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Working Paper No. 558

**Managing the Impact of Volatility in International Capital Markets
in an Uncertain World**

by

Jan Kregel

The Levy Economics Institute

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ABSTRACT

International financial flows are the propagation mechanism for transmitting financial instability across borders. They are also the source of unsustainable external debt. Managing volatility thus requires institutions that promote domestic financial stability, ensure that domestic instability is not transmitted internationally, and guarantee that international institutions and rules of the game are not themselves a cause of volatility. This paper analyzes proposals to increase stability in domestic markets, in international markets, and in the structure of the international financial system from the point of view of Hyman P. Minsky's financial instability hypothesis, and outlines how each of these three channels can produce financial fragility that lays the system open to financial instability and financial crisis.

Keywords: Minsky; Financial Crisis; International Capital Flows; Risk Reduction; Hedging; Speculation; International Financial Architecture; Bretton Woods System

JEL Classifications: F33, F34, F55, G21, G28

INTERNATIONAL CAPITAL FLOWS AND FINANCIAL INSTABILITY

International financial flows are the propagation mechanism for transmitting financial instability across borders. They are also the source of unsustainable external debt. Managing volatility thus requires institutions that:

- promote domestic financial stability;
- ensure that domestic instability is not transmitted internationally; and
- ensure that international institutions and rules of the game are not themselves a cause of volatility.

INTERNATIONAL INSTITUTIONS AS A CAUSE OF VOLATILITY

These three aspects were well understood by the architects of the postwar international trade and financial system. It was their basic belief that it was the unsustainable interallied debt and German reparations that brought about the instability in international capital flows that contributed to the 1929 stock market crash and the collapse of the multilateral trading system, all contributing to the Great Depression and laying the groundwork for the Second World War. A sustainable peace, as well as economic prosperity, thus required policies to manage domestic credit systems as well as the international flows of borrowing and lending. Resolving these questions required increased government control, as well as regulation and surveillance of private and international capital markets.

In the United States, the stock market break brought the introduction of New Deal banking legislation that determined the activities permitted to financial institutions with directed prices and quantity constraints on markets. At the international level, the proposed solution was to remove international financial flows from the private sector, placing international financial intermediation under government supervision.¹ In the words of U.S. Treasury Secretary

¹ A post-Bretton Woods United Nations expert panel that included Nicholas Kaldor proposed that all international development lending be done by national governments issuing domestic bonds, the proceeds of which would be administered through the World Bank. See United Nations (1949).

Morgenthau, the purpose of the postwar reform of the international monetary and financial system was “to drive the private money lenders from the temple of international finance.”²

Keynes’s proposal for an international clearing union went a step further, according to Paul Einzig (1944), and would have completely eliminated private-market currency trading. Thus both exchange rates and capital flows were to have been subject to coordinated intergovernmental decisions. The basic objective was to limit the size of external financing for external deficits and thus to limit the size of any country’s external debt.³ Countries would be shielded from instability created by the monetary and fiscal policies of other nations and transmitted through capital flows or exchange rate fluctuations.

While the main objective of the United States was to insure that financial instability did not interfere with the restoration of a free, multilateral trading system, Keynes’s main objective was to gain the autonomy from the gold standard necessary to implement domestic policies of full employment. Under both approaches this meant a “managed” currency to replace the gold standard.

However, the international financial system that was eventually adopted reinstated the gold standard, with the dollar replacing gold,⁴ and preserved the role of private financial institutions in foreign exchange transactions and in intermediating international financial flows, but with one important difference emphasized by Robert Triffin—the dollar was a national currency whose supply depended on the country’s external balance, while gold was the currency

² Quoted in Gardner (1956).

³ The “Keynes Plan” envisaged an international clearing union that would create an international means of payment called “bancor.” Each country’s central bank would accept payments in bancor without limit from other central banks. Debtor countries could obtain bancor by using automatic overdraft facilities with the clearing union. The limits to these overdrafts would be generous and would grow automatically with each member country’s total of imports and exports. Charges of one or two percent a year would be levied on both creditor and debtor positions in excess of specified limits. This discouragement to unbalanced positions did not rule out the possibility of large imbalances. Part of the credits might eventually turn out to be gifts because of the provision for canceling creditor-country claims not used in international trade within a specified time period.

