector.\textsuperscript{12} Their activities comprised short-term finance, leasing finance, underwriting and security trade, and consumer finance. Because finance companies were prohibited to take deposits, they sold promissory notes of different maturities, including an at call variety, to obtain funds from the public. Moreover, regulations on the establishment of new branches were more restrictive for finance companies (Kirakul 1996). Interest rates offered on promissory notes were usually higher than the rates on deposits of the same maturity. The same applied to the lending rates of the two types of institution. Other important sources of funds were borrowing from commercial banks, and since 1990, foreign borrowing. Finance companies traditionally directed more of their lending toward riskier, but higher

Table 4. Selected balance sheet items of Thai finance companies, 1980-96

|------|------|------|------|------|------|------|------|------|------|------|------|------|

\textsuperscript{11} Commercial banks are required to lend a certain percentage of their previous year’s deposits in rural areas to the agricultural sector (since 1987 20\%). However, enforcement of this regulation has often been lax (Easterly and Honohan 1990).

\textsuperscript{12} In the aftermath of the crisis 56 finance companies were closed down by the government.
yielding activities, because their cost of funds was higher and they faced even fewer restrictions than banks on their lending practices. In the 1990s approximately two-thirds of the loan portfolio went to the construction and real estate sector, the financial services sector, and consumer credit, which was twice as much as for banks. Finance companies were big players in the markets for consumer credit and real estate credit, with market shares of 37% and 47% respectively in 1996. Finance companies were thus much more exposed to economic and financial shocks than commercial banks.

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13 Until 1995 finance companies were not required to submit credit plans to the Bank of Thailand. For much of the period 1980-96 finance companies have been less closely supervised than banks.
4. Econometric issues

Following the empirical literature on the monetary transmission mechanism we use a Vector Autoregression (VAR) model to investigate the impact of private capital inflows. We estimate the following reduced-form VAR model,

\[ Z_t = A_1 Z_{t-1} + \ldots + A_p Z_{t-p} + u_t \]

where \( Z_t \) is a vector of variables observed at time \( t \), and \( p \) is the maximum lag of the system. The VAR disturbance vector \( u_t \) is assumed to be serially uncorrelated and to have covariance matrix \( V \). This reduced form can be thought of as being derived from the following structural model,

\[ Z_t = B_0 Z_t + B_1 Z_{t-1} + \ldots + B_p Z_{t-p} + e_t \]

where \( e_t \) is the vector of the underlying structural shocks that we want to identify. \( e_t \) has as covariance matrix the identity matrix. The reduced form disturbances \( u_t \) are thus related to the underlying structural disturbances \( e_t \) by

\[ u_t = [I - B_0]^{-1} e_t = A_0 e_t, \]

implying \( V = A_0 A_0' \). The impulse-response functions to the structural shocks \( e_t \) can be calculated via

\[ Z_t = [I - A(L)]^{-1} A_0 e_t \]

We estimate VAR model by ordinary least squares to obtain estimates of the matrices \( V \) and \( A(i), i = 1, \ldots, p \). \( A_0 \) is calculated from \( V \) using the conventional Cholesky decomposition.
Hence, $A_0$ is a lower triangular matrix and $u_t$ is assumed to be determined in a recursive fashion by $e_t$.

The empirical analysis is based on quarterly data for the period 1980:I-96:IV. The maximum lag $p$ is set at 4 to allow for realistic lag structures. Consequently, 16 years of data are available for estimation after using up one year of data as starting values of lagged variables. Given the limited length of the available time series, it is clearly impossible to include all variables of interest in a single unconstrained VAR system. On the other hand, if we include too few variables in the VAR we run the risk of significant omitted variables bias. Given this trade-off we follow the intermediate strategy employed by Christiano, Eichenbaum and Evans (1996). We estimate a range of VARs for which the vector $Z$ contains five variables. $Z$ always includes the following four variables: the log of the GDP deflator ($P$), the log of real GDP ($Y$), the interbank rate ($RB$), and private capital flows ($CF$). These four variables comprise a minimalist model of the Thai economy. The fifth variable of $Z$ is the one we want to focus on, say $X$. $X$ is thus different for every estimated VAR model.\footnote{As noted by Christiano, Eichenbaum and Evans (1996), a consequence of this approach is that the impulse is not exactly the same across the different VAR models, because the fifth conditioning variable is different. The IRFs of the four common variables ($P$, $Y$, $CF$ and $RB$) are broadly similar across the models, however, suggesting that this is not a serious problem.} As exogenous conditioning variables we employ the current and one-period lagged values of the 3-month euro-dollar deposit rate, the Japanese short-term interest rate, the average of the oil price index and a commodity price index, the yen/dollar exchange rate, a dummy for the devaluation in 1984:IV, which is one before 1984:IV and zero otherwise, and seasonal dummies.\footnote{All data series are seasonally adjusted, either at source or by the X-11 method. We add seasonal dummies to correct for any remaining seasonality. Details on the data can be found in the appendix.}

