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Central Bank Policy in a More Perfect Financial System

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Contents

I. Introduction

Financial markets, national and international, have witnessed a daunting expansion in recent decades. Their rapid growth has been accompanied by massive deregulation in many countries and a process of financial innovation, most notably the development of new types of and new markets for financial derivatives. This has made existing asset markets more liquid and has created new opportunities for trading financial market risks, enabling investors to achieve a better degree of hedging against these risks and, in doing so, to increase the value of the underlying assets. Financial innovation and deregulation have also allowed financial institutions to move beyond the borders of their traditional activities, making the differences between *banks*, *securities dealers*, *mutual funds*, and *insurance companies* increasingly blurred.

As these developments change the nature and operation of financial markets, an important question to ask is, what do they imply for the conduct and effectiveness of monetary policy. The conventional answer offered in the literature holds that they have but marginal implications. According to this view, financial innovations such as derivatives allow banks to react faster to monetary policy shocks and, at the same time, allow non-banks to protect themselves against such shocks to some extent. As a result, the transmission of monetary impulses to the economy may become somewhat weaker, but it remains unchanged in principle. A more radical view would argue, however, that financial innovations, and the development of derivatives in particular, have important implications for the nature of an economy's monetary system. More specifically, they imply a move towards a more perfect financial market system, and one in which central bank money and its close substitutes lose their unique role as generally accepted means of transaction. A relatively new literature has begun to speculate about the nature of an economy where that occurs, and its monetary policy implications.

The rapid expansion of derivatives markets has also caused policy makers and

economists to worry about the potential threat they might pose to the stability of the financial system. Popular views regard derivatives traders as players engaged in risky bets and counter-bets, creating excess volatility of asset prices and interest rates and threatening to disrupt the orderly functioning of the markets. More sophisticated observers realize that derivatives enable financial institutions to circumvent traditional regulation and to engage in new types of risky activities, and fear that they might create excessive systemic risk. Furthermore, derivatives allow financial institutions to circumvent regulation and assume more risk than their regulators would realize from considering their balance sheets. Another important question is, therefore, how derivatives markets should be integrated into the framework of financial regulation. Since financial derivatives markets are global markets, an important aspect of this question is, how such regulation can be implemented on an international scale.

These are the main issues discussed in this paper. To set the tone, we begin with a characterization of the evolution of financial derivatives markets, the most visible aspect of financial innovation, over the past 20 years in section II. In section III, we discuss the economic functions of derivatives and derivatives markets. In section IV, we turn to the monetary policy consequences of the development of a more perfect financial system, assuming that the growing trend of derivatives markets will continue. We argue that in a more perfect financial system, central bank money and fixed-price bank deposits will eventually lose its role as the predominant means of transaction. Hysteresis and the role of government in modern economies, however, will make sure that central bank money retains its unit-of-account function. As a result, central banks will lose much of their ability to use monetary policy to affect the real economy and their attention will shift mainly to securing price stability. In section V, we discuss the implications of an emerging, more perfect financial system for banking regulation. In light of the conclusions in section IV, we argue that systemic risk will eventually decline as a concern of regulatory policies, while the potential instability of individual financial institutions, due to the classical principal-agent problems between depositors and bank owners, will move to the forefront.

II. Derivatives and Derivatives Markets

Derivatives are agreements between two counterparties specifying the exchange of cash payments based on changes in the price of a particular asset or differences in the returns to different securities (e.g. Kuprianov, 1993).[1] They do, therefore, derive their value from an underlying instrument. Derivatives can be grouped into three categories, futures and forwards, options, swaps and other derivative instruments.[2] As the latter can be decomposed into combinations of forwards and options, the first two are considered "basic" instruments. A forward contract is an obligation to buy or sell an underlying asset at a specified forward price on a known date in the future. If the cash price at the expiration date of the contract is higher than the specified forward price, the holder incurs a profit on her long position, otherwise she incurs a loss. Forwards and futures thus generate symmetric risk structures between the two counterparties to the contract. In contrast, an option is the right to buy or sell (call vs. put option) an underlying asset at the strike price at a known date in the future. The owner can always choose not to exercise the contract. Thus, options create asymmetric risk between the two parties to the contract. The possible gain of the buyer is theoretically unbounded, while possible losses are restricted to the size of the option premium. The seller, on the other hand, incurs a potentially unlimited risk of loss and is compensated by a fixed premium (e.g. Issing and Bischofberger, 1996).

A swap is an agreement between two parties to swap, i.e. to exchange, future cash flows based on different returns to or changes in the price of a specified underlying. This is equivalent to the simultaneous selling and purchasing of the

[1] Although their recent growth has attracted attention, derivatives themselves are not new. An early derivative product was a dual-currency bond offered by the Confederate States in 1863, with optional convertibility of the principal into 40,000 pounds of cotton delivered on the Gulf of Mexico (Raisler, 1997). An even earlier example are Japanese rice futures, which have been introduced in 1610 during the first Shogunate (McKenzie, 1993).

[2] The first futures traded at the Chicago Board of Trade (CBOT) in 1972 were foreign exchange contracts. The CBOT also introduced the first interest rate future in 1975 (Federal Reserve Bank of Richmond, 1993).

respective cash flows.[3] Swaps are predominantly customized instruments, although some swaps are now exchange-traded. The most common type is a so-called „fixed/floating swap", in which the „fixed-rate payer" agrees to make payments based on a fixed, long-term interest rate to the so-called „floating-rate payer". The latter, analogously, makes payments indexed to a variable, short-term market interest rate. The respective amounts to be paid are calculated on the basis of a specified principal, which is commonly a notional amount. It is common to exchange the net difference of payments only.

According to their degree of standardization, derivative contracts can be divided into fully standardized, exchange-traded (ET) contracts and more customized, over-the-counter (OTC) instruments that are traded in informal markets. Organized markets cut the direct link between the seller and buyer. They have clearing houses serving as the standard counterparty for all contracts traded. To reduce credit risk and provide collateral for settlement payments, existing ET contracts are revalued at current market values on a daily basis and market participants are required to make cash deposits (margin requirements) before they are allowed to undertake transactions. Daily losses and gains (variation margins) are then deducted or added to the deposit, while a certain minimum deposit must be maintained. These procedures together with a high degree of standardization are designed to provide high fungibility and market liquidity. Measures to reduce credit risk, such as thrid party guarantees, collateral requirements and marking-to-market of existing contracts, have arisen in OTC markets as well, but the less formal nature of these markets implies that they are less standardized and less developed than those in organized markets.

Finally, derivatives can be distinguished according to the underlying assets: Foreign exchange instruments, (single currency) interest rate contracts, equity, and commodity contracts (BIS, 1996).

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[3] See Federal Reserve Bank of Atlanta (1993): The first ever swap contract was a currency swap involving IBM and the World Bank in 1981. The first ever interest-rate swap was entered into by the US Student Loan Marketing Association in 1982.

Since the mid-1980s, growth of turnover and notional amounts outstanding in both the over-the-counter (OTC) and organized markets for financial derivatives, have outperformed the growth in most other financial markets. From year-end of 1995 to year-end 1996 notional amounts of globally outstanding interest rate swaps grew by 49% while currency swaps grew by 45% (BIS, 1998). ISDA figures for the first half of 1997 indicate that outstanding notional principal on OTC markets grew by about 42% and 22% against end-June 1996 for interest rate swaps and currency swaps respectively. The markets for interest rate futures and exchange-traded options, on the other hand, grew 26% and 11% during 1997. The average annual growth rate of the combined markets for OTC- and exchange-traded derivative instruments has been 40% over the ten years up to 1996 (IMF, 1997, 1996a).

Measuring the size of financial markets is necessarily an elusive concept. Here, we follow established practice and look at three aspects of market size: notional contract values, gross market value of existing contracts, and turnover.

II.1. Over-the-counter Markets for Derivatives

According to the 1995 survey conducted by BIS among the central banks in twenty-six countries, and after adjustment for double-counting, the global notional amounts outstanding in OTC foreign exchange, interest rate, equity, and commodity derivative contracts accounted for a total of US$ 40.6 trillion at the end of March 1995. Including estimated gaps in reporting the figure even reaches a total of US$ 47.5 trillion (see Table 1). All but 2% of this total is accounted for by interest rate and currency instruments. Single-currency interest rate derivatives account for 60.7% of the global OTC notional amount, whereas foreign exchange contracts make up another 37.2%. Contracts based on equity and commodites account for only 1.3 and 0.8% respectively. The increasing linkage between domestic and international markets and, hence, the global nature of trade in financial derivatives is accentuated by a share of 55% of reported notional amounts outstanding involving counterparties from

different countries (BIS, 1996) .

Table 1: Global Derivatives Markets at end-March 1995 (billions of US$)

contract category	over-the-counter (OTC)[4]	exchange-traded[5]
notional amounts[6]	47530 (100%)	8186 (100%)
of which		
- foreign exchange	17700 (37.2%)	60 (0.7%)
- interest rate contracts	28850 (60.7%)	7835 (95.7%)
- equity contracts	630 (1.3%)	221 (2.7%)
- commodity contracts	350 (0.8%)	71 (0.9%)
gross market values	2205 (100%)	n.a.
of which		
- foreign exchange	1420 (64.4%)	n.a.
- interest rate contracts	700 (31.7%)	n.a.
- equity contracts	55 (2.5%)	n.a.
- commodity contracts	30 (1.4%)	n.a.

Source: BIS (1996); own calculations.

Banks and other financial institutions account for a large share of the combined OTC markets, partly performing their role as suppliers of financial derivatives and increasingly also trading on their own behalf.[7] Inter-dealer business in local and cross-border trading accounted for about 57% of global notional amounts outstanding in March 1995 (BIS, 1996). In terms of notional amounts outstanding, interest rate swaps, accounting for a share of 69%, appear to be the largest component of the OTC markets for interest rate derivatives, followed by FRAs (17%), OTC options (13%), and swaptions (1%) respectively. Forwards and swaps together account for 83% of the notional amounts outstanding in the foreign exchange markets for derivatives, followed by options with a share of 17%.

[4] Notional amounts outstanding and gross market values of OTC contracts net of inter-dealer double-counting (including estimated gaps in reporting).

[5] N.a. = not available; amounts have been halved to approximate for double-counting. See BIS (1996), p. 3.

[6] Notional amounts outstanding are an indicator for market size and may also serve as an indicator for the amount of potential exposure to price-risk being exchanged in the derivatives markets. Gross markets values, however, measure the replacement values of the different derivative positions and do therefore indicate credit risk. Because of netting arrangements (e.g. ISDA Master Agreement) credit exposure is probably even lower than replacement values suggest. See BIS (1996), p. 24.

