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MANAGING FINANCIAL RISK: A RISK-ANALYSIS FRAMEWORK FOR INTERNATIONAL CAPITAL FLOWS[1]

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Recently, leading industrialized nations have begun considering specific ways to "strength[en] the architecture of the international financial system" and thereby meet the potential danger of systemic instability that follows from the increasing integration of the global economy (Rubin 1998). This paper concerns itself with a key feature of the increasingly integrated global economy: international capital flows. It analyzes the relationship between these flows and financial stability and also suggests a framework, an "international capital flows framework" or IKFF, for policy makers to use as an analytic tool in evaluating and managing the risks associated with such flows. The IKFF suggests thinking of economic markets (EMs) as financial institutions that need to manage their international cash flow "statements" and "balance sheets" in much the same way as international financial institutions (IFIs). The IKFF consists of an integration of a simplified account of the IMF's balance of payments model and the risk-management and capital adequacy standard for IFIs proposed by the Basle Committee for Banking Supervision. More particularly, the IKFF applies the methodology of investment disaggregation and risk-weighting used in the capital adequacy standard to the different components of the capital account of the balance of payments. This application yields an analytically determined "adequate" level of foreign reserves that policy makers and private investors could use as a rule of thumb in evaluating the

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risk of financial instability and insolvency associated with different EMs. Until better, more sophisticated models are available, constructed through careful and rigorous study of accurate data on the vector of international capital flows, this rough-and-ready rule of thumb can serve as an analytic tool for EM financial analysis.

INTRODUCTION

In the wake of the Asian crisis of 1997–1998, policy makers and scholars have discussed not only the increasing integration of the global economy, but also the potential dangers that follow from such integration. Recently, leading industrialized nations have begun considering specific ways to "strength[en] the architecture of the international financial system" and thereby meet this potential danger (Rubin 1998).[2] This paper concerns itself with a key feature of the increasingly integrated global economy: international capital flows. In broad terms, this paper will analyze the relationship between international capital flows and financial stability; it will also suggest a framework, an "international capital flows framework" or IKFF, for policy makers to use as an analytic tool in evaluating and managing the risks associated with such flows. The IKFF suggests thinking of economic markets (EMs)[3] as financial institutions that need to manage their international cash flow "statements" and "balance sheets" in much the same way as international financial institution (IFIs). In specific terms, this paper will proceed as follows. First, it will discuss the theorized causes and systemic consequences of international capital flows, applying the Kindlebergian Minsky Model of financial crisis; the paper will then illustrate this discussion by example, examining the role of international capital flows in the recent Asian crisis. Then, in its second part, the paper will construct the IKFF. The IKFF consists of an integration of a simplified account of the IMF's balance of payments model and the risk-management and capital adequacy standard for IFIs proposed by the Basle Committee for Banking Supervision. More particularly, the IKFF applies the methodology of investment disaggregation and risk-weighting used in the capital adequacy standard to the different components of the capital account of the balance of payments. This application yields an analytically determined "adequate" level of foreign reserves that policy makers and private investors could use as a rule of thumb in evaluating the risk of financial instability and insolvency associated with different EMs.

Causes and Consequences of International Capital Flows

International capital flows consist of the movement of capital from one to another autonomous, usually sovereign EM possessing a monetary authority. These flows have changed dramatically in the last 25 years, both in terms of quantity and quality (World Bank 1996a, 3). Regarding quantity, despite measurement difficulties,[4] it is certain that there has been a tremendous increase in both gross and net international capital flows since the early 1970s (IMF 1991, 1). Net flows to East Asia in the period prior to the recent crisis,[5] for example, were only $2.2 billion in 1970 but some $85.3 billion in 1994—a total increase of some 3,877 percent (World Bank 1996a, 133). And East Asia was hardly an anomaly, as net capital flows to South Asia went from $1.4 billion to $13.8 billion, an increase of 986 percent; to Sub-Saharan Africa, from $1.7 billion to $20.1 billion, an increase of 1,182 percent; and to Latin America and the Caribbean, from $4.2 billion to $51.1 billion, an increase of 1,217 percent (World Bank 1996a, 133). Overall, net global capital flows to the developing world increased from approximately $11.3 billion in 1970 to over $207.4 billion in 1994, showing an aggregate increase of over 1,835 percent (World Bank 1996a, 133). Furthermore, a qualitative shift in the nature of the flows has accompanied this quantitative increase, as private capital, rather than official flows, now comprises a far greater share of international capital flows than previously (IMF 1991, 1). For example, in East Asia, private capital comprised only 36.4 percent ($0.8 billion) of flows in 1970, but some 90.6 percent ($77.3 billion) in 1994 (World Bank 1996a, 133). Latin America saw a similar shift, with private capital rising from 76.2 percent ($3.2 billion) to 97.3 percent ($49.7 billion) in 1994. Overall, total net capital flows to developing countries consisted of only 51.3 percent ($5.8 billion) private capital in 1970 but nearly 76.6 percent ($158.8 billion) in 1994 (World Bank 1996a, 133).[6]

There are many different possible explanations for this increase in international, and especially private international, capital flows. From an historical perspective, the demise of the Bretton Woods regime in 1971 and the ensuing advent of floating exchange rates undoubtedly contributed to the rise in international capital flows (World Bank 1996a, 3). The concomitant elimination of capital controls in many countries and the liberalization of financial markets has also surely contributed (IMF 1991, 1). From an economic perspective, the explanation of the increase in international capital movements stems from four general conditions

relating to economic opportunity, consumption preferences, risk expectations and aversion, and return expectations (IMF 1991).[7] These conditions, particularly return expectations, play a key explanatory role not only in the recently observed changes of international capital movements, but also within the consequences of such movements on global financial stability (Kindleberger 1978).

