

Citation for published version: Grabel, Ilene. "Predicting Financial Crisis in Developing Economies: Astronomy or Astrology?" *Eastern Economic Journal* 29, no. 2 (2003): 243-258
Stable URL: <http://www.jstor.org/stable/40325412>

PREDICTING FINANCIAL CRISIS IN DEVELOPING ECONOMIES: ASTRONOMY OR ASTROLOGY?

Ilene Grabel

*Associate Professor of International Finance
Graduate School of International Studies
University of Denver
Denver, CO 80208, USA*

Office: 303/871-2546; FAX: 303/871-2456; Internet: igrabel@du.edu

Abstract:

In the aftermath of the European currency crisis of 1992-3, the Mexican financial crisis of 1994-5 and the Asian financial crisis of 1997-8, neoclassical economists in the academy and policy community have been engaged in a project to develop predictors or indicators of currency, banking and generalized financial crises in developing economies. This paper critically examines the efforts of the economics profession in this regard on both empirical and theoretical grounds. The paper argues that these predictors perform poorly on empirical grounds—indeed, the predictors developed after each of these crises failed to predict the next major crisis. These predictors are also rejected on theoretical grounds. From a post-Keynesian perspective, there is no reason to expect that the mere provision of information will prevent crises by changing agents' behaviors. The paper will also propose several indicators that are consonant with post-Keynesian economic theory, although it will be argued that these indicators do not represent a sufficient means to prevent financial crisis. Ironically, as agents develop confidence in the predictive capacity of crisis indicators, they may engage in actions that increase the economy's vulnerability to crisis. Far more important to the project of preventing financial crisis in developing economies is the implementation of constraints on those investor behaviors that render liberalized, internationally integrated financial systems inherently prone to instability and crisis. Hence, intellectual capital would be more productively expended on devising appropriate changes in the overall regime in which investors operate (such as measures that compel changes in financing strategies) rather than in searching for new predictors of crisis.

I. INTRODUCTION

As with the 1990s, the 2000s are proving to be a fruitful time for those involved in the project of developing predictors of financial crisis in developing economies. Indeed, the occurrence of a financial crisis in the previous eighteen months seems a rather reliable predictor of the development of new predictors! Neoclassical economists have sought to develop reliable predictors of currency, banking and generalized financial crises following the European currency crisis of 1992-3, the Mexican financial crisis of 1994-5, and the Asian financial crisis of 1997-8 [e.g., Berg and Patillo, 1998; Edison, 2000; Frankel and Rose, 1996; Goldstein, 1997a, 1997b; Hardy and Pazarbasioglu, 1998; Kamin and Babson, 1999; Kaminsky, Lizondo, Reinhart, 1997; Kaminsky and Reinhart, 2000; Sachs, Tornell, Velasco, 1996].¹ The most ambitious of these efforts involves drawing together several crisis predictors to create “early warning systems” that can be employed by policymakers, regulators and investors (the gold standard of such efforts is Goldstein, Kaminsky, Reinhart [2000]).

Unfortunately, the empirical record of crisis predictors is rather poor. Predictors developed after the European currency crisis failed to predict the events in Mexico, predictors developed after the Mexican crisis failed to predict the Asian crisis, and predictors developed after the Asian crisis failed to predict the 2001 Turkish crisis [Corbett and Vines, 1998; Eichengreen, 1999; Sharma, 1999]. The current crisis in Argentina was also not predicted by existing models.² Additionally, counterfactual tests indicate that existing predictors would not have predicted the very crises that motivated their development [Berg and Patillo, 1998; Demirgüç-Kunt and Detragiache, 1999; Eichengreen and Portes, 1997; Goldfajn and Valdes, 1997; Hardy and Pazarbasioglu, 1998]. However, undaunted by empirical failure, the effort to discover reliable crisis predictors (hereinafter, the neoclassical “predictors project”) continues.

So sure are neoclassical economists that a reasonable set of predictors can be developed that a great deal of intellectual capital is being expended in efforts to design an early warning system that will predict the next big financial crisis.

This paper critically examines the neoclassical predictors project on both empirical and theoretical grounds. The paper argues that these indicators perform poorly on empirical grounds. These indicators are also rejected on theoretical grounds. From a post-Keynesian perspective advanced notably by Minsky (among others), there is no reason to expect that the mere provision of accurate and timely information about the changing state of “market fundamentals” in developing economies will prevent crisis by changing agents’ behaviors. The neoclassical predictors project is based on several misguided initial assumptions. First, that in the context of a neoliberal policy environment, financial markets will self-regulate in a stabilizing manner provided that agents have access to information that reveals the economy’s vulnerability to crisis and are free to take the defensive actions that they deem warranted. In this view, the neoliberal financial regime is entirely inculpable in the financial instability and recurrent crises that have proliferated during the era of neoliberal reform. Second, that the information on which the success of these predictors is predicated can reasonably be expected to be accurate. Third, that the interpretation of predictors is exogenous to the economic environment and the state of expectations.

The paper will also propose several indicators that are consonant with post-Keynesian economic theory, although it will be argued that these indicators themselves do not represent a sufficient means to prevent financial crisis in developing economies. Ironically, as agents develop confidence in the predictive capacity of crisis indicators, they may be more likely to engage in actions that increase the economy’s vulnerability to crisis. Moreover, the

dissemination of information about the economy's vulnerability to a crisis may in fact accelerate investor exit, thereby bringing about precisely the crisis that the indicators are designed to predict. Far more important to the project of preventing financial crisis in developing economies is the implementation of constraints on those investor behaviors that render them prone to currency, banking and financial crises. Hence, the intellectual capital of the economics profession could be more productively expended devising appropriate changes in the overall regime in which investors operate (such as measures that compel changes in financing strategies) rather than searching for the correct set of crisis predictors.

