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Abstract

This paper provides a framework for examining developing-country financial crisis. It is based upon Hyman Minsky's financial fragility thesis and applied to the case of Thailand 1984-1999. There is empirical evidence for the evolution of the Thai economy through the Minskian regimes (hedged through speculative to Ponzi) in the period prior to the onset of the 1997 Asian crisis. Evidence also suggests that the Ponzi regime has two stages and that the rate of return on nonproductive speculative investment turns negative as the country entered the Ponzi regime. The diversion of foreign capital inflows to speculative investment played an important part in the deterioration of the Thai financial position. These results, if general, have strong implications for the field of country risk analysis, in particular, for the design of early warning models of financial crisis for developing countries.

Keywords: Asian crisis, country risk, developing countries, financial crisis, financial fragility, Minsky, Ponzi, Thailand

JEL classifications: F4, E1, O5, D

1. Introduction

The Asian crisis in 1997 stimulated new ideas and reconsideration of old ideas about the source(s) of financial crises. Discussion of potential sources of crisis involved implicit government guarantees on bank loans, crony capitalism, moral hazard, perception of financial fragility, etc. An important element that re-emerged was the liability structures of firms. Hyman Minsky's work is considered to be the mainstay in this arena of financial crisis theory. The scope of his analysis, however, is confined to a closed, fully developed capitalist system. To explain the Asian crisis from a Minskian point of view his work has to be extended to an open, developing capitalist system. A number of authors have tried to do just this, but, as I will argue below, their work leaves one dissatisfied with respect to the timing of the three Minskian regimes (hedged, speculative, and Ponzi).

Minsky (1975) provides an analysis of the relationship between financial crises and the evolution of the liability structure of firms over the course of a boom. A liability structure of a firm consists of the forms of liabilities (e.g. stock, debt) that were issued in order for the firm to acquire assets. A balance sheet is helpful for analyzing a firm's liability structure by summarizing the firm's assets and liabilities at a point in time. Elements of a balance sheet generate cash inflows (from assets) and outflows (from liabilities). Assets have varying degrees of liquidity (ease of conversion into cash), and liabilities have varying dates when payments fall due. As useful as a balance sheet is, a cash flow statement is even more helpful for monitoring a firm's liability structure over time by specifying the inflows and outflows of cash generated by operations, investments, and financing activities over some period of time, typically a year. This statement records the investment

decisions made by a firm as well as how investments were financed (financing decisions).

Minsky argues that the systemic instability of a closed, developed capitalist economy depends upon the evolution of liability structures of the firms that comprise it. The idea is that these structures become increasingly fragile over the duration of a boom simply through their (seemingly) independent finance and investment decisions as they strive to accumulate. By the term “fragile” he means an increase in payment commitments relative to gross profits due to a gradual increase in debt financing, especially short-term debt financing (Minsky 1995a, 85). Increased fragility of individual firms implies that the economy as a whole becomes financially unstable as well, increasing its vulnerability to a financial crisis. Financial crises, then, are endogenous, not exogenous, to a developed capitalist economy. The onset of crisis is triggered by an event or sequence of events which shake the confidence that lenders have in the ability of firms to obtain cash flows to make payment commitments. Exactly how it unfolds depends upon the institutional characteristics of the economy and how, and if, the economy’s policymakers intervene.

In the wake of the Asian crisis, a number of authors have made attempts to extend Minsky’s analysis to an open, developing capitalist economy.¹ Gary Dymksi (1999), for instance, argues that opening the capitalist economy (developed or developing) permits large capital inflows to create “imbalances” if the economy lacks the institutional mechanisms to channel the flows properly into investment projects. Specifically, if an economy lacks the proper institutional structure to channel the inflows into productive investment (purchase or construction of real assets), away from speculative investment (purchase of claims to real assets), the inflows exacerbate an asset bubble. This bubble becomes a new source of a Minsky crisis, a source which is independent of the primary

source of instability - the evolution of firms' liability structures over the course of a boom. A crisis erupts whenever investors' confidence weakens to the point that capital inflows slow or reverse. Slowing capital inflows, or reversals, puncture the asset bubble and trigger a debt-deflation process, which is made worse by a weakened exchange rate. The idea of an asset bubble in a Minskian framework is not new, but the implication of the source of the flows which drive the bubble is: Minsky cycles are not necessary to generate a Minsky crisis. Financial crisis can occur at any point during the business cycle in an open economy (developed or developing). Dymski argues that financial crises are more likely to occur in developing countries as they tend to lack the institutional mechanisms (e.g., capital controls) to channel inflows towards productive investments. Yilmaz Akyüz (1998) also cites the lack of proper institutional mechanisms as exacerbating a Minskian process within an open, developing country.

Jan Kregel (1998) argues that an open (developing or developed) economy is vulnerable to a financial crisis much earlier in the business cycle than what Minsky's closed, developed economy model suggests. This is due to the margins of safety needing to be higher for firms in open economies in order to absorb the effects of exogenous changes in foreign interest rates and exchange rate upon cash flows. Margin of safety is defined as the difference between cash flow generated from assets and cash flows generated by liabilities by a sufficient cushion to absorb unforeseen changes in either of these two flows (Kregel 1998, 3). For example, if international interest rates increase, the payment commitments increase for domestic firms who borrow abroad. If a widening interest rate spread triggers capital flight and the devaluation of domestic currency, the interest rate effect upon cash flows is compounded. Furthermore, if domestic policy is to raise domestic interest rates to protect a weak currency, then cash flow problems are made even worse.

So, unlike Dymksi, Kregel believes the susceptibility to a financial crisis depends upon the economy surpassing a particular point in the business cycle, not at any time, and that point occurs where firms' margins of safety become too thin. In effect, Kregel is widening the range of time over a boom in which financial crises is likely to occur. Note that, like Dymksi, Kregel views the trigger of a financial crisis as exogenous to the domestic economy.

Philip Arestis and Murray Glickman (1999) put forth a Minskian analysis which suggests that, like Kregel, financial crisis in an open economy arrives earlier than in a closed economy by arguing that the Minskian stages be redefined to include the effects of exchange rate fluctuations along with vulnerability to increases in the interest rate. However, unlike Dymksi and Kregel, the authors argue the trigger to crisis can be either domestic or foreign in origin.

All of these studies lend theoretical and empirical support to the correspondence between the events in Asia and Minsky's Financial Instability Hypothesis. However, they provide little help on how to monitor an economy for the timing of the onset of Minskian phases in an open economy, developed or developing. If anything, matters are made worse by arguing a financial crisis in open, developing countries can occur either at any time (Dymksi) or over a broader range of time during a business cycle (Kregel, Arestis-Glickman). By broadening the range of time over a business cycle in which a financial crisis may occur these analyses seem not only devoid of providing a way to assess the status of an economy with respect to the Minskian regimes, but also suggest it is useless to do so as the triggers of financial crisis, domestic or foreign, are not predictable.

Using a Minskian analysis of an accounting framework, developed by Duncan Foley (2001), this

paper will attempt to provide a rough guide to the health of an open economy by examining the relationships between the rates of profit, interest, and accumulation over time. It is argued that as the economy shifts into the speculative position (the second Minskian regime), via a falling rate of profit on productive investment (investment in production of goods and services), capital flows are increasingly diverted from productive investment into speculative investment (investment in claims to real assets for capital gain) in an attempt to secure funds for investment and to pay debt service. However, this investment strategy is proven to be short-lived as the health of the economy continues to deteriorates and slips into the Ponzi regime (the third Minskian regime).