The first condition of international capital movements is that there must exist some set of investment opportunities in a given EM available to participants from multiple EMs (IMF 1991, 20). This does not entail that the availability of each opportunity be the same for different participants, however. Since the marginal benefits that participants associate with different investments will differ, the marginal costs[8] can also differ and yet still allow the rational exploitation of the opportunity by different participants from different, i.e. "international," EMs.[9]

The second condition of international capital flows, that present and future consumption preferences must differ within different EMs (IMF 1991, 20), is actually an amalgamation of two conditions: consumption preferences given a level of wealth and the wealth available. Just as individuals prefer to consume and save different proportions of their incomes, so do EMs.[10] Additionally, even if different EMs have the same propensity to consume from present income, their desire to smooth that consumption and the underlying variance of income will also affect international capital movements; therefore the propensity to smooth consumption, inversely related to the willingness to tolerate consumption variance, will also drive international capital flows.[11] And, finally, wealth and its accumulation will directly and indirectly affect the quantity of capital available for investment from a given EM. Directly, the greater the supply of capital, the lower its cost, implying that investment opportunities in other EMs will become increasingly attractive as their cost of exploitation declines. Indirectly, the stock and growth of wealth will affect individual EM participants' preferences regarding consumption and consumption smoothing,[12] as well as risk aversion.[13]

The third general condition of international capital movements is the willingness of various EMs and EM participants to assume varying degrees of risk (IMF 1991, 21). This difference in risk aversion will not only affect the willingness to seek or hold particular investment opportunities, but also will affect the willingness to hold a portfolio of given riskiness (Goodhart et al 1998, 48). Such a diversification desire will itself correlate directly with increased international capital movements if, *ceteris paribus*,

the risk associated with a portfolio of investment opportunities in different EMs has a lower overall degree of correlation than would a portfolio within any given EM.

Finally, the fourth and most essential condition of international capital flows is a difference of expectations regarding investment returns among participants in different EMs. Capital flows, like other "trades", depend upon market participants having "conflicting views on the effects of [an] unanticipated event" (IMF 1991, 7). Market participants shift their capital between different international EMs in ways that each believes will maximize return; because underlying beliefs differ, the vectors of the flows differ.[14] Furthermore, the effect of return expectations on the movement, international or otherwise, of capital is indisputably significant. Indeed, one of the most important aspects of the influence of return expectations on capital movement is their dynamic feedback-effect. Return expectations directly relate to the "herding" (IMF 1998a, 157; Calvo 1996, 6) behavior or "bandwagon effect" (IMF 1993b, 10) among EM participants that has historically played such a large role in financial crises (Kindleberger 1978).[15] Return expectations, therefore, occupy a unique place among the causal conditions of international capital movements in that they not only are a central cause, but also a central consequence, of such flows.

This raises the question of the consequences, systemic and specific, of international capital flows. These consequences are of obvious importance to policy makers seeking to stabilize the integrated global economy. One way of considering these consequences is through the analytically simple yet nonetheless powerful model for financial crises suggested by Kindleberger (1978). Following an analysis of Kindleberger's model, this paper will attempt to use that model in a broad-brush discussion of international capital flows before concluding this discussion of the causes and consequences of international capital flows by examining the Asian financial crisis and the role that international capital movements played in causing it.

Kindleberger's model stems largely from the work of Hyman Minsky, and Kindleberger clearly credits this source, referring to his model as a "Minsky Model" (Kindleberger 1978, 15). The essentials of this model are the following. First, an exogenous shock strikes a financial system or, in our context, an EM. This shock, known as a "displacement," need be of no distinct nature providing it is powerful enough to cause a "realignment of profit opportunities" within and among the EMs. Second, the participants within the "displaced" EM recognize the realignment of profit opportunities; they thus divest themselves of their currently held assets,

earning now reduced relative returns, and reallocate their capital to those newly available opportunities in the "invested" EM earning suddenly relatively higher returns. Third, the movement of some EM participants into these newly created and recognized profit opportunities attracts attention within various EMs, causing herding behavior as many different EM participants seek to take similarly profitable positions, leading to excessive "gearing" within the market, or an overexpansion of credit. This overexpansion of credit leads to "overtrading", driving up the price of exploitation of the new profit opportunity and thereby creating a "bubble" or a "mania." Next, some participants in the EM, likely the first to take positions in the new profit opportunity, recognize this mania and exit, collecting their profits. This leads to "distress," as participants recognize flight; this "distress" mounts to "revulsion" as all those in the suddenly no-longer-profitable and fast-collapsing opportunity seek to close their positions in an example of reverse-directional herding. This revulsion, in turn, creates a "panic," as the stampede from assets to liquidity will depress asset prices, create a "discredit," and consume the liquidity in the (dis)invested EM . Kindleberger calls this final condition a "crash," and to the extent that the now dis-invested EM is tied to others, i.e., to the extent that an integrated international financial system exists, "contagion" effects could spread the liquidity crisis or "crash" from the invested EM to the displaced and throughout the entire integrated system.

