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INTERNATIONAL MONEY MARKETS: EUROCURRENCIES

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Abstract
Eurocurrencies are international markets for short-term wholesale bank deposits and loans. They emerged in Western Europe in the late 1950s and rapidly reached a global scale. A Eurocurrency is a form of bank money: an unsecured short-term bank debt denominated in a currency (by instance, US dollars) but issued by banks operating offshore, in a geographical location or a legal space situated outside of the jurisdiction of the national authorities presiding over that currency (by instance, the Federal Reserve). In Eurocurrency markets, banks intermediate mainly between foreign residents. They borrow funds by "accepting" foreign currency deposits and lend foreign currency-denominated funds by "placing" deposits with other banks, by granting short-term loans or investing in other liquid assets. Historically, Eurodollars accounted for the largest share of Eurocurrencies, although other international currencies (Deutsche Marks, Japanese Yens and especially Euros since 1999) played an important role. Eurocurrency markets were a manifestation of financial integration and interdependence in a globalizing economy and performed critical functions in the distribution and creation of international liquidity. At the same time, their fast growth was a recurrent source of concerns for central bankers and policymakers due to their implications for macroeconomic policies and financial stability. This chapter analyzes different aspects of the historical development of Eurocurrency markets and their role in the international monetary and financial system. The first part discusses theoretical interpretations, presents estimates of markets' size, describes their structure and explains the determinants of their growth. The second part analyzes the spread between Eurodollar rates and other US money market rates, the role of arbitrage, the evolution of risk factors and the causes of historical episodes of stress and contagion in the interbank market. The last part discusses political economy issues, such as the role of governments and market forces in the emergence of Eurodollars in the 1950s and the failed attempts to impose multilateral controls on Eurocurrency markets in the 1970s.

Keywords: international banking, wholesale banking, money markets, international liquidity, offshore finance, liability management, interest arbitrage

Contents

Introduction

Eurocurrencies are a form of bank money: an unsecured short-term bank debt denominated in a currency (by instance, US dollars) but issued by banks operating offshore – that is, in a geographical location or a legal space situated outside of the jurisdiction of the national authorities presiding over that currency (by instance, the Federal Reserve) – in order to fund short-term loans. Eurodollars were the first and more prominent example of Eurocurrency. The term was coined in the late 1950s, when banks in London and other European financial centers started bidding for dollar liquid balances in the hands of foreign wealth owners (other commercial banks, central banks, official institutions, commercial companies) and used them to fund short-term loans to other foreign banks and non-financial companies. At the same time, smaller offshore markets for time deposits denominated in other international currencies emerged; the most relevant examples were the EuroDeutscheMark, EuroSwissFranc and Euroyen markets in London, and the Eurosterling market in Paris. In the 1970s, as banks operating in extra-European financial centers expanded their Eurocurrency (mostly Eurodollar) activities, the market acquired a global dimension, turning into "one of the fastest-growing as well as the most vital and important capitalist institutions" of the 20th century (Stigum and Crescenzi 2007, p. 209). By the mid 1980s, London accounted for 25 per cent of global Eurocurrency assets, followed by Tokyo (10 per cent), Paris (7 per cent) and offshore financial centers in the Caribbean (Bahamas, Cayman Islands) and the Far East (Singapore and Hong Kong), with a share between 4 and 6 per cent each (Lewis and Davis 1987, pp. 230-231). Since then, the prefix "Euro" survived more as a remnant of the origins of the market, than as a characterization of its geographical scope. Given the historical importance of Eurodollars, their impact on global monetary and credit conditions, and the extensive literature on their origins, development and implications, this chapter will oftrn make special reference to them.

As a financial product, a Eurocurrency is simply a time deposits (or a certificate of deposit, that is, a negotiable receipt of a deposit) yielding a fixed rate and with maturities ranging from overnight to six months. Time deposits are a form of near (or quasi) money: short-term stores of value that cannot be used directly as a medium of exchange to settle debts but can be very easily converted into cash. In spite of their simplicity, Eurocurrencies represented a financial innovation with enormous consequences. Their "essential feature" (Niehans 1984) was the separation between the location of the issuing bank and the currency in which transactions were denominated. This resulted in the unbundling of currency risk from political risk, and more generally in the ability to circumvent regulations imposed by national authorities (Lewis and Davis

1987, pp. 217-219 and 269-270). By instance, the most important advantage of booking dollar deposits offshore was to avoid interest rate ceilings, reserve requirements, and deposit insurance fees imposed by US authorities on deposits held with domestic banks. By significantly reducing the costs of bank intermediation, this allowed depositors to yield higher interest rates and borrowers to have access to cheaper short-term loans.