⁴ Reports of the negotiations suggest that Keynes never approved the use of either gold or the dollar: “... in September 1943, Keynes told White that the United Kingdom did not contemplate going on to a gold or a dollar standard, but might be prepared to accept a unitas standard. Whenever the matter was brought up, he categorically rejected the idea that the dollar should be given a special status, and he continued to take the same line at Atlantic City when the subject briefly cropped up there. [...] The change from ‘gold’ to ‘gold and U.S. dollars’ was lost in the ninety-six page document the chairmen of the delegations would sign a few days later. Whether or not any of them noticed it, or understood its implications, it seems that none of them expressed any reservations about it. Keynes would not find out until later, when he studied the Final Act” (Van Dormael 1978).

of no nation and had relatively inelastic supply. Nonetheless, the objective to minimize the role of private financial institutions in the intermediation of capital flows and exchange rates remained. However, placing the dollar at the center of the system while the United States had a large and seemingly indestructible current account surplus made U.S. financial institutions the center of international intermediation and supplies of international liquidity. Although international capital flows came to play an increasingly important role in the international system, in the end the demise of the system was as much due to speculation generated by the Triffin paradox as it was to the transmission of domestic instability via international flows. This was clearly a case of instability generated by the system itself, rather than being transmitted by the system.

However, by the end of the 1970s there was clear evidence of the role of domestic financial instability in creating international stability transmitted by international capital flows. As noted above, the object of both the United States and UK proposals was to limit the increase in foreign indebtedness by limiting the ability of countries to run sustained external surpluses. The commitment to a fixed dollar parity was the first constraint, for when reserves were no longer sufficient to finance a current account imbalance, a country was obliged to draw against its credit at the International Monetary Fund (IMF). Soon after its inception, such drawing ceased to be automatic and included conditions on domestic policy, directed to reversing the imbalance. Failing correction, an exchange rate adjustment was added. The main point was that after reserves were depleted, imbalances could only be financed by borrowing from the IMF and this was accompanied by policies that made further financing unnecessary.

However, this all changed in the 1970s when private lending became a major source of balance of payments financing. This was due to the response of U.S. banks to the 1966 credit crunch as banks shifted from “asset management” to liability management practices, including funding through foreign branches operating in the nascent eurodollar market in London. Thus the beginning of the dismantling of the New Deal regulations on the U.S. domestic banking system provided the impetus for the return of private international capital flows and became the primary vehicle for the recycling of petrodollars in the mid-1970s that was accompanied by a lapse in risk assessment on private loans and deficient national supervision that emerged in a full-scale regional financial crisis in Latin America, starting with the Mexican default in 1982.

This raises the question of what might limit capital flows or limit their volatility. This will depend on the potential that a country has to raise the resources required to meet external claims. This can come from four possible sources. During Bretton Woods they were limited to:

- a positive net balance on goods and nonfactor services trade;
- foreign exchange reserves generated by past current account surpluses; and
- multilateral or bilateral public development assistance or debt relief,

but, in the 1970s, after the return of international capital flows, they were supplanted for long period by:

- net private capital inflows.

As already noted, the problems of increasing volatility in international capital markets arises because the latter option allowed countries to escape the Bretton Woods limitation on capital flows to short-term trade credits.

From the point of view of Hyman Minsky's analysis of financial fragility, under Bretton Woods countries were encouraged to have hedge financial profiles, with balanced external payments positions and reserves sufficient to act as a margin of safety against fluctuations in net export earnings. When the cushion of official reserves was not sufficient to meet payments and keep exchange rates from speculative attack, reserves could be supplemented by official lending by multilateral institutions such as the IMF. The majority of such lending was to industrialized countries with balance of payments difficulties caused by internal or external shocks that turned what could be classified as a "hedge" financing profile into a "speculative" profile in which they could not meet payment for current goods and services at the existing fixed exchange rate. In exchange for temporary bridge financing from the IMF, the country agreed to adopt tight monetary and fiscal policies designed to reduce income sufficiently to bring about a fall in imports relative to exports (that were supposed to rise but usually also fell, but by less) in order to produce a reverse flow of resources in the form of a current account surplus that could be used to repay the official lending and replenish reserves. It is clear that such a system carried a

deflationary bias since all countries could not have hedge financing profiles unless there was an external source of liquid reserves via a lender of last resort.

The basic philosophy behind this approach was that a commitment to a fixed exchange rate was identical to the commitment to pay in a timely fashion included in any financial contract so that devaluation was equivalent to a partial default on debt service to nonresident holders of domestic assets. The system was organized on the presumption that on average, over time, countries applying appropriate monetary and fiscal policies to preserve price stability would have a balanced external position and would always be able to meet their financial commitments in terms of foreign currency at their declared par rate with the dollar. Bretton Woods was a system organized for a world dominated by trade amongst more or less similar countries with individual countries occasionally falling into speculative mode due to an unforeseen internal (excessive wage increases relative to productivity) or external shock (loss of a protected export market), which could be countered or offset by changes in internal (domestic absorption) policies. While the adjustments were implemented the payment shortfalls were met by official lending. It was only in the extreme case of fundamental disequilibrium that exchange adjustments (expenditure switching) were contemplated as a complement to internal adjustment policies. Thus the accumulated stocks of external sovereign debt of most countries remained very low and the majority of international capital flows involved direct investments, for example, by American companies setting up operations in Europe before the creation of the European Economic Community (EEC) and in Latin American countries, primarily in the areas of natural resource extraction.