The disturbances are orthogonalized on the basis of the conventional Cholesky decomposition. In that case, the ordering of the variables in the VAR determines the pattern of recursivity, and thus may be of crucial importance for the orthogonalization of the disturbances. The main identifying assumption in this paper is that the interbank rate and capital flows should not
contemporaneously affect real variables and prices. If \( X \) is a financial variable, say the money stock, we use the ordering \( P, Y, CF, RB, X \). If \( X \) is a real variable, say an investment indicator, then we use the ordering \( P, Y, X, CF, RB \).\(^\text{16}\) We make an exception if \( X \) is an import variable, because capital inflows may be directly linked to import flows. In that case \( X \) comes after \( CF \), but before \( RB \).

The time series we use are usually non-stationary (integrated of order one), among them \( P, Y, RB \) and \( CF \). This brings up the question whether we should difference the data. Employing differenced data has the drawback of neglecting potentially important long-run relationships among the time series involved. Like a number of recent empirical papers on the monetary transmission mechanism, we have therefore chosen to estimate unrestricted VARs in levels.\(^\text{17}\) We thus refrain from imposing cointegration and estimating vector error correction models. Our approach still allows for the existence of cointegrating relationships, however.\(^\text{18}\) Faust and Leeper (1997) argue that – in part because the number of cointegrating relationships is unknown and thus has to be estimated – imposing long-run restrictions will not necessarily improve the reliability of structural inferences.

5. Empirical results

Figures 3-7 present the impulse response functions (IRF) of various variables (usually \( X \)) after a one-standard error shock to private financial capital inflows.\(^\text{19}\) Capital inflows are measured as the growth rate of the stock of private foreign financial liabilities. The stock of private foreign financial liabilities.

\(^{16}\) Interchanging \( P \) and \( Y \) in the ordering does not affect the results materially. The same holds for interchanging \( RB \) and \( CF \).

\(^{17}\) See e.g. Bernanke and Blinder (1992), Christiano, Eichenbaum and Evans (1996), and Ramaswami and Sloek (1998).

\(^{18}\) See Hamilton (1994, Chapter 20.4) for a discussion on the issue of “to difference or not to difference.”

\(^{19}\) Figures 3a, 3b, 3e, 3g and 3h are based on the same VAR system, where \( Z = (P, Y, CF, E, RB) \) and \( E \) the log of the baht-dollar exchange rate (expressed as baht per dollar). All other figures display the IRF of variable \( X \).
financial liabilities is measured in dollars, and has been computed by cumulating private capital inflows excluding foreign direct investment inflows. All IRFs show percentage points in deviation of the baseline path. The broken lines indicate one-standard error bands.\textsuperscript{20}

Figure 3a presents the private financial capital flow impulse, which can be described as a one-time spike followed by a smaller but sustained inflow. The economy thus reacts to the capital inflow in a way that attracts more capital. Figures 3b-3f show the reaction of the monetary authorities. The baht/dollar exchange rate is kept close to the peg, as the baht is allowed to appreciate by only 0.2\%-0.3\% against the dollar. This forces the authorities to accumulate international reserves. On impact international reserve holdings increase by 1.5\%, ultimately by over 3\% compared to the baseline. The Bank of Thailand tries to mitigate the expansionary effect of the foreign exchange market interventions by sterilization operations.\textsuperscript{21} Initially, it sterilizes to the tune of 2\% of bank reserves, but after two years the total of the sterilization operations amounts to 8\% of bank reserves. The BOT does not completely neutralize the effect of the interventions on the monetary base, however. Base money increases by 0.6\% in the first quarter, and remains above the baseline for three quarters. The sterilization attempts temporarily put upward pressure on the interbank rate, but after 2 quarters the interbank rate falls by about 30 basis points, and returns to the baseline in the next two quarters. Output and the price level steadily increase after a private capital inflow. After 3 years output has risen by 0.6\%, reflecting