The paper will be organized in the following manner. Section II assesses the neoclassical predictors project. It examines the range of indicators that have been developed and reviews their empirical performance. Section III develops a post-Keynesian critique of the neoclassical predictors project, arguing among other things that the information yielded by predictors can in fact induce the very crises they are designed to avert. It then presents a set of predictors that are consistent with post-Keynesian theory, but acknowledges that these, too, are insufficient policy tools to avert crisis. I argue that predictors can contribute to crisis prevention only if they operate in the context of an overall policy regime in which investor options and market volatility are constrained by governmental action. In this connection I present proposals for trip wires and speed bumps to regulate agents' behaviors. As such, they reach far beyond dissemination of information, the hallmark of the predictors project.

II. THE NEOCLASSICAL PREDICTORS PROJECT

The neoclassical predictors project begins from the premise that (many) financial crises can be prevented provided that economic actors know the extent of an economy's vulnerability (either in the aggregate, or in regards to weaknesses in the banking sector or the currency).

Adequate provision of this knowledge in the form of individual predictors or a set of predictors packaged as an early warning system is a sufficient condition for crisis prevention. This is because rational economic agents are assumed to respond to information about crisis potentialities in ways that prevent realization of the predicted crisis. Participants in the neoclassical predictors project do not advocate any sort of *regulatory or governmental response* to the dangers revealed by predictors. The defensive postures adopted by private actors—themselves made possible only by unfettered markets—are a sufficient means to ward off the predicted crisis. Thus, microlevel reactions by market actors are stabilizing at the macrolevel.

The logic of the neoclassical approach to predictors is rather straightforward. There is an assumed independence between a predictor and an event. From this perspective, crisis prevention requires two things: good predictors that fill information gaps; and an open, liberalized regime in which agents are free to reallocate or liquidate their portfolios in response to problems made apparent by predictors. Hence, the self-regulating actions that rational agents take in response to predictors will prevent the predicted event from coming to fruition (or at least will mitigate its severity). The underlying logic of the neoclassical approach to predictors is summarized in figure 1.

<<FIGURE 1 HERE>>

The neoclassical approach assumes that once a dangerous economic tendency is revealed, rational (private) economic actors will change their behaviors in a manner that ultimately stabilizes markets.

The Predictors Literature

Theoretical and empirical treatments of the etiology of currency crises is not a new area of research in neoclassical macroeconomics. The starting point for theoretical treatments of the

subject is Krugman's seminal 1979 paper on the circumstances that lead to the collapse of fixed/pegged exchange rate regimes. Krugman maintains that such regimes collapse under the pressure of weak fundamentals—to wit: excessively expansionary monetary and/or fiscal policies or persistent balance of payments deficits render fixed/pegged currencies untenable. Extensions of Krugman [1979] are legion; in these elaborations, weak fundamentals play a central role in triggering currency crises. The earliest extensions of Krugman (termed first generation models) focus on the role of monetary and/or fiscal imbalances in speculative attacks against a multiplicity of exchange rate regimes; later extensions (termed second generation models) center on the possibility for multiple equilibria and self-fulfilling attacks on a currency following the deterioration of fundamentals.³ The European currency crisis of 1992 reinvigorated efforts to understand the causes of currency crises; important works in this regard include Eichengreen and Wyplosz [1993], Eichengreen, Rose, Wyplosz [1995] and Rose and Svensson [1994]. Neither the work in the post-Krugman tradition nor the work of the Europeanists attempted to develop explicit predictors of financial crisis.

It was not until the Mexican crisis of 1994-5 that neoclassical economists moved beyond the project of uncovering the causes of crisis and attempt to elaborate predictors of financial crisis in developing economies. Official efforts to understand the Mexican crisis were very much guided by the view that crises could be prevented through the provision of accurate and timely information about conditions in developing economies. The central role of information in crisis prevention was indeed the main message of the June 1995 Group of Seven Summit held in Halifax in the wake of the Mexican crisis. At Halifax, the IMF was urged to encourage the prompt publication of economic and financial statistics and to identify regularly countries that did not comply with the institution's new information standards (standards that eventually

became the IMF's Special Data Dissemination Standard or SDDS).⁴ The neoclassical predictors project builds directly on the IMF's failed efforts to prevent crises in Asia through the provision of information through the SDSS.

Participants in the neoclassical predictors project propose two broad types of predictors—the “regression” or “probit” approach associated with Frankel and Rose [1996] and the more frequently discussed early warning system (often termed the “signal extraction”) approach associated with Goldstein, Kaminsky and Reinhart [2000].⁵

The regression approach estimates the probability of a currency or a banking crisis and identifies the variables that are statistically correlated with crisis. Econometric work by Frankel and Rose [1996] exemplifies this approach to crisis prediction [see also Sachs, Tornell and Velasco, 1996]. For example, Frankel and Rose [1996] conclude that currency crashes occur when foreign direct investment dries up, when currency reserves are low and falling, when domestic credit growth is high, when Northern nominal interest rates rise, and when the real exchange rate is overvalued by 10%.

The early warning system approach compares the behavior of a variable before a crisis with its behavior during normal times. A variable is then taken to be useful if it displays anomalous behavior before a crisis but does not provide false signals of an impending crisis in normal times. When a variable exceeds or falls below a certain threshold, it is said to issue a signal that a crisis may occur.