Kindleberger has created a useful typology readily applicable to the context of modern integrated international economies with large capital flows. When placing this model within that context, the roles of international capital flows are twofold. First, they clearly will contribute to the speculative pressure leading to "manic" increases in investment values in an EM. Empirical research by Montiel suggests that expanded capital inflows, even when sterilized, nonetheless cause "surges" in asset prices and, indeed, a "widespread boom in asset markets" (1996, 208). International capital flows bring increased market power to bear on investment opportunities; this leads to sharp, swift reactions in asset prices, causing greater volatility and instability in asset markets (Crockett 1997, 34). Such volatility and amplified asset price reactions, when capital is flowing into an EM, lead to greater and swifter inflation of Kindlebergian bubbles. Furthermore, such volatility can be exacerbated by the particular conditions pertaining to a given EM, such as inadequate information distribution[16] or potential liquidity restraints in the form of foreign exchange. Additionally, to the extent a given EM's asset market was inefficient, subject, for instance, to pricing "momentum" or "dramatic reversal"

effects (IMF 1998a, 172), the increased market power created by international capital movements would aggravate these inefficiencies. Second, international capital movements will also contribute to the revulsions causing the collapse of Kindlebergian bubbles and financial panic: the outflow of international capital will lead to rapid asset price depression and collapse. International capital flows will not only exacerbate Kindlebergian revulsion through assets prices, however, but also through channeling discredit and liquidity evaporation, particularly in regard to foreign exchange (Bosworth 1998, 7). Such so-called contagion effects (Goldstein 1998, 17 ff.; Crockett 1997, 10; Litan 1997, 259 ff.; Calvo and Reinhart 1996, 159) can be particularly devastating when involving EMs of different sizes (Calvo and Reinhart 1996, 169) or when the banking, payment, or settlement systems of the respective EMs are weak for either structural or conjunctural reasons (Rubin 1998; Litan 1997, 264 ff.; *The Economist* 1996, esp. 13–14).

If international capital movements can play such a powerful role within the Minsky Model in creating at least local, and potentially systemic, financial crisis, then it follows that the conditions leading to these movements would themselves be contributors to the likelihood of crisis. Therefore, causing shifts in economic opportunities, consumption preferences, risk expectations and aversion, and return expectations could destabilize the economic markets in which such shifts occurred. What would cause such shifts? Differing macroeconomic polices in different EMs (IMF 1993b, 3 ff.) would affect the first condition, economic opportunities, and the fourth, return expectation, and likely also the second and third, consumption preferences and risk aversion, respectively. Differing legal structures, specifically in regard to capital controls on the source side (World Bank 1996, 35) would affect the first condition. Differing credit policies within domestic banking sectors or by EM monetary authorities (IMF 1993b, 5 ff.) similarly would impact at least the fourth condition, and likely as well the second and fourth. The implication, then, is that to the extent that international capital flows exist, the stability of individual EMs will be subject in two ways to the stability of other EMs because of the linkages forged by such mobile capital: first, indirectly through each EM's dependence upon systemic stability, which any individual EM's instability would threaten; and, second, directly through otherwise innocuous actions by EMs, such as fiscal or monetary policies, that create the conditions triggering potentially destabilizing capital flows.

A brief examination of the Asian financial crisis of the past two years will illustrate the above analysis.[17] First, it is clear that "bountiful global

liquidity conditions" (Goldstein 1998, 13) contributed to the outbreak of crisis in Asia (G-10 1998b, 7), with over $420 billion in net private capital washing into the developing Asian countries from 1990 through 1997 (Goldstein 1998, 13). This surge in private capital flows, following the path predicted in the above model, compressed spreads and depressed yields on debt floated in these markets and indicated wider investor participation (IMF 1998a, 6); both of these in turn imply the sort of herding behavior characteristic of Kindlebergian bubbles. Crockett, indeed, characterized the nature of capital flows into the region, while not as "manic," as "disaster myopi[c]" (1997, 8). Investors saw only the inflation of asset prices resulting from capital inflows (IMF 1998d, 3), creating the illusion of bountiful economic opportunities. These fed fanciful expectations of ever-increasing returns and ever-decreasing risks (IMF 1998d, 3).[18] Such fancies led market participants to maintain large unhedged exposures in foreign currencies (IMF 1998a, 6), increasing precisely the risk that the disaster myopic and manic participants had failed to notice in the first place.

Then financial distress struck. As the region's macroeconomic fundamentals were generally quite good (IMF 1998a, 64), the preeminent cause of the distress appears to have been a reevaluation of the quality of regional investments, which were increasingly in industrial overcapacity, inefficient government supported monopolies, or real estate speculation (Goldstein 1998, 14). This reevaluation led to shifts in perceptions regarding the risks involved in regional investments and their expected returns. These shifts in perceptions generated pressure on foreign exchange rates as market participants, suddenly nervous, attempted to hedge open positions (IMF 1998d, 3; IMF 1998a, 2). Pressure on the Thai baht first appeared in January 1997, then abated until June 1997 (IMF 1997, 15). Once pressure resumed, however, Thailand was unable to maintain its exchange rate and allowed the baht to float. The baht depreciated rapidly and extensively, losing 55 percent of its value against the U.S. dollar by January 1998 (IMF 1998a, 2). This depreciation triggered financial distress throughout the region, leading to a revulsion in which capital flowed out of Thailand, Malaysia, the Philippines, and Indonesia, with distress also ultimately surfacing in the crisis' second stage in Hong Kong and Korea (IMF 1997, 16).

This revulsion of international capital, the severity of which led Mahathir Mohamad to describe international capital markets as "a jungle of ferocious beasts" (*The Economist* 1998a, 69), created dynamic feedback-effects, as the Minsky Model would predict. Initial depreciations led to greater depreciations as investors unwound unhedged positions; this

increasing depreciation led to an increase in counterparty debt default and exacerbated weaknesses in the banking sector, which required monetary authorities to keep interest rates low—an unsustainable position given finite foreign reserves (IMF 1998a, 5). Eventually, by January 1998, the Indonesian Rupiah had lost 81 percent of its value against the U.S. Dollar, the Malaysian Ringgit, 46 percent (IMF 1998a, 2); and the average volatility of the region's exchange rates, as measured by the standard deviation of the daily spot rate, increased by a factor of 10 between July 1997 and January 1998 (IMF 1998a, 2). Foreign finance dried up,[19] asset prices plunged, and domestic demand declined (IMF 1997, 1). The Kindlebergian bubble had burst; there was financial panic and ultimately collapse. Not until early 1998 would equity markets begin to rebound; and they would suffer a relapse in April 1998 as the real drop in the region's output became obvious (IMF 1998a, 4). The region's foreign reserves, which declined in total some 12.0 percent ($9.7 billion) from 1997/1998, will, according to IMF estimates, recover in 1999 and resume their previous growth, expanding some 19.8 percent ($14.0 billion) in 1998/1999 (IMF 1998e, 227).