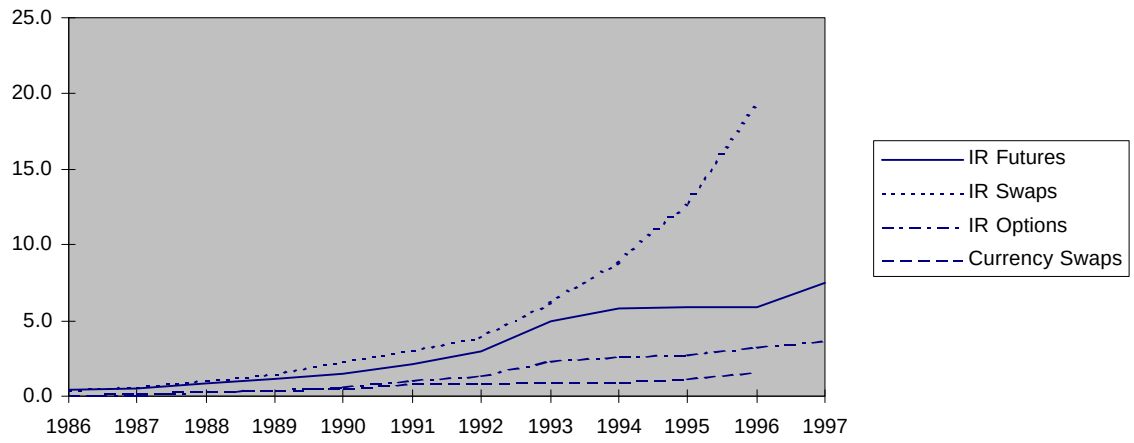
[7] See GAO (1996), Appendix VII and Edwards and Mishkin (1995), pp. 35-37.

Table 2: Turnover in notional amounts; April 1995		(daily averages; billions of US$)
category	over-the-counter (OTC)	exchange-traded
foreign exchange	720 (82%)	7 (1%)
interest rate contracts	160 (18%)	563 (99%)
Total	880 (100%)	570 (100%)

Source: BIS (1996); own calculations.

The gross market value of outstanding OTC derivatives amounted to US$ 2.2 trillion on 31st March, 1995 (or roughly US$ 1.8 trillion without correction for estimated gaps in reporting). Although this is equivalent to only about 4.6 percent of the notional amounts outstanding, it is nevertheless more than three times the capital of the world´s 75 largest banks (IMF, 1996a). These global gross market values serve as an indicator for the overall cost which would have been created had contracts had to be replaced at market prices prevailing on 31st March 1995.

Figure 1: Selected Derivatives Markets; notional amounts outstanding in trillions of US$



Source: BIS (1998); IMF (1997, 1996a).

Foreign exchange products accounted for 64.4% of the gross market value, interest rate contracts for about 31.7% and those contracts involving equity and commodity prices 2.5% and 1.4% respectively. While forwards and swaps together account for 93% of the gross market value of OTC foreign exchange derivatives, swaps alone contribute a share of 87% to the replacement value of outstanding OTC

interest rate contracts (BIS, 1996).

Table 3: Breakdown by OTC instrument type and indicator

Instrument type	Notional amounts	Gross market values	share[8]	turnover[9]
Foreign exchange	**100%**	**100%**	**8.0%**	**100%**
- Forwards & swaps	83%	93%	9.1%	94%
- Options	17%	7%	3.0%	6%
- Other	0%	0%	16.4%	0%
Interest rates	**100%**	**100%**	**2.4%**	**100%**
- FRAs	17%	3%	0.4%	43%
- Swaps	69%	87%	3.0%	41%
- Options	13%	9%	1.7%	14%
- Other	1%	1%	3.2%	2%
Equity	**36%**	**50%**	**8.6%**	**n.a.**
- Forwards & swaps	9%	14%	13.5%	
- Options	91%	86%	8.2%	
Commodities	**100%**	**100%**	**8.8%**	**n.a.**
- Forwards & swaps	66%	78%	10.1%	
- Options	33%	22%	5.5%	

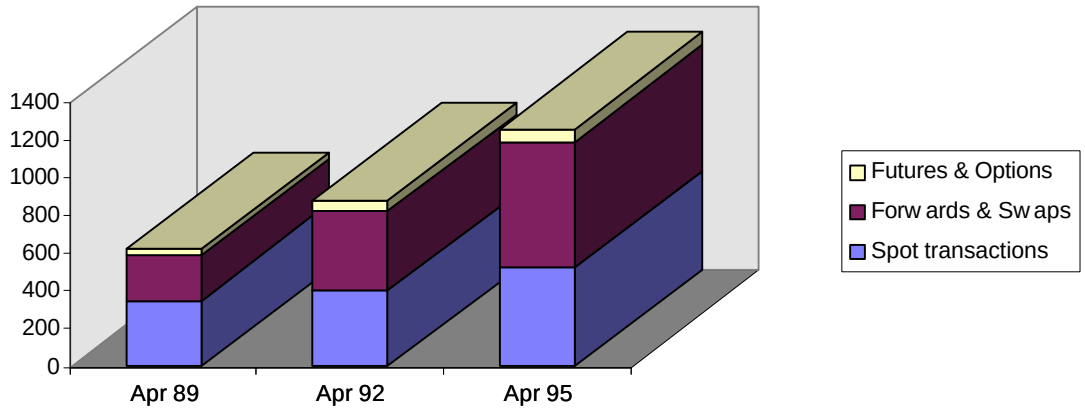
Source: BIS (1996); own calculations.

The BIS survey estimates total average daily turnover (new transactions) in notional amounts of OTC foreign exchange and interest rate derivative contracts at US$ 880 billion in April 1995, about 82% of which was accounted for by foreign exchange contracts. This runs counter to the relative size of the respective notional amounts outstanding and is due to the longer maturities of interest rate products (BIS, 1996).

[8] Reported gross market values as a percentage share of reported notional amounts outstanding. The "share" rises in the length of maturities and is smaller for lower volatilities of the respective underlying.

[9] Percentage shares are based on reported turnover net of local and cross-border double-counting without adjustment for estimated gaps in reporting.

Figure 2: FOREX Market Turnover



Data: daily averages in billions of US$; Source: BIS (1996).

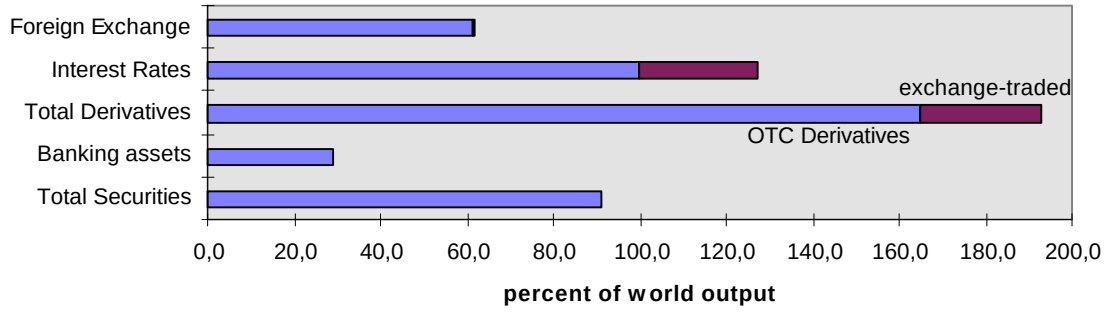
II.2. Exchange-traded Derivatives

Reported notional amounts outstanding on exchanges totalled about US$ 16.4 trillion at end-March 1995. To adjust for double-counting the amount must be halved and therefore reduced to a notional value of US$ 8.2 trillion. The global market for financial derivatives, i.e. the combined markets for OTC and exchange-traded contracts, amounted to US$ 55.7 trillion and was therefore roughly twice as large as 1995 world output.

Between the end of 1986 and the end of 1997, the total notional amount of outstanding ET derivative contracts grew at an annual average rate of 31% and stood at $12.3 trillion at end-1997. During the same period, annual turnover rose from 315 million contracts to some 1.2 trillion contracts, or at an average annual rate of about 13%. Until recently, markets for ET products generally grew in line with OTC markets (figure 1). In recent years, however, the growth of exchange-trade in derivatives has been outpaced by the development in the markets for OTC instruments, which grew at an annual average rate of about 45% (notional amounts outstanding) over the ten years up to 1997, although figures for the first half of 1997 indicate a slowdown in

growth. (BIS, 1998; ISDA, 1997).

Figure 3: Derivatives in Comparison



Data: notional amounts, assets of BIS-reporting banks; Source: BIS (1996) and own calculations.

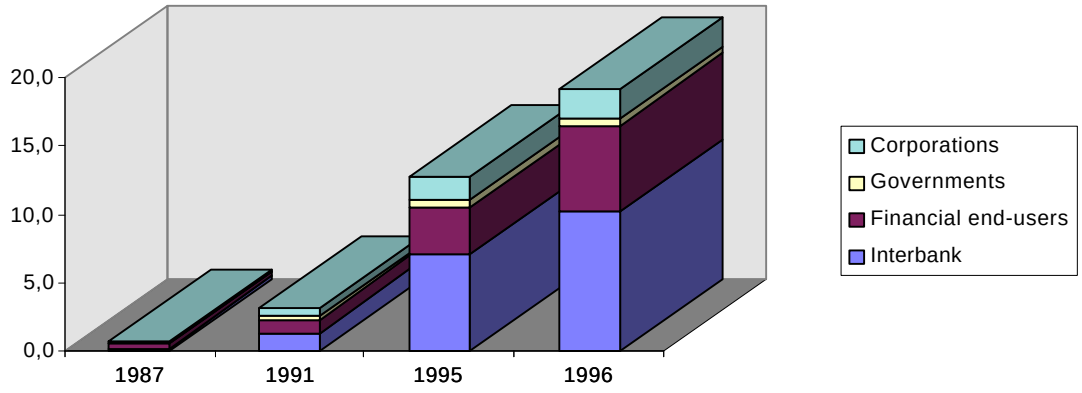
Markets for ET derivatives are even more dominated by products involving interest rates than OTC markets. Interest rate derivatives account for about 96% of notional amounts outstanding in the markets for exchange-traded instruments. Nonetheless, OTC interest rate markets are by far larger than interest rate business involving exchange-traded derivatives. A share of 79% of organized interest rate business falls to futures, while options account for the rest. In terms of daily averages of reported turnover, interest rate instruments make up 99%, of which 89% fall to futures. Generally, futures seem to be traded more actively than options. Interest rate and foreign exchange futures account for 89% of daily April 1995 average turnover in the combined markets for exchange-traded foreign exchange and interest rate derivatives. Dealers seem to use futures to offset their net OTC exposures. Thus, cross-market hedging using exchange-traded derivatives serves to meet hedging demands generated by OTC activities.[10]

II.3. Interest Rate Derivatives: Counterparties

[10] See Kambhu et al. (1996), pp. 10/11; Federal Reserve Bank of Richmond (1993), p. 199.

Figure 4 illustrates the growth in the market for interest rate derivatives using ISDA data on the market for interest rate swaps. A large and growing share of the notional amounts outstanding in global interest rate swap markets is contributed by the inter-bank (ISDA member) business, whose share increased from 30% of the total volume in 1987 to 53% in 1996. Non-financial end-users account for 11% (down from 18%), while the contribution of financial end-users declined from 44% of the total amount to a share of about 33% over the same period (actually recovering from a low of 27% in 1995). The share of the government sector, the least important player on international markets for interest rate swaps, drops from 7% to a mere 3%.

Figure 4: Interest Rate Swaps by Counterparty



Data: Notional amounts outstanding in trillions of US$; Source: BIS (1998, 1996).