This evolution process through the Minskian regimes is supported by empirical evidence from Thailand prior to the Asian crisis. In fact, the data reveal potentially significant information about the characteristics of the onset of the Ponzi regime and of a financial crisis. The most important characteristic is that an economy enters the Ponzi regime prior to the onset of a financial crisis. Other characteristics the data exhibited were: (1) the Ponzi regime may consist of two parts, financial crisis being the second part, (2) the first part of the Ponzi regime is characterized by the start of the deflation of the stock market, (3) the financial crisis is characterized by a negative rates of return on productive and speculative investments, and (4) currency devaluation occurs after the onset of financial crisis. These results may have important implications for public and proprietary country risk assessments, which completely missed the timing of the Asian crisis in 1997.

2. Minskian Analytical Framework

Hyman Minsky's Financial Instability Hypothesis is based upon the idea that over an extended tranquil period the success of past investments prompts firms to become less risk averse and to

gradually change their portfolios in such a way that the time series of future cash flows generated by assets become increasingly destined to fulfill the time series of debt service payments generated by liabilities. (A tranquil period is a period in which the economy expands with only minor recessions (Minsky 1995a, 85).) Specifically, firms become less risk averse because “the value of portfolio liquidity” declines when cash flows yielded from operations are strong (Minsky 1991, 162). Portfolios will change over time as they reflect investment and financing decisions which firms make in order to survive and grow in a competitive environment.

Indebtedness not only increases, but it becomes more short-term for two reasons. First, the production of output tends to be of a short-term nature, and, so, requires short-term financing (Minsky 1980, 506). Second, the interest rate on short-term debt is less than the interest rate on long-term debt in a tranquil period, as agents think they have better knowledge about the short-term than they do for the long-term in a world filled with uncertainty. This being the case firms begin to introduce rollover financing to increase their bottom lines (Minsky 1995b, 203). Implications of refinancing are: (1) debts grow faster than profit on productive investment, if the interest rate is constant or rising, and (2) demand for financing becomes more and more inelastic to changes in the interest rate (Minsky 1980, 517). Increased indebtedness of individual firms and its short-term nature gradually render the entire economy susceptible to interest rate increases and to weakening cash flows.

Minsky (1991, 1995b) classifies firms into three types: hedged, speculative, and Ponzi. The classification of firms is based upon the sources and uses of funds. In a simple cash flow accounting framework, sources of funds can be defined as internal (profit) and external

(borrowing). Funds are used for debt service payments (interest payment plus some fraction of the principal) and/or for new investment:

$$\textit{Sources} = \textit{Uses}$$

$$\textit{profit} + \textit{borrowing} = \textit{investment} + \textit{debt service} \quad (1)$$

A firm is classified as hedged when its profit is greater than the sum of investment and debt service payment, implying the firm is able to reduce its (net) debt burden. A speculative firm is one whose profit is greater than its debt service payment, but not quite enough to cover both debt service and all of investment. An implication is part of the firm's investment is paid for with new borrowing, so the debt burden is increasing. This is common behavior for a growing enterprise. A Ponzi firm is one whose profit does not cover its required debt service payment. The firm must borrow in order to meet its debt service obligation; here, too, the firm's debt burden is increasing.

Using these classifications, Minsky progresses to the macro-level by visualizing firms within an economy as being distributed along a line, where financial robustness is at one end and financial fragility is at the other. The placement of a firm along this line depends on the relationship between its debt service and cash flow – i.e., its classification. A hedged firm is considered to be robust, and a Ponzi firm is considered to be fragile. At the start of an upswing firms are generally classified as hedged, and, so, the economy, as a whole, is viewed as financially robust. As the boom proceeds, firms increase borrowing to pay for new investment and/or to increase their bottom lines by taking advantage of low interest on short-term debt. Consequently, the liability structures of firms become increasingly classified as speculative or Ponzi, and the distribution of firms shifts along the line away from robust towards the fragile end. This shift in the distribution of firms gradually leads the

economy into increasing financial vulnerability (Minsky 1995b, 200-201).

According to Minsky, then, the simple act of borrowing to finance accumulation is a primary determinant of instability in a capitalist system (Minsky 1980, 520). How a financial crisis unfolds depends upon the institutional characteristics of the economy and how, and if, its policymakers intervene, but the basic scenario is as follows. As the proportion of debt service payments rises relative to firms' cash flows, financial institutions become increasingly exposed to failures in asset performance (nonperforming loans). When cash flows into financial intermediaries fall, they become more risk averse and cut exposure by decreasing loans for consumption and investment (Minsky 1995b, 198). The decline in granting new loans and in refinancing old ones means the supply of finance drops, and, so, investment drops. As investment drops, profit falls, further diminishing the cash flows of firms and increasing the proportion debt service paid out of cash flows. The interest rate rises as the supply of financing falls and (increasingly inelastic) demand for financing increases, worsening the liquidity situation of firms and the terms on which any new financing is made. Eventually, firms resort to selling assets to acquire cash to make debt payments. As prices of assets and stocks decline, consumption and investment fall, worsening cash flow problems of firms and banks (and a debt-deflation process ensues).

The Lance Taylor-Stephen O'Connell (T-O) model (1989) is a Minskian macro-model that pertains to a closed, developed capitalist economy. The model stresses two assumptions. First, total wealth in the system changes with confidence and with the position of the system in the business cycle. Second, in certain settings asset substitutability in portfolios becomes high, increasing the potential for capital flight or a shift into money from claims to real assets (Taylor-O'Connell 1989, 9).

What role does financial fragility of firms play in the T-O model? The authors argue firms' net worth changes over an expansion. A firm's net worth is defined as assets minus liabilities; assets consist of the capitalized value of its plant and equipment, and liabilities consist of the value of its equity. According to T-O, net worth is negatively related to the interest rate and positively related to the rate of profit. As the early part of a boom is characterized by a rising rate of profit and a falling interest rate, the net worth of firms is increasing (i.e., they are in a hedged position). They borrow against new net worth in order to expand their businesses. At the top of an expansion, the ratio of debt to net worth ("gearing" or "leverage") rises as growth in net worth slows, and, so, firms shift from hedged to speculative to Ponzi.² After the peak, the exuberance component of the total rate of profit, which represents overall state of confidence, begins to fall, and, in turn, slows capital accumulation and raises the ratio of money to debt (provided the government holds the growth of money supply constant). Price of capitalized assets falls, leading to a decline in investment and a further decline in profit. As long as the rising money-debt ratio stimulates a drop in the interest rate, causing the exuberance factor and the total profit rate to rise, then investment will pick up and stimulate a recovery. In an environment of high asset substitutability, however, the money-debt ratio is likely to fall, not rise, implying that the interest rate will increase instead of decrease. Hence, the reversal of the exuberance factor component of the total profit rate and the pickup in investment are stymied. A recovery is hampered so long as the profit rate declines and rentiers are further driven towards holding money. Taylor and O'Connell indicate that bankruptcies can replace high asset substitutability in the generation of unstable dynamics in a monetary contraction (Taylor-O'Connell 1989, 14-15). The authors argue the lack of coordination of firms' independent portfolio decisions triggers changes in total wealth, generating financial crises via a

Fisherian debt-deflation process (Taylor-O'Connell 1989, 3-4).³ Crisis in this model occurs when the economy is in a phase of the business cycle where asset substitution is high relative to that found in the earlier stages of the cycle. Note, the expansion and contraction is intensified by the presence of financial intermediaries, whose assets and liabilities expand and contract with the expansion and contraction of the economy; expansion is characterized by rising rate of profit and falling interest rate, and contraction is characterized by falling rate of profit and rising interest rate.

Foley (2001) notices that, according to the assumptions made by the authors, the T-O model cannot shift out of the hedged position into more financially fragile states. Specifically, the T-O model assumes a closed economy in which the growth rate is defined to be a fraction of the rate of profit, the fraction being the savings rate of rentiers (out of profit). The model needs two modifications in order to illustrate how the economy shifts between the Minskian classifications: (1) allow the rate of investment to exceed the profit rate and (2) work with an open economy rather than a closed economy.