Evaluating and Managing International Capital Flow Risk

This paper has thus far examined the EM conditions that contribute to international capital flows. It then applied the Kindlebergian "Minsky Model" to such flows in attempting to discuss their potential consequences for economic and financial instability. Finally, the paper adduced the Asian financial crisis of 1997/1998 as an illustration of the instability that such international capital flows can induce. But this discussion so far points to a larger question: if international capital flows create such a risk of potentially far-reaching destabilization of the international financial and economic system, how can this risk be reduced or at least better managed? Of course one immediate response would be to institute capital controls, which would eliminate international capital movements altogether. But such a policy choice would have obvious difficulties. First, such controls would unavoidably be imperfect; capital movements would continue, but through less predictable path (*The Economist* 1998c). Second, these controls would constitute a reversal of current global trends towards increasing international political cooperation. "Capital balkanization" is simply incompatible with the political and economic liberalization that has marked international developments of the past four decades and would likely be politically unimplementable. Finally, the

elimination of capital flows would entail obvious economic costs (*The Economist* 1998c). It is an economic truism that capital is most efficiently used where it produces the highest returns; and within a global perspective, the investment opportunities producing the highest returns are not necessarily, and in fact are likely not, in the same EMs as currently generate surplus capital. The elimination of international capital flows would therefore produce an inoptimal level of such flows and an inoptimal level of risk of instability within the international economic system.

This paper suggests an analytic tool, an "international capital flows framework" or IKFF, for measuring and better managing the risks associated with international capital flows. The IKFF is based on the Basle Committee for Banking Supervision's approach to risk management for IFIs. This paper suggests thinking of each "national" EM essentially as an IFI that needs to manage its cash flow, or balance of payments, and its balance sheet, or national indebtedness, in much the same way as "other" IFIs. This approach follows both the suggestions of Goldstein and Calvo that the "concept of adequate international reserves needs to be revised to take greater account of capital flows [and] financial stocks..." (1996, 250) and the insight of Crockett that liquidity-based "bank run" analysis applies well beyond the banking system (1997, 7). To that end, this paper will adapt the Basle Committee's risk-weighted capital adequacy standard and apply it in a stylized form to a simple model of the balance of payments. The development of this analytic framework will proceed as follows. First, this paper will discuss the Basle Committee's own risk-weighted capital adequacy standard. Then it will consider a simplified version of the IMF's model of the balance of payments. Finally, the paper will integrate these two models into the IKFF. This integration proceeds from the premise that the primary objectives of the Basle Committee's capital adequacy standard—limitation of leverage and the creation of a buffer against unexpected loss, diminishment of the likelihood of institutional insolvency and cascading contagion leading to systemic failure,[20] and mitigation of moral hazard (de Swan 1998, 232)—are highly relevant to and applicable within the international capital flow context.

The Basle Committee, a G-10 organization meeting under the aegis of the Bank for International Settlements, appeared in 1974 after the collapse of the Bankhaus Herstatt shocked the G-10 with the possible systemic consequences of the failure of individual IFIs (Basle Committee 1997b, 1). The Basle Committee focused initially on the regulation of foreign banking establishments with its original Concordat in 1975 (Basle Committee 1997b, 1).[21] The "Principles for the Supervision of Banks' Foreign

Establishments," a replacement and modernization of the original Concordat (Basle Committee 1983, 1) now known universally as the "Basle Concordat," followed in 1983 and has been amended at numerous times, most significantly in July 1988 by the "International Convergence of Capital Measurement and Capital Standards," or capital adequacy standard (Basle Committee 1997b, 3). The Basle Committee reissued the capital standards document in updated form in April 1997 in conjunction with the issuance of the "Core Principles for Effective Banking Standards" (Basle Committee 1997b, 3). This updated standard, along with the "Amendment to the Capital Accord to Incorporate Market Risks" (Basle Committee 1996, 1, esp. n. 1), forms the basis of the risk-weighted capital adequacy model that this paper will apply in the construction of the IKFF.

The Basle Committee's risk-weighted capital adequacy standard consists of two central elements. The first is the calculation and qualification of underlying reserve capital, based on outstanding capital, that a financial institution must hold. The second is the risk weights that a financial institution must use in translating its assets into an outstanding capital calculation (Basle Committee 1997c).[22] This first element, underlying reserve capital, itself consists of two components: tier 1 and tier 2 capital. Tier 1 capital includes paid-up share capital or common stock and disclosed reserves; tier 2 capital includes undisclosed reserves,[23] asset revaluation reserves, general loss or loan-loss provisions,[24] hybrid debt/equity instruments, and subordinated debt. While the Basle Committee makes no specifications regarding the proportions of the two components comprising tier 1 capital, the five components of tier 2 capital are subject to strict proportionality requirements.[25] Furthermore, declared tier 2 capital itself may not be more than 100 percent of the amount of declared tier 1 capital, i.e., more than half of the aggregate required capital reserve amount. In total, to meet the requirements of the risk-weighted capital adequacy standard, tier 1 and tier 2 capital must comprise at least 8 percent of outstanding capital.