After the collapse of the Bretton Woods System, default on domestic-currency denominated external commitments became acceptable in the form of flexible exchange rates. Thus this exchange rate partial default risk on foreign claims that had been borne by the multilateral financial system and by national governments in the form of the cost of reserve balances was shifted to the individual lender. One way in which lenders could hedge against this risk was to denominate foreign loans in their domestic currency.

At the same time, international capital flows became increasingly important; first in providing adjustment finance, but more importantly in making it possible to allocate capital internationally on the basis of highest returns. Financial flows were no longer controlled in the

interests of market stability, but were now directed to achieve efficient international allocation of capital. This provided the justification for the recycling of the dollar balances of the petroleum exporting countries to Latin America in the 1970s. It had long been presumed (despite the objections of economists such as Nurkse and Singer) that developing countries provided higher returns because of their low capital stock, while capital-intensive developed countries faced diminishing returns to investment. Whether or not the presumption that risk-adjusted returns in developing countries are superior to developed countries is correct, the rise in lending to developing countries in Latin America as petrodollars were recycled, followed by the sharp reversal of U.S. interest rates and the appreciation of the dollar, quickly converted what had been hedge/speculative financial profiles of these countries into Ponzi financing schemes with negative net present values.

After the traditional Bretton Woods adjustment solution of current account surpluses to meet the debt service brought such substantial declines in income as to produce what came to be called the “lost decade” of growth in Latin America and the risk of political instability, a solution was eventually found in the Brady Plan. Given that no debt relief or official assistance was forthcoming, and with outright default considered as jeopardizing the stability of the global financial system, there was only one remaining solution from the list given above—to borrow more to meet outstanding financial commitments. This is the traditional solution to a Ponzi financing scheme—the problem was to find a willing lender.

Debtors sought to attract funds by opening their internal markets and deregulating their capital accounts by introducing what has come to be known as the Washington Consensus policies. In addition, funds were raised directly through the issue of a securitized structured financing issue of Brady bonds. This involved the creation of a special purpose entity that held U.S. Treasury discount bonds as assets. Against these assets they issued Brady bonds equal to the (higher) maturity value of the Treasury securities, using the difference to buy in the country’s outstanding debts in the secondary markets. In addition, two or three interest-only U.S. Treasury strips were purchased to meet the initial interest payments on the Brady bond issue; the rest of the interest payments would be produced by the recovered debt. These Brady bonds were sold to institutional investors because they were given investment-grade ratings on the basis of the fact that they held U.S. Treasury collateral and U.S. Treasury interest payments.

This was one of the first steps on the road that led to AAA collateralized mortgage obligations (CMOs) of subprime mortgages that used a similar procedure to create a market though ratings leverage.

Policy to Stabilize External Financial Flows⁵

Building on Minsky's approach, stability can be increased by measures that ensure that firms maintain hedge financing profiles defined as financial management that insures that exogenous changes in cash commitments are matched by changes in cash inflows to meet them. At the international level, hedge financing means ensuring that net export earnings are more than sufficient to cover debt servicing needs in every future period. Since net export earnings for developing countries are generally highly volatile due to reliance on a small number of export commodities with highly variable demand and prices, this might involve calculation of the volatility of net exports over a period of time and then limiting borrowing to the amount that generates debt service equal to average net export earnings less a cushion of safety represented by, say, two standard deviations. Reserves could be held to cover all or part of the two standard deviation cushion of safety over debt service. However, reserves and private credit lines that also have been used are generally very costly, since the former usually have a negative carry and the latter include international risk premia on private lending. One method of reducing these costs of reserves would be intraregional reserve pooling across countries with different export baskets. This comes close to the idea behind Keynes's clearing union proposal, which represented the pooling of reserves across surplus and deficit countries. Alternatively, countries limiting their debt service to average net export earnings could be given unconditional automatic drawing rights on their reserve tranche, as originally proposed for the IMF, or special drawing rights (SDR) balances of an amount equal to the required cushion of safety.