\textsuperscript{20}Like Christiano, Eichenbaum and Evans (1996), we show one-standard error bands. We do this for presentational reasons, as displaying two-error bands would double the range of Y-axis and thus “flatten” the IRF. As is well-known, standard errors for dynamic inferences based on VARs are in general relatively large (see Hamilton 1994, chapter 11.7). This is likely to be even more true in our case, where the time-span of the data is relatively short, and the data refer to a developing country. The purpose of the plots is to concisely present the average response and a standard measure of the uncertainty surrounding it. The bands should not be interpreted as confidence intervals associated with conventional levels of statistical significance.

\textsuperscript{21}The Bank of Thailand has used three sterilization methods: selling public sector bonds, selling BOT bonds, and transferring public sector deposits out of the commercial banking system to the central bank. Unlike other countries, the BOT has not used changes in reserve requirements as a sterilization technique. Reserve requirements were only used for prudential reasons. The required reserve ratio has been held constant at 7\% since 1979.
Figure 3. Macroeconomic effects of private capital inflows and BOT policy response

Note: Percentage points in deviation of the baseline. The dashed lines are one-standard error bands.

the output-enhancing effect of investment, while the price level has risen by 0.3%. Nominal GDP thus rises by approximately 1%.
Despite the BOT’s sterilization efforts the banking system remains very liquid for about a year, as shown in Figures 4a-4b. The banks’ nonborrowed reserves and especially liquid asset holdings, which can be easily transformed into reserve assets, display a sustained increase until the fourth quarter after the capital inflow. The banks respond by lowering their lending rate by 10 to 15 basis points (Figure 4c).\textsuperscript{22} Figures 4d and 4f present evidence of a credit boom, as lending by banks and finance companies grows about twice as fast as nominal GDP. Banks also disproportionally extend credit to finance companies (Figure 4e), especially in the first few quarters after the capital inflow. Banks thus act as intermediaries for the much smaller finance companies to give them access to foreign funds. Since finance companies traditionally concentrate on real estate finance, consumer finance and the financing of stock market investments, this is an important channel of transmission.

Real stock prices (Figure 5a) increase 1\% on impact and ultimately more than 3\%, stimulating spending and lending. Figures 5b-5d present some evidence that investment in new buildings leads the spending boom. Figure 5c shows that domestic sales of cement increase sharply after a capital inflow, while building permit approvals also soar (Figure 5d). The relative price of construction materials shows a prolonged increase for two years (Figure 5b). The building boom also provides indirect evidence of a boom in real estate and land prices. The production of new buildings against higher costs only makes sense when already existing buildings have risen in value. The increase in property values provides another channel through which private spending is stimulated.

\textsuperscript{22} It stands to reason that finance companies will also lower their lending rate, as the lending rates charged by banks and finance companies tend to move together. (The latter are only available from 1985.IV onwards.)
Figure 4. Private capital inflows and bank behavior

(a) Nonborrowed reserves banks

(b) Liquid assets banks

(c) Lending rate banks

(d) Bank lending to private sector

(e) Bank lending to finance co.

(f) Fin. Co. lending to private sector

(g) Broad money (M2)

Note: Percentage points in deviation of the baseline. The dashed lines are one-standard error bands.
Figure 5. Capital flows and the stock market and building boom

Note: Percentage points in deviation of the baseline. The dashed lines are one-standard error bands.
The combination of greater availability of credit, lower lending costs and increases in wealth provides a powerful boost to private expenditure, the total of private consumption and private investment (Figure 6a).