Table 4 sheds some light on the counterparty breakdown for all OTC interest rate instruments. Reported notional amounts outstanding at end-March 1995 net of local double-counting have been structured by type and counterparty. The table provides figures for inter-dealer contracts and contracts between dealers and different end-users. It is apparent, that markets for OTC interest rate derivatives are dominated by inter-dealer business, with the market for FRAs being the segment of all OTC markets which is most dominated by contracts between dealers.

Turning to contracts involving dealers and end-users, the share of non-financial

customers is especially small for FRAs, while options and swaps are used to a greater extent. In contrast, end-users from the financial sectors are heavily engaged in the OTC options business, with FRAs and swaps accounting for smaller shares. But although significantly smaller than their options activities, their shares are nevertheless bigger than the respective contributions of non-financial end-users.

Table 4: OTC Interest rate contracts by type and counterparty

(Reported notional amounts; billions of US$)

Product	Total	Financial Institutions	Non-Financial Institutions	Inter-Dealer (local&abroad)
FRAs	6559.5	13.8%	4.9%	81.3%
Swaps	24389.8	17.9%	12.8%	69.3%
OTC options	4390.9	27.9%	19.5%	52.6%
Total	356212	18.4%	12.2%	69.4%

Source: BIS (1996); own calculations.

The *Survey of Industry Practice* conducted by the Group of Thirty (1993) provides additional data on the derivatives use of financial institutions. About 92% of the reporting financial firms indicated that they used interest rate swaps, with 54% and 46% of the same group using FRAs and currency swaps, respectively.[11] In the same survey, more than 83% of the reporting financial firms considered the use of derivatives either very important (24%) or even imperative (58%) for risk management. A small survey conducted by GAO (1996) yields similar results.[12] The Group of Thirty survey indicates that banks have become the dominant, though not the only group of dealers on derivatives markets, and that there is a tendency of market concentration among dealers. This is indicated by the observation that about 75% of the notional turnover of each domestic derivatives market are covered by an average of only 10 market makers. Furthermore, some dealers fall in the group of top 10 dealers in more than one country, confirming the tendency towards global concentration (Vrolijk,

[11] The respective shares for private sector corporations are 87% and 64% for interest rate and currency swaps, respectively. 44% consider the use of derivatives very important, 37% imperative. (Group of Thirty, 1993).

[12] GAO (1996) reviews the use of derivatives by 12 major end-user banks and thrifts. 64% of the notional amounts of derivatives held were interest rate contracts, about 42% of which were used for hedging. Of all instruments used for hedging, 99% were based on interest rates. While all reviewed firms were using derivatives for hedging activities, 75% of them were also using derivatives for the purpose of dealing.

1997). Requirements of technology, know-how and expertise in appraising capital and credit quality all contribute to this tendency. In this regard, Campbell and Kracaw (1991) highlight the role of market making, i.e. the pooling of offsetting risks in large derivatives portfolios. Gonzales-Hermosillo (1994) and Board et al. (1995) argue that the tendency for market concentration is characterized by a growing market share of high-quality dealers. They note that more than 90% of swap counterparties are triple-B rated or above, while an increasing share of the market falls to so-called, structured derivative product companies (SDPC) or special purpose vehicles (SVP). These highly-specialized OTC derivatives dealers are legally separate subsidiaries of parent firms and endowed with enough capital and operational procedures sufficient to gain a triple-A credit rating (Remolona et al., 1996).

II.4. Interest Rate Derivatives: Maturity Structure

The maturity breakdown of global notional amounts of reported OTC derivatives contracts outstanding points at a predominance of short- and medium-term instruments. Table 5 provides information regarding the maturity structure of OTC interest rate derivatives. The table shows a share of 44% for short-term interest rate instruments, with medium-term contracts accounting for another 43 percent. The proportion of interest rate contracts of maturities less than one year is the smallest for interest rate swaps, while FRAs are predominantly short-term with a share of 88% falling to the respective instruments.

Table 5: OTC interest rate derivatives by maturity[13]

Contract-type	Up to 1 year	Over 5 years	1 < year ≤ 5
FRAs	88%	0	12%
Swaps	35%	16%	49%
Options	36%	14%	50%
Total	44%	13%	43%
All OTC instruments	**56%**	**10%**	**34%**

[13] Total notional amounts outstanding net of inter-dealer double-counting.

Source: BIS (1996).

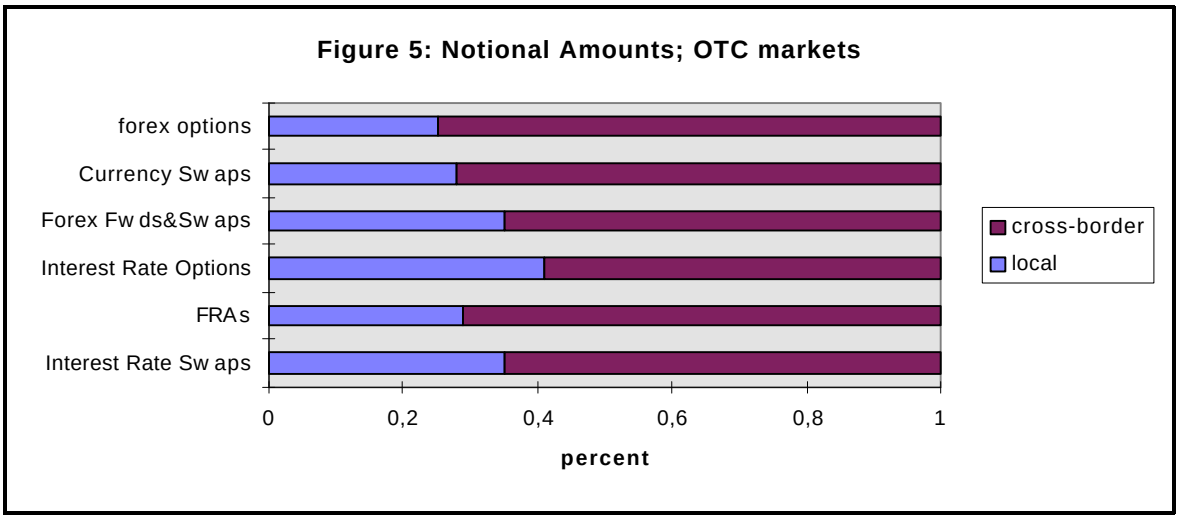
This fact is supported by the „share“-variable reported in table 3 and seems to reflect the wide-spread use of FRAs for hedging purposes related to short-term interest rate risks. Breaking down the maturities of the other OTC derivatives markets reveals that foreign exchange instruments are even more dominated by short term contracts, with shares of 79% and 16% for maturities up to one year and between one and five years, respectively. The same is true for equity and commodity based products, where the respective shares amount to 44% and 43% for the equity based markets, and 75% and 24% for commodity derivatives. Finally breaking down the maturity structure for the combined OTC derivatives markets yields that only 10 percent of the notional amounts outstanding were for more than five years, while 56% were for less than one year.

II.5. Summary

Derivatives markets are becoming increasingly global, as suggested by a share of 55% of reported notional amounts and about 75% of average daily turnover involving counterparties from different countries. Figure 5 indicates the shares of cross-border trades in the different OTC markets.[14] The data suggest that transactions in swaps and FRAs are overwhelmingly between banks. Banks, therefore, seem to use short-term interest rate swaps and FRAs to manage the interest rate risks created by their portfolios.[15]

[14] Notional amounts (as of March 1995) net of local inter-dealer double-counting.

[15] See BIS (1992), pp. 48-58; GAO (1996), Appendix VII.



Source: BIS (1996) and own calculations.

Brewer et al. (1994) and Heinecke and Shen (1995) provide empirical evidence showing that banks use derivatives in order to extend their traditional lending activities. Specifically, they demonstrate a positive association between the use of interest rate swaps and the growth in bank loans, concluding that derivatives are complements to bank´s loan portfolios. Furthermore, however, banks seem to engage in derivatives in order to offset the shortfall in profits coming from their traditional business (Edwards and Mishkin, 1995).

III. Economic Functions of Derivatives

Financial derivatives allow investors to assume or lay off certain risks attached to an underlying financial asset. Until recently, derivatives were used exclusively to address market risks of the underlying assets, i.e., changes in the value of the asset due to changes in markets prices and interest rates. More recently, “credit derivatives” have emerged, which allow investors to assume or lay off credit risk, i.e. the risk of borrower default on the underlying loans and other assets. Examples are „credit default swaps” and „total-rate-of-return (TROR) swaps.” Trading in credit derivatives is dominated by a small number of highly rated banks and largely restricted to a fairly

narrow range of sovereign and quasi-sovereign instruments.[16]

In general economic terms, derivatives thus serve to achieve a more complete financial system. Previously fixed combinations of the risk properties of loans and financial assets can be bundled and unbundled into new, synthetic assets. Repackaging risk properties in this way can provide a more perfect match between an investor's risk preferences and the effective risk of her portfolio or cash-flow. In addition, derivatives allow individual risk elements of an asset to be priced and traded individually. This implies a more efficient price system in the asset markets, as derivatives prices can signal changes in individual aspects of the pay-off profile of the underlying asset that were previously merged with all other aspects.

Beyond these general considerations, derivatives fulfill a number of more specific economic functions (BIS, 1994a; Issing and Bischofberger, 1996). A first function is to save transaction cost and allow a better exploitation of comparative advantage. For example, two borrowers who can each obtain a better interest rate in one market but need a loan in the other market can swap their interest payments, allowing each to exploit the other's cost advantage. In doing so, the use of derivatives increases the value of the investors' assets.

A second function is to provide opportunities for hedging and more perfect and cheaper portfolio diversification. Investors, both end-users and financial institutions can use derivatives to stabilize interest payments over time and reduce their exposure to interest rate and exchange rate shocks. Regarding the allocation of risks in the economy, three cases can be distinguished (Issing and Bischofberger, 1996). The use of derivatives facilitates the elimination of economic risks, when the parties to a contract - or the end users in a chain of contracts - use it to hedge against opposite risk exposures. Empirical evidence from the BIS (1996) survey of OTC markets suggests that the vast majority of derivatives contracts serves to channel exposures to

[16] Credit derivatives are not necessarily part of the swap market. The above mentioned credit default swap is actually a put option on a portfolio of assets. See Federal Reserve Board (1996) and Neal (1996).

price risks from one end-user to another with offsetting demands, leaving dealers with only small exposures to price risks in the aggregate (Kambhu et al., 1996; IMF 1996a). The resulting credit risks seem to be rather small. The net credit exposure on swaps, for example, is only about 1% of its notional principal (Hentschel and Smith, 1997). Derivatives serve to achieve a more efficient distribution of risks between private agents, if one party to a contract hedges against a risk and the other, the speculator, assumes the corresponding exposure. Specializing in the acquisition and processing of relevant information, the speculator will generally be better able to assume that risk than her counterpart, so that the redistribution of risks enhances the economy's efficiency in coping with economic uncertainties and the aggregate risk is effectively reduced (Darby, 1994). Both risk reduction and redistribution have positive welfare and wealth effects in the economy.

New risk is created if the parties to a contract are two speculators with different expectations. The positive economic aspect of this case is that trade among speculators with different expectations facilitates competition among agents with different information sets and different specializations in gathering and evaluating new information. Competition among profit-maximizing speculators assures that, in the longer run, only those with efficient information technologies survive.