An alternative means of supplementing the reserve cushion would be for central banks to purchase far "out of the money" put options on their currencies (i.e., to sell their domestic currency against the dollar) as a technique for defending the exchange rate in the presence of large speculative outflows. Since out of the money options have a minimal premium, the strategy would have low costs; as the currency weakens from capital outflows, the options

⁵ Much of the material in this section comes from J. Kregel (2004).

would increase in value and could be exercised to provide additional reserves to stabilize the currency. The positive influence on reserves will exist even if the central bank uses the foreign exchange to sterilize the funds used to exercise the put contract (buy the foreign exchange).⁶

There are other strategy options for official intervention in the foreign exchange markets. For example, the sale of covered calls on foreign currency (a commitment to sell the foreign currency held in central bank reserves against the domestic currency) could also be used to defend an upper limit (maximum depreciation) for the exchange rate. Likewise, in order to prevent an undesired currency appreciation, the central bank could write (sell) put options on a foreign currency (a commitment to buy the foreign currency with domestic currency).⁷

Preventing a Speculative Profile from Becoming a Ponzi Profile—Matching Cash Inflows and Outflows

The second aspect of Minsky's approach is to ensure that countries that are hit by external shocks that transform their financing profiles from "hedge" to "speculative" should be able to return quickly to hedge financing rather than being transformed into Ponzi financing. Here the provision of temporary liquidity is important, as is the necessity to ensure that external shocks do not have an asymmetric impact on cash flows and debt payment commitments. This would involve the specification of financial liabilities that are linked through a derivative contract to cash inflows, i.e., to either the sales or prices of exports.

Whether or not open financial markets and free financial flows provide net additional resources to a country, they should provide a more efficient means of changing the profile of future cash flows and bearing the risks over the occurrence of such flows. Thus, just as a bank attempts to manage its interest rate and liquidity risks or a firm attempts to manage its interest rate or translation exposure on foreign earnings, a country should attempt to manage its own financial fragility by managing its balance sheet so as to match its earnings more closely to its commitments.

This is a different objective than attempting to borrow enough reserves to build up an arsenal or a *blindaje* that wards off speculators in the short term. Such a policy may, however,

⁶ See Taylor (1995).

⁷ Many of these strategies are discussed in the *Hannoun Report* (BIS 1994).

create even greater financing difficulties in the medium to long term because it raises debt service (the borrowing costs are higher than the returns from investing the reserves).

Examples of matching cash receipts and cash commitments by means of natural hedges already exist, although they have not been fully exploited due to the traditional IMF approach of providing adjustment loans. Par and discount bonds issued by Mexico, Venezuela, Nigeria, and Uruguay in exchange for their defaulted commercial bank loans in their Brady restructurings carried “Value Recovery Rights,” an instrument similar to a warrant entitling the holders to payments in addition to the fixed interest coupon when the issuer sells more petroleum than some benchmark (e.g., the amount for a specified base year or average of years or some excess above the average price for that year). Thus, as petroleum sales increase (either from an increase in sales or an increase in price), cash outflows due on the bonds increase, increasing the effective rate of return on the outstanding bonds. Ideally such instruments should be designed to have a symmetrical impact on cash inflows and outflows, so that when financing ability declines the cash commitments decline in step. Basically, the idea is to make fixed interest obligations behave more like variable return equity and have the lender take on part of the volatility risk of the debtor’s earnings in exchange for a reduced risk of default.

Another approach⁸ proposes that the government whose foreign exchange earnings are heavily exposed to a specific industry (such as oil) agrees to exchange (swap) the returns from the beneficial ownership in the government company’s foreign exchange reserves for the returns on an asset (a developed country asset or a global equity index portfolio) whose return would be less volatile than oil prices. This should lower the spread on government bonds since the volatility of the income stream now servicing the bonds will be that of the lower volatility equity index. However, while such a proposal should reduce volatility, it would not produce full hedging since developed country stock prices are likely to be highly correlated to commodity prices and, in particular, to petroleum prices.

An alternative method to match inflows to outflows relies on participation of the private sector in providing liquidity to a country that is unable to meet its current commitments (Lerrick 2001). Instead of providing emergency bailout funding, the IMF would purchase American-style put options (to be exercised at any time) from creditworthy private sector financial institutions

⁸ See also Favero and Giavazzi (2003).

that give the Fund the right (but no obligation) to sell to the sellers of the options floating rate notes issued by the major emerging-market governments with international indebtedness if they are in difficulty in meeting their cash commitments because of a reversal of flows or an external shock. The notes would be issued with a short maturity, carry a high, variable interest rate, and would be publicly traded. This provides an automatic inflow of funds from the private sector when the country is facing difficulty and would provide bridge funds that permit the crisis-stricken borrower to restructure its outstanding debt, if necessary, and to obtain long-term financing (both from the capital markets and from the development banks for structural adjustment programs). The condition on the exercise of the options would be an agreement by the issuing government to an IMF-sanctioned adjustment program or fulfillment of the preconditions of an IMF Reserve Augmentation Line (RAL), with no presumption of IMF or bilateral official financing.