It increases much faster than output: after five quarters private spending has risen by 1.5% compared with 0.4% for output. As data problems preclude a further breakdown of private spending into consumption and investment, we can only present some indirect evidence on the nature of the private spending increase (Figure 6b-6f). Apart from the building boom, import data too suggest that private spending is mainly driven by investment rather than consumption (Figures 6b-6d). The initial capital inflow is partly used to finance additional imports, which are fairly evenly divided between imports of consumption and capital goods. However, the subsequent spending boom coincides with a huge increase in imports of capital goods, as within a year these imports rise by 4%. By contrast, imports of consumption goods, including durable consumption goods, decline. Additional support for a dominant role for investment instead of consumption is provided by the different behavior of the sales of vehicles and those of motorcycles (Figures 6e and 6f). Vehicles comprise both passenger cars and commercial vehicles. Consequently, vehicles can be considered to be mainly investment goods, while motorcycles are mainly durable consumption goods. Sales of vehicles (Figure 6e) broadly follow the same same pattern as private expenditure (Figure 6a). By contrast, sales of motorcycles only pick up after one year, when output has risen significantly, and also do not grow as strongly as vehicles sales.

Turning to the external side of the economy, the private spending boom is reflected in a deterioration of the current account balance and the balance on goods and services (Figure 7c). The initial capital inflow translates in part into a larger deficit on the balance of goods and services. After a temporary improvement, this balance first goes into a sharp decline because of higher imports (Figure 7a), mainly capital goods, which is then

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23 Kolchar et al. (1996) find that private investment in Thailand depends negatively on the real lending rate. Greene and Villanueva (1991) and Rama (1993) report statistically negative effects of real interest rates on private investment for developing countries.

24 The split-up of vehicles into passenger cars and commercial vehicles (trucks and buses) is only available for part of the sample period. Measured in units, the share of passenger cars is less than 30% of total vehicles. Their share in total expenditure will be much less than that.
Figure 6. Private capital inflows and private spending

(a) Private expenditure

(b) Imports of investment goods

(c) Imports of consumer durables

(d) Imports of consumer goods

(e) Sales vehicles

(f) Sales motorcycles

Note: Percentage points in deviation of the baseline. The dashed lines are one-standard error bands.
Figure 7. Private capital inflows and the external side of the economy

Note: Percentage points in deviation of the baseline. The dashed lines are one-standard error bands.
reversed after two quarters when exports starts to increase (Figure 7b). Exports increase by 1% to 1.5% over the next two years, restoring the balance on goods and services to close to its initial value. Capital inflows are thus associated with temporary current account deficits. They also make the economy more outward-oriented as both imports and exports tend to increase more than output. The response of exports suggests that a significant part of the private capital inflow is channeled into export-oriented sectors. Exports take off with a delay because of the time it takes to implement the necessary investment projects.

The modest appreciation of the baht and rising domestic prices translate into a gradual appreciation of the real effective exchange rate which lasts about one year. After one year the real exchange stabilizes at 0.7% above the baseline value. However, the appreciation does not seem to represent a significant worsening of competitiveness as exports display a healthy growth (Figure 7b). The relative price of nontradeables, which is a measure of the internal real exchange rate, also gradually rises by 0.3% over 3 years, possibly indicating that part of the spending increase has fallen on nontradeable goods and services (especially construction). Alternatively, the increase may reflect productivity gains in the tradeables sectors as a result of the extra investment. This would increase the equilibrium real exchange rate.

Finally, capital inflows are associated with a deterioration of several indicators of financial and macroeconomic vulnerability. Macroeconomic indicators like the sizable (temporary) current account deficit and a modest real appreciation have already been discussed. Sachs, Tornell and Velasco (1996), Radelet and Sachs (1998), Mishkin (1999) and Corsetti, Pesenti and Roubini (1998a,b) argue that a lending boom (shown in Figures 4c-4f) in itself provides indirect evidence of greater fragility of the financial system because in a climate of rapid expansion of lending average loan quality is likely to deteriorate. A similar point can be made about the construction and investment boom, which is also likely to get accompanied by declining investment efficiency (Figures 5 and 6). When adverse developments occur, more borrowers will have difficulties in making interest and redemption payments, burdening the banking system with a more serious bad loans problem. Foreign investors, and domestic residents too, may then
have more reasons to harbor doubts about the credibility of the implicit government guarantee of
the liabilities of the banking system and those of the private sector as the fiscal burden of a
potential bailout rises (Corsetti, Pesenti and Roubini 1998a,b).