The second central element of the Basle Committee's risk-weighted capital adequacy standard consists of risk weights.[26] Each asset appearing on the balance sheet of an IFI falls into one of the nineteen different asset categories, including the catch-all "all other assets" category. These nineteen categories are themselves grouped into five different risk-buckets; each risk bucket assigns specific risk weights to each category it contains. These risk weights vary from a low of 0 percent, for such assets, for example, as cash or claims on central governments and banks that are denominated and funded in that national currency, to a high of 100

percent, for example, for claims on the private sector, real estate investments, or the catch-all category.[27] The intermediary risk weights are 20 percent and 50 percent, with a 10 percent option available at the discretion of regulatory authorities for claims on domestic state-owned enterprises. These weights are used by IFIs to translate their balance sheet assets into outstanding capital calculations by simply multiplying the balance sheet value of the asset by its risk weight (rw); the product is the amount of outstanding capital against which the bank must hold adequate reserves. The amount of required reserves is then found by multiplying the calculated outstanding capital amount by the capital reserve requirement (krr). As an illustration, if a financial institution held only a loan for $10 million to a domestic state-owned enterprise, which in the relevant jurisdiction carried a 20 percent risk weight, that institution would need to hold $160 thousand in reserve capital ($10 million × .2(rw) × .08(krr)); this $160 thousand would have to consist of at least $80 thousand in cash or disclosed reserves, with the remaining $80 thousand held in any of the components of tier 2 capital (subject to proportionality restrictions).

Clearly a capital adequacy standard is only one tool useful in increasing the stability of IFIs (Basle Committee 1997c, 2). Such standards are obviously flawed in that they can be misleading because asset quality does not correlate perfectly with asset category (Basle Committee 1997c, 2); and the roughness of the asset categorizations, as well as the use of only five risk-buckets, implies substantial inefficiency in the ultimate outstanding capital calculation (Crockett 1997, 28). So does the failure of the standard to recognize the risk-reduction stemming from holding a portfolio of assets (Crockett 1997, 28). Nevertheless, such standards have been almost universally adopted and have achieved measurable success in realizing their articulated objectives.

The simplified balance of payments model appearing in this paper is adapted from the comprehensive model presented by the IMF in its Balance of Payments Manual (IMF 1993a).[28] Following the methodology of Calvo and Reinhart (164), this paper will use the balance of payments (BoP) as a proxy for international capital flows. Furthermore, the simplified balance of payments model appearing here will consist only of a capital account (KA).[29] The reasons for this first simplification are twofold. First, again following the methodology of Calvo and Reinhart, it is clear that the KA more closely than the current account (CA) links to international capital flows (164); by definition, the CA tracks the movements of goods and services exchanged for capital, while the KA tracks capital directly.[30] Second, the CA, because of its connection to real-resource transfer, is less

volatile in the short term than the KA; and its relevance to sudden financial instability is therefore attenuated.[31]

The simplified KA consists of four basic divisions: direct investment, portfolio investment, other investments, and international reserves, or "reserve assets" in the language of the IMF (IMF 1993a, 44 ff.). Each of these divisions contains many different sub-parts, but for the purposes of this paper, it is unnecessary to reduce the KA beyond its basic divisions, as the IKFF will be specified only to this level.[32] The IMF defines "direct investment" as "international investment that reflects the objective of obtaining a lasting interest by a resident entity in one economy in an enterprise resident in another economy" (IMF 1993a, 86). Such investment is more commonly known by the moniker of foreign direct investment (FDI). Portfolio investment, according to the IMF's breakdown, includes equity securities and debt securities, whether in the form of bonds or notes; money market instruments and financial derivatives or secondary instruments such as options also fall within this division (IMF 1993a, 91). The third basic division of "other investment" is a negative concept, defined by the IMF to include "all financial transactions not covered in direct investment, portfolio investment, or reserve assets" [italics omitted] (IMF 1993a, 95). The fourth and final division consists of international reserves, which are those assets "readily available to and controlled by monetary authorities for direct financing of payments imbalances" (IMF 1993a, 97). Such assets include monetary gold, special drawing rights at the IMF (SDRs), reserve position in the IMF, foreign exchange assets, whether of currency and deposits or securities, and any other appropriate assets (IMF 1993a, 97). Any securities that do not satisfy the requirements of being part of international reserves would fall into either the KA division of direct investment or portfolio investment, as appropriate (IMF 1993a, 97).

Using this BoP model as a proxy for international capital flows, it is now possible to integrate these simplified BoP elements with the discussed risk-weighted capital adequacy standard to produce the IKFF. Broadly, this integration will proceed by using the basic BoP divisions as "risk-buckets" that will then serve to translate the different KA flow amounts into a total outstanding capital flow (OKF), which will then form the basis of the determination of adequate capital reserves (AKR). Specifically, this integration will proceed by first adapting, in turn, each central element of the Basle Committee's capital adequacy standard to the simplified BoP model and applying each to the international capital flow context. Translating an EM's assets into an OKF will involve taking each outstanding asset, or

item within the KA, and multiplying it by an assigned risk weight.[33] Since the KA has a total of four basic divisions, e.g., foreign direct investment, portfolio investment, other investment, and international reserves, there will be a total of four different "risk buckets." The resulting products, when summed for each item in the KA, will be the total OKF. The adaptation and application of the element of risk weights will precede that of the calculation and qualification of underlying reserve capital.

The lower bound of any risk weight must clearly be zero, applied in the Basle Committee context to cash, for example. In the IKFF context, the lower bound would have to belong to international reserves. It is impossible for international reserves to carry any risk weight higher than 0 percent since an EM will hold its calculated capital reserves as international reserves; so any positive risk weight would entail the holding of reserves based on the amount of reserves held, a dynamic, logical impossibility. The upper bound for risk weights, on the other hand, would surely belong to portfolio investment. Such investment, known as "hot money" (*The Economist* 1998a), is infamous for its easy flow, directional volatility, and volume variance. Regardless of their face maturities, debt and equity instruments are always marketable, subject only to specific instrument restrictions and market thickness. And the financial derivatives and secondary instruments included in portfolio investment flows can often amplify this volatility and variance, leading to particularly dramatic shifts in capital flows. The Asian crisis[34] and the Mexican crisis of 1994 (Goldstein and Calvo 1996) are pointed examples of the directional volatility and volume variance of such investment. Portfolio investment should therefore carry a 100 percent risk weight.