Goldstein, Kaminsky and Reinhart [2000] is the point of departure for all efforts to develop early warning systems [reviews and extensions appear in Berg and Patillo, 1998; Edison, 2000; Hardy and Pazarbasioglu, 1998; Hardy, 1998; Hawkins and Klau, 2000; IMF, 1998: ch. 4; Kamin and Babson, 1999].⁶ Goldstein, Kaminsky and Reinhart [2000] find that there is a

systemic pattern of empirical abnormalities leading up to most currency and banking crises in developing economies over a sample period ranging from 1970-95. For currency crises, they find that the best predictors using monthly data are appreciation of the real exchange rate (relative to trend), a banking crisis, a decline in stock prices, a fall in exports, a high ratio of broad money (M2) to international reserves, and a recession. Among the annual predictors of currency crises, the two most reliable predictors are a large current account deficit relative to both GDP and investment. For banking crises, they find that using monthly data the most reliable predictors of crisis (in descending order of importance) are appreciation of the real exchange rate (relative to trend), a decline in stock prices, a rise in the M2 money multiplier, a decline in real output, a fall in exports, and a rise in the real interest rate.⁷ Among the annual predictors of banking crises, the most reliable are a high ratio of short-term capital inflows to GDP and a large current account deficit relative to investment. They find that in most banking and currency crises, a high proportion of the monthly leading indicators—on the order of 50-75%--reach their signaling threshold. In other words, when a developing economy is moving toward a financial crisis, many of the leading indicators signal a crisis.

Goldstein, Kaminsky and Reinhart [2000] show that there is a wide divergence in the performance across leading indicators; warnings usually appear ten to eighteen months prior to the onset of crisis. The authors remain firm in their view that the early warning system can make apparent an economy's vulnerability to crisis. They do make clear, however, that the system does not speak to the timing of a crisis.

The Empirical Performance of Predictors

The empirical performance of crisis predictors is rather dismal. Numerous empirical tests (many indeed conducted by proponents) conclude that predictors would not have provided ex-ante signals of the events in Mexico or Asia.

For example, Flood and Marion [1999], Hawkins and Klau [2000], and the IMF [1998, ch.4] all conclude that predictors, at best, have a mixed record of success. Goldfajn and Valdes [1997] and Hardy and Pazarbasioglu [1998] are less ambiguous: the former study concludes that exchange rate crises are largely unpredictable events, a result they demonstrate in the case of the currency crises in Mexico and Thailand; the latter study concludes that the Asian banking crises would not have been predicted by the usual macroeconomic predictors. Eichengreen's [1999] survey of predictors concludes that they have remarkably poor power [see also Eichengreen, Rose and Wyplosz, 1995]. His assessment is worth quoting at length: "If investors, with so much at stake, cannot reliably forecast crises, then it is hard to see why bureaucrats should do better...Their [predictors] track record is not good. Models built to explain the 1992-93 ERM crisis did not predict the 1994-95 Mexican crisis. Models built to explain the Mexican crisis did not predict the Asian crisis" [p. 84].

Several studies test a comprehensive battery of predictors; these studies, too, fail to offer empirical support to the neoclassical predictors project. In a test of nearly all existing predictors (both of the regression and the early warning variety), Berg and Patillo [1998] find that some models perform better than guesswork in predicting the Asian crisis. But they find that none of these models reliably predicts the timing of the crisis (that is, whether there would be a crisis in 1997). This is because false alarms, in almost all cases, always outnumber appropriate warnings. Edison [2000] also concludes that early warning systems issue many false alarms and miss

important crises. Sharma's [1999] review of the empirical performance of early warning systems concludes that they would not have predicted the events in Asia (a conclusion echoed by Corbett and Vines [1998]). Sharma sums up the matter definitively: "the holy grail of crisis prediction may be intrinsically unattainable" [p. 42].

The most prominent advocates of predictors remain unshaken by the weight of discouraging empirical evidence. Goldstein [1997b], for example, concludes that preliminary tests of the predictors he develops indicate that they would have predicted the Thai crisis. Goldstein, Kaminsky and Reinhart [2000] conclude that their system performs quite well, not only in tracking currency and banking crises in developing economies over the 1970-95 sample period, but also in anticipating most of the countries affected by the Asian crisis (particularly as regards currency crises in Asia).⁸ To their credit, the authors clearly acknowledge that their early warning system is prone to many false alarms and would have missed some important crises: the best indicators send a significant share of false alarms on the order of one false alarm for every 2-5 true signals (see chapter 5).

The empirical shortcomings of the neoclassical predictors project are clear, even to some of its most ardent participants. What is not clear is why efforts to refine existing predictors and to develop new ones proceeds despite the empirical failings of the enterprise.

III. A POST-KEYNESIAN VIEW OF PREDICTORS

From a post-Keynesian perspective, the neoclassical predictors project is based on several misguided initial assumptions. The collective weight of these logical problems (coupled with the empirical failure of predictive exercises) frustrates the neoclassical enterprise of crisis prediction.

Recall that the neoclassical predictors project begins from the presumption that the provision of accurate and timely information about an economy's vulnerability is ultimately

market stabilizing, provided that agents are able to adopt appropriate defensive postures in response to this information (see figure 1). Post-Keynesians reject this view for a number of reasons.

1.) Agents can respond to new information in a manner that is either market stabilizing or destabilizing.

In the post-Keynesian view, the idea that predictors and events are independent of one another does not make sense. By making agents aware of fragilities in the economy, predictors may induce market-stabilizing or destabilizing changes in behavior. This is because, from a post-Keynesian perspective, predictors and crises (as events) are entirely dependent on one another. Given endogenous expectations and the inherent instability of liquid, liberalized, internationally integrated financial markets, rational economic actors are just as likely to engage in destabilizing herd behavior in response to new information as they are to engage in market-stabilizing behavior. In the game of musical chairs, no one wants to be the last one left standing, as Keynes noted long ago. We simply cannot predict with certainty whether agents will respond to the information provided by predictors in a market-destabilizing or stabilizing manner. In light of recent events (e.g., the collapse of Enron and several other corporations in the US, Argentina's financial crisis), investor panic seems a likely response to warnings of dire circumstances ahead.

The logic of the post-Keynesian understanding of predictors is presented in figure 2.