Following Radelet and Sachs (1998) and Corsetti, Pesenti and Roubini (1998a,b) we look at
three ratios that may gauge the vulnerability to a run on the foreign exchange reserves. An
increase in these ratios indicates a higher degree of vulnerability. The ratio of total private foreign
debt to international reserves initially decreases due to the interventions aimed at preventing the
appreciation of the domestic currency. This ratio ultimately returns to the baseline (Figure 7f).
Hence the foreign exchange coverage of total private debt temporarily improves and does not
deteriorate over the medium term. By contrast, a similar indicator using foreign liabilities of
domestic financial institutions (commercial banks and finance companies) as the debt variable,
does worsen over time (Figure 7g). Since the foreign liabilities of the Thai financial institutions
were largely of a short-term nature, private capital inflows are associated with increases in
vulnerability to a liquidity crisis. Finally, the ratio of broad money (M2) to international
reserves is a broader measure of vulnerability, which refers to the credibility of the implicit
government guarantee of the domestic financial system (Figure 7h). This indicator, which
measures the vulnerability of a run on the reserves by domestic residents, also improves rather
than deteriorates following a private capital inflow.

We can use our empirical results for an interpretation of the Thai baht crisis. One of our main
findings is that capital inflows are associated with increased vulnerabilities, pointing to a greater
likelihood of a crisis. Sustained large private capital inflows over a long period, coupled with the
policy decisions to keep a fixed baht-dollar exchange rate and to mainly rely on monetary policy
to manage the capital inflows, gave rise to a prolonged asset market boom, lending boom and
investment boom. By the end of 1996, the cumulative effects of these booms had made the Thai
financial institutions quite vulnerable to changes in market sentiment or deteriorating expectations

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25 Radelet and Sachs (1998) found that the ratio of short-term debt to international reserves had predictive
power for the onset of a financial crisis, while the ratio of debt to international reserves did not. They took
this as evidence that the crises they studied were liquidity crises rather than solvency crises.
about their cash flows and net worth, or those of their borrowers. The foreign exchange coverage of foreign liabilities of Thai financial institutions deteriorated. Thailand also ran large current account deficits in 1995 and 1996, partly as a consequence of large capital inflows, partly as the result of adverse external shocks. The link between the baht and the dollar thus became increasingly vulnerable to speculative attacks.

However, our empirical analysis also offers supportive evidence for the view that a crisis was not inevitable. A remarkable finding is that private capital inflows do not lead to unsustainable current account deficits, as exports catch up with imports with a lag of about two years.\textsuperscript{26} The historical experience thus suggests that the large current account deficits in 1995 and 1996 should not have raised questions of external solvency. Based on the historical pattern, the current account was set to improve in 1997 and 1998, so there was no urgent need for investors to withdraw their money from the country. Consequently, the Thai baht crisis seems to be more of a liquidity crisis, in which financial panic played an important role, than a solvency crisis.\textsuperscript{27} Recognizing the vulnerabilities of the Thai financial system, some investors began to retreat from Thailand. This process quickly ensued in a scramble for the exit by foreign investors, rendering the 13-year old link between the baht and the dollar unsustainable. After the fall of the baht, capital flight hit the rest of the region as well, due to perceived similarities between Thailand and the other Asian countries, and the Asian financial crisis was born.

6. Summary and conclusions

The recent Asian financial crisis was triggered by the breakdown of the baht-dollar peg in July 1997. Since Thailand is the country where it all began, this paper aims at increasing our

\textsuperscript{26} Figure 7c shows that about 30% of the initial deterioration of the balance of goods and services still exists in the third year, while a similar phenomenon is observed for the capital inflow. After 5 years (not shown) both capital inflows and the balance of goods and services are very close to the baseline again.