A slightly different approach to the same problem would have the multilateral financial institutions create an investment fund that would intervene in the sovereign debt market of a country having difficulty meeting its commitments, offering to buy all its outstanding debt stock at a large discount from the expected value in the event of restructuring. This is equivalent to having the multilateral financial institutions writing put options at far out of the money strike prices on a developing country's outstanding debt, setting a floor to the market price since the buyer of the option would always be certain to be able to sell the debt at the strike price. If this occurs and the country eventually recovers and the price of its debt rises, the profits would accrue to the investment fund (Lerrick and Meltzer 2001). Developing countries with sovereign wealth funds could also undertake the creation of such a stabilization fund.

Emerging-market borrowers have already introduced a number of different types of innovative financial instruments to smooth the time profile of their stream of future payments commitments, such as issuing bonds with a (European) put option that allows the investor to redeem the bond at a predetermined date before the maturity date. If the government believes that its credit rating will improve and the price of its bonds increase over time as spreads decline, investors will have no interest in early redemption and the option will not be exercised. This would allow the government to issue longer maturity debt and spread its payments commitments more closely to its expected cash inflows. However, this strategy is based on the

presumption of improvement in future conditions; if this is not the case they will increase the cost of debt service if the option is exercised and contribute to precipitating a crisis.

The use of these sorts of hedging instruments has a cost, but so does the use of contingent credit lines or preemptive borrowing to hold additional reserves. But the costs involved in such hedge strategies increase when times are good, rather than increasing when times are bad, and thus provide stability to the financing profile. In effect, this balance sheet approach to financial stability attempts to blend the variable cash flow aspects normally associated with equity instruments with the fixed cash flow aspects of bonds.⁹

However, there are two important deficiencies in all these proposals to provide stability in the international financial system by ensuring hedge financing profiles or providing liquidity to temporary speculative profiles. First, they suffer from the same fallacy of composition that Keynes attempted to eliminate through his proposal for automatic liquidity through the clearing union—it is not possible for every country to attain hedge, or even speculative, profiles. Second, imposing hedge or speculative profiles on developing countries implicitly prevents the global increase in welfare that is presumed to result from free mobility of international capital and the use of net resource transfers from developing to developed countries in simultaneous support of both global growth and development. This is because a hedge profile implies that the country's cash inflows are more than sufficient to match cash outflows, which means an external surplus and reverse resource transfers.

External Flows as a Sustainable Source of Domestic Finance

There is however, a basic difficulty with the maintenance of a hedge profile for a country that is integrated into the international trade and financial system. The first problem is that not all countries can maintain a current account surplus at the same time. At least one country has to have Ponzi financing position if others are to have hedge or speculative positions. In the current international environment there is no method to compensate or insure that country from instability. This should have been the role of the clearing union (but it was not created) or the IMF (but it has not chosen to play that role). This point is nothing different from the accounting

⁹ Michael Pettis (2001) has noted the importance of the fact that the price behavior of emerging-market distressed fixed-interest sovereign debt more resembles equity than bonds for the design of hedging strategies to reduce financial fragility.

identity that says if one domestic sector desires to net save, then the other sectors in aggregate must dissave.

There is, however, another demonstration of the difficulty of maintaining a hedge financing position through an external surplus. This is because an external surplus must be initially based on a commercial surplus, which, in the absence of any other capital services or capital account transactions, will cause an accumulation of foreign claims that will generate foreign interest earnings that are credited to the capital services account of the balance of payments. These credits on current account will reinforce the positive credit balance of the current account and, unless the country is willing to allow an increasing amount of real consumption to be replaced by notional income, eventually produce a capital services account that will “crowd out” real exports of goods and services, with a negative impact on employment and consumption. This calls into question the sustainability of the current account balance over time, but, at the same time, calls into question the ability to run a hedge financing scheme to ensure domestic stability.

Evsey Domar provided the answer to the question of whether such a hedge financial scheme could be sustainable by adapting a prior argument concerning the sustainability of debt-financed public investment. As long as capital outflows increased at a rate that was equal to the rate of interest received from the outstanding loans to the rest of the world, the inflows created on the factor service account by the interest and profit payments would just be offset so there would be no net impact on the trade balance. On the other hand, if interest rates were higher than the rate of increase in foreign lending, the policy would become self-defeating and the trade balance would eventually become negative to offset the rising net capital service inflows. Eventually the continually rising factor service flows would turn the trade balance negative.