Eurodollars and the other Eurocurrencies were an innovative form of wholesale banking (i.e. transactions with large customers – including other banks – involving large sums), which led to the development of an international money market with a specific microstructure and autonomous sets of interest rates. Since the 1960s, therefore, Eurocurrency markets played a critical role as a channel for the redistribution of international liquidity. Banks' borrowing and lending in the Eurocurrency wholesale market was also conducive to a major structural change in banking business: the marketization of liabilities, pioneered by US commercial banks both domestically and internationally in the 1960s, and subsequently adopted by banks in both industrialized and developing economies. Liability management – the active management of short-term debt instruments with different rates, maturities and currency of denomination to match the size and characteristics of asset portfolios – created unprecedented scope for leverage, thus enhancing the fast expansion of banks' balance sheets. However, it also made banks much more vulnerable to currency, liquidity, interest rate and counterparty risk, and facilitated the international transmission of financial shocks (Kane 1979; Lewis and Davis 1987, pp. 81-128; Battilossi 2010).

By drawing on an extensive economic and historical literature, this chapter analyzes different aspects of the historical development of Eurocurrencies and their role in the international monetary and financial system between the late 1950s and the Great Financial Crisis of 2007-09. The first section (Theory) discusses alternative interpretations based on different approaches to monetary economics. The second section (Scale) presents estimates of the size of Eurodollar and Eurocurrency markets in the long run. The third section (Structure) describes the microstructure of the market and its interbank segment. The fourth section (Growth) discusses the different phases of expansion of the market and their determinants. The fifth section (Arbitrage) analyzes the relationships between rates in the Eurodollar market and other US money markets. The sixth section (Risk) explores how risk in the Eurocurrency markets evolved over time and analyses historical episodes of severe stress in the interbank market. The seventh section (Political economy) focuses on the attitude of British authorities in the emergence of Eurodollars and the international debates of the 1970s on the multilateral regulation of Eurocurrencies. A brief summary and final considerations are offered in the last section.

Theory

Multiplier vs portfolio

The business of "accepting" (borrowing) and "placing" (lending) Eurodollars emerged in London in the second half of the 1950s as a consequence of a set of favourable circumstances. Early accounts (Einzig 1960 and 1964, Holmes and Klopstock 1960, Altman 1961 and 1963) focused mainly on supply-side factors, such as the availability of a critical mass of dollar deposits booked with European banks. Some of them were related to Cold War political tensions. In case of national emergencies, the Trading with the Enemy Act of 1917 and its subsequent amendments allowed US presidents to "freeze" or seize assets held in the US by governments and residents of a foreign country. Therefore, by holding dollar balances with banks in Europe, the Soviet Union and other communist regimes limited their exposure to country risk – that is, the risk of seeing their dollar reserves affected by sanctions such as those imposed by the US on Communist China and North Korea after the outbreak of the Korean War in 1950 (Coates 2018). Multinationals companies, central banks in non-industrial countries and international institutions, such as the Bank for International Settlements (BIS) were also considered as important sources of dollars for European banks. In fact recent research confirmed that the BIS placed dollar deposits with banks in the City in connection with its swap operations with the Bank of England in support of the Pound (Yago 2013, pp. 160-163). Specific demand-side shocks were another factor emphasized in the early literature, namely, the restrictions imposed by British authorities during the currency crisis of 1957 on the use of sterling-denominated trade credit for non-sterling area trade, which induced British banks to offer dollar-denominated facilities funded by dollar term deposits. More recent research cast doubts on whether these elements provide a sufficient explanation for the emergence of the market, and points to other factors. They include: the opening of opportunities for international interest arbitrage between money markets in New York and London by the mid 1950s thanks to the emergence of interest rate differentials; the gradual return of currencies to external current account convertibility, culminated in 1958; the presence in London of the largest foreign exchange market in Europe and the reopening of forward markets for hedging exchange risk; the reactivation of traditional bank correspondent connections between New York, London and continental financial centers; a cartelized banking system and extensive domestic and external regulations that encouraged British banks to pursue innovative lines of business; and the acquiescent attitude of British monetary and supervisory authorities,

which allowed dollar intermediation to flourish unregulated (Schenk 1998 and 2002; Burn 1999 and 2006, pp. 99-134; Battilossi 2000, 2002a and 2002b).