The remaining two risk buckets are more problematic to risk-weight. FDI clearly carries some risk of reversal and therefore must have a risk weight higher than zero. Due to its connection with control and long term interest, however, it is also far less volatile than portfolio investment and therefore must have a risk weight below 100 percent. Following the admittedly crude division of risk weights of the Basle Committee, a risk weight for FDI in the range of 20 percent to 50 percent seems appropriate. As for risk-weighting "other investments," this is obviously problematic because of the differentiation of the assets that can fall within this category. Since the KA does record maturities of investment within the category, i.e. long term is more than a year while short term is less than a year, it is conceivable that this basic division could contain dual risk weights based on this bifurcation. But the modern relevance of maturities to flow volatility is questionable (IMF 1993a, 41) and their separate risk-weight-

ing within the IKFF, at least as here developed, therefore represents an unwarranted complication.[35] Lacking any clearly useful way to risk-weight the sub-parts of "other investments," the IKFF will weight them in aggregate at a weight roughly between FDI and portfolio investment, in the 40 percent to 80 percent range.

That completes the adaptation and application of the Basle Committee risk-weighting model to the BoP. The IKFF therefore currently has the following form:

$$OKF = IR(0\ rw) + PI(1\ rw) + FDI(.2\approx.5\ rw) + OI(.4\approx.8\ rw)$$

In order to determine the AKR from this, it is necessary to adjust the OKF by an appropriate capital reserve ratio. So:

$$AKR = OKF(krr) = krr[IR(0\ rw) + PI(1\ rw) + FDI(.2\approx.5\ rw) + OI(.4\approx.8\ rw)]$$

The determination of the AKR amounts to adapting the remaining central element of the Basle capital adequacy standard to the international capital flows context. This task of calculating and qualifying underlying reserve capital is simplified in the IKFF, as here developed, because no distinction is made between kinds of reserve capital, e.g., tier 1 or tier 2 capital. All assets that qualify as international reserves, whether cash, deposits, gold, SDRs, etc., will count equally as reserve capital for the purposes of the IKFF.[36] This leaves only the task of setting the appropriate reserve ratio. Clearly the 8 percent reserve ratio chosen by the Basle Committee as appropriate for IFIs is an arbitrary standard; there is nothing "magic" about 8 percent or 12 percent or any other particular reserve level (Greenspan 1998, 4). Indeed, "[t]here is no objective basis for ex-cathedra statements about levels of capital. There can be no certainty, no dogma, about capital adequacy." (Estrella [quoting Cooke] 1998, 195). But fortunately there is no need to find "the right" level of capital adequacy, if such existed; it is only necessary to find a level sufficient for the attainment of at least the three primary articulated objectives of capital adequacy standards.

Such a level would rationally be bounded at its lower end by the 8 percent ratio of the Basle Committee. First, this ratio is familiar to the international financial system that surely associates it with banking prudence and systemic stability: these beneficial associations would carry over to the IKFF. Second, if this 8 percent ratio is sufficient for safeguarding profit-seeking and thus risk-taking IFIs, it should certainly be suffi-

cient for doing the same for what would be, due to extraordinary diversification, risk-neutral EMs.

The upper limit for capital reserve levels could then be bounded by a nod to "on the ground" implementation mechanics. Currently, Chile imposes a Tobin-like tax on international capital flows.[37] Since no reserve requirement would want to be more confiscatory than an actual tax, it follows that the capital reserve level would not want to be greater than the level of this tax, 30 percent. Of course the amount of this tax is, like the Basle Committee capital ratio, arbitrary; Chile—or another country—could easily have a 20 percent or 50 percent tax.[38] Nonetheless, the current 30 percent Chilean rate is familiar to financial markets and, moreover, has apparently functioned with some success (IMF 1998a, 7). Lacking better information, the IKFF capital reserve ratio should fall within the range of 8 percent–30 percent. The IKFF is therefore completely defined as:

$$AKR = (.08 \approx .3\ krr)[IR(0\ rw) + PI(1\ rw) + FDI(.2 \approx .5\ rw) + OI(.4 \approx .8\ rw)]^{39}$$

By evaluating the international capital flows of individual EMs within this framework it would potentially be possible to gain a better idea of the risk that these EMs are facing due to such flows. Furthermore, by applying this framework in self examination, it would be possible for EMs to take action to manage their international capital flows in a way more consistent with continued stability.

Conclusion

Any number of remarks would be possible at this point regarding the practicality of capital adequacy standard-like regulatory implementation of the here suggested IKFF. Certainly a tax on individual international capital flows, similar to the Chilean tax, seems one obvious possibility. The appropriate authority of an EM, almost surely its central bank, could tax any international capital flow in the amount of its AKR. This would serve not only the purpose of providing the EM with the needed level of reserves, but would also serve in a Tobinian sense to "throw sand in the wheels" of international finance. Alternatively, using a "pre-commitment" approach to capital reserves, an approach currently championed by the Federal Reserve (Meister 1998, 2; Goodhart et al 1998, 84), an EM could use the IKFF to pre-estimate for a given period its capital reserve needs and could then arrange for contingent credit or liquidity facilities to be available to meet these needs. The G-10 is currently examining the feasibility of precisely such facilities within its search for "innovative financial arrange-

ments" to meet financial crisis (G-10 1998b, 8). Clearly the crucial issue in regard to the IKFF is the acquisition of reserves, whether through taxation, contingent facilities, or otherwise. But this and other regulatory-related issues are beyond the scope of this paper, which seeks explicitly only to suggest an analytic framework or analytic tool that policy makers and private investors could use in order better to evaluate and measure the international capital flow-related risks stressing given EMs. Which courses of action those policy makers and investors would choose in response to the results of their IKFF-based analysis is a separate questions; how an EM would seek to increase its foreign reserves when the IKFF flashed a warning signal is, unfortunately, a question for another paper.