To incorporate these modifications, Foley begins with an analysis of the firm, specifically focusing upon its financial dynamics. As mentioned above, the financial structure of a firm is summarized by its balance sheet statement. The two main components of a balance sheet, assets and liabilities, define a firm's net worth: net worth (N) = assets (A) – liabilities (B). A firm is called insolvent when its net worth is less than or equal to zero. Change in net worth equals change in assets minus change in liabilities, where the dots indicate time derivatives: $\dot{N} = \dot{A} - \dot{B}$.

One can shift the change in net worth from being defined on balance sheet items to items found in

the cash flow statement, since the cash flow statement gauges flows of cash into and out of a firm over a period of time. Change in assets is simply investment (I), and change in debt is new borrowing (D). These two elements enter into the simple cash flow statement of a firm that we saw before:

$$R + D = I + V \quad (2)$$

where R is profit and V is debt service payment. A firm's debt contract is simply the finance it receives in exchange for debt service (stream of interest and principal payments); bankruptcy occurs if a debt service payment is missed. The path of a firm's financial health, and solvency, can be described by the growth and profit rates of its assets and by the interest rate. To see why start with equation (2), subtract R from both sides, divide I and R by the firm's assets (A), and divide V by the firm's stock of debt (B):

$$D = (g-r)A + iB \quad (3)$$

where r is the profit rate (R/A), i is the interest rate (V/B), and g is the rate of growth of firm's assets (I/A). For the economy as a whole, or for the representative firm, a similar equation results where the capital stock (K) is used in place of A as the denominator for r and g and where the current account deficit is taken to be new external borrowing (D). (Recall, if the balance of payments is to equal zero, then the current account is essentially the negative of the capital account.) Thinking of the economy in terms of a representative firm, then, financial fragility of the system evolves along a path traced by the combination of the rates of interest (i), profit (r), and growth (g).

What are the Minskian classifications for an economy's financial state according to the Foley

framework? The economy is called “hedged” when the rate of profit (r) is greater than the rate of accumulation (g) and the rate of interest (i): $r > g > i$ or $r > i > g$. Under these conditions, debt service is paid out of profit and new investment is covered by a combination of profit and borrowing. The economy is in the speculative state when the rate of accumulation is greater than the profit rate: $g > r > i$. If the interest rate rises, debt service payments can still be made, as long as they do not exhaust profit obtained from productive investments. As soon as the interest rate becomes greater than the profit rate, the economy passes into the Ponzi state: $i > r$. In this state, the economy is vulnerable to financial crisis or is financially fragile. Solvency is now entirely dependent upon creditors’ confidence in the economy’s ability to generate revenue. If this ability is perceived to be impaired, creditor confidence will diminish (Foley 2001, 4-7).

The above description of the evolution of financial fragility suggests that monitoring the trends in g , r , and i , and the relationships between the trends, could assist the assessment of a country’s vulnerability to financial crisis. For instance, the transition from the hedged regime to the speculative regime suggests that rate of profit is falling relative to the rate of accumulation, enabling the switch from $r > g$ to $g > r$. Likewise, the shift from the speculative regime to the Ponzi regime suggests that the rate of profit is falling relative to the interest rate, enabling the shift from $r > i$ to $i > r$.

Further accuracy in such an assessment could be achieved by incorporating the presence of speculative investment. As a boom progresses the rate of profit on productive investment has a natural tendency to fall and to become more uncertain. Capital is diverted from away from productive investment towards speculative investment as firms attempt to offset increasingly

uncertain, lower expected returns on productive investment with relatively higher, seemingly more secure expected returns on speculative investment in the stock market and in real estate, “more secure” due to the short-term nature of the investment. This diversion tends to inflate asset prices. Capital inflows that specifically seek short-term gains will exacerbate this tendency. Increased speculative investment, relative to productive, enhances the system’s vulnerability to financial crisis as it relies on investors’ confidence, which can shift quickly.

3. Evolution of Thailand Through the Minsky Regimes

The framework was examined using annual and quarterly data for Thailand prior to and during its recent crisis. Interested readers are referred to the Appendix for data sources and details on the construction of the figures used. The period of 1984 - 1999 was used for the annual figures, and the period of 1st quarter 1984 - 4th quarter 1999 was used for the quarterly figures. It is important to stress that the rates used in Foley (2001) are average rates. For instance, the profit/capital stock definition of the rate of profit is the rate of return on all pre-existing capital and is thought to be a good approximation to the long-run return on new investment. Similarly, capital accumulation, defined as investment relative to capital stock, is the average increase in capital stock. The Thai lending rate is the minimum interest rate that banks charge to their prime customers for a loan (the MLR); note, because of its sensitivity to market conditions, the repo rate is indicated in endnotes for those periods in which data for this rate are available. The repo rate is the interest rate used in the sales and purchases of bonds, for which the payment of principal and interest are guaranteed by the government, by financial institutions who are members of the repo market.

The figures for annual average rates of profit, interest, and growth are illustrated in graph 1, and the

quarterly figures are illustrated in graph 2. According to the average rates, the Thai economy is in the hedged regime ($r > g$) for all years, 1984-1999, including those in which Thailand was obviously in financial distress (1997-98). The average rates, although moving correctly, do not move so drastically as to shift between the Minskian states.

graph 1 (annual, average rates) here

graph 2 (annual, quarterly rates) here

If one recognizes that investment flows are driven by the short-term, or incremental, rate of return on new investment, a different picture emerges. According to Shaikh (1996), the near-term rate of return is what firms use to make decisions about undertaking new investment projects, because in a world of uncertainty the incremental return is a better guide than the average rate to what firms can expect to receive on the investment of new funds, given the prevailing market conditions. The incremental profit rate, thus, acts as a signal which directs capital flows. This rate will then influence the pace of capital accumulation. For instance, if the incremental rate of return starts to decline, and remains declining over time, then one can expect the pace of capital accumulation to decline as well, with some time lag. The incremental rate of profit (r') is defined, a la Shaikh, as the change in profit divided by change in capital stock (prior period investment): $r' = \Delta R / \Delta K = \Delta R / I_{t-1}$, where $\Delta R = R_t - R_{t-1}$, $\Delta K = K_t - K_{t-1} = I_{t-1}$. The incremental profit rate tends will be more volatile than the average rate as it reflects cyclical, short-term changes in aggregate demand. If one places all series on an incremental, rather than average, basis, it would be difficult to determine the trends from an incremental analysis because of the noise they contain. Incremental capital accumulation (g') is defined as $\Delta I / \Delta K = \Delta I / I_{t-1} = \% \Delta I$, where $\Delta I = I_t - I_{t-1}$, $\Delta K = K_t - K_{t-1} = I_{t-1}$, and incremental

interest (i') as $\Delta V/\Delta B = \Delta V/D_{t-1}$, where $\Delta V = V_t - V_{t-1}$, $\Delta B = B_t - B_{t-1} = D_{t-1}$.

Replacing the average profit rate with the incremental profit rate in the annual figures yields graph 3. The figures indicate the Thai economy was in the hedged regime from 1986 through 1990. The incremental rate of profit is greater than the rate of capital accumulation, which, in turn, is greater than the interest rate: $r' > g > i$. Over this time period, the rate of profit (r') averages 31.9%, capital accumulation (g) averages 20.1%, and the interest rate (i) averages 12.5%. The rate of profit hits its peak (44.4%) in 1987 and then began to decline the following year. The rate of capital accumulation increases from 1986, and hits its peak (24.8%) in 1990 – 3 years after the peak in the rate of profit. The rate of interest declines slightly in 1987 and then ascends for the rest of this stage.