The fact that banks freely competed for deposits in foreign currencies was at odds with a financial environment in the US, UK and Continental Europe still strongly influenced by the legacy of interwar and war finance, with extensive exchange and capital controls, pervasive regulations of interest rates and binding constraints on the size and composition of banks' portfolios. Initially, analysts and practitioners struggled to grasp how the market worked and what implications it had for the international monetary system and the conduct of national economic policies. The magnitude of this "surprise effect" was such that, more than twenty years after the first transactions had taken place in London, Eurocurrencies "continue[d] to appear to be an enigma even to those who operate in them continually" (Dufey and Giddy 1978, p. 2). In fact, the exponential growth of the market generated lively debates among economists and raised serious concerns among policymakers about its possible consequences for exchange rate stability and the international propagation of inflation. An early source of controversy was its relationship with the US balance of payments deficit that emerged at the end of the 1950s and the fast growth of foreign dollar liabilities, both private and official, which in 1960 led Robert Triffin to formulate his "dilemma" (Eichengreen 2006, p. 116-117, and 2011, pp. 50-51; Bordo and McCauley 2017). Some pinned the balance-of-payments hypothesis on the fact that dollar reserves of foreign central banks were an important source of Eurodollar deposits, either directly or indirectly (Klopstock 1970). Others argued that foreign dollar holdings were not a sufficient condition for the growth of the market, and that Eurodollars were essentially a monetary phenomenon (Friedman 1971).

Although most subsequent economic analysises underwrote Friedman's view, economists disagreed on its theoretical underpinnings. The main debate opposed supporters of a "multiplier" approach to those of a "portfolio" approach. This divide reflected a more fundamental controversy between the "fractional reserve theory" and the "financial intermediation theory" of banking that emerged in monetary economics in the 1960s and 70s (Werner 2016). The key intuition of the multiplier approach, as formulated by Friedman (1971) and formalized by Fratianni and Savona (1972), was that the Eurodollar system operated similarly to a domestic banking system of fractional reserves. As a consequence, the expansion of the market was understood as the consequence of a credit or deposit multiplier mechanism, through which a portion of the liquid funds lent by banks to non-bank borrowers was redeposited with other banks in the system, thus generating an endogenous process of credit creation. Critics of the multiplier approach

emphasized its inconsistency with some of the observed characteristics of the system – especially the large and increasing role of interbank transactions and its nature of an open system connecting different national financial systems – and the failure of empirical studies to provide robust estimates of the base and magnitude of the multiplier (Machlup 1970; Masera 1972; Crockett 1976; Niheans and Hewson 1976; Dufey and Giddy 1978, pp. 135-154; Mayer 1979; Johnston 1981; De Cecco 1987).

The alternative "portfolio approach" was based on the financial intermediation theory proposed by Gurley, Shaw and Tobin, among others, in which banks and non-bank financial intermediaries compete for loanable funds with securities markets by issuing liabilities and purchasing claims from borrowers. In this view, the portfolio preferences of wealth owners and the characteristics (return, riskiness, liquidity) of the liabilities issued by banks determine their ability to expand their balance sheets. The portfolio approach adequately captured two essential characteristics of Eurodollars: the "near money" nature of time deposits (not means of payments, but closed substitutes for money held in anticipation of payments); and the fact that they were imperfect substitutes of domestic deposits and money market assets. The conclusion was that its growth was driven by the ability of banks to compete with other intermediaries and markets in attracting a larger share of the fast growing global market for dollar-denominated short-term credit – "a growing slice of an expanding pie" (Dufey and Giddy 1978, p. 107-130; Niehans 1982, pp. 17-19). As banks outside the US competed with banks located in the US for the intermediation of dollar-denominated liquid funds owned by wealth owners worldwide (Goodfriend 1981), Eurodollars were a substitute for domestic deposits and worked as a "parallel market" deeply integrated with national money markets in the US and elsewhere. It offered alternative opportunities for the placement of short-term funds both to US investors for transactions in domestic currency (thus competing with the New York money market) and to non-US investors for transactions in foreign currencies (thus competing with other national money markets, by instance, the London market) (Johnston 1983, p. 76).