\textsuperscript{27} Of course, these empirical results do not constitute a watertight proof. For instance, it is conceivable that Thailand’s current account was unsustainable because of negative external shocks. On the other hand, the surprisingly rapid recovery and return of confidence in 1999 also seems to suggest that self-fulfilling pessimism and a liquidity problems were important aspects of the crises.
understanding of the background of the crisis by investigating the effects of private financial capital inflows in Thailand in the period 1981:I-96:IV, i.e. the period before the crisis. We trace the effects of private financial capital inflows on both macroeconomic and financial variables by means of Vector Autoregression (VAR) analysis.

Our findings can be summarized as follows. Despite efforts by the monetary authorities to mitigate their expansionary effects, private capital inflows are found to be followed by higher asset prices, lower lending rates, and a surge in lending by commercial banks and finance companies to the private sector. The response of domestic spending seems to be driven by sharp increases in building and investment activity rather than a consumption boom. The current account balance temporarily deteriorates, since imports initially go up sharply, in particular those of capital goods, and exports only start to catch up after one year. There is also a modest appreciation of the real exchange rate, which does not seem to represent a significant worsening of competitiveness as it does not preclude strong export growth. Private capital inflows are associated with increases in output, while the inflationary consequences are limited. They also lead to greater integration in the world economy as both imports and exports tend to increase more than output.

Although private capital inflows bring clear economic benefits, they also give rise to a heightened vulnerability to capital flow reversals. Capital inflows encourage processes that end up in a greater vulnerability of Thai financial institutions to changes in market sentiment or deteriorating expectations about their cash flows and net worth, or those of their clients. The lending boom in the wake of a capital inflow is plausibly accompanied by declining quality of the loan portfolio. Similarly, the average quality of investment projects probably deteriorates during the surges in construction and investment that take place after capital inflows. Private capital flows are also associated with an increase over the medium term of the ratio of the foreign liabilities of Thai financial institutions to Thailand’s foreign exchange reserves, making a run on the reserves more likely. However, being vulnerable does not imply that a crisis is inevitable. The historical record for 1981-96 suggests that foreign capital flows were spent in a sustainable manner as the
associated current account deficits were temporary affairs. Consequently, the Thai baht crisis appears to bear more resemblance to an acute liquidity crisis, in which financial panic played an important role, than a genuine external solvency crisis.

Our empirical analysis can also be used to extract some policy lessons concerning the prevention of a financial crisis. Since external solvency appears to be less of an issue (at least in the Thai case), crisis prevention and containment revolves around reducing the build-up of vulnerabilities. The World Bank (1998, chapter 3) offers an overview on this topic, discussing more flexible exchange rate regimes, better regulation and supervision of domestic banks and other financial intermediaries, improvements in credit risk evaluation and monitoring capabilities of domestic financial intermediaries, capital market reform, and better corporate governance. All these measures enhance the efficiency of the process by which investment is allocated in the economy, and so limit the potential for ultimately destabilizing asset market, lending, and investment booms.

Finally, restrictions on (short-term) capital inflows, especially foreign borrowing by domestic banks, have been advocated as a means to limit the economy’s exposure to a costly liquidity crisis. The basic argument is that short-term capital inflows carry fewer economic benefits than long-term (especially FDI) inflows, but are much more prone to damaging reversals. There are of course serious doubts about the efficacy of capital controls in general. However, the Thai experience also suggests that such a policy could involve considerable costs. Our analysis points to positive output effects of private financial capital inflows, despite the fact that short-term inflows made up a large portion of total financial inflows throughout the sample period (see Table 1). This finding argues for a judicious use of restrictions on short-term capital inflows. Moreover, improved supervision of the banking sector may also induce banks to reduce foreign borrowing and to shift towards longer maturities.

28 See also Corsetti, Pesenti and Roubini (1998c) and Mishkin (1999).
Appendix. Sources and construction of the data

The main sources of the data are *International Financial Statistics (IFS)*, published by the IMF, and the Statistical Appendix in the *Monthly Bulletin* and the *Quarterly Bulletin* of the Bank of Thailand (denoted by *BOT* below). The numbers of the *BOT* Tables given below refer to the ones in the 1997 issues of the *Bulletins*. In earlier issues the relevant table may have a different number due to changes in coverage of the Statistical Appendix. Its title is usually unchanged. The sample period is 1980:I-96:IV.