Graph 3 (annual Minsky chart) here

From 1991 to 1994 the Thai economy is in the speculative regime. Capital accumulation is greater than the incremental rate of profit, which, in turn, is greater than the interest rate: $g > r' > i$. Over this time period, the rate of profit averages 21.3%, capital accumulation averages 21.5%, and the interest rate averages 12.4%.⁴ The rate of profit on new investment continued the descent it began during the hedged regime, struggling to recover in 1992 and in 1994. Capital accumulation also declined in this stage after hitting its peak in 1990. The rate of interest reverses its climb in 1992.

From 1995 to 1998, the annual figures indicate the Thai economy is in the Ponzi regime. The interest rate is greater than the incremental rate of profit: $i > r'$. Over this time period, the rate of

profit averages -12.0%, capital accumulation averages 14.4%, and the interest rate averages 13.7%.⁵ In 1997 the rate of profit turns negative, and the pace of capital accumulation slows more rapidly. The Thai economy, then, arrived at the Ponzi state two years prior to the onset of the financial crisis, with financial crisis arriving about the time that the rate of profit on productive investment turned negative.

The Thai economy snaps back into the hedged regime in 1999. This can be attributed to productive investment contracting to such an extent that the change in profit relative to prior period investment, the definition of the incremental rate of profit, simply yields a higher rate of profit. In 1999, the rate of profit is 53.6%, capital accumulation is 6.2%, and the interest rate is 9.0%.

Quarterly figures tell a similar story with respect to the timing of the onset of the Ponzi regime, see graphs 4, 5, and 6. The Thai economy is hedged in 1986-90 ($r' = 29.2\%$, $g = 19.4\%$, $i = 12.5\%$), speculative in 1991-94 ($r' = 20.7\%$, $g = 21.9\%$, $i = 12.4\%$), and Ponzi in 1995-98 ($r' = -19.2\%$, $g = 15.7\%$, $i = 13.7\%$). The quarterly data reveal that the economy has the potential to swing between Ponzi and hedged regimes while in the speculative state. The figures also reveal more detail on the timing of entry into the Ponzi phase (1st quarter 1995) and when the rate of profit turns negative (1st quarter 1997). Note, in both the annual and quarterly figures, the boundaries of the regimes are not as clear cut as they seem due to, for instance, certain components of profit being unavailable for servicing debt.

Graphs 4, 5, and 6 (quarterly Minsky charts) here

4. Relationship of the Incremental Rate to the Foley Model

How does the incremental rate fit into the Foley model? It would appear that it is important to distinguish between the long-term and the short-term. According to the long-term view, the Thai economy was healthy as it was hedged according to the average rates of profit, interest, and capital accumulation right through the crisis. That is, the (average) rate of profit generated by the existing capital stock was greater than the rates of capital accumulation and interest. In the long-term not only could profit of existing capital stock be expected to cover new investment, but debt service payments and repayment of principal on loans as well. In the short-term, however, the incremental profit, or the profit from new investment, was declining and declining fast, see graph 7. Whereas the Thai capital stock was yielding a return that indicated the long-run return was very high, the declining return to new investment meant, in the short-term, firms were struggling to obtain funds to make payment commitments and for additional investment. This placed pressure on firms to find money from somewhere fast, and they did by diverting part of funds for new investment in productive activities towards speculative investment.

Graph 7 (incremental vs. average rate of profit) here

With respect to speculative activity, the first thing to note is that during the hedged regime the incremental rate of return on productive investment hits its high in 1987, and is nearly maintained through 1988, according to the quarterly figures, and then drops nearly 50% in 1989, see graph 8. The annual real stock market rate of return (stock mkt r) appears stable (low-mid 30%'s); the average for the period is 34.9%.⁶ The rate of return on productive investment averaged 31.9% for

this phase, and falls below the stock market rate of return in 1988 & 1989. Speculative investment on the Stock Exchange of Thailand (SET) appears to pick up speed in 1989, as one would expect if firms attempt to offset a declining rate of return on productive investment with rate of return on speculative investment.

Graph 8 (Annual Minsky chart w/stock mkt r) here

In the speculative regime (1991-94), the real stock market rate of return averaged 15.4% per annum, which is less than the incremental profit rate (21.3%). This can be attributed to a mild recession Thailand experienced in late 1991-92. Towards the end of this stage, the stock market rate of return is again greater than the return on productive investment and near its pre-recession levels (27.4% in 1993 and 33.8% in 1994). The rate of return for real estate investment (RE ror), see graph 9, can be calculated for the speculative regime and part of the Ponzi regime. Please note, to date, the real estate rate of return calculation is limited by the availability of data. It appears to indicate that speculative investment in real estate accelerates towards the end of the speculative period.

Graph 9 here

In the Ponzi regime (1995-98) the real stock market rate of return averages -30.1%. The entire period is characterized by negative annual rates of return for the SET. 1995 is the first time since 1991 that the rate of return is negative; it remains negative in 1996, whereas in the earlier recession, which occurred during the speculative regime, the stock market rate of return exhibits much more resilience by heading back to the positive territory quickly. The crisis (1997) is characterized by

plunge in the speculative rate of return as capital inflows reverse. In 1995 the rate of return on real estate investment hits a peak of about 13%, and it begins to decline in 1996.

5. Summary of Results

Summarizing the trends of r' , g , i , and d within the Minsky regimes suggests the following. The hedged regime ($r' > g > i$) is characterized by rising incremental rate of profit (begins to decline towards end of phase – starting 1988), increasing interest rate, increasing capital accumulation, and worsening current account: $\uparrow r' + \downarrow d = \uparrow g + \uparrow i$. The rate of return on the stock market becomes greater than the rate of return on productive investment towards the end of this phase, stimulating speculative investment in the stock market.

The speculative regime ($g > r' > i$) is characterized by declining rate of profit, declining interest rate, declining capital accumulation, and improving current account: $\downarrow r' + \uparrow d = \downarrow g + \downarrow i$. The trends in all rates reverse themselves from the previous stage, although the rate of profit began its descent late in the hedged phase. Note at the end of this regime there is an uptick in the interest rate, perhaps indicating some tightening in the loan market. Although the rate of return in the stock market regains its position of being greater after the recession, its average rate of return over the period is less than that on productive investment. The strategy of offsetting a declining rate of profit with rate of return on speculative investment did not work.

The Ponzi regime ($i > r'$) can be viewed as having two stages: pre-crisis and crisis. The pre-crisis stage is characterized by a declining rate of profit, declining capital accumulation, and little change

in the interest rate and the current account, although there is an initial worsening of current account between the transition of speculative and Ponzi regimes: $\downarrow r' + d = \downarrow g + i$. In a sense, the first stage of Ponzi regime is the calm before the storm. Stock market, however, starts to deflate as holdings are sold off to pay for debt service and operating expenses. The crisis erupts as the second stage of the Ponzi regime, triggered by some event or series of events that shakes investor confidence. Crisis, in 1997, is characterized by sudden increase in the interest rate, a negative rate of profit and continuing negative rate of return on stock market, a dramatic slowing of capital accumulation, and an improving current account (which was enhanced later by the devaluation of the baht).

6. Implications of Results for Earlier Extensions of Minsky's Analysis

What are implications for earlier extensions of Minsky's model to open, developing countries?

First, these results would appear to question Dymski's argument that a financial crisis is not only unrelated to Minskian cycle, but can occur at any time during the business cycle, depending upon shifts in investor confidence. The actual onset of crisis appears to be triggered by investor confidence, but the economy must be running out of steam in order to make investors nervous and willing to pull the plug on new loans and from taking positions in speculative investments. Note, the stock market rebounded from a mild recession in the speculative phase; however, it did not rebound when downturn occurred in the Ponzi regime.