<<FIGURE 2 HERE>>

In the context of a neoliberal financial regime (in which agents are free to take defensive actions in response to new information, changes in market sentiment, etc.), predictors have indeterminate effects on macroeconomic stability.

From the post-Keynesian perspective, we discover what I will call the “predictor credibility paradox.” In short, the enhanced credibility of a predictor may subvert it. To the degree that a predictor induces a heightened level of confidence among economic actors, it may introduce and validate risky behaviors that bring about a crisis. Thus, the degree of confidence with which predictors are held influences the way that predictors themselves will move markets. Crises result from the behavior of agents, and the behavior of agents is predicated on expectations which are, in turn, a function of their “knowledge.” So a predictor becomes yet another piece of information that can change the behavior of agents for better or worse.

Predictors, then, do not report on the future in a neutral way—they can induce changes in investor behavior that can be market stabilizing or destabilizing.

2.) The informational prerequisites for early warning systems are simply unreasonable in the developing economy context.

The success of neoclassical predictors depends very much on the accuracy and availability of information about a range of economic conditions. But these informational prerequisites cannot be accommodated in the developing economy context. Problems of data inaccuracy are to be expected. Indeed, identification of precisely this problem motivated the IMF’s creation of the SDSS. But identification of the problem has not solved it. For instance, the IMF has acknowledged that important data have been mis-reported by authorities in Ukraine [NYT, 5/5/00]. False and missed alarms are likely as long as the integrity of data are compromised. And false alarms are obviously no small matter insofar as they can trigger real crises by causing an investor panic. Moreover, governments have a strong incentive to mis-report data once a “predictors regime” is in place, and this incentive deepens as a country enters

crisis territory. Paradoxically, then, the introduction of predictors is likely to reduce the quality of reported data.

Even in the US, the quality of economic data is far from ideal. The Federal Reserve and various departments of the US government issue ex-post adjustments of data as a matter of course. For example, the dating of business cycles is always subject to ex-post adjustment; the accuracy of data on US productivity has been the subject of much discussion of late (see e.g., NYT [9/5/01, 10/17/01, 11/30/01]). The need for ex-post revision (and/or disputes about methodology) may cause little problem when the matter at stake is the dating of recessions (or calculating productivity growth), since this news is unlikely to affect behaviors in consequential ways. But inaccurate data reporting in the context of predicting crisis is another matter entirely. In this context, inaccuracies are not benign.

3.) The interpretation of predictors is endogenous to the economic environment.

The neoclassical predictors project presumes that the interpretation of predictors is a science rather than an art. The former implies that the determination as to what constitutes a “dangerous reading” is independent of the economic climate and the state of expectations. In contrast, post-Keynesians view the interpretation of predictors as far more art than science.⁹ The determination as to what constitutes a dangerous level for some set of predictive variables is endogenous to the economic environment. The changing interpretation of price/earnings ratios on the US stock exchange over the previous two years is a case in point. The same price earning ratios demonstrated the emergence of a “new economy” in the context of buoyant expectations, and evidence of serious problems in the context of the emergence of recessionary expectations.

4.) Neoclassical predictors are predicated on the false notion that there exists a consistent set of knowable macroeconomic fundamentals (embodied in predictors) and that economic agents make decisions based on a rational assessment of these fundamentals.

At its base, the predictors developed by neoclassical economists begin from the assumption that there exists a set of objective fundamentals, that these fundamentals are knowable, and that rational agents make decisions based on the state of fundamentals. From a post-Keynesian perspective, of course, there is no set of static, knowable fundamentals in the domain of investment decisions. As Keynes' [1964] beauty contest and musical chairs analogies make clear, investment decisions are made in an environment of fundamental uncertainty, are driven by expectations and conventional wisdom, and are characterized by herd effects. Hence, when agents believe they are making rational investment decisions based on objective fundamentals, they fail to recognize that the identification of fundamentals is itself largely an interpretative exercise. For example, a rising current account deficit may be taken as a sign of an impending crisis and a reflection of underlying economic fragility, or may be taken as a reflection of a country's strength and desirability to investors.

Moreover, if the etiology of every crisis is at least slightly different, then we have no reason to expect that a standard early warning system based on a static set of fundamentals would be appropriate for the job. For example, the root causes of the ERM, Mexican, and Asian crises remain distinct. Therefore, it comes as no surprise that predictors developed after each crisis failed to predict the next one [Corbett and Vines, 1998].

5.) Refining existing neoclassical predictors will not end the pattern of recurrent crisis in developing economies. The problem lies with the regime: regimes of neoliberal finance are inherently prone to crisis, particularly in the developing economy context.

The search for predictors by neoclassical economists assumes that crises are a consequence of informational inadequacy rather than a fundamental, structural feature of the economic environment of regimes of neoliberal finance. Economies with internationally integrated, liquid, liberalized financial systems are inherently crisis prone, as Keynes long argued and recent events have well shown. (Arestis and Demetriades [1997], Arestis and Glickman [2002], papers in Chang, Palma, and Whittaker [2001], Crotty and Lee [2001], Grabel [2003, 2002, 1995], Nissanke and Stein [2003], Palma [1998], Singh and Weisse [1998] and Weller [2001] treat this issue in the context of developing economies; numerous post-Keynesians, such as Davidson [1972] and Minsky [1986] treat this issue in the context of wealthy countries.)