The stock of private foreign financial liabilities is measured in dollars, and calculated by cumulating net private capital inflows, which are computed as net capital inflows minus net official inflows minus net foreign direct investment (FDI). Quarterly data on net capital inflows and net FDI inflows are taken from *IFS*, lines 78bd, 78be and 78bj. Quarterly net official inflows in baht are taken from *BOT* Table 44 (*Balance of Payments*), and converted to dollars using the average baht/dollar exchange rate (*IFS*, line rf). The end-1979 starting value of total external liabilities is taken from *Global Development Finance* (World Bank). The end-1979 starting value of government external debt is taken from *BOT* Table 27 (*Government External Debt*). The stock of international reserves is from *IFS*, line 1d.

National accounts data are not available on a quarterly basis. Quarterly data are constructed by interpolating annual data are taken from *IFS*, lines 90-99. For real GDP the electricity consumption, calculated as total sales minus sales to residences, is used as interpolating variable. The source of the electricity sales data (measured in kWh) is the *Quarterly Bulletin of Statistics* (Table 4.1 Electricity – Installed Capacity, Energy Generated and Sold), published by the National Statistical Office. Exports and imports of goods and services are interpolated by their respective counterparts from the Balance of Payments statistics (*BOT* Table 44), deflated by the GDP deflator. Public expenditure (public investment plus public consumption) is interpolated by the current and capital outlays by the government, deflated by the GDP deflator. The government budget data are taken from *BOT* Table 27 (*National Government Actual Expenditures by Major Economic and Functional Classification*). The GDP deflator is interpolated by the Consumer Price Index (*IFS*, line 64). Private aggregate demand, the sum of private consumption and private investment, is then calculated via the National Accounts identity, as GDP minus public expenditure minus exports plus imports.

Lending to the private sector by banks is taken from *BOT* Table 7 (*Assets and Liabilities of Commercial Banks*). That by finance companies is taken from *BOT* Table 22 (*Assets and Liabilities of Finance Companies*). Lending by banks to finance companies is also taken from *BOT* Table 22. *BOT* Table 15 (*Reserves of Commercial Banks*) contains data on bank reserves. Nonborrowed reserves are calculated as total reserves minus liquidity credits by the central bank, taken from *BOT* Table 3 (*Monetary Base*). Liquid assets of banks are taken from *BOT* Table 9 (*Main Assets and Liabilities of Commercial Banks*). Liquid assets comprise
vault cash, deposits with the BOT, other financial institutions and banks abroad, government and public sector enterprise securities, and gold. Base money is taken from IFS, line 11.

Imports of capital goods, consumer goods and consumer durables are from BOT Table 33 (Imports by Economic Classification). They have been deflated by the GDP deflator. Sales of motorcycles and vehicles (measured in units) are taken from BOT Table 61 (Domestic Sales of Manufactured Goods) for 1990-96, and from tables in the regular reports on recent economic developments in the Quarterly Bulletin for earlier years. Vehicles comprise both passenger cars and commercial vehicles, like trucks and buses. Separate series for the two types are not available for the whole sample period.

Domestic sales including imports of cement (measured in tons) are taken from BOT Table 61 for 1990-96, and from tables in the regular reports on recent economic developments in the Quarterly Bulletin for earlier years. These reports are also the source of the construction permits (measured in square meters). The relative price of construction materials is calculated as the ratio of the wholesale price subindex for construction materials and the corresponding subindex for manufactured products. Source of the data is BOT Table 66 (Wholesale Price Index for Thailand by Groups).

The interbank interest rate is taken from IFS, line 60b. The lending rate is the minimum overdraft rate taken from BOT Table 23 (Structure of Interest Rates) and from tables in the regular reports on recent economic developments in the Quarterly Bulletin. Data for 1980-81 refer to the prime rate. The source of the US and Japanese interest rates is IFS, lines 11160ldd and 60ea, respectively. The yen/dollar exchange rate is taken from IFS, line rf. The stock market index in local currency is taken from the Emerging Market database of the International Finance Corporation (IFC). Source of the real exchange rate based on consumer prices is the Information Notice System (IMF).
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