The above results also pose problems for Kregel's scenario. Although Kregel links financial crisis to the Minsky cycle, large capital inflows appear not to push forward the onset of financial crisis, but pushed it back in time. The reason being that large capital inflows can keep the rate of return in

stock market higher than they would have been otherwise. This enables firms to use speculative returns to mask a falling rate of profit on productive investment – longer. As noted above, however, this is a temporary situation as a falling rate of profit on productive investment must, at some point, begin to impact the prices of financial assets.

Finally, the results call into question Arestis-Glickman's argument that the Minskian stages should be redefined to include currency fluctuations. In the case of Thailand, the exchange rate was essentially pegged to the U.S. dollar; Thai banks were not hedged and were dependent on the exchange rate policy of the Thai central bank. This means that the exchange rate fluctuations were not a factor in setting up the conditions for financial crisis. However, the pressure that leads up to financial crisis was felt by the central bank as a loss of reserves, which is conducive to currency crisis. To include exchange rate fluctuations in an attempt to incorporate the impact of a weakening domestic currency or currency crisis, a natural extension of financial crisis, implies one would be analyzing the Minskian framework for symptoms of currency crisis, not a financial crisis. Thus, the Minskian framework would be left with little value for monitoring an economy for the timing of a financial crisis.

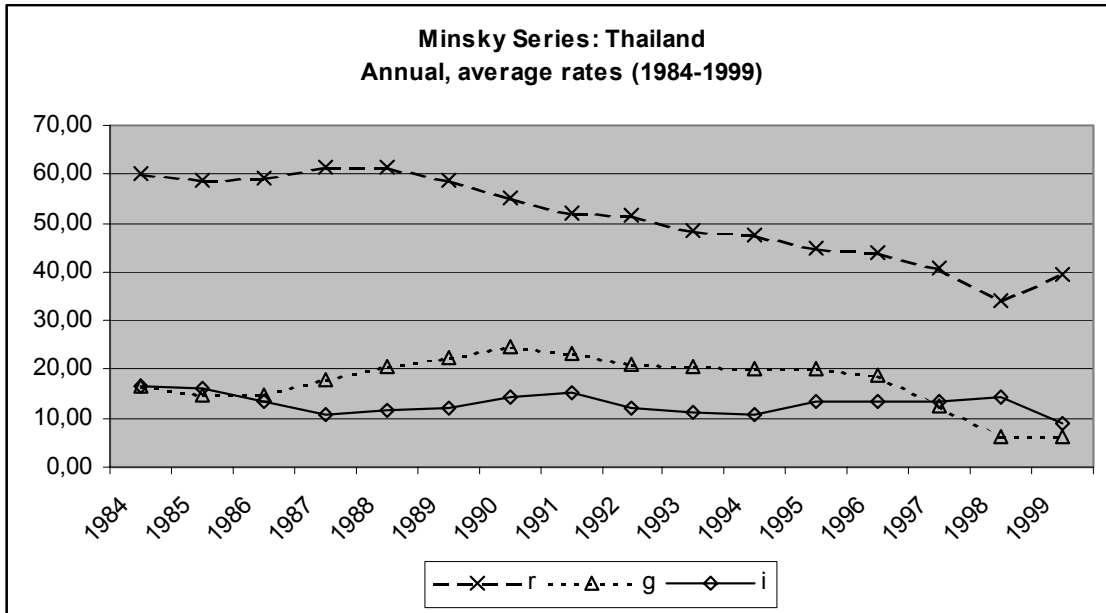
7. Implications for Country Risk Assessment Methodology

It's important to stress that the onset of the crisis begins in the first quarter of 1997, about six months prior to the devaluation of the baht and that the Ponzi phase begins about two years before the onset of the crisis. What would be the implications for public and proprietary country risk assessments? The most important implication is that an economy may enter the Ponzi regime prior to financial crisis. Country risk assessments are typically early warning systems designed to assess

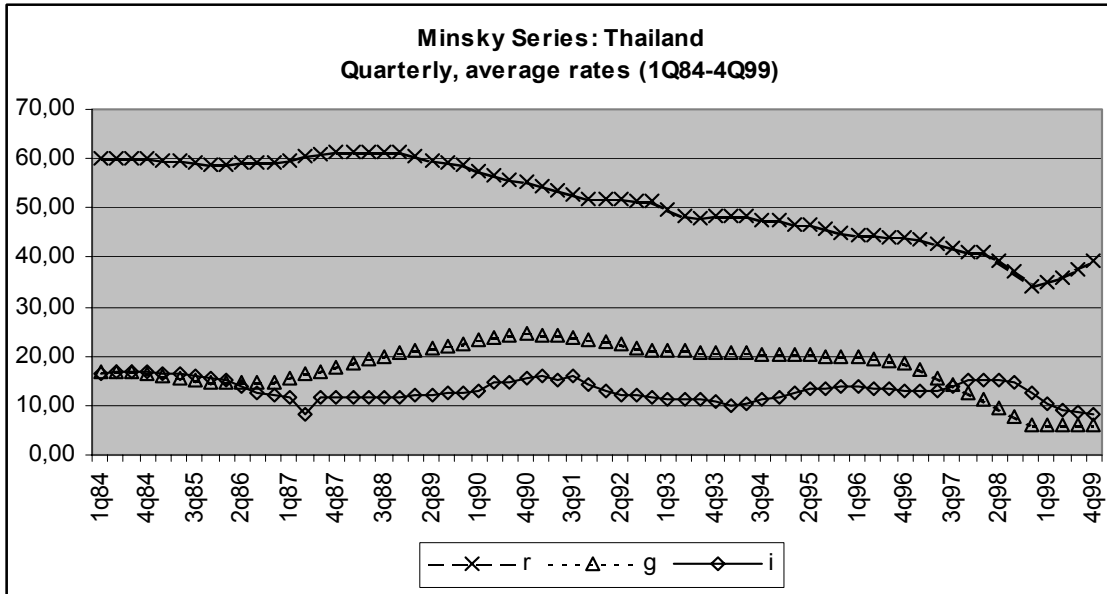
the probability that publically-guaranteed debt is rescheduled, that problems arise in remitting payment cross borders, or that changes in social-economic conditions affect profitability of business investment, typically, investment of international financial firms. The assessments are basically monitoring for characteristics or results of crisis, not the health of an economic system. For example, a problem with cross-border payment and/or profit remittances is characteristic of currency crises. Also, social upheaval generally occurs as a result of economic crisis. If country risk assessment models are monitoring for characteristics or results of financial crises, they are essentially useless in monitoring for the conditions leading to the onset of financial crisis.

A proper country risk assessment design would also include analysis of institutions. Two institutions are particularly important: banking system and industrial policy. The banking system needs to be monitored as this is the source of financial stability, as per Minsky. Industrial policy needs to be checked to see if capital inflows are being allocated to productive investment rather than speculative investment. The latter, if left unchecked, can exacerbate an assets bubble by fueling a high rate of return on speculative investment, increasing susceptibility to financial crisis by creating a trigger in the form of a sudden change in investor confidence. However, these two institutional checks are necessary for both developed and developing countries. What would be special about the scenarios for developing countries? It is widely recognized that developing countries have been under tremendous pressure to conform to neo-liberal vision of a sound capitalist economic structure in an effort to secure future capital flows which are so sorely needed to develop their economies and raise the standards of living of their citizens. In other words, they are under tremendous pressure to create exactly the economic environment that natures financial instability. What is needed in these countries are institutions to act as thwarting mechanisms to