With respect to the stability of the financial system, it is interesting to note that the Domar conditions for a successful long-term hedge financing strategy are the precise equivalent of the conditions required for a successful Ponzi financing scheme from the point of view of the rest of the world (or the required deficit country). As long as the rate of increase in inflows from new investors in a pyramid or Ponzi scheme is equal or greater than the rate of interest paid to existing investors in the scheme there is no difficulty in maintaining the scheme. However, no such scheme in history has ever been successful—they are bound to fail eventually by the

increasing size of the net debt stock of the operator of the scheme. Paradoxically, in the present global context, it is not the hedge financing countries, but the United States—the required deficit country—that is operating a similar type of Ponzi scheme. Thus the only hedging scheme is one that keeps imbalances from becoming too large. In the absence of IMF control or a clearing union, capital controls present the only possibility to keep the financial imbalance within reasonable bounds.

Internal Instability as a Source of External Instability

A much more important source of volatility comes from instability in domestic financial markets being transmitted internationally by international capital flows and the operation of international banks across borders. This can take two forms, an excessive increase in national liquidity due to domestic policies producing excessive inflows or outflows, or the collapse of a financial boom leading to an excessive demand for liquidity that produces a global liquidity crisis. These have been the predominant sources of crises in the last quarter century. Examples are the shift in U.S. monetary policy in the late 1970s, producing the return flow of capital to the United States from Latin America; the global liquidity crisis that followed the Russian exchange rate crisis of 1998 and the collapse of Long Term Capital Management (LTCM) in the summer of that year; and the current crisis in international markets. These last two examples have the common characteristic of being liquidity crises. This is largely due to changes that have taken place in developed country financial markets over the last twenty years.

The characteristic feature of the new financial architecture that was built up in the United States in the 1990s paralleled the Washington Consensus in restoring the market as the basis of pricing and allocation of finance. This represented a reversal of the New Deal legislation that had given the government the central role in regulating financial markets. At the same time, greater reliance was placed on market discipline to regulate financial institutions. In this progressive dismantling of government oversight, broker dealers saw the elimination of fixed commissions on equity trades, commercial banks and thrifts saw the elimination of fixed deposit rates, and investment banks used the introduction of self-registration to shift from relationship-based to transactions-based underwriting of capital financing. This increased role for market competition amongst financial institutions led to a rapid increase in financial

intermediation, or financial layering, that caused a decrease in market transparency and the information that is essential to the effective operation of the market mechanism.

One aspect of market information that is required for the operation of the market is a commodity that is sufficiently homogenous to allow competitive pricing in exchange. As far back as William Petty, economists have recognized the importance of homogeneous commodities as a prerequisite for the operation of competitive markets and the role of prices in providing market information.¹⁰ Aside from corporate equity, that are homogenous by legislation, other financial assets are usually considered to be too idiosyncratic and particular to be priced and traded in competitive markets. Thus they have traditionally been dealt with through bilateral negotiation through financial institutions acting as intermediaries such as brokers and dealers.

One of the major changes introduced by the new financial architecture based on the market mechanism was the creation of new, uniform financial products that could be traded and priced more efficiently. However, they were often created in ways that reduced the transparency and information required by the market. An example of the creation of new instruments may be seen in the unbundling, or financial engineering, of financial instruments. Stripping the interest coupons from fixed income instruments allowed the creation of a series of short-term instruments that could be compared to other trade short-term instruments. It created the possibility of transforming fixed income instruments into floating rate instruments, and instruments that were negatively related to interest rates could become positively related to interest rates. A whole series of new products were created, but without the creation of organized markets to trade and price them; rather, providing better definition of products tended to blur the differences between different kinds of products. They also shifted the role of the market from valuation to arbitrage. The role of the market mechanism was less to provide price discovery than to identify mispricing through arbitrage across the different components of the instrument. The actual price was less important than the equalization of the whole to the sum of its parts.

The emphasis on the operation of the market led to the search for uniform assets that could be traded in areas that had previously been presumed to be untradeable because of their

inherent incomparability and heterogeneity. Starting with automobile and credit card loans, the process was extended to banks' commercial and industrial loans, and even to residential and commercial mortgages. Here the homogeneity requirement was produced through the help of the law of large numbers and ergodicity. But, not only was the definition of the product opaque, once again the markets in which they were to be traded were not organized markets, but arms-length transactions over the counter.

All of these newly created products had one characteristic in common; they represented the title to specified, distinct expected future income flows—interest and principle on a bond, a loan, or a mortgage in which the counterparty in the transaction is the final borrower and completion depends on the flow of income earned by the borrower validating the instrument.