Neoclassical economists fail to appreciate that the neoliberal financial regime that they promote in developing countries plays a critical role in the promulgation of the very financial crises that they now seek to predict. In particular, the promotion of highly liquid, internationally integrated capital markets in these countries—in the context of insufficient financial and regulatory architecture—plays an important role in explaining many recent crises. Consistent with the assumptions of post-Keynesian theory, several empirical studies show that financial liberalization in developing countries is a strong (and, in some cases, the best) predictor of banking, currency and/or generalized financial crises [Corbett and Vines (quoting Wyplosz), 1998; Demirgüç-Kunt and Detragiache, 1998; Weller, 2001]. (Empirical evidence that links financial liberalization and financial crisis is also reviewed in Arestis and Demetriades, 1997; Brownbridge and Kirkpatrick, 2000; Williamson and Mahar, 1998.)¹⁰

6.) Economists have never succeeded in predicting economic turning points.

Finally, it bears mentioning that efforts at divining market swings have never met with much success. The spectacular failure of the hedge fund, Long Term Capital Management, a

fund managed by Nobel Laureates and other distinguished economists, demonstrates that even pioneers of elaborate risk management models cannot anticipate market shifts with great accuracy.¹¹ Developing economies simply cannot afford to bear the costs of failed efforts at crisis prediction (namely, false signals that trigger investor panics, or missed signals).

Some Necessary Tools for Crisis Curtailment in Developing Economies

Now that we have considered the empirical and theoretical failures of the neoclassical predictors project, we turn to the practical matter of crisis curtailment from a post-Keynesian perspective.

It is possible to envision “indicators of vulnerability,” or “trip wires” that are compatible with post-Keynesian theory.¹² (From a post-Keynesian perspective, we are far more comfortable with the terms indicator of vulnerability or trip wire than we are with the term crisis predictor.) In this view, trip wires are a necessary tool for ascertaining the particular vulnerabilities that confront an economy. A post-Keynesian approach to assessing vulnerability accepts the neoclassical assumption that indicators can and indeed will affect markets and sectoral performance through their effect on the behavior of economic agents (see figures 1 and 2). But contra the neoclassical view, these trip wires are—at best—*necessary* to the task of crisis prevention. Trip wires only represent a *sufficient* means of crisis curtailment *if* they are firmly linked to changes in the institutional or regulatory context in which economic actors operate (see III.C below).

On their own, trip wires have a rather narrow value as a diagnostic tool. With the above caveats in mind (particularly those relating to informational adequacy), we consider several trip wires that are consistent with post-Keynesian theory. Post-Keynesian trip wires do not attempt

to capture market fundamentals (having rejected their existence). Instead they attempt to measure the types of financial risks to which developing economies are most prone.

1.) Currency risk

Currency risk refers to the possibility that a country's currency may experience a precipitous decline in value. Currency risk can be evidenced by the ratio of official reserves to total short-term external obligations (the sum of accumulated foreign portfolio investment and short-term hard-currency denominated foreign borrowing); and the ratio of official reserves to the current account deficit.

2.) Fragility risk

Fragility risk refers to the vulnerability of an economy's private and public borrowers to internal or external shocks that jeopardize their ability to meet current obligations. Fragility risk arises in a number of ways. First, borrowers might finance long-term obligations with short-term credit, causing "maturity mismatch" (or what Minsky called "Ponzi financing"). This leaves borrowers vulnerable to changes in the supply of credit, and thereby exacerbates the ambient risk level in the economy. Second, borrowers might contract debts that are repayable in foreign currency, causing "locational mismatch". This leaves borrowers vulnerable to currency depreciation/devaluation that may frustrate debt repayment. Third, agents might finance private investment with capital that is highly subject to flight risk. This dependence renders collateral values more volatile, and thereby reduces the creditworthiness of borrowers just when they are most in need of funds.

Locational mismatch (that induces fragility risk) could be evidenced by the ratio of foreign-currency denominated debt (with short-term obligations receiving a greater weight in the calculation) to domestic-currency denominated debt. A proxy for maturity mismatch could be

given by the ratio of short-term debt (with foreign-currency denominated obligations receiving a greater weight in the calculation) to long-term debt. If this ratio and gross capital formation were both rising over time, that would indicate the emergence of maturity mismatch.

3.) Flight risk

Flight risk refers to the likelihood that holders of liquid financial assets will sell their holdings en masse in the face of perceived difficulty. Lender flight risk refers to the possibility that lenders will call loans or cease making new loans in the face of perceived difficulty. Flight creates a self-fulfilling prophecy that deflates asset and loan collateral values, induces bank distress and elevates ambient economic risk. Flight risk can interact with currency risk to render the economy vulnerable to financial crisis.

An indicator of lender flight risk is the ratio of official reserves to private and public foreign-currency denominated debt (with short-term obligations receiving a greater weight in the calculation). The vulnerability to portfolio investment flight risk could be measured by the ratio of total accumulated foreign portfolio investment to gross equity market capitalization or gross domestic capital formation.

4.) Contagion risk

Contagion risk refers to the threat that a country will fall victim to financial and macroeconomic instability that originates elsewhere. Indicators of the vulnerability to contagion risk are difficult to envision, but a strategy for reducing the likelihood that contagion threats will come to fruition will be discussed in section III.C. (below).

Sufficient Tools for Crisis Curtailment

For those engaged in the neoclassical predictors project, the necessary and sufficient conditions for crisis prevention are the operation of sound crisis predictors *and* a neoliberal

financial regime. The latter is critical insofar as neoclassicals assume that the microlevel responses of economic actors to crisis predictors leads to outcomes that are stabilizing on the macrolevel (see figure 1). Therefore, economic actors must be free to respond defensively to changes in the economic environment.