A third function of derivatives is that, by unbundling risks, their use creates additional liquidity in asset markets. Santomero and Trester (1998) investigate whether thie increased liquidity together with reduced communications cost leads to increased risky lending by banks. They find that banks are willing to provide more risky lending to finance real sector investment as a result of increased liquidity. However, they argue that this does not imply increased riskiness of the banks. Rather, banks have moved from greater exposure to external shocks to greater risk taking on the returns of their assets.

A related point is that the possibility of tying derivatives notionally to a specific asset implies that trading opportunities are not limited by the existing stock of the

underlying asset. The result is, again, a positive wealth effect for the investor.

A fourth function is to enable investors to devise investment strategies bridging market segments that were previously separated. This implies an increase in the substitutability of financial assets across a wide range of market segments and a broader scope of arbitrage possibilities between markets (Deutsche Bundesbank, 1994). As a result, spill-overs of shocks from one market to others are increased and the correlation of market developments in individual markets becomes stronger, but the impact of an individual shock on the market where it originates is reduced.

Finally, financial institutions can use credit derivatives to avoid a concentration of their credit risk on particular groups of customers without severing the customer relationship, and to diversify portfolios by assuming risk exposures to different borrowers without entering into new customer relationships. Thus, credit derivatives allow banks to focus more strongly on their role as initiators of credit, and other financial institutions to use the resulting credit risks to achieve a more suitable risk structure of their portfolios.

Deregulation together with the greater liquidity and substitutability of financial assets provided by derivatives markets have triggered important institutional changes in the financial system. On the one hand, it has fostered disintermediation, i.e., the tendency of borrowers to access capital markets directly rather than through the use of a bank. On the other hand, non-bank financial institutions have ventured into business areas traditionally reserved for commercial banks. Responding to the resulting loss of traditional business, banks have become the dominant players in the derivatives markets (see above). Corresponding to the greater substitutability of financial assets, then, institutional differences have become more blurred. The emergence of large financial conglomerates in Europe over the last decade points in the same direction.

One important question regarding the economic function of derivatives is, do

they contribute to the stabilization or destabilization of financial markets. The answer has several aspects. One is that the unbundling of different types of risk attached to an underlying asset and the creation of separate markets for each of them implies that there are now more prices to consider. Creating a price for a specific type of risk means that news regarding this particular type have a larger impact on this particular price, but a smaller one on other prices, it is thus both stabilizing and destabilizing. Furthermore, the increased liquidity of asset markets and the greater substitutability of financial assets lead to stronger links between individual markets and more efficient shock absorption. From this perspective, derivatives should reduce market volatility. A related point is that greater arbitrage possibilities between forward and spot markets should facilitate the incorporation of new information into spot market prices, making the reaction of the latter to unexpected market developments less disruptive. This is supported by the observation that forward market prices typically "lead" spot prices over time (Board et al., 1995).

At the same time, derivatives allow traders to take speculative positions with greater financial leverage, since they can buy and sell risks without having to acquire or sell the underlying assets. Traders can react faster and with larger trading volumes to news and shocks affecting asset price expectations, and engage in more complex investment strategies that may exacerbate excess demands or excess supplies of assets in times of turbulence (BIS, 1994). As a result, even small shocks can trigger large changes in asset holdings. In this sense, the development of derivatives markets can destabilize markets.

Empirical evidence suggests that the emergence of derivatives markets has not caused additional volatility in spot markets (IMF, 1997; Cohen, 1996; Board et al., 1995). In fact, official reports on the 1987 crash indicate that the low volume of derivatives trade slowed down the recovery from the crash[17]. However, the BIS (1994) suggests that trading in derivative markets may occasionally have had destabilizing effects on the underlying securities markets during periods of unusual stress, as some

[17] Board et al. (1995) refer to the Bank of England and Stock Exchange reports on this issue.

trading strategies may amplify excess supplies of assets in times of falling prices. The US General Accounting Office (GAO, 1994) argues that the increased links across markets and the concentration on a small number of traders increases the risk of "chain events", i.e., crises that spread from one market to another. The main concern is the potential effect of a sudden withdrawal of one large trader from the market, which could suddenly make the market very illiquid. To avoid destabilizing effects of derivative-based, automated trading strategies, exchanges today have implemented circuit breakers that stop trading in the case of sudden, large price movements. Kambhu et al. (1996) report from simulation exercises that price shocks cause less volatility in OTC derivatives markets than in securities markets.

IV. Monetary Policy Consequences of Derivatives

Section II has illustrated the rapid growth of the new financial instruments. Section III has reviewed their economic functions and interpreted them in terms of the emergence of a more perfect financial market system. What does this imply for the effectiveness and conduct of monetary policy? We develop an answer to this question in two steps. First, we consider the implications of derivatives for the design of monetary strategies, given the transmission mechanism of monetary policy. Next, we discuss their implications for the monetary transmission mechanism. This corresponds approximately to a distinction between medium run and long run effects. Naturally, the longer-run considerations are more speculative. To lay out a long-run scenario, we will assume that the growth of financial derivatives markets will continue and eventually create a much more perfect financial system.

IV.1. Implications for Monetary Strategies

For a given monetary transmission mechanism and a given set of goals, the design of a monetary strategy is a set of rules regarding instrument choice and the

reaction to current events enabling the central bank to best reach its objectives. Since the link between monetary policy actions and target variables - the price level, output and employment - are “long and variable” (Friedman, 1968) strategy design involves the choice of an intermediate target variable serving as a link between the two. An intermediate target strategy focuses on how the intermediate target should be controled over a medium-run time horizon, during which the target variables themselves cannot be or can only imperfectly be observed.

A first implication of a more complete financial market for any monetary strategy is the availability of a broader range of observable asset prices conveying information about the current and expected state of the economy. In addition to inflation, interest rate and exchange rate expectations contained in interest rates and futures prices, derivatives prices in particular contain new types of information a central bank can use to improve its monetary strategy. For example, the Black-Scholes (1973) model of option pricing implies that market expectations about asset price volatility can be extracted from options prices (Söderlind and Svensson, 1997). Furthermore, comparing call and put prices and volumes yields information about market expectations of changes in the prices of the underlying assets and their volatility. At a general level, the emergence of derivatives markets can help central banks to get a more complete picture of market sentiments and, thus, the market environment they operate in (BIS, 1994).

The discussion of the choice of an intermediate target focuses on the source of the dominant shocks in an economy and the stability of the link between the intermediate and the ultimate targets of monetary policy. The first issue was raised by Poole (1970) who argues that a central bank should choose “the” interest rate (more generally, an asset price), if the dominant shocks arise from the financial sector (shocks to the money demand function), and a monetary aggregate, if the dominant shocks arise from the real sector.

One important, traditional argument in this debate is that the emergence of new

financial instruments can be interpreted as a source of instability of the money demand function. As new financial instruments are being developed, the public's demand for money changes, and this in a way that is often difficult to predict with any reasonable degree of precision. In a period of rapid development of derivatives markets, central banks should, therefore, give preference to asset prices over monetary aggregates as intermediate targets. But the argument has less strength than it looks at a first glance. On the one hand, the preference for asset prices is only a transitional one. On the other hand, the introduction of financial instruments allowing the stabilization of cash flows and the reduction of exposure to interest rate shocks should affect an economy's investment demand function as much as its money demand function. If so, the net effect on the desirability of asset prices as intermediate targets is unclear.

In the longer run, the emergence of a more complete asset market contradicts the assumption, central to Poole's analysis, that the economy has only "one" interest rate. More generally, a reliable interest rate target then requires that the central bank can target an interest rate index representing the whole range of interest rates over the yield curve. In this regard, the implications of a more perfect financial environment are ambiguous. Monetary policy necessarily operates on the short end of the yield curve. The transmission of monetary impulses from the short to the long end depends on how changes in inflation expectations triggered by monetary policy actions translate into changes in long-term interest rates. On the one hand, the availability of a broader range of arbitrage opportunities suggests that expectations effects "travel faster" along the yield curve (see e.g. Vrolijk, 1997 and Cottarelli and Kourelis, 1994). This results in a more rapid adjustment of financial asset prices to monetary shocks. It is usually argued that this effect is of minor importance, as the speed of financial market adjustment is already high (Issing and Bischofberger, 1996). However, for less liquid assets like mortgages and bank loans price adjustment might be significantly increased.

On the other hand, the greater substitutability among financial assets and the

more efficient price system suggest that long term rates are more strongly affected by expectations (and information) from other sectors of the economy. With a greater information set underlying the inflation expectations in long-term interest rates, a given monetary impulse will have a smaller effect on these rates. Hentschel and Smith (1997) argue that the greater information set available should help agents to distinguish between real and monetary shocks, thus reducing the real effects of monetary policy.

Exchange rate policies, the other version of a monetary strategy based on asset prices, are more strongly affected by the emergence of more complete asset markets. After the breakdown of the Bretton Woods System in 1973, many central banks, particularly among the G7 reverted to "sterilized interventions" to combine a monetary strategy geared at domestic policy goals with an exchange rate target. Sterilized interventions, in which the liquidity effect of the central bank's foreign exchange market operations is immediately offset by counteracting operations in the domestic money market and which therefore change the relative supply of domestic and foreign financial assets without changing the money supply, can only affect the exchange rate, if domestic and foreign financial assets are imperfect substitutes. From this perspective, the emergence of a more perfect financial market system should decrease the effectiveness of sterilized interventions.[18]

International finance speaks of the "unholy trinity" to describe the inconsistency of a combination of high international capital mobility, a fixed exchange rate and a monetary policy geared at domestic policy goals. With high capital mobility, fixed exchange rates become highly exposed to speculative attacks, leaving the central bank no room for a policy that might raise even slight doubts about the sustainability of the exchange rate target. Thus, national monetary authorities have no choice but either to completely subdue monetary policy to the exchange rate target, and, hence, accept the rate of inflation of the currency they peg to and the loss of monetary policy

[18] The alternative mechanism how sterilized interventions can affect exchange rates is if they are understood by the market as credible signals about future central bank actions (Mussa, 1986). In this context, a the emergence of a more complete financial market system has no clear implications for their effectiveness.

as a tool to stabilize the domestic economy, or to renounce the exchange rate target. The experience of the European Monetary System (EMS) in 1992/93, when the system collapsed after a period of mounting imbalances between national monetary policy goals and the requirements of the fixed rate, has forcefully demonstrated this point (von Hagen, 1996). Eichengreen et al. (1998) point to the potential role played by specific institutional investors (hedge funds) and, hence, their position taking using derivatives contracts during the 1992/93 EMS and the recent Asian currency and financial crises. They do not, however, find any strong evidence for the hypothesis that hedge funds precipitate such crises either directly through the sheer size of their positions or indirectly via herding behavior of other market participants.

One might, of course, turn the argument around and suggest that central banks themselves could make use of derivative instruments rather than outright purchases and sales in the spot market to stabilize exchange rates. While this is possible in theory, and central banks have occasionally used forward market interventions, central banks would then take speculative positions in the same way private speculators do.[19] One may argue that this is an efficient way of sending credible signals about future central bank intentions - after all, the central bank should not speculate against its own future actions. But, if the spot rate later moves in the wrong direction the central bank would take large losses and be accused in public as engaging in unprofitable, and unpopular speculative activities. If, in contrast, the central bank made large profits on speculative positions, other market participants would accuse it of using its own power to manipulate spot prices in order to make its own bet come true at the cost of private market participants. Institutions of public policy like central banks fear such accusations too much to make the use of derivatives on a large scale attractive to central banks.