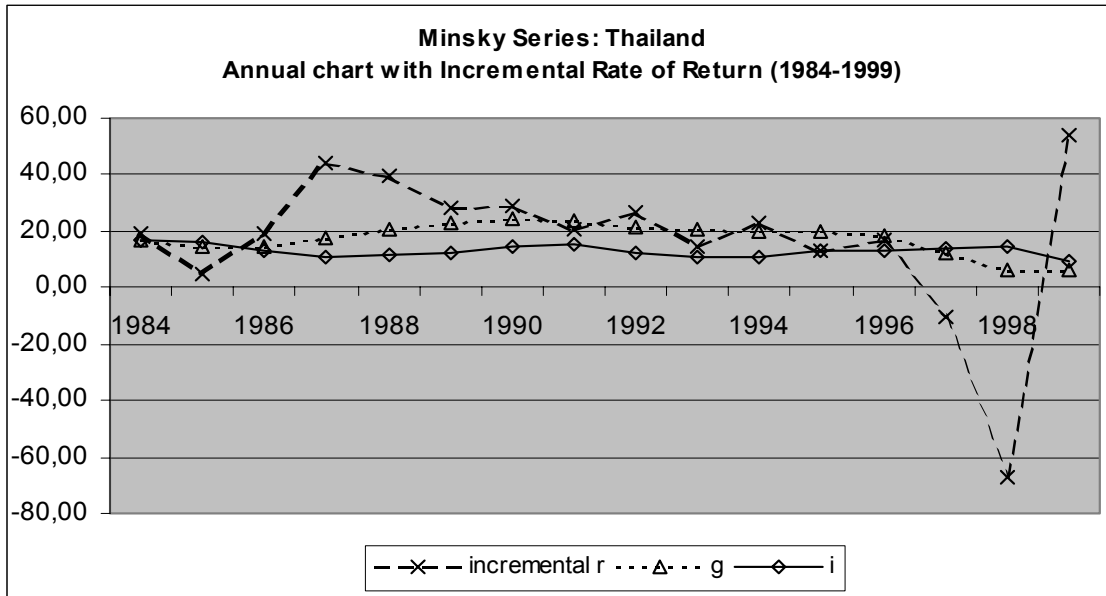
stem instability, and the forms of these institutions should not mimic, without question, those of western institutions. The institutional forms or thwarting mechanisms need to be designed specifically to each socio-economic structure in order to adequately provide the framework for enhanced stability. However, it is unrealistic to expect that a well-designed institutional configuration can completely contain instability, especially in a period of rapid economic development.