By contrast, from a post-Keynesian perspective, indicators of vulnerability (i.e., trip wires) are merely necessary to the task of curtailing crises. Moving from necessary to sufficient conditions for crisis curtailment depends critically on institutional and regulatory changes in the overall regime in which investors operate. In what follows, I make a case for one such change, a “speed bump” initiative that is tied directly to the post-Keynesian trip wires discussed above. The strategy of coupling trip wires and speed bumps involves the development of a set of targeted, graduated policies that are activated whenever trip wires reveal particular vulnerabilities in the economy.¹³

The trip wire-speed bump strategy is rather straightforward. Developing economies at the lowest, medium and highest levels of development might require distinct trip wire thresholds. Trip wires must be appropriately sensitive to subtle changes in the risk environment and adjustable. Sensitive trip wires would allow policymakers to activate graduated speed bumps at the earliest sign of heightened risk, well before conditions for investor panic had materialized [*cf.* Neftci, 1998; Taylor, 1998]. When a trip wire indicates that a country is approaching trouble, policymakers could then immediately take steps to prevent crisis by activating speed bumps. Speed bumps would target the type of risk that is developing with a graduated series of mitigation measures that compel changes in financing and investment strategies and/or dampen market liquidity.

Speed bumps can take many forms. Examples include measures that require borrowers to unwind positions involving locational or maturity mismatches, curb the pace of imports or foreign borrowing, limit the fluctuation or convertibility of the currency, or slow the exit and particularly the entry of portfolio investment. I emphasize the importance of speed bumps governing *inflows* rather than outflows because measures that merely target outflows are more apt to trigger and exacerbate panic than to prevent it. Thus, if trip wires revealed that a country was particularly vulnerable to the reversal of portfolio investment inflows, new inflows of portfolio investment would have to “wait at the gate” until domestic capital formation or gross equity market capitalization increased sufficiently. Thus, speed bumps would slow unsustainable financing patterns until a larger proportion of any increase in investment could be financed domestically.

Trip wires could indicate to policymakers and investors whether a country approached high levels of currency, fragility, and flight risk. The speed bump mechanism provides policymakers with a means to manage measurable risks, and in doing so, reduces the possibility that these risks will culminate in a national financial crisis. Speed bumps affect investor behavior *directly* (e.g., by forcing them to wait at the gate, to unwind risky positions, etc.) and *indirectly* (by reducing their anxiety about the future). Together, their effects mitigate the likelihood of crisis. Those countries that have trip wires and speed bumps in place would also be less vulnerable to contagion effects from crises that originate elsewhere (because they would face lower levels of risk themselves).¹⁴ Figure 3 presents a schematic view of a post-Keynesian approach to crisis curtailment (i.e., a regime in which trip wires activate speed bumps).

<<FIGURE 3 HERE>>

One important caveat bears mention. The risks introduced by off-balance sheet activities, such as derivatives, cannot be revealed by trip wires (and hence can not be curbed by speed bumps) insofar as data on these activities are largely unavailable. If policymakers compelled actors to make these activities transparent, then trip wires and speed bumps for them could be designed. In the absence of the will to enforce transparency, policymakers in developing countries would be well advised to forbid domestic actors from engaging in off-balance sheet activities.¹⁵

IV. CONCLUSIONS

The trip wire-speed bump regime discussed here differs sharply from the neoclassical predictors project. In keeping with neoclassical thought, the predictors project is predicated on the view that financial crisis results particularly from imperfect information and financial controls that prevent investors from responding defensively to changes in the economic environment. From this perspective, the prevention of crisis necessitates increased surveillance by the IMF tied to deepening neoliberal reform to ensure that investors enjoy full information in the context of complete markets. The trip wire-speed bump approach presumes instead with Keynes that better information and intensification of neoliberal financial reform are insufficient to prevent crisis (indeed, these are likely to have perverse effects). From a post-Keynesian perspective, warnings of potential danger (via a trip wire) must be coupled with firm restrictions on investor behavior. Besides the temporary speed bumps described here, these include permanent measures such as capital controls, restrictions on currency convertibility and the liquidity of portfolio investment, and extra-market mechanisms of credit allocation. See Gabel [2003] and Chang and Gabel [2003-04] for extensive examinations of these and related measures.

This paper has exposed the empirical and theoretical problems with the neoclassical predictors project. The paper has attempted to develop a post-Keynesian approach to crisis curtailment through a trip wire-speed bump approach that necessitates rather stringent controls over investor freedoms. Critics of this approach might rightly raise important considerations of political will. This issue is outside our present scope of discussion. However, we are encouraged by the numerous recent challenges raised by anti-WTO, anti-IMF, anti-neoliberal globalization activists on the matter of the hegemony of the neoliberal regime. Critics of the trip wire-speed bump approach might also raise the concern that this approach would slow economic growth in developing economies by slowing foreign investment inflows. But recent experience in Argentina (and elsewhere) shows that the slower short-term growth these speed bumps *might* induce are a worthwhile price to pay to avoid the instability created by a currency collapse and/or the sudden exit of external finance.

REFERENCES

Arestis, P. and Demetriades, P. Financial development and economic growth: Assessing the evidence, *Economic Journal*, May 1997, 783-799.

Arestis, P. and Glickman, M. Financial crisis in Southeast Asia: Dispelling illusion the Minskyian way, *Cambridge Journal of Economics*, 2002, 237-260.

Berg, A. and Pattillo C. Are currency crises predictable? A test. IMF Working Paper, November 1998.

Brownbridge, M. and Kirkpatrick, C. Financial regulation in developing countries, *Journal of Development Studies*, October 2000, 1-24.

Chang, H.-J. and Grabel, I. There Is No Alternative?: Policy Options for Developing Economies. London: Zed Press, forthcoming 2003-04.

Chang, H.-J., Palma, G., and Whittaker, H. Financial Liberalization and the Asian Financial Crisis. Basingstoke, Hampshire: Palgrave, 2001.

Choueiri, N. and Kaminsky G. Has the Nature of Crises Changed? A Quarter Century of Currency Crises in Argentina. IMF Working Paper, November 1999.

Corbett, J and **Vines, D**. The Asian crisis: competing explanations. Center for Economic Policy Analysis. Working Paper Series III, July 1998.