In short, this paper attempted simply to clarify the importance of international capital movements and the role that such movements can play in creating international financial and economic instability. It sought, moreover, to suggest an analytic framework for evaluating the risks associated with such capital flows. This framework applied the methodology of risk- weighting found in the capital adequacy standard of international banking to a highly simplified version of the balance of payments. Although incomplete, this framework has obvious utility. It highlights both the practical and conceptual similarity between the banking sector narrowly understood and the transactions of the international financial and economic system as manifested by international capital movements. It makes an explicit parallel between the cascading runs experienced by international financial institutions and those liquidity and confidence crises experienced by EMs. And, finally, the IKFF provides an analytically determined "adequate" level for an EM's foreign reserves that policy makers and private investors can use as a rule of thumb in measuring the risk of financial instability and insolvency associated with a given EM. Until better, more sophisticated models are available, constructed through careful and rigorous study of accurate data on the vector of international capital flows, this rough-and-ready rule of thumb can server as an analytic tool for EM financial analysis, much as profitability ratios or liquidity ratios do in institutional analysis.

Notes

[1]The author would like to thank William V. Rapp, Director of Graduate Studies in International Relations at Yale University, for his generous support during the writing of this article.

[2]The G-10, for example, formed three working groups in April 1998 to focus on issues connected with increasing international economic

integration. These working groups issued their first reports in October 1998: *Report on the Working Group on Strengthening Financial Systems* (G-10 1998c), *Report on the Working Group on Enhancing Transparency and Accountability* (G-10 1998a), and *Report on the Working Group Managing International Financial Crisis* (G-10 1998b).

[3]With "economic market" (EM) or "economic markets" (EMs), this paper means autonomously governed economic units with monetary authorities that report individual financial accounts. The paper uses this terminology to avoid explicitly any judgment regarding the political autonomy or sovereignty of any discussed EM.

[4]Measuring total capital flows has proven to be quite difficult, as most EMs report only net flows (IMF 1998a, 6). Even regarding net flows, there are difficult empirical issues because of the flows' sometimes uncertain origin and amount (IMF 1991, 2).

[5]The countries within each of these geographic regions as defined by the World Bank appear in *World Debt Tables* (World Bank 1996b, 187).

[6]Additionally, the composition of private capital itself changed: bank lending has decreased proportionally, and FDI and portfolio investment (defined as both bond placement and equity placement) has proportionally increased. For example, net commercial bank loans comprised 20.3 percent of net global private capital flows in 1970, but only 4.4 percent in 1994, while FDI increased from 20.3 percent to 38.6 percent; and portfolio investment increased similarly from 23.0 percent to 32.4 percent during the same period (World Bank 1996a, 133–5).

[7]These conditions are generalizations in that they speak of economic markets, i.e., national economies, as if they were single units with a single risk preference, single consumption preference, and single internal rate of return. None of these are true, of course (IMF 1991, 69); but such generalizations are useful in discussing international capital movements.

[8]Certain elements of this cost, such as increased information capture and capital movement "Tobin" taxes, would be greater for international as opposed to domestic flows.

[9]This discussion assumes a very simple model of investment in which market participants invest capital until the point where the marginal cost of such investment equals the marginal return (World Bank 1996a, 69). Marginal cost in this instance of course includes the opportunity cost of making another investment, or no investment at all, within the given time frame, as well as the impact of the present deployment of capital on its future availability, i.e, on future investment opportunities. Cost calculations would have to include complex considerations regarding risk and would, of course, depend upon difficult-to-calculate expectations, risk aversions, and consumption preferences.

[10]The United States, for instance, has an historically greater preference for consumption than other nations, especially, for example, Japan; this preference has led to the need for the U.S. to finance its consumption and investment choices through international capital flows, as evidenced by the consistent U.S. balance of payment deficits (*See* IMF 1998b).

[11]For a discussion of consumption smoothing in this context, see "The Current Account in Developing Countries: A Perspective from the Consumption-Smoothing Approach" (Ghosh and Ostry, 1995).

[12]Consumption appears in theory to correlate positively with wealth. But this correlation would not be linear since consumption would only increase with wealth until some point at which no more consumption were possible before decreasing proportional to wealth, i.e., holding steady in absolute terms, as wealth increased thereafter. The impact of wealth on consumption smoothing appears theoretically ambiguous: greater absolute consumption could cause less concern with consumption variance or it could create the opposite effect, e.g., a greater "consumption dependence."

[13]Assuming diminishing returns, the marginal benefit from any addition of wealth would decline as wealth increased; therefore the cost associated with any given risk to wealth, including investment risk or the loss of potential wealth, would also decline, causing decreasing aversion to marginal wealth risk at higher wealth levels.

[14]This is of course an analytical simplification: capital flows surely stem also from attempts to improve the liquidity or the diversification of an individual portfolio (IMF 1991, 20); and in both liquidity- or diversification-related movements, underlying expectations of investors do not differ; rather the "maximization" or consumption and risk preferences of each does.

[15]Herding or bandwagon behavior consists of the dynamic impact of investment decisions, which themselves alter perceived return expectations. This alteration leads in turn to a shift in investments and thereby to a directional harmonization of capital flows that causes capital concentration.

[16]Inadequate information distribution is not only the lack of information, but also its superfluity. As modern processing and communications technology makes possible ever-increasing quantities and manipulations of data, the ability humanly to process that information efficiently and rationally may actually diminish. In other words, information is subject to diminishing returns; and its inadequate international distribution may be where it has, in some EMs, negative marginal returns.