Thus, the rapid development of derivatives markets has likely strengthened the logic and force of the “unholy trinity”. Increased liquidity of financial markets and

[19] This could be avoided if the central bank closes its derivatives position by an appropriate operation in the spot market. This however, makes the operation equivalent to a sterilized intervention (e.g. BIS, 1994).

increased leverage of financial positions imply that speculators can attack unsustainable fixed exchange rates even faster and more powerfully than before. The rapid innovation of new financial instruments in these markets also implies the futility of attempts to “throw sand in the wheels” through regulation or the introduction of a “Tobin tax” on speculative transactions (Salvatore, 1997). As a result, the new financial environment has increased the vulnerability of fixed exchange rate systems.

As the European example teaches, one way out of this dilemma is to move to a full-fledged monetary union. But the European Monetary Union will remain the exception on the international scene as it requires the political willingness to accept the loss of national sovereignty in a broad range of policies. The example of Argentina in recent years teaches that the other solution is a currency board, i.e., to give up monetary policy independence completely and to accept the possibility of domestic recessions in times of large capital flows out of the economy even if these are entirely due to economic events abroad, such as the “Tequila crisis” in 1994/95. Since this solution, again, is politically unattractive for most countries, the likely consequence of the development of derivatives markets is a strong decline in the interest countries take in fixed exchange rates as a monetary strategy.

Turning to monetary aggregates, a first point is that the increased substitutability of financial assets and the increased liquidity provided by derivatives makes the definition of “money”, particularly of broad monetary aggregates increasingly difficult (Savona and Maccario, 1997). Simple-sum monetary aggregates are based on the assumption that their components are perfect substitutes and that the aggregate as a whole has only a very low degree of substitutability with other financial assets. This may remain true for cash and pure transactions accounts (more on this below), but it is increasingly questionable for time deposits, savings deposits, certificates of deposit. The standard response of central banks, to broaden the simple-sum aggregate used as intermediate target, is clearly inappropriate, as it disregards anything between perfect and very low substitutability. Furthermore, the broader the aggregate, the more a monetary target becomes equivalent to targeting the entire

balance sheet of the banking sector, with little hope for sufficient controllability of the intermediate target.

The more sophisticated response, coming from aggregation theory, is to construct monetary Divisia indices (Barnett, 1978, 1980). By construction, Divisia indices incorporate different degrees of substitution among financial assets by incorporating relative prices. Empirical evidence has shown that Divisia indices do indeed yield superior measures of the money supply than broad simple-sum aggregates (Mullineux, 1996). Yet, they are unsatisfactory as intermediate targets, because they are difficult to explain to the public, making it hard to communicate central bank policy intentions to the public, because the theory of the money supply underlying the Divisia approach is not well developed, and because targeting Divisia indices requires a forecast of the effect of monetary policy actions on relative asset prices, which remains exceedingly difficult.

The essence of this discussion then is a preference for narrow simple-sum monetary aggregates, which remain valid even under Divisia aggregation. Since such aggregates are notoriously more volatile in the short run than in the long run, this preference implies a shift to monetary targets over longer time horizons (two or more years) and with it a stronger focus of monetary policy on the trend growth of money rather than a reaction of monetary policy to short run fluctuations in other economic variables (von Hagen, 1997). Hentschel and Smith (1997) argue that use of derivatives should reduce demand for excess reserves by improving bank´s liquidity risk management. This, in turn, should also reduce the volatility of the money multiplier, which would increase the central bank´s effective control over narrow monetary aggregates.

More recently, the debate over monetary policy strategies has contrasted monetary targets and inflation targets. While monetary targets can be, and in practice have been, combined with a target for the rate of inflation (von Hagen, 1995), the substantive difference between the two approaches is in the choice of the intermediate

target. Specifically, inflation targeting involves the use of an inflation forecast as intermediate target, using a much broader range of variables as inputs than just a monetary target. Thus, Svensson (1996) speaks about “inflation forecast targeting”. But since there is nothing in the concept of monetary targeting preventing the central bank from using all available information to update its monetary target and interpret deviations from it, the mere scope of information variables yields no convincing argument in favor of inflation forecast targeting (von Hagen, 1997). This is confirmed by the observation that, on the basis of the central bank’s reactions to current events, there are hardly any differences between the two (Mishkin and Posen, 1997). Similarly, the fact that inflation forecasts in practice use a host of economic relationships from labor and output markets in addition to financial sector relations to predict inflation yields no apriori grounds, except under very narrow assumptions about the stochastic nature of the shocks, for the assumption that such forecasts be less vulnerable to structural shifts in the process of financial innovation than the relations required to derive a monetary target.

IV.2. Implications for the Transmission of Monetary Policy

Does the existence of a more complete financial market system as provided by the emergence of financial derivatives change the effectiveness of monetary policy? With this question we turn to the transmission mechanism of monetary policy. Answers to this question obviously depend on the underlying theory of the monetary transmission mechanism itself.

A first answer, and one that remains within the scope of the traditional IS-LM paradigm, starts by recognizing that financial derivatives allow their users, businesses and households, to obtain insurance against interest rate and exchange rate shocks. Smith and Stulz (1985) and Froot et al. (1993), among others, show why firms should use derivatives as part of their risk management strategies. To the extent that monetary policy actions are a source of interest rate and exchange rate shocks, the

widespread use of financial derivatives should reduce their immediate impact on investment decisions and, hence, on aggregate demand. However, the finite maturity of all financial derivatives implies that the user cannot shield himself against interest rate or exchange rate changes forever (Hausler, 1996). Thus, monetary policy actions will have an effect sooner or later (Deutsche Bundesbank, 1994; Issing and Bischofberger, 1996). But this conclusion is weaker than it may first seem. Empirically, changes in central bank interest rates are themselves rarely of a permanent nature.[20] Furthermore, in an international environment firms can use financial derivatives to trade domestic for foreign interest rate risk. The possibility that domestic and foreign interest rate shocks offset each other then implies a reduced effect of domestic interest rate shocks on domestic investment decisions. In sum, under the IS-LM paradigm one should conclude that the power of monetary policy to affect aggregate demand is eroded by the emergence of a more perfect financial market system.

The IS-LM paradigm, however, has long come under attack, since it does not fit well with empirical evidence of how monetary policy affects the economy: The timing and size of the reactions of the real economy to changes in central bank interest rates are too different from what this paradigm predicts (Mishkin, 1995; Bernanke and Gertler, 1995). To get a more convincing explanation of the transmission mechanism, the picture must be broadened.

The *credit-market view* of monetary policy transmission (Bernanke, 1993; Bernanke and Gertler, 1995) does this by introducing credit market imperfections while maintaining the general macro economic framework of the Keynesian system. Refuting the assumptions of the *Modigliani-Miller theorem*, it argues that internal and external finance are imperfect substitutes and that firms rely critically on external funding to finance investment projects. Among the sources of external funding, bank loans are imperfect substitutes for corporate securities, and there is a class of borrowers in the

[20] Bernanke and Gertler (1995) estimate that federal funds rate shocks in the US generally peter out after six to nine months.

economy, e.g., small businesses, that are constrained to bank loans as the only source of borrowing. When interest rates rise in the economy, banks face an outflow of short-term deposits, which cannot be easily substituted for by issuing certificates of deposits or other sources of funds. Under such circumstances, banks prefer to invest in marketable securities rather than bank loans, as the former are more liquid and less risky than the latter. Thus, the supply of bank credit decreases, and borrowers constrained to this source of funding cut their investment expenditures, leading to a decline in aggregate demand. Another version of the credit market view holds that businesses relying on bank loans as the only source of funding face credit constraints that depend on the value of their marketable collateral (Kiyotaki and Moore, 1997). As interest rates rise, the value of collateral declines and with it the availability of credit. Again, aggregate demand falls by more than the rise in interest rates would suggest in itself.

Since the emergence of financial derivatives provides a more complete market system, one should expect that it reduces the importance of transmission channels relying on market imperfections (Issing and Bischofberger, 1996). Specifically, the possibility to trade variable for fixed interest rate payments and to hedge against fluctuations in asset prices should protect businesses against variations of their creditworthiness due to variations in short term interest rates (e.g. Titman, 1992). Furthermore, the increased liquidity of bank loans provided by derivatives increases the substitutability between these and other forms of credit and, therefore, reduces the strength of the mechanism. Thus, the use of derivatives should reduce the effect of changes in central bank interest rates to the pure IS-LM effect which, as suggested by empirical evidence on the interest elasticity of investment demand, would be rather small.

The credit view still remains within the boundaries of the IS-LM paradigm as the general macro economic framework.[21] A central tenet of this paradigm is that the

[21] Proponents of the credit market view have so far been more interested in empirical research than in developing a model of general macroeconomic equilibrium incorporating their arguments. Although the underlying model is usually claimed to be of a three-asset type (money, bonds, and bank credit), the interaction

financial markets of an economy can be usefully summarized in a two-assets structure in which “money” is a substitute only for “bonds”, implying that all non-monetary assets are perfect substitutes, and “the” interest rate is the only relative price in the financial system. A change in the money supply then has a straightforward impact on this interest rate, which, in turn, affects aggregate demand. The more complete a financial market system, the less this is a tenable view of the economy. The *monetarist* critique of the IS-LM framework in the 1960s and 1970s already demonstrated that, even considering no more than three financial assets, money, bonds, and equity, and, hence, two asset prices raises the complexity of the analysis considerably and makes predictions of the effects of monetary policy actions on aggregate demand more demanding (Brainard and Tobin, 1968; Brunner and Meltzer, 1976; Meltzer, 1995). The more assets there are, the more information such predictions need on the degrees of substitutability between money and other assets, which themselves may change over time. This, of course, reinforces our observation about the consequences of financial innovations for the measurement of money. Here, the point goes deeper, however. In a more perfect financial system, the transmission of monetary impulses to the real sector becomes increasingly complex and hard to forecast, too.

In a more complete financial market system, then, central banks find it harder to predict the effect of a given monetary impulse on real output and employment with any reasonable precision. While it remains true that a monetary expansion ultimately raises the price level, its short-run real effect is much more difficult to determine. Thus, discretionary monetary policies aiming at moving output and employment closer to some target levels become more uncertain. The important policy implication is that central banks operating in a more complete financial environment should refrain from active monetary stabilization of short-run real fluctuations and focus on the more long-run goal of price stability instead. Thus, the emergence of financial derivatives “disciplines” monetary policy in the sense of inducing a shift of the policy makers’ attention to low inflation.

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of these markets is not analyzed. This is in contrast to the earlier literature led by Brunner and Meltzer, where the bank loan market was at the heart of the analysis.

IV.3. Non-Monetary Payment Systems

The extension of the analytical framework discussed above still follows the traditional paradigm of monetary economics in assuming that money, and money alone, is the economy's general medium of transaction and unit of account. Banks play a special role in monetary economics, because, by definition, their liabilities are "money" (Tobin, 1963). Proponents of the "New Monetary Economics" (Cowen and Kroszner, 1987) have long pointed out that this assumption is by no means a natural one: Payment technologies can be conceptualized that are based on the exchange of financial assets other than money, and where the medium of exchange does not coincide with the unit of account (Fama, 1980, 1983). Wallace (1983) argues that the special role of money and, hence, monetary policy is due entirely to legal restrictions, making money artificially the only unit of account.