Crotty, J and **Lee, K**. Neoliberal restructuring in Korea: ‘Miracle’ or disaster? Paper presented at the conference on Financialization of the world economy, University of Massachusetts and Political Economy Research Institute, December 2001.

Davidson, P. Money and the Real World. New York: Halsted Press, 1972.

Demirgüç-Kunt, A and **Detragiache, E**. Unpublished paper. Monitoring banking sector fragility: A multivariate logit approach with an application to the 1996-97 banking crises, International Monetary Fund, 1999.

Demirgüç-Kunt, A and **Detragiache, E**. Financial liberalization and financial fragility. International Monetary Fund Working Paper, 1998, No. 83.

Dodd, R. Unpublished paper. The role of derivatives in the East Asian crisis. Derivatives Study Center, June 2000.

Edison, H. Do indicators of financial crises work? An evaluation of an early warning system. Board of Governors of the Federal Reserve System. International Finance Discussion Papers, July. 2000.

Eichengreen, B. and Wyplosz, C. The Unstable EMS. *Brookings Papers on Economic Activity*, 1993, 51-124.

Eichengreen, B. Rose, R. and Wyplosz, C. Exchange market mayhem: the antecedents and aftermath of speculative attacks. *Economic Policy*, October 1995, 249-312.

Eichengreen, B. and Portes, R. Managing financial crises in emerging market, in *Maintaining Financial Stability in a Global Economy*. A symposium sponsored by the Federal Reserve Bank of Kansas City, August 1997, 193-225.

Eichengreen, B. *Toward a New International Financial Architecture: A Practical Post-Asia Agenda*. Washington, D.C.: Institute for International Economics, 1999.

Federal Reserve Bank of Kansas City. *Maintaining Financial Stability in a Global Economy*. A symposium sponsored by the Federal Reserve Bank of Kansas City, August 1997.

Flood, R. and Marion, N. Perspectives on the recent currency crisis literature. *International Journal of Finance and Economics*, 1999, 1-26.

Frankel, J. and Rose, A. Currency crashes in emerging markets: An empirical treatment. *Journal of International Economics*, November 1996, 351-368.

Goldfajn, I. and Valdés, R. Are currency crises predictable? Working paper of the IMF,

WP/97/159, December 1997.

Goldstein, M. Presumptive indicators of vulnerability to financial crises in emerging economies, in *Creating resilient financial regimes in Asia: Challenges and policy options*, edited by P. Basu. Oxford University Press, 1997a, 79-132.

----- . Commentary: The causes and propagation of financial instability: lessons for policymakers,” in *Maintaining Financial Stability in a Global Economy*. A symposium sponsored by the Federal Reserve Bank of Kansas City, August 1997, 96-117.

Goldstein, M.; Kaminsky, G. and Reinhart, C. *Assessing Financial Vulnerability: An Early Warning System for Emerging Markets*. Washington, DC: Institute for International Economics, 2000.

Gonzalez-Hermillosa, B. Developing indicators to provide early warnings of banking crises. *Finance and Development*, June 1999, 36-39.

Grabel, I. Speculation-led economic development: a post-Keynesian interpretation of financial liberalization programmes in the Third World. *International Review of Applied Economics*, 1995, 127-149.

----- . Rejecting Exceptionalism: Reinterpreting the Asian Financial Crises, in *Global Instability: The Political Economy of World Economic Governance*, edited by J. Michie

and J. Grieve Smith. London: Routledge, 1999, 37-67.

----- . Averting crisis? Assessing measures to manage financial integration in emerging economies. Cambridge Journal of Economics, 2003, vol. 27, forthcoming.

----- . Neoliberal Finance and Crisis in the Developing World. Monthly Review, April 2002, 34-46.

Hardy, D. Are banking crises predictable? Finance and Development, December 1998, 32-35.

Hardy, D. and Pazarbasioglu, C. Leading indicators of banking crises: Was Asia different? IMF Working Paper, June 1998.

Hawkins, J. and Klau, M. Measuring potential vulnerabilities in emerging market economies. Bank for International Settlements. Working Papers, October 2000.

International Monetary Fund (IMF). Range of indicators may provide warning system for currency crises. IMF Survey, August 18 1997, 257-260.

----- . Kohler calls for a public-private partnership to promote greater financial stability. IMF Survey, June 4 2001, 181-183.

----- . Reinhart examines theory and practice in addressing financial crises. IMF Survey,

June 4 2001, 187-189.

----- Roubini argues weak financial, banking sectors, compounded by panic, brought on Asian crisis. IMF Survey, June 4 2001, 192-193.

----- Financial crises: Characteristics and indicators of vulnerability. World Economic Outlook, May 1998, 74-97.

Kamin, S. The current international financial crisis: How much is new? Board of Governors of the Federal Reserve System. International Finance Discussion Papers, June 1999.

Kamin, S. and Babson, O. The contributions of domestic and external factors to Latin American devaluation crisis: an early warning systems approach. Board of Governors of the Federal Reserve System. International Finance Discussion Papers, September 1999.

Kaminsky, G.; Lizondo, S. and Reinhart, C. Leading indicators of currency crises. Working paper of the IMF, WP 97/79, July 1997.

Kaminsky, G. and Reinhart, C. The twin crises: the causes of banking and balance-of-payments problems. The American Economic Review, June 1999, 473-500.

----- On crises, contagion, and confusion. Journal of International Economics, 2000, 145-168.

Kenen, P. editor. From Halifax to Lyons: What has been done about crisis management? Essays in International Finance. Princeton University: Department of Economics, October 1996.

Keynes, J.M. The general theory of employment, interest and prices. NY: Harcourt Brace Jovanovich, 1964.

Kregel, J. Derivatives and global capital flows: applications to Asia, Cambridge Journal of Economics, 1998, 677-92.