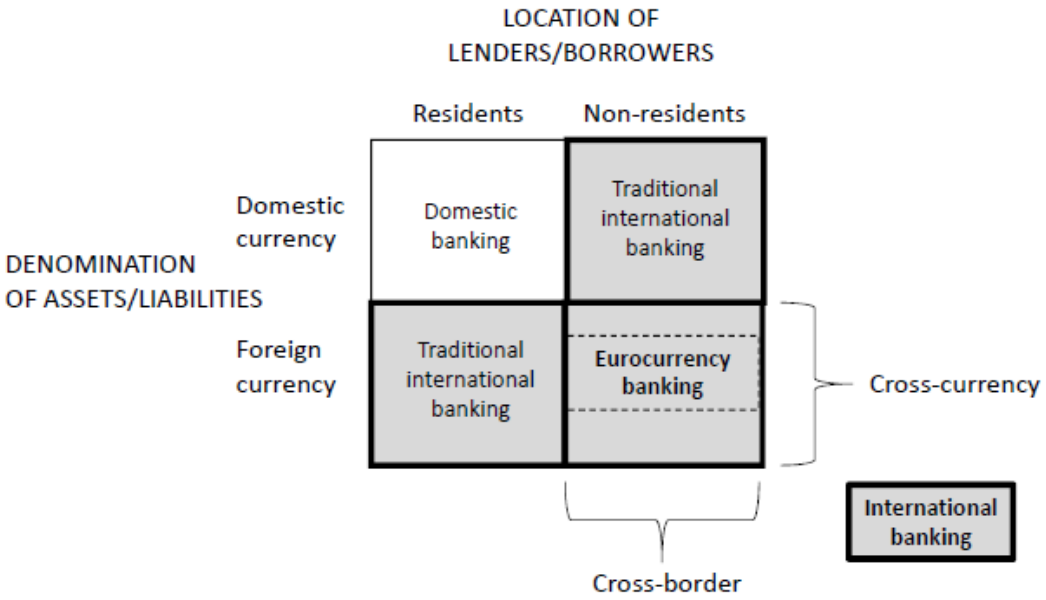
International and Eurocurrency banking

Since the 1960s, when statistics about Eurodollars and other Eurocurrencies began to be compiled by central banks, Eurocurrency banking has been conventionally identified on the base of two elements: the currency of denomination (domestic vs foreign) of banks' assets and liabilities, and the residence of banks' counterparties (national vs foreign). More precisely, it was defined as both cross-currency and cross-border intermediation (short-term bank

assets and liabilities denominated in foreign currencies vis-à-vis foreign residents). This convention, however, reflected more the existing regulatory and supervisory procedures of the time, which differentiated between business in domestic and external currency, or with resident and non-resident customers, than a conceptual difference between Eurocurrency and other types of international banking. As Bryant (1987, p. 24) made clear, "from an analytical perspective, there is nothing logically compelling about the conventional definition […] The establishment of asset and liability relations with foreigners and the denomination of obligations in external currencies … is a pervasive feature of life in interdependent national economies. There is no good reason for isolating one aspect of international banking and analysing it independently of the rest of the nexus of financial relations linking nations together".

In fact, banks continued to engage in "traditional" foreign banking activities (Lewis and Davis 1987, pp. 220-221). These included short-term lending to non-resident customers in domestic currency (cross-border) or to resident customers in foreign currency (cross-currency) in order to finance international trade or the raising of capital funds. It also entailed placing interest-bearing deposits denominated in foreign currency with foreign banks– e.g. a British bank keeping a Dollar balance with a US correspondent bank (cross-border and cross-currency: in the traditional jargon of correspondent banking, a nostri claim) – to facilitate their customers' access to foreign exchange and international trade. In many cases, Eurocurrency banking originated from, and were closely linked to traditional international banking, mainly channelled through foreign exchange markets (Mayer 1985). Some banks could possibly enter Eurodollar banking in order to use more efficiently the dollar liquidity owned in the form of traditional balances held with US correspondents (Lewis and Davis 1987, p. 284). Traditional international banking expanded rapidly in the post-war period and continued to provide the bulk of means for international payments, including short-term credits for trade financing and hedging forward against exchange risk (McKinnon 1977, pp. 4-5). In the early 1980s, the size of claims on foreign residents in domestic currency and claims on domestic residents in foreign currencies was respectively 57 and 42 per cent of the total claims on foreign residents in foreign currencies (the conventional measure of Eurocurrency banking) in OECD countries. Taken together, assets with some international charcateristics (cross-border, cross-currency, and both) represented one quarter of the gross balance sheets of banks in industrialized countries (including domestic assets); this share varied from 72 per cent in the UK to 8 and 11 per cent in Germany and Japan respectively (Bryant 1987, p. 26-27).