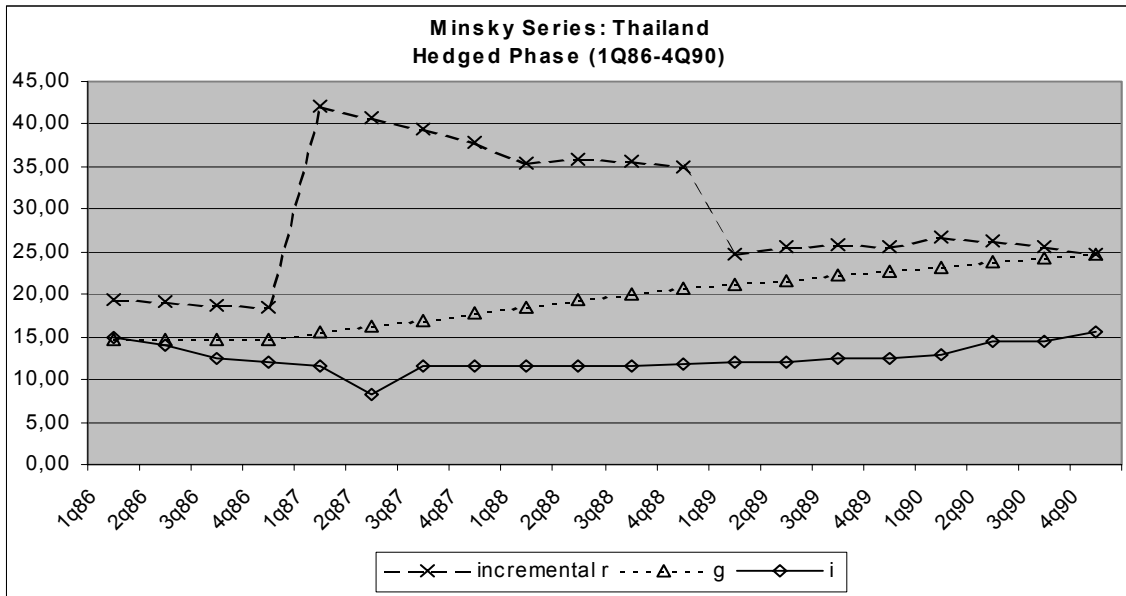
Graph 1



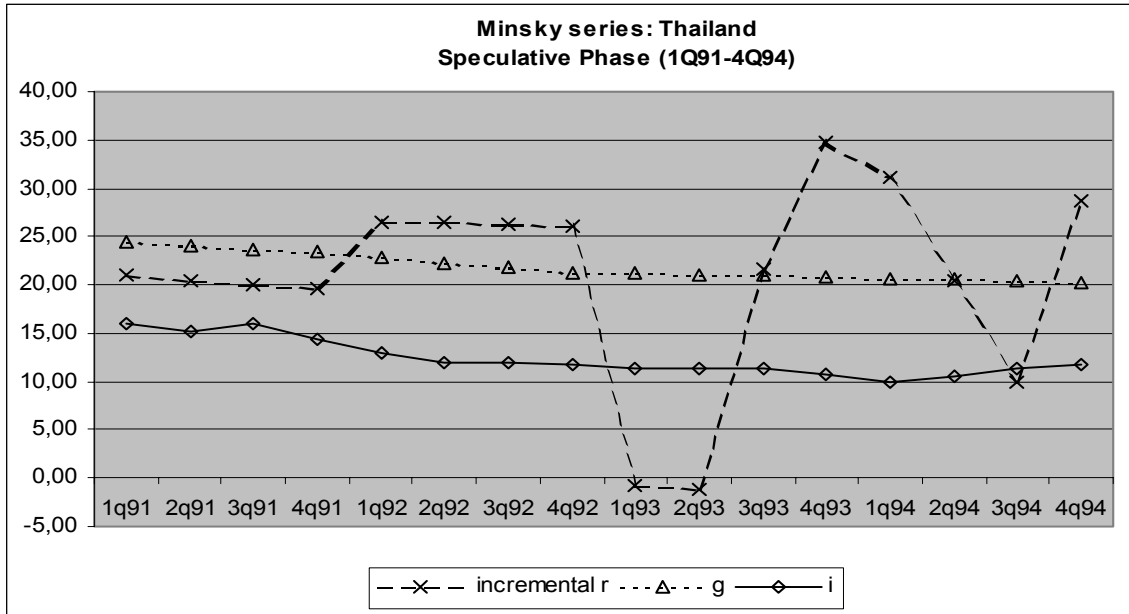
Graph 2



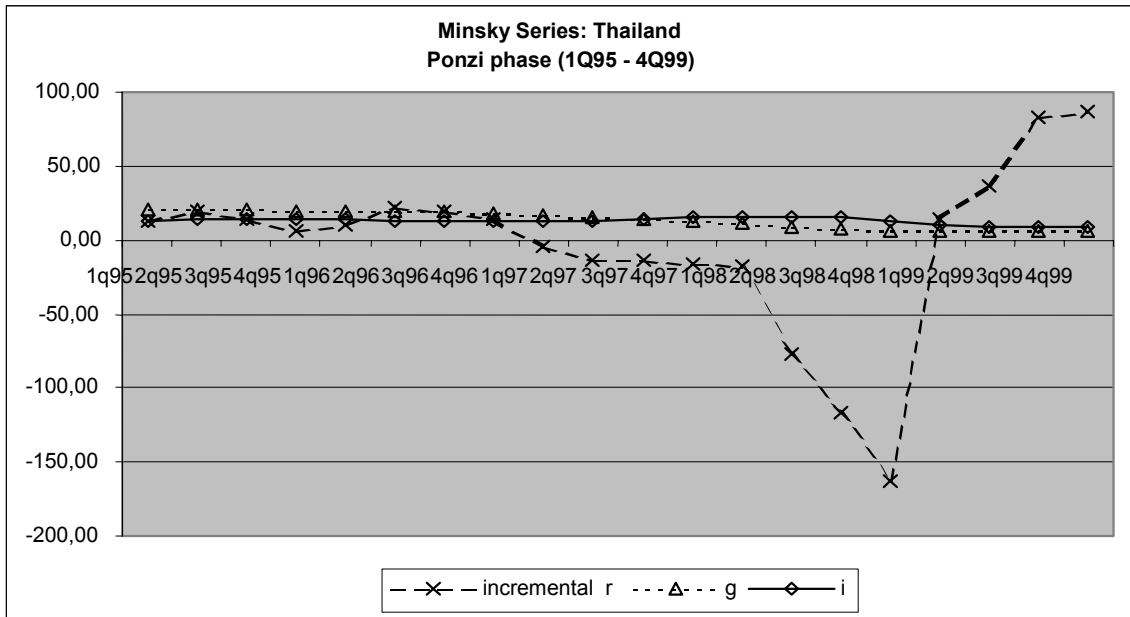
Graph 3



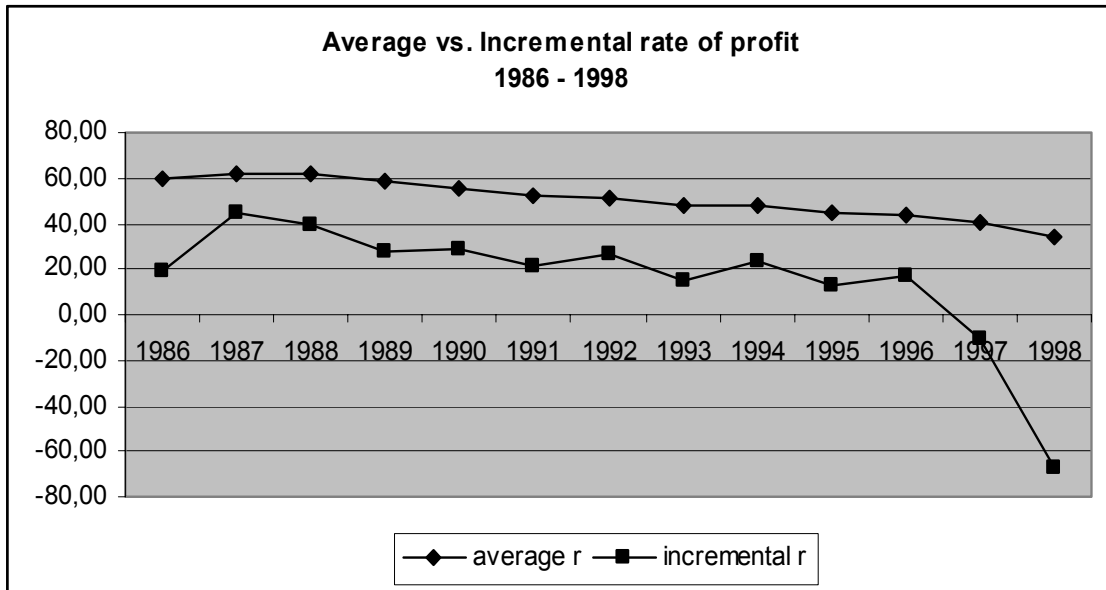
Graph 4



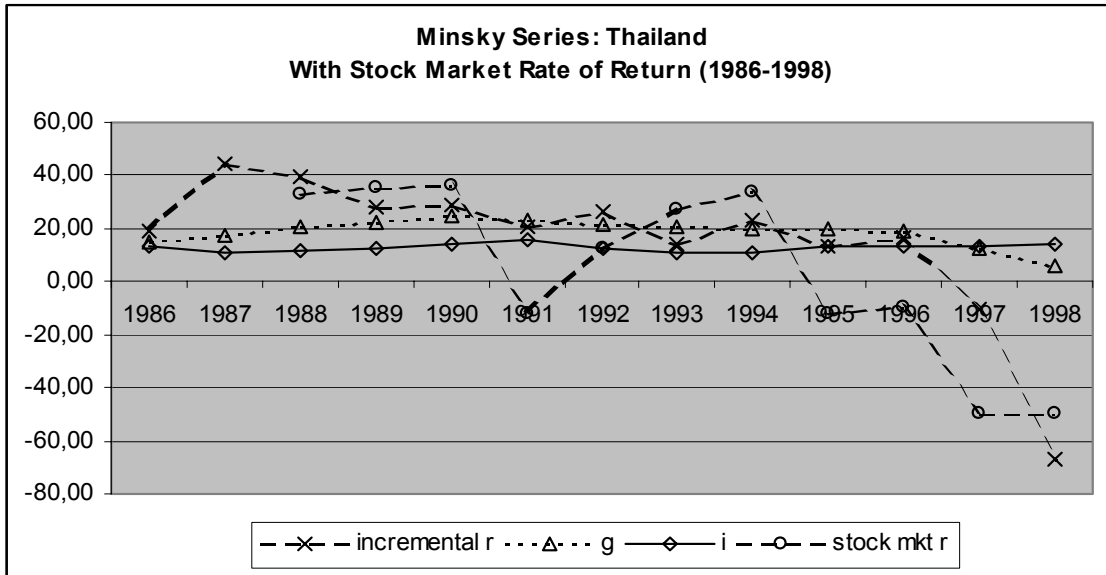
Graph 5



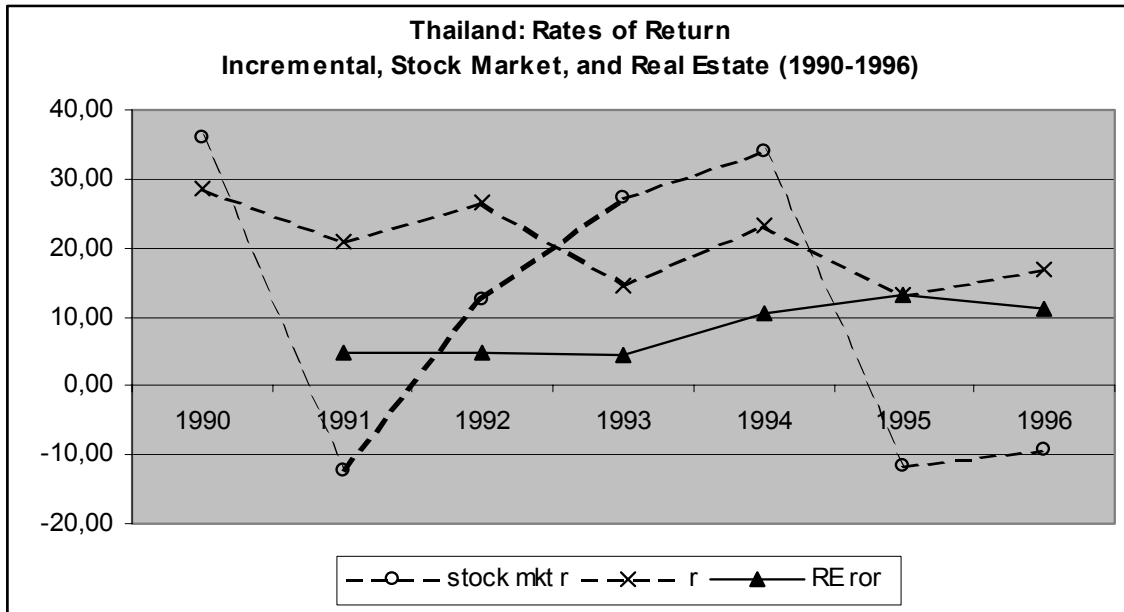
Graph 6



Graph 7



Graph 8



Graph 9

APPENDIX

Notes on Data Sources & Constructions

Capital accumulation (rate of) – Annual series for capital accumulation was obtained by dividing annual real, gross private investment relative to annual, real private capital stock (base year 1988), both series are in millions of Thai baht. The result was then multiplied by 100 for an expression in terms of a percent. The quarterly series was created similarly using corresponding quarters of the two series mentioned above.