A slightly different example is to be found in the reintroduction of financial futures and options that was initiated by the return to floating exchange rates after the collapse of Bretton Woods. These derivative instruments were traded in organized and, initially, highly regulated markets. However, regulations were progressively relaxed and trading moved increasingly “over-the-counter.” The Enron “loophole” that allowed exemptions for proprietary electronic over-the-counter trading was exemplary of this trend. Thus new products such as gas and electricity futures were created, but the market conditions were such that there could be no market discipline and their prices were easily manipulated.

These products are different from traditional financial instruments in that their valuation is not dependent on the performance of future income of the borrower, but on the future movement in a specified price on which the return on the contract is derived. Thus the ability of the seller to complete the transaction is independent of the performance of the underlying investment and validation is usually sought through the provision of margin collateral that is deposited with the exchange clearing house acting as guarantor. Neither the buyer nor the seller need have any direct interest in the performance of the underlying commodity. But, the absence of an organized market is even more damaging to market discipline since it shifts the risk of completion for both buyer and seller from the exchange clearing house to the counterparty.

Much has been said about the increase in leverage that was produced by the spread of derivatives. But it is important to recognize that bank lending is also levered lending, with bank

¹⁰ See Roncaglia (1985).

capital playing the same role as margin requirements in standard derivative contracts. A more important difference is the handling of counterparty risk and the risk on the source of the ability to meet the repayment conditions.

Structured loan vehicles combine both aspects and create a different combination of repayment risk. For example, in a below-libor loan that combines a standard loan with the sale of an option on a financial or real variable, the size of the loan becomes variable and the ability of the borrower no longer depends on the income that is being financed, but on the movement of the specified price. As more and more lending is done through structured product, the ability to repay becomes increasingly dominated by price risks that are independent of the ability and operation of the borrower's real productive activities.

Thus financial markets became more dependent on pricing the probability of future events rather than on the valuation of future income flows from financed activity or on the credit of the borrower. Both these assessments require the anticipation of future events and both are built on assumptions about the past behavior, but the former refers to the assessment of credit risk and the business plan of the borrower and is thus based on specific information, while the latter is an attempt to forecast an essentially unknown future universe.

While it was normal for investment banks and broker dealers to assess the price of their positions daily since they were funded by short-term (often overnight) money, this had not been the case with commercial banks and savings and loans. The justification was that since the investment bank portfolio might have to be liquidated in the case of a funding shortfall, it was required to mark its assets to liquidation value to determine solvency. But the commercial banks' short-term deposits were assumed to be sufficiently stable and loans sufficiently collateralized that they did not have to be formally revalued since they would normally not have to be liquidated. Similarly thrifts were expected to hold mortgages to maturity so the only relevant value was the maturity value of the principal. However, the creation of bundled securities of uniform characteristics brought an extension of the application of mark-to-market rules to all financial institutions, further delinking the determination of asset values from the assessment of underlying income flows, even when they were present.

However, the most important innovations that were introduced into the new financial architecture related to a little-noticed activity—the leveraging of credit ratings. The plain vanilla

interest rate swap is often presented as simply the exchange of the commitment to pay a variable interest rate for a fixed interest rate on a given loan principal. However, such instruments are usually constructed on the basis of the difference between the credit rating from the fixed borrower and the floating rate borrower, providing both the possibility of borrowing at rates below that they would pay with a direct issue. Again, the transaction obscures market information since the fixed rate lender may have no idea that the fixed rate issuer is not servicing the bond. Indeed, in many deals the fixed rate borrower with the higher credit rating was encouraged to issue. The transparency of information on these contracts could be further exacerbated when leverage was added, to either the fixed or floating leg.

A more recent example of this credit leveraging is AIG's use of the AAA credit rating of its insurance subsidiaries to create AIG Financial Products (AIGFP), which functioned as a virtual stand-alone investment bank. In particular, it provided principal protection or other guarantees to structured fund products built from index, equity, bond, mutual fund, and hedge fund portfolios, as well as loans and loan facilities involving limited recourse to fund vehicles. It could compete in these markets, not because of the capitalization of the trading unit, but because of the credit rating given to the parent holding.

In particular, it allowed AIGFP to sell credit default swaps with margins determined on the basis of that rating even though it was the strength of the insurance subsidiaries that supported the credit rating, but whose assets could not act as cushions against loss on the derivative operations. When these contracts lost value and AIG had to provide collateral, it was the holding that was responsible and its inability to provide margining for the positions brought down the entire company.