New Monetary Economics takes an economy with an unregulated, competitive banking system as its paradigm (Black, 1970; Fama, 1980; Hall, 1983). Competitive banks offer transaction services and manage portfolios of interest bearing, risky assets. Bank accounts are shares in such portfolios, pay competitive interest rates and have variable prices in terms of the economy's unit of account.[22] Depending on the depositor's preferences, banks offer accounts of different interest-rate risk combinations. Obviously, there is little special about such transaction accounts as financial assets. Transactions from them are merely transfers of assets from the payer's account to the recipient's account. Since they provide an extra service, banks charge a competitive fee for them. Apart from that, an arbitrage-free equilibrium demands that such accounts pay the same interest rate than any other asset of the same risk-return characteristic.

In the purest form of such a system, there is no need for a special asset to serve

[22] As Fama (1980) points out, deposits might alternatively have a fixed price in terms of the unit of account and a variable interest rate.

as a generalized medium of payment. Hence, the transactions accounts create no need for a bank to hold reserves - voluntary or required - of such a medium against them. This is the main difference compared to the traditional monetary economy, where payments are settled in a medium provided by the central bank (central bank reserves and currency) and where the amount of reserves and currency made available by the central bank - or their price as determined by the central bank - puts a limit on the banking sector's ability or willingness to make loans and create deposits, the cornerstone of monetary policy. The implication is that the aggregate volume of these accounts is determined entirely by the private sector's demand (Fama, 1980; Fischer, 1987). As Greenfield and Yeager (1983) put it: "No longer, then, could there be to much of it [of central bank money in a regulated economy], causing price inflation, or too little, causing depression, or a sequence of imbalances, causing stagflation. A wrong quantity of money could no longer cause problems...". Thus, there is no role for government policy trying to affect output and employment in such an economy.

The discussion of the economic functions of derivatives suggests that the development of a more complete financial system can take the modern economy a big step towards such a system. A first reason for this is that derivatives allow to circumvent existing legal restrictions in financial markets, making regulations less binding. A second reason relates to the demand for transactions accounts of the type envisioned by New Monetary Economics, i.e., variable-price shares in financial portfolios. One important reason why transactions accounts with variable prices have not been widely used in the past even after two decades of financial regulation is probably that private households and firms value planning certainty for their daily transactions. A high degree of certainty about the purchasing power available in a transactions account reduces information and transactions cost. Obviously, this demand for certainty relates much more to the short run than the long run. In this regard, the development of financial instruments allowing banks to offer transactions accounts based on interest-bearing assets with low short-run volatility should make such accounts much more attractive as an alternative to traditional, fixed-price

deposits. One should expect, therefore, that such accounts would become increasingly popular as the development of derivatives markets continues, particularly since financial deregulation increases competition in the banking industry. The decline of the traditional banking industry in the US and elsewhere as a result of competitive pressures over the past decade, accompanied by a decreasing importance of traditional bank deposits as a source of funding and an increasing role of banks in the derivatives markets (Edwards and Mishkin, 1995) clearly supports that expectation.

A third reason for the demise of central bank money as medium of transaction relates again to the supply side. For a given stock of fixed-price transactions accounts, the increased liquidity of non-monetary assets provided by financial derivatives allows banks to improve the efficiency of their reserves management. That is, central bank money can be substituted against interest-bearing assets as liquid reserves. While the banks' demand for reserves will not disappear completely, the likely consequence is that the amount of central bank money the central bank supplies to the banking industry, or the price of central bank money set by the central bank, will lose importance as a parameter determining the amount of loans banks are willing to extend and the interest rates they charge. This would reduce the power of monetary policy to control the volume of money and credit. Obviously, the extent of this substitution process depends on the conduct of monetary policy itself, since the choice between central bank money and other liquid reserve assets is an endogenous one. On the one hand, the greater availability of alternative reserve assets is likely to put pressure on central banks to provide better quality services to the banking industry. More relevant for monetary policy, however, is the consideration that frequent and unexpected changes in a central bank's lending conditions to commercial banks will reduce the attractiveness of central bank money as a reserve asset compared to other alternatives. Thus, the less steady and transparent central bank behavior, the more central bank money will lose importance as a reserve asset and the more the central bank will lose control over the supply of money.

One might argue that central banks can prevent that from happening by setting

sufficiently high required reserve rates and by extending the coverage of reserve requirements to a broader range of bank liabilities, beyond fixed-price deposits. Fama (1980), for example, shows how the central bank can create a demand for money by imposing a reserve requirement in terms of central bank money on a completely non-monetary asset serving as medium of transaction. However, in a world of high international capital mobility, reserve requirements create international competitive disadvantages for a national banking industry. Competition for market shares in the international financial markets results in pressures on central banks to reduce reserve requirements to avoid hurting their national banking industries. There is a close resemblance in this situation to international competition in capital taxation: high capital mobility puts strong downward pressure on reserve requirements. The reduction of required reserve ratios in recent years, even in countries where the central bank traditionally regards reserve requirements as indispensable for monetary policy, like Germany, indicates the force of this competition.

Despite these tendencies to replace money by other means of transaction, however, the demand for government-issued money will not disappear completely, as envisioned by the proponents of New Monetary Economics. One reason is quite simply that governments themselves can secure a demand for the money they issue by insisting that all tax payments be made using it.[23] As long as governments uphold this requirement, central bank money will remain in use, and, given the size of the modern state in the economy, will create a sizeable demand for money as medium of transaction in transactions with the government. As taxation pervades all sectors of the economy, the demand should remain a function of aggregate real income and real wealth, although it will likely be much less interest elastic and much more seasonal than money demand is traditionally. Even where all transactions among private agents were executed without using central bank money, banks would still hold some reserves of central bank money to serve their customers' demand for executing transactions with the government.

[23] The importance of the government's power to tax as a basis for the demand for government-issued money is discussed extensively in Goodhart (1997).

Furthermore, a demand for government-issued cash as a medium of transaction in very small denominations will remain. New Monetary Economics focuses entirely on payments from bank accounts and disregards the fact that economic agents execute small payments in their daily shopping activities. The desire to make informal, non-market exchanges of a medium of transaction (gifts and payments in the shadow economy) contributes further to this demand for cash.[24]

Nevertheless, even with these qualifications it is plausible to expect that the demand for government-issued money will decline substantially as banks develop more attractive types of transactions accounts. The degree to which new media of transaction will replace money is ultimately an endogenous variable. Taking the unregulated financial system and a fully demand-determined supply of the quantity of transactions accounts as the reference point suggests that it will depend largely on the central bank's behavior in controlling the supply of money. The more frequently the central bank exploits its role as provider of a medium of transaction to actively constrain the business of financial institutions in pursuit of discretionary macro economic management, the more these institutions will be induced to seek alternative means of payment and offer them to the non-bank public. Similarly, uncertainty about central bank actions constraining financial institutions will induce banks to substitute out of money as a medium of transaction. From this perspective, the emergence of a more perfect financial market system induces central banks to refrain from short-run oriented, macro economic activism in favor of a more long-run oriented, predictable monetary policy.

Expecting the role of monetary policy in controlling aggregate demand to diminish is, obviously, not the same as expecting that aggregate demand will no longer be exposed to shocks originating in the financial sector. Here, we disagree with the proponents of New Monetary Economics, who claim that, in an unregulated financial environment, financial institutions will not be able to actively create credit, and, hence, macro economic fluctuations caused by an excess supply of (demand for) credit which

[24] See Rogoff (1998) for a theory of the demand for cash based on informal exchanges.

must be met by an excess demand for (supply of) goods cannot arise (Black, 1970; Tobin, 1963). As Krüger (1997) shows, this view mistakes an unregulated economy to be necessarily one of perfect information. As long as information asymmetries prevail between lenders and borrowers, and information advantages make banks "local" monopolists in their loan relationships, the potential for credit creation, hence macro economic fluctuations remains. Nevertheless, the declining role of money as the general medium of transaction implies a declining role of monetary policy as an independent source of such fluctuations and as a policy tool to combat them. Whether macro economic fluctuations will, in the end, be more or less pronounced than in a traditional monetary economy remains an empirical question.

The possible emergence of a financial system where central bank money largely loses its role as medium of transaction raises the question, discussed in the New Monetary Economics, of what will be the unit of account in such an economy. As pointed out by Fama (1980), there is nothing that requires an economy's medium of transaction to coincide with its unit of account.[25] While competition and market forces can drive the economy towards using more efficient transactions technologies, the choice of a unit of account is a matter that markets cannot solve easily. A unit of account is an important element of communication among market participants, and its attractiveness for an indivual economic agent depends on how many other agents use the same unit of account. Thus, the choice involves important economies of scale and network externalities. Empirical evidence suggests that economies switch from one unit of account to another only in times of hyperinflation, when the value of this unit is uncertain and eroding rapidly. Hysteresis thus plays a large role in answering the question. A suggestive answer then is that government-issued money would retain its role as unit of account even in economies where it no longer serves as the dominant medium of transaction, as long as central banks secure its stable value in terms of goods and services.

[25] It is worth noting in this context that the introduction of European Monetary Union as currently planned introduces a separation of the unit of account and the (dominant) medium of transaction. Specifically, the Euro will be the sole medium of transaction in wholesale financial transactions immediately upon the start of EMU, while the national currency units will remain units of account in retail business for the first few years.

In sum, we have argued that the development of a more perfect financial market system bears important consequences for monetary policy and its role in the economy. It allows banks to offer shares in interest-bearing asset portfolios as transactions accounts with relatively little short-run price volatility. Central bank money will remain the medium of transaction with the government and retain its unit of account function, but monetary policy will lose its power to affect the real side of the economy by actively restraining the amount of loans banks are willing to extend. By itself, this should induce central banks to shift attention away from trying to achieve short-run oriented goals of output and employment stabilization and from short-run oriented, discretionary activism. As central banks will realize that the banking sector's choice between central bank money and other, highly liquid reserve assets depends critically on the stability of the central bank's lending conditions, and that the public's use of central bank money as unit of account depends critically on the stability of its value, this tendency for monetary policy to adhere to monetary policy rules and focus on the long-run goal of monetary policy, price stability, will be reinforced.

Note that, even if monetary policy loses its power to affect output and employment in the short run, price stability remains a reasonable goal of monetary policy [26]. Since the demand for money remains well-defined, a positive price of money in terms of other goods exists. Monetary policy will then have to combine a high degree of elasticity of the money supply to accomodate seasonal variations in the demand for money in the short run with a long-run money growth trend that follows the trend growth rate of aggregate output. Going back to previous arguments, a monetary strategy of multi-annual targets for narrow monetary aggregates would be an appropriate strategy to achieve that.