Capital stock – The data series for annual, real gross fixed capital formation (I) for private construction (C) and equipment (E) was used to construct annual capital stock (K) series, base year 1988. Annual, net capital stock was computed using the formula:

$$K(t) = \sum_{j=0}^N I(t-j) * (1 - \text{dep})^j$$

where the depreciation rate (dep) is 9.45%. The depreciation rate was determined using the Hulton & Wycoff's PIM procedure, as described by Aldamir Marquetti (1997). This procedure defines dep as BAL/T , where BAL is the degree of declining balance due to depreciation and T is average lifetime of an asset. T was assumed to be 14. BAL is defined as $((0.91)(C/I) + (1.65)(E/I))$, 1.65 is equipment's degree of declining balance due to depreciation and 0.91 is structure's degree of declining balance due to depreciation. The resulting series is in millions of Thai baht. Quarterly capital figures were obtained through linear interpolation of the annual series. The annual capital stock series begins in 1983 and the quarterly series begins fourth quarter 1983.

Current account – The net sum of trade balance, service, transfer account, and current transfer.

Quarterly and annual figures were obtained from Table 55 at the "Foreign Trade and Balance of Payments" webpage at the Bank of Thailand's website (www.bot.or.th). The figures are in millions of Thai baht. Annual figures are available starting 1980; quarterly series are available starting first quarter of 1990. Note, quarterly figures were annualized for use in this study.

Gross fixed capital formation or investment deflator (GFCF) – GFCF delator series, annual and quarterly, were obtained by dividing nominal by real GFCF observations. As the base year is 1988, the deflator is 1.00 in 1988.

Lending rate – The minimum lending or interest rate (MLR) charged by commercial banks to its prime customers for a loan. Quarterly and annual figures for lending rate were manually calculated using a monthly series obtained from the International Financial Statistics database. A quarterly observation consists of simple average of monthly observations that define the quarter. An annual observation consists of simple average of monthly observations that define the year.

Nominal Gross Domestic Product (GDP) - The value of final goods and services produced within a country within a given period by using domestic factors of production. Nominal or current GDP measures the value of output at the prices prevailing in the period during which the output is produced. Quarterly and annual figures for 1993 to present were obtained from Table 1 at the "Quarterly Gross Domestic Product" webpage at the National Economic and Social Development Board's website (www.nesdb.go.th). Historical annual data for nominal GDP, through 1992, were obtained in the Summary Table 1 located in NESDB's "Executive Summary, Capital Stock of Thailand in 1970-1996". Historical quarterly series, 1Q83 through 4Q92, was obtained by linearly

interpolating the annual series found in the "Executive Summary." This implies that the quarterly GDP series used in this study is annualized. From 1Q93 to 4Q99 quarterly observation consists of current 3-month observation from NESDB plus the three prior quarters. The observations are in millions of Thai baht.

Nominal, gross fixed capital formation (or investment) in private construction and equipment - Annual investment data was obtained at the National Economic & Social Development Board website, National Income table 11, and its publication "Executive Summary: Capital Stock of Thailand, 1980-1996," summary table 7. Note, as annual investment observations are available starting 1980, observations for 1970-79 were constructed assuming an average growth rate per annum of 4% and the definition: $I(1980-j) = (I(1980)/\exp(0.04*j))$. Quarterly investment figures were obtained through linear interpolation of the annual figures. The observations are in millions of Thai baht.

Nominal Profit – The difference between nominal GDP and nominal wages & salaries of workers. A quarterly observation consists of difference between corresponding quarterly observations nominal GDP and nominal wages & salaries. An annual observation consists of difference between corresponding annual observations nominal GDP and nominal wages & salaries. The data are in millions of Thai baht.

Nominal Wages & Salaries of workers – Basic wages or salaries payable for the specified time or piece of work, not including overtime payments, bonuses or fringe benefits. Annual data for wages & salaries were obtained from Summary Table 9 located in the National Economic & Social

Development Board's "Executive Summary, Capital Stock of Thailand in 1970-1996," and from Summary Table 10 at the "National Income" webpage at the National Economic and Social Development Board's website (www.nesdb.go.th). Quarterly wage figures were obtained through linear interpolation of the annual series. The data are in millions of Thai baht.

Real estate price index – Datastream, base year 1990 = 100.

Real, gross fixed capital formation (or investment) in private construction and equipment (I) - Annual investment data was obtained at the National Economic & Social Development Board website, Quarterly GDP table 12, and its publication "Executive Summary: Capital Stock of Thailand, 1980-1996," summary table 8. Note, as annual investment observations are available starting 1980, observations for 1970-79 were constructed assuming an average growth rate per annum of 4% and the definition: $I(1980-j) = (I(1980)/\exp(0.04*j))$. Quarterly investment figures were obtained through linear interpolation of the annual figures. The observations are in millions of Thai baht.

Real profit - The nominal profit series deflated by the GFCF deflator (base year 1988). This method applied for both annual and quarterly series. The observations are in millions of Thai baht.

Real profit rate (marginal) – Profit/capital stock is a typical long-term definition of the rate of profit, and is what is specified in Foley (2001). However, this rate is not likely to be sensitive to short-term changes in the economy, and, so, it was replaced by a marginal definition. After Anwar Shaikh (1996), the real, marginal rate of profit is defined to be the difference between current and

prior period real profit relative to prior period real investment (real gross fixed capital formation),ⁱ base year is 1988. Annual and quarterly profit rate series were calculated according to this method. Note, quarterly observations were annualized by multiplying quarterly rates by 4.

Real stock market rate of return – The (real) rate of return for the stock market is defined as the sum of real capital gain (difference between consecutive observations of SET price index) and real dividend per share (current period), divided by real price index of prior period. The real price index and real dividend per share series were generated by deflating the corresponding nominal series with the investment (GFCF) deflator (base year 1988). Nominal data for the stock market price index was obtained at Datastream; the series name is PI . The observations were daily, so a quarterly observation is simple average of the observations for the month & an annual observation is simple average of the quarterly observations for the year. Similarly, nominal data for dividend yield was obtain at Datastream; the series name is DY.

Repo rate – The interest rate used in the sales and purchases of bonds, for which the payment of principal and interest are guaranteed by the government, by financial institutions who are members of the repo market. The 1-month repurchase rate was selected for this study because of its sensitivity to changes in market conditions. Quarterly and annual series for repo rate were manually calculated using a monthly series obtained from the Bank of Thailand. A quarterly observation consists of the simple average of monthly observations that define the quarter. An annual observation consists of the simple average of monthly observations that define the year. These series begin in 1989 as the Thai repurchase market began January, 1989.

Real Wages & Salaries of workers – Real wage series were constructed by deflating the nominal series by the corresponding CPI (base year 1988). The same method applied to both annual and quarterly series. The resulting figures are in millions of Thai baht.

ENDNOTES

1. Authors who have given balance sheets an important role in their analyses of financial crises include Paul Krugman (1999) and Liliana Rojas-Suarez (1998), as cited in Morris Goldstein, Graciela Kaminsky, and Carmen Reinhart (2000).
2. The T-O model is not clear in defining the peak of an expansion.
3. Note, also, the T-O model assumes all wages are consumed by workers and all profits are distributed to rentiers (Taylor-O'Connell 1989, 5).
4. The average rate for the 1-month repo is 7.3%.
5. The average rate for the 1-month repo is 12.0%.
6. Stock market observations are incomplete for the hedged phase (lacking years 1986-1987).

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