Krugman, P. A model of balance-of-payments crises. Journal of Money, Credit, and Banking , November 1979, 311-325.

----- Don't count on it. New York Times, September 5 2001, A23.

Lowenstein, R. When genius failed: The rise and fall of long-term capital management. NY: Random House, 2000.

Minsky, H. Stabilizing an Unstable Economy. New Haven: Yale University Press, 1996.

Neftci, S. FX short positions, balance sheets and financial turbulence: An interpretation of the Asian financial crisis. Center for Economic Policy Analysis Working Paper, New School University, 1998.

New York Times (NYT). Ukraine faked data to IMF, study says. NYT, May 5 2000, A7.

----- Deepening wrinkles in the new economy. NYT, October 17 2001, C2.

----- The good old days were not as good as we thought. NYT, November 30 2001, C1.

Nissanke, M. and Stein, H. Financial globalisation and economic development: Toward an institutional foundation. Eastern Economics Journal, forthcoming 2003.

Palma, G. Three and a half cycles of ‘mania, panic and [asymmetric] crash. Cambridge Journal of Economics, 1998.

Rose, A. and Svensson, L. E. O. European exchange rate credibility before the fall. European economic review, May 1994, 1185-1216.

Sachs, J.; Tornell, A. and Velasco, A. Financial crises in emerging markets: the lessons from 1995. Brookings Papers on Economic Activity, 1996, 147-215.

Sharma, S. The challenge of predicting economic crises. Finance and Development, June 1999, 40-42.

Singh, A. and Weisse, B. Emerging Stock Markets, Portfolio Capital Flows and Long- term

Economic Growth: Micro and Macroeconomic Perspectives. *World Development*, 1998, 607-22.

Taylor, L. Capital market crises: liberalization, fixed exchange rates and market-driven destabilization. *Cambridge Journal of Economics*, 1998.

Weller, C. Financial crises after financial liberalisation: Exceptional circumstances or structural weakness? *Journal of Development Studies*, October 2001, 98-127.

Williamson, J. and Mahar, M. A survey of financial liberalization. *Essays in International Finance*. Princeton University: Department of Economics, November 1998.

NOTES

* Paper presented at the session on “Financial Globalisation” at the Eastern Economics Association conference, Boston, MA, March 15-17, 2002. I am grateful to George DeMartino, an anonymous referee, participants at the EEA conference sessions on Financial Globalisation, Philip Arestis (the organizer of the sessions and this special issue of the EEJ), and Ken Koford for critical reactions to this paper. Peter Zawadzki and Rob Fortier provided outstanding research assistance.

¹ The voluminous predictors literature is usefully reviewed in several works—Berg and Patillo [1998], Edison [2000], Eichengreen [1999: ch. 6], Flood and Marion [1999], Goldfajn and

Valdés [1997], Gonzalez-Hermillosa [1999], Hardy [1998], Hawkins and Klau [2000], IMF [1998, ch. 4], and Sharma [1999]. It bears noting that not all neoclassical development economists view efforts to create predictors as viable or sufficient to prevent crisis. Extensive references to the neoclassical predictors literature appear in the body of this paper.

² See Grabel [2002b] for discussion of the Argentine crisis.

³ The theoretical literature on currency crises is reviewed in Eichengreen [1999, App. B], Goldfajn and Valdés [1997], and Kaminsky, Lizondo, Reinhart [1997].

⁴ See Eichengreen and Portes [1997] and the papers collected in Kenen [1996] for a summary and evaluation of the decisions taken at the Halifax Summit. These works also discuss the recommendations of the Rey Committee (formed at Halifax) and the decisions taken at the 1996 G7 Summit (in Lyons) on crisis prevention and the need for information dissemination.

⁵ General descriptions of these two approaches draw on Edison [2000], Goldstein, Kaminsky and Reinhart [2000], and Sharma [1999].

⁶ Goldstein, Kaminsky and Reinhart [2000] draw on the “signals methodology” elaborated in Kaminsky and Reinhart [1999] and other related work by these authors, e.g., Goldstein [1997], Kaminsky, Lizondo, Reinhart [1997], and Kaminsky and Reinhart [2000]. The description of the authors’ empirical findings is taken from Goldstein, Kaminsky and Reinhart [2000: Ch. 8].

⁷ Note that they find that banking crises in developing economies are harder to predict using monthly data than are currency crises.

⁸ They acknowledge that their early warning system would neither have predicted difficulties in Indonesia during the Asian crisis, nor Argentina's difficulties following the Mexican crisis.

⁹ This hardly implies that economic performance is determined exclusively by interpretation.

¹⁰ Financial liberalization is a variable that rarely figures into neoclassical predictors of crisis. Kaminsky and Reinhart [1999] are an exception among neoclassicals in this regard.

¹¹ I thank James Crotty for bringing this point to my attention. See Lowenstein [2000] on the failure of Long Term Capital Management.

¹² The subsequent discussion of risk categories, tripwires, and "speed bumps" draws on Gabel [2003].

¹³ Note that for the reasons advanced earlier, Goldstein, Kaminsky and Reinhart [2000, 107-110] do not speak to the issue of an ex-post policy response to the information revealed by predictors. In a frustratingly brief discussion they speak rather vaguely to the ex-ante policy implications of their early warning system.

¹⁴ It is certainly possible that activation of trip wires in one country could aggravate contagion risk in those countries that investors have reason to perceive as being vulnerable to similar

difficulties. This risk could be mitigated through the use of “contagion” trip wires. These would be activated (in “country B”) whenever speed bumps are implemented in a country that investors have reason to view similarly (“country A”). In such circumstances, country B would then implement appropriate speed bumps.

¹⁵ Dodd [2000], Kregel [1998], and Neftci [1998] demonstrate the significant role of off-balance sheet activities in the Asian financial crisis.