[17]While any extensive analysis of the causes and consequences of the Asian crisis is clearly well beyond the scope of this paper, the applica-

tion of the above model, despite its simplicity, produces powerful insights.

[18]The World Bank itself was hardly immune to this disaster myopia as it in its "Development in Practice" book *Managing Capital Flows in East Asia*, some six months before the crisis broke, stated that "[p]ortfolio optimization models indicate that more international diversification would improve the risk-return profiles of investor portfolios . . . Accordingly, one would expect to see a period of portfolio stock adjustment that would generate sustained demand for the more attractive assets of the better-performing developing countries, many of which are in East Asia." (1996a, 9).

[19]Domestic finance dried up as well, as there was extensive "capital flight," or the departure of domestic capital, from the impacted Asian countries (Bosworth 1998, 6–9).

[20]"Cascading" is a term of art within banking regulation literature that refers to the failure of institutions in turn due to a "run" and its accompanying liquidity crisis (Litan 1997, 259). The parallel within the international capital flow context would be "contagion."

[21]German authorities in 1974 closed down the Herstatt Bankhaus in the middle of $520 million-worth of foreign-exchange transactions. Herstatt had already received D-marks from numerous American banks but, shut before New York's settlements systems had opened, did not reciprocate by transferring dollars in return. This caused a panic among American banks that had transacted with Herstatt and "CHIPS [Clearing House Interbank Payments System] wobbled, but fortunately did not go down" (*The Economist* 1996, 14).

[22]The following discussion is based on the entirety of the capital adequacy standard as promulgated by the Basle Committee. *See* "International Convergence of Capital Measurement and Capital Standards" (Basle Committee 1997c).

[23]Undisclosed reserves are identical to disclosed reserves except for the fact that they do not appear on the institution's published balance sheet (Basle Committee 1997c, 72).

24In contrast to general loss provisions, the standards explicitly exclude from reserves any capital allocated to specific projected losses, such as the devaluation or destruction of a specific asset or the default on a specific loan (Basle Committee 1997c, 73).

[25]*See* Annex I of "International Convergence of Capital Measurement and Capital Standards" (Basle Committee 1997c) for a summation of this limitations.

[26]The following discussion is based on the entirety of the capital adequacy standard as promulgated by the Basle Committee. *See* "International Convergence of Capital Measurement and Capital Standards" (Basle Committee 1997c).

[27]For a summary description of the different asset categories, see Annex II of "International Convergence of Capital Measurement and Capital Standards" (Basle Committee 1997c).

[28]The IMF revises this manual periodically to reflect changes in economic transactions. The manual issued in 1993, the fifth edition, is the most recent; it contains significant modifications of the fourth edition, from 1977, in particular in regard to the capital account, recast in the fifth edition as the "capital and financial account" (IMF 1993a, 3). This change undoubtedly occurred in no small part due to the perceived increasing importance of international capital flows.

[29]Or "financial account," to follow the technically accurate most recent IMF usage, since the "capital account" consists only of capital transfers and the acquisition or disposal of non-produced, nonfinancial assets (IMF 1993a, 44). This paper, however, will throughout use the more common "capital account."

[30]The basic balance of payments identity is CA + KA = Δ IR (international reserves) = BoP. Any difference between goods sold abroad and foreign goods purchased domestically will result in investment abroad (if X > M) or borrowing from abroad (if X < M), or will be financed by monetary authorities through the use of foreign reserves.

[31]It must nevertheless be stressed that the KA is only an approximation of international capital flows, which have otherwise proved notoriously difficult to measure (IMF 1998a, 6; IMF 1991, 2). Many KA transactions, for instance, will net out and thus not actually appear as entries in the KA (IMF 1993a, 79).

[32]Further development of the IKFF would of course entail its making use of the sub-parts within the KA's basic divisions. Following the Basle Committee's own standards, for example, different risk weights could be given to different kinds of portfolio investments, i.e., stocks versus bonds or debentures. Such development, however, which could produce a functional model far more sophisticated than the analytic framework ultimately suggested here, is beyond the project of this paper, which hopes merely successfully to suggest the utility of such a framework. Furthermore, such a sophisticated model might in any case currently be beyond the reliability of its KA data input.

[33]The "risk" associated with capital movements, to use the language of the Basle Committee, would be "country transfer risk" and the associated "exchange rate risk" (Basle Committee 1997c, 8). But the risk discussed in this context is the combined consequences of such risks on an EM and systemic level.

[34]See the above discussion of this crisis at p. 8 ff.

[35]But maturities would be highly relevant to a risk-weighting of outstanding foreign debt stocks. *See* note 37.

[36]Though this is clearly another area of potential further development of the IKFF, in that international reserves could at least be divided between SDRs, cash, and deposits, and IMF reserves on the one hand, and appropriate securities on the other. The former group would parallel core or tier 1 capital, while the latter, supplementary or tier 2. *See* note 32.

[37]Chile requires that money borrowed from overseas be subject to a 30 percent holding "tax", with the central bank holding 30 percent of the total value of the capital inflow for one year in a non-interest bearing account. (IMF 1998a, 7; *The Economist* 1998, 69). This tax increases the cost of short term, high value capital movements into Chile.

[38]And indeed Malaysia's current capital controls (Boom 1998) arguably are a 100 percent tax on international capital movements.

[39]A potential addition to the framework upon its further development would be a risk bucket to account for external debt. This would account not only for risk associated with international capital flows, but also that resulting from international capital stocks. *See* Goldstein and Calvo (1996), 238 ff. for a discussion of such risk. Similarly, "errors and omissions" would also need to appear in the IKFF, presumably as another risk bucket weighted at 100 percent.

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