The demise of short-run, macro economic stabilization as a monetary policy objective contributes to the declining importance of exchange rate considerations in monetary policy. This, in turn, will make central banks less interested in international

[26] See Cowen and Krozner (1994). Woodford (1997) shows that the central bank can control inflation even if the demand for central bank money tends to zero in the limit.

policy coordination, as the benefit from policy coordination comes mainly from the international spill-overs of monetary surprises generated by central banks in response to aggregate demand and supply shocks (e.g. Canzoneri and Henderson, 1991). This tendency will be reinforced by the fact that in a more complex financial markets environment the design of optimally coordinated central bank strategies becomes increasingly difficult.

V. Regulatory Policies

The rapid emergence of derivatives markets has raised fears about their potential damaging effect on the stability of the financial sector, exemplified by the statement of Henry Gonzalez, chairman of the Banking Committee of the US House of Representatives: "I have long believed that growing bank involvement in derivatives trade is, as I say and repeat, like a tinderbox waiting to explode."[27] Likewise, the GAO (1994) report concludes that there was some reason to believe that derivatives created a threat to the financial system and that additional regulation was required, although the GAO saw the increasing activities of unregulated non-bank financial institutions in these markets as the main reason to worry (Bothwell, 1994). In contrast, Greenspan (1994a) warns that increasing regulation might create the false impression that federal regulation would remove all risk, inducing private agents to engage in ever riskier activities. Similarly, Goodhart et al. (1997) warn that regulation would be excessive and overly expensive if it tried to reduce the risk facing small investors and consumers to unduly low levels. The Group of 30 (1997) insists that, while it is not sensible to eliminate all risk, the risk of large disruptions of the financial system as a whole should be eliminated through regulatory initiatives.

Apart from the sheer size of the new markets (Edwards and Mishkin, 1995), two factors are behind these fears, the fact that they allow to take speculative positions with greater leverage and more complex strategies, and the fact that, since derivative

[27] Congressional Record 18 June 1993, H 3322.

positions are not visible in the balance sheets of financial institutions and because they often span across international borders, monitoring the riskiness of financial institutions becomes more difficult. The existing empirical evidence suggests that the first factor may be a valid concern for individual financial institutions engaging in excessively risky activities (witness the Barings crisis), but not so for the financial system as a whole, since the net exposure of the banking system to credit risks stemming from derivatives trade is rather small (IMF, 1996a; Edwards and Mishkin 1995; Kambhu et al, 1996).[28] Recognition of the second factor has triggered a discussion about changes in the regulatory approach of bank regulators.

Traditional, corporatist arrangements for banking regulation have emphasized restricted market access, limited competition and the imposition of regulatory standards based on financial accounting, balance sheets and income statements (Goodhart and Schoenmaker, 1993). These arrangements relied heavily on a strict institutional separation of different types of financial activities, such as commercial banking, real estate finance, insurance, etc. This separation was reflected in a division of regulatory responsibilities among different regulatory bodies, each concerned with one particulat financial industry. With restricted market access and competition, regulatory functions could often be implemented on the basis of semi-private industry arrangements or in cooperation between industry organizations and government agencies rather than direct government intervention.

Financial innovation and the emergence of a more perfect financial system have eroded the borders between different markets and spurred more intense competition, including international competition, among financial institutions. Corporatist arrangements become much more difficult to maintain in such an environment, because competition tends to destroy the traditional, insider-club nature of industry relations, and because the branching out of financial institutions into new markets has created a more fuzzy industry structure than the traditional one. At the same time, the use of derivatives and other innovations has facilitated the circumvention of barriers to

[28] Even the Barings crisis, after all, did not result in problems regarded as systemic.

market entry and limits to competition. The traditional arrangements have, therefore, both lost effectiveness in constraining management behavior and created inefficiencies as the same financial activities came to fall under different regulatory jurisdictions and regulatory bodies are notoriously bad in cooperating with each other (Goodhart, 1996a, Goodhart and Schoenmaker, 1993). Regulatory responses to these challenges include a shift towards more market-friendly modes of regulation, the consolidation of regulatory functions, and attempts at international cooperation (Padoa-Schioppa, 1995).

V.1. Motivations for Banking Regulation

There are three basic reasons why financial institutions are regulated [29], each leading to different modes and instruments of regulation. The first is the protection of (small) depositors against the risk of bank failure (Dewatripont and Tirole, 1994). It is motivated by the observation that small depositors find it hard and excessively costly to monitor the lending activities of their banks, and are therefore unable to prevent banks from pursuing too risky lending strategies. While banks can, in principle, offer to insure their deposits to solve this problem, information asymmetries between the insurer and the bank make it impossible to price deposit risk in an actuarially fair way, and mispricing risk induces moral hazard on the part of the insured (e.g., Chan, Greenbaum, and Thakor, 1992). Where it exists, deposit insurance is, therefore, commonly compulsory and provided by the government which uses further regulatory tools to address the moral hazard problems created by the insurance.

The second reason for financial regulation is to prevent financial contagion, i.e., the spill over effects large withdrawals of deposits at one bank may have on the banking industry. The mismatch in maturities between bank assets and liabilities creates the risk that depositors run to withdraw their funds from a bank in the event of

[29] We ignore some secondary reasons related to the smoothness of the money supply process and credit allocation schemes driven by social policy goals.

even a slight suspicion that the bank be unable to repay its liabilities (Diamond and Dybvig, 1983). As each depositor wants to be first in line to obtain his deposit before the bank has used up its liquid reserves, bank runs are of a self-propelling nature. If depositors at other banks read the closing of one bank as a signal that their banks are equally in financial trouble, the run can spread to other banks. Regulatory strategies to prevent bank runs involve measures to convince depositors of the financial soundness of the banking sector, such as, prudential rules limiting the risk exposure of the banks and forcing them to hold reserves sufficient to meet sudden increases in the demand for cash. Furthermore, bank panics can be prevented by a credible lender of last resort. If depositors are assured that banks can obtain the reserves to pay out their deposits, the value of being first in line disappears and bank panics do not arise.

The third reason for financial regulation is to preserve the integrity of payments mechanisms.[30] Payments systems can help economize on central bank money and avoid long delays in payments if they limit actual settlement between the participants to the net positions at the end of a specified settlement period. In doing so, they create credit relations among the participants during the time interval between the initiation and the final settlement of all payments. In contrast to a bank's ordinary lending business, a payments system makes banks extend credit to other banks as a result of the business activities of the latter, without choice nor assessment of their counterparts (Angelini and Passacantando, 1992; Goodhart and Schoenmaker, 1993). If a participant proves unable to meet its obligations, all other participants may be affected as they are interconnected in a cobweb of credit relations. The system would then have to grind to a halt and all payments be unwound to isolate the failing institution from the other participants, a procedure that would be lengthy, costly, and often impossible. In an international context, this liquidity risk is augmented by "Herstatt risk", the settlement risk resulting from the fact that national payment systems in different countries may not be open during the same hours of a day. The smooth operation of payments systems can be assured by an agent who guarantees the

[30] See Goodhart and Schoenmaker (1993) and Hartmann (1994) for a review of these issues.

execution of all payments initiated during a settlement period, another lender-of-last-resort function. Regulatory provisions surrounding this function focus on the quality of a bank's risk controls, computing and back-up facilities and network technologies (Goodhart and Schoenmaker, 1993).

Among the three modes of banking regulation, the first is akin to consumer protection, i.e., it focuses on the need of uninformed customers to be protected against fraudulent business practices. The latter two address systemic issues; i.e. spill-overs of the activities of one bank to other banks or the payment system. Although there is a large degree of variation across countries in this regard (von Hagen, 1997), central banks are typically charged with one or both lender-of-last resort functions. The reason is that the systemic risks are themselves the result of the use of central bank money as a medium of transaction. Bank runs and financial contagion only arise because bank deposits have a fixed price in terms of money and bank reserves of central bank money are only a fraction of their nominal value. If bank accounts were simply shares in asset portfolios with variable prices, the value of being first in line to withdraw funds from a bank disappears and, hence, the incentive for a bank run. A rumor that a bank might be financially unsound might still induce its customers to withdraw shares from their bank accounts, but this would simply produce a decline in the value of their shares (Cowen and Kroszner, 1994). Payment systems can still be divised in the money-less economy envisioned by New Monetary economists, but since payments would be exchanges of portfolio shares with variable prices, they would have to be executed on a gross-settlement basis. Thus, if the emergence of a more perfect financial system entails the demise of central bank money as the general medium of transaction, it reduces the importance of systemic risk. Financial regulation to protect consumers against the principal-agent problems from asymmetric information then moves to the forefront.

Technical and institutional developments in recent years have reduced the importance of the risks related to the viability of payment systems (IMF, 1996b). A number of countries have adopted real-time gross-settlement (RTGS) systems in

which settlement is executed continuously and on a gross basis. The European Monetary Union's payment system, TARGET, will be of that type, too. The straight-foward way to eliminate "Herstatt" risk is the introduction of "payment versus payment" (PVP) systems, in which a third party assures that both parties to a transaction have made their payments before the funds owed to them are simultaneously released (IMF, 1996a, 1997). One way to facilitate this is to extend business days in at least one market so that business hours of markets in different time zones overlap. For this purpose, the Federal Reserve Bank of New York started operating the Fedwire system for a full 18 hours a day in 1997. Obviously, however, this approach has limits of practicality. Alternatively, PVP systems can be operated by global clearing banks that bridge the time gaps between business hours, e.g., through a cooperative arrangement among national central banks (Emmons, 1997). A major difficulty with that approach is that it requires close international coordination of regulatory arrangements which we discuss below.

V.2. Regulatory Approaches

The central focus of current regulatory standards is to assure the solvency of financial institutions by maintaining a sufficiently high capitalization. High capitalization insures the creditors against adverse shocks to the value of the institution's portfolio of assets. This is exemplified by the capital-asset ratios laid down in the Basle Accord of 1988. Regulators wish to assure sufficient capitalization by imposing minimum capital asset ratios on banks. To take into account the different risk properties of different bank assets, regulators define fixed weights for different types of assets and different classes of bank capital (Dewatripont and Tirole, 1994).

The basic problems with this approach are widely discussed in the literature.[31] Regulatory arrangements are incentive contracts between bank managers and regulators. Imposing capital standards - which, if they restrict management behavior,

[31] See Dewatripont and Tirole (1994), and Hartmann (1994, 1997) for reviews of this debate.

have positive opportunity costs - on banks, changes the incentives and constraints under which managers seek to optimize bank portfolios, and this in ways that are not necessarily conducive to achieve the regulators' objectives. Focusing on balance sheet ratios attracts attention away from other important aspects of bank management, such as internal risk controls and management incentives. Capital asset ratios may induce banks to choose a higher share of risky assets in their portfolios. While portfolio theory suggests that theoretically correct risk-weights for different assets can be found; these weights would vary with changing market conditions. More importantly, incoherent risk weights, i.e., weights that are different from the theoretically correct ones, create incentives that result in an increase rather than a mitigation of systemic risk. Similarly, minimum capital asset ratios must be distinguished from optimum capital asset ratios. Minimum ratios, while easily verifyable, should only be used as a first-line tool to monitor bank performance. In a more perfect, yet more complex financial environment, these considerations gain increasing weight, implying that alternative regulatory approaches should move to the forefront (Goodhart, 1996a).