All of these structures followed the Brady bond pattern of leveraging credit ratings from one set of assets to another that had no similar credit characteristics. The applications to the securitizations in the mortgage market and then the subprime market are obvious. Structured finance entities may then be seen as representing a method of manufacturing a credit rating through the structure of the assets and by leveraging credit ratings through the process of credit enhancement provided by monoline insurer guarantees or first loss entities.

What is less obvious is the fact that financial markets no longer evaluate the credit of the issuers of financial assets or the processes that generate the discounted present values of income

flows. Instead they trade credit risk and invest in credit risk directly. The limit of the unbundling process of financial engineering is to reduce every financial instrument into its individual risk components and then to trade them separately or recombined in packages to exhibit designed risk characteristics that meet investment objectives. Thus the homogeneous commodity required for the efficient operation of the market mechanism that has been produced by financial engineers is risk. Indeed, the current dominance of the credit default simply reflects the fact that it is risk that is being traded, not cash flows.

This has two important consequences. The first is that by reducing everything to a single, similar characteristic, it reduces the very diversity upon which stability of the financial system depends. Thus, while individual risks may be diverse, changes in risk levels will tend to be highly correlated, reducing the effectiveness of any strategy to provide risk reduction.

Secondly, in difference from a cash flow on a bond or a stock, risk has no unambiguous definition since it depends on the ability of the future to repeat the past. The use of standard statistical techniques that are at the basis of most risk analysis have been criticized in a number of ways. First, economists such as George Shackle consider most economic events as unique and thus not subject to measurement by statistical probability. Paul Davidson¹¹ has pointed out that standard risk analysis depends on financial variables being represented by a stationary ergodic series. Nasim Taleb has noted that for most financial variables the marked leptokurtosis representing their deviation from normal distributions is usually represented by one single event. Normal sampling techniques will seldom cover a sufficiently long time period to provide a true representation of the distribution and thus of the variance as a measure of risk. An event that occurs on average every ten years would require a series that covers at least thirty years and might still not cover the event, which, when it occurs, would be unforeseen. The more unique the event the, less likely that it will be included in any data series (which is simply a way of saying that there is no correct definition of the population size required to calculate measures of volatility).

Benoit Mandelbrot (1997) has shown that financial variables are better represented by a power function, but with no certainty of the value of the exponent. He notes the importance of long-run serial dependence in financial data, measured by the Hurst coefficient, as well as the

Noah and Joseph effects (catastrophic interruption to serial dependence and ordering of events), and suggests alternative measures of risk based on fractal, rather than normal, distributions.

As Keynes stressed, diversity of opinion is important to stability, which raises the question of how information in the market is transmitted. Common opinion or convergence of opinion leads to instability. Network analysis provides an approach to answering this question. Are more degrees of separation better for dissemination of information and diversity? Baran's analysis of centralized, decentralized, and distributed networks suggests that distributed networks are less vulnerable to attack (this is how information is transmitted on the internet). Centralized networks, on the other hand, are subject to higher risk of attack and thus to an abrupt change in opinion. Richard Kahn (1954), in a famous article, suggested the balance of the objectives of agents in the market. A market dominated by widows and orphans who hold assets for income will behave differently from a market populated by bond traders who profit from changes in capital values.

In addition, as noted above, whatever measure of risk is used, the presence of risk arbitrage can reduce transparency and increase volatility.

Finally, in modern financial markets, risk analysis itself has become a commodity and is outsourced to private, profit-making institutions—credit rating agencies that were not originally designed to provide this information for financial assets, but have been called upon to serve this function. However, there is no pricing mechanism to evaluate the effectiveness or efficiency of their products.

It is important to recall that the trading of risk is to optimize the relation between risk and return. There is only one way to completely eliminate risk, and that is to swap a long and a short position in the same asset, which achieves a perfect negative correlation with no basis risk. However, this condition is rarely satisfied in financial markets. This means that traditional measures of risk tend to predominate decision making by financial institutions.

Taleb (2008) has performed an analysis of the power coefficient on high frequency financial data for a broad range of instruments. He concludes that the value is between two and three, with a mean absolute error greater than one. He notes that this mean error has massive consequences on predicted results. The expected value of loss in excess of a certain amount

¹¹ See for example, Davidson (2002).

multiplied by more than ten times is the result of a change in the coefficient that is less than its mean error—and “[t]hese are the losses banks were talking about with confident precision!”

If there is no coherent way to measure risk, then the domestic financial system will always be a source of potential international disturbance unless there are international measures to dampen the transmission mechanism or measures are taken to return financial systems to credit assessment rather than risk arbitrage. This is less a question of international capital flows than a question of the cross-border operation of transnational banks. As long as banks’ business models are directed towards risk arbitrage and risk leveraging, and as long as they operate internationally, they will be a source of international financial instability.

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