Recent experience with bank failures, including large international banks, suggests that weaknesses in the management procedures and risk controls of a bank are more important factors behind failures than non-compliance with balance sheet ratios (Goodhart et al., 1997). Specifically, Goodhart (1996b) explains how misguided pay schemes and bonus arrangements for bank managers can induce excessively risky management behavior. The Group of 30 reports survey results among bank managers that indicate inadequate management procedure, failure of internal controls and actions of rogue employees as the three most likely causes of bank failure. This suggests that regulation should focus more on management practices and internal risk controls (GAO, 1994). In line with this, the Group of 30 (1993) report put forth a set of management standards as a guide for good practice. In the US, the Federal Reserve System and the Office of the Comptroller of the Currency have issued guidelines for bank examinors incorporating some of these recommendations. Key ideas are to ensure that derivatives activities are (1) consistent with the bank's overall risk

management philosophy and strategy, (2) conducted in a safe and sound manner, (3) overseen by an independent risk-management group with clear authorities (GAO, 1994).

Turning this insight to mean that regulators should draw up requirements for formal management procedures, rules, and organizational structures would miss the point. Such formalities can easily be implemented, but rather than their mere existence what matters is that the spirit of the intended procedures is being followed. This is much harder for regulators to verify (Goodhart, 1996a).

A basic problem with this is that different institutions have different corporate cultures of risk management and different comparative advantages. Turning away from simple balance sheet ratios therefore must imply a sufficient degree of flexibility of the regulatory arrangement to allow for specialization and competition. An important aspect of this is that institutions proving themselves to be equipped with better risk management techniques should be subject to lower capital requirements to honor their efforts for improved management. Two proposals have emerged to facilitate that. The first, incorporated in the proposed amendment to the Basle Accord (Hartmann, 1997), requires banks to choose a particular model of market risk management from a set of allowable options approved by the supervisory authority. Using the model and historical or simulated data to evaluate the riskiness of its portfolio regularly, banks can determine the capital requirement needed to assure a sufficiently high confidence level of achieving a minimum level of return over a given holding period. This eliminates the need to define fixed asset weights as in the standard approach and the related incentive problems. However, the approach still demands very complex choices regarding the minimum level of return, the relevant holding period, the parameters of stress-testing models and the like. Furthermore, it demands very specialized expertise from the regulators and, where this is absent, the requirement of official approaval may hamper the development of new and better risk management models.

The second proposal, developed at the Federal Reserve Board, relies on precommitment to standards on the outcome of bank management decisions rather than regulating management tools (Hartmann, 1997; Goodhart et al., 1997). Under this approach, banks precommit to maximum cumulative trading losses over a certain time horizon and are obliged to hold enough capital to cover those maximum losses. Violation of the loss maximum are then subject to financial penalties. The advantage of this approach is that it leaves the choice of risk management techniques entirely to the financial institutions and, hence, frees the regulators from the burden of verifying compliance with the approved techniques. The proposal also allows institutions to choose from a broader range of models and techniques and, therefore, promotes competition. One difficulty with the approach is that the threat of financial sanctions may not be credible, if the fines are large enough to push an already troubled financial institution over the brink of insolvency, and may not be effective, if the fines are small or their payment can be postponed. A related difficulty is that the proposal might lead to fines imposed on all financial institutions in times of a general market disruption.

V.3. Institutional Arrangements

At the national level, division of regulatory responsabilities among industry-specific agencies is obviously inefficient, when the borders between these agencies become increasingly blurred. On the one hand, it creates competitive distortions if the same business activity is regulated in different ways under different regulatory competencies. On the other hand, getting a complete picture of the risk exposure of a financial institution requires insight into the potential for spillovers from one functional branch of the institution to another. Subjecting, say, the insurance brach of a financial conglomerate to one regulatory body and the banking branch to another implies that both regulators may miss important information about the true riskiness of the branch they are responsible for. To avoid such inefficiencies calls for a comprehensive regulatory approach and for equal regulatory treatment of the same activities (Padoa-Schioppa, 1995). The obvious solution would be the creation of a single regulatory

body with authority over all financial institutions, and the allocation of supervisory functions at the level of the consolidated conglomerate rather than its branches. The recent proposals for unified regulatory authorities in Britain (Securities and Investment Board, SIB) and Korea (Financial Supervisory Board) reflect those principles (OECD, 1998; SIB, 1997).

There are, however, a number of difficulties with this. In practice, the appropriate domain of a unified financial regulator may be difficult to define in view of the fact that financial and non-financial firms are often closely intertwined and that applying strictly the principle of equal regulation for the same activity would call for a consolidation also of the regulators of financial institutions and those of financial markets (Padoa-Schioppa, 1995). A unified regulatory super-authority may be regarded as an institution too powerful and, therefore, not subject itself to sufficient accountability. Abuse of regulatory power and internal administrative inefficiency would easily replace the inefficiency of the current, fragmented setup, with little hope for better outcomes. A second problem is that a unified authority may end up using inappropriate regulatory tools to solve specific problems. For example, an authority administering both a lender-of-last resort function and overseeing risk management controls may be drawn into using the former too frequently to save troubled financial institutions, both because it would develop a more friendly view of the management problems facing a bank than a lender-of-last-resort concerned entirely with systemic issues, and because it may want to cover up failures of its own oversight functions.

A related problem with a unified authority is that it suppresses competition among regulatory agencies. Where several agencies work side by side, institutional competition can work and create incentives for each agency to work efficiently. With regard to institutional competition on an international level, Herring and Litan (1995), therefore, argue that given the minimum standards in place, individual countries should be left with sufficient discretion over additional standards for other types of risk not covered by international standards like the Basle Accord. While this would certainly not provide a level playing field, it would facilitate regulatory competition and

the discovery of superior mechanisms. Institutional competition also serves as a safeguard against regulatory capture, as an agency developing too cosy relations with institutions it is supposed to control would face criticism from other agencies. A unified regulatory authority would be more strongly exposed to regulatory capture.

Thus, there a good reasons also to refrain from full consolidation of regulatory authorities. One way to strike a balance between consolidation and division of authorities is to define the borders of regulatory domains according to functional responsibilities rather than industry structures (Goodhart, 1996a). As we discuss above in more detail, financial regulation can be functionally separated into consumer protection and prevention of systemic risk, and the latter into financial contagion and payment system risk.

V.4. International Coordination

In an increasingly interdependent international environment, financial regulation raises new difficulties. International ripple effects of national financial toubles have raised the awareness of the necessity to coordinate regulatory activities (e.g., GAO 1994, Group of 30, 1997). But given the diversity of national regulatory practices, little if any progress has been made in this direction beyond the Basle Accord. The most efficient solution would, in theory, be the set-up of a global regulatory authority internalizing all spill-overs between national financial systems. But while all regulation must, ultimately, be based on national legislation, the coordination of national policies is the best achievable solution.

International coordination of regulatory activities faces two basic problems. The first starts with recognizing that regulation imposes costs on the regulated institution. Differences in regulatory regimes are, therefore, the basis for competitive advantages and disadvantages in international markets. Thus, in a system of open financial markets, governments have an incentive to reduce regulatory burdens on their own

industries to strengthen their competitiveness. This makes credible commitments to a common set of rules and standards difficult.

Second, the administration of regulatory tools such as deposit insurance and lender-of-last-resort functions entails potentially large expenditures of tax money to the creditors of financial institutions. In view of this, governments have a bigger incentive to protect domestic depositors against the risk of bank failure than foreign depositors. Since a transfer of tax revenues to foreigners is not politically attractive, governments can be expected to be reluctant to rescue foreign bank depositors and delay payments or refrain from honoring their obligations altogether if the deposit losses are large. The failure of the Italian Banco Ambrosiano SpA that was controlled by a Luxembourg holding company illustrates the point. When the failure of the holding company brought down the Italian bank in 1983, creditors of Banco Ambrosiano were treated more favorably than creditors of the holding company (Herring and Litan, 1995). Furthermore, governments do have an incentive to offer lender-of-last-resort protection to foreign banks operating in their countries, since a run on or the illiquidity of a foreign bank operating in the domestic market may spill over to the domestic banking sector. Goodhart and Schoenmaker's (1993) survey of bank failures supports that point by illustrating governments' interest in rescuing foreign-owned banks operating in their domestic markets. However, governments are unlikely to care much about the ripples financially troubled, domestic banks may cause in foreign markets, as illustrated by the Herstatt case (von Hagen, 1992). By implication, governments will be reluctant to stand by as providers of lender-of-last-resort functions to domestic banks operating mainly in foreign economies. This, in turn, means that the incentive to enforce domestic regulation on banks operating abroad to reduce the risk exposure of foreign lender-of-last-resort providers is weak, since the benefit of the enforcement falls on the foreign government.

These basic difficulties put a narrow limit on the scope of international cooperation, which in practice becomes reduced to a case-by-case approach to joint actions. One implication is that international coordination entails too many resource-

costly rescue operations when financial institutions or systems come under stress, and too little preventive action.

Realizing the narrow scope for international coordination, the Group of 30 (1997) stresses the potential for cooperative arrangements among international financial institutions. In a cobweb of international, interdenpendent financial relations, each participating institution has an interest in understanding how its partners-competitors manage their business as a condition to better understanding and managing its own risk exposure. The Group of 30 thus argues that the “core” institutions of the global financial markets should subject their operations to an expanded review by a single, independent, external auditor, or agree on more consistent and meaningful disclosure of financial and risk information, and cooperate with national regulators to improve their monitoring capabilities of financial institutions and their international activities. The relatively large degree of concentration of global business acitivities on a small number of “core” institutions should facilitate such an industry arrangement. Interestingly, the very process that undermines industry arrangements at the national level would, in this view, promote an industry arrangement at the global level. Private sector financial institutions have already responded to outside pressures to publish additional information on their risk-taking activities. A number of banks voluntarily disclosed more than legally required. Thus, there is a tendency towards regulatory mechanisms that are relying on self-regulation and reinforcement of market discipline (IMF, 1997). The BIS (1997) reports that disclosure practices improved during 1996, particulary with respect to value-at-risk data. While industry arrangements like this are certainly desirable, one may doubt that they would go much beyond rules for a more standardized disclosure of financial information in practice.

Another example for market-based regulation and supervision as well as for the limitations of this approach is the emergence of structured derivative product companies (SDPC). As discussed above, these specialized OTC derivatives subsidiaries are constructed in a way sufficient to gain a triple-A credit rating. Rating

agencies, therefore, are used to assess counterparty credit-risk in the derivatives markets and do hereby, in a way, serve as a market-based device for financial market supervision. Events like the recent Asian crisis, however, which was not reflected in any credit rating before the crisis actually occured, point to the weaknesses and limitations of such an approach.

In the end, then, coordination among governments in the area of financial regulation will remain quite limited. In a world of national governments and national legislation, this is the price paid for a more global and more perfect financial system. The recent financial market crises in Mexico and Asia, however, suggest, that more stringent application of regulatory rules already in place at the national level could have prevented much if not all of the damage. In fact, bad government behavior, such as nepotism in staffing the management of financial institutions, deliberately lax supervision of financial institutions to avoid taking unpopular action, and the extension of implicit guarantees to financial institutions as part of ambitious industrial and development policies, seems to be a large factor behind the financial crises in Asia. Peer pressure on governments to enforce existing rules effectively, combined with advice and incentives to do so, may, after all, be more promising than efforts to coordinate the activities of national regulators.

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