Figure 1
Eurocurrency and International Banking



Scale

Measures

The main source of quantitative information on Eurodollars and other Eurocurrencies is the Bank for International Settlements, which in 1964 began to publish data on international banking activities (i.e. cross-border and cross-currency short-term assets and liabilities) reported to central banks by resident banks. Countries reporting to BIS were initially limited to G-10 members but the geographical coverage was gradually extended (see Table 1). In 2015 BIS locational banking statistics covered banking offices of domestic and foreign institutions located in 44 countries. Data include the currency composition of resident banks' balance sheets, as well as a geographical breakdown of their counterparties (banks, non-banks, official institutions) in more than 200 countries (BIS 2015).

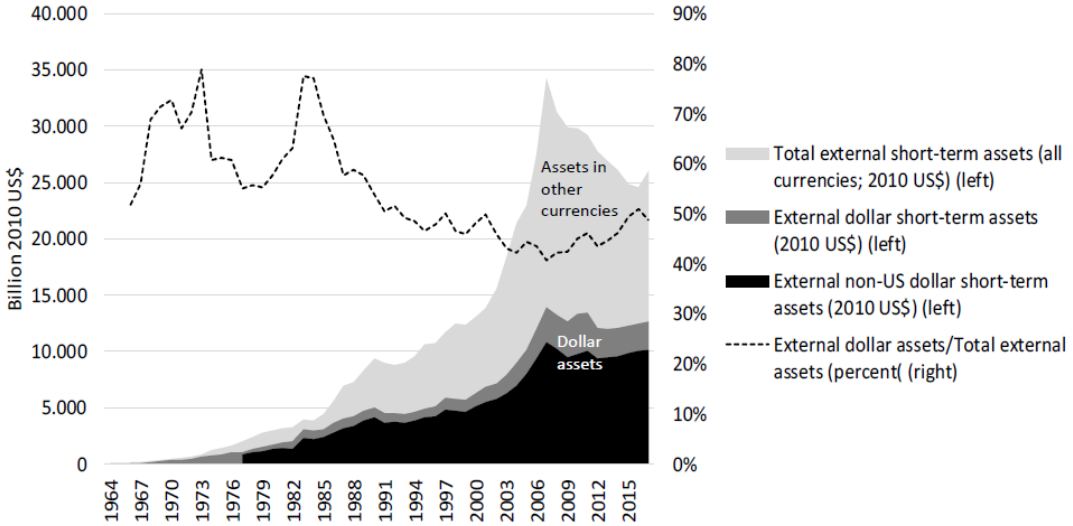
Table 1
Chronology of BIS reporting countries

1964: Belgium-Luxemburg, France, Italy, Netherlands, Sweden, Switzerland, UK, West Germany
1968: Canada, Japan
1970: USA (including selected US banks' branches in offshore centres in the Caribbean and Far East),
1977: Austria, Denmark, Ireland
1983: Finland, Spain, Norway; Bahamas, Bahrain, Cayman Islands, Hong Kong, Netherlands Antilles, Singapore.

1997: Australia, Portugal
2000: Turkey
2001: Greece, Guernsey, India, Jersey, Isle of Man
2002: Bermuda, Brazil, Panama, Chile, Taipei
2003: Mexico
2005: South Korea
2006: Macao
2008: Malaysia
2009: Cyprus

BIS data can be used to proxy the scale of the different types of international banking illustrated in Figure 1: cross-border transactions (external positions in domestic currency: e.g. US banks' dollar claims vis-a-vis non-US residents), cross-currency transactions (local positions in foreign currencies: e.g. UK banks' dollar claims vis-à-vis British residents) and Eurodollar/Eurocurrency transactions (external positions in foreign currencies: e.g. UK banks' dollar claims vis-à-vis non-British residents).

Figure 2
External short-term assets in dollars and all currencies, 1964-2018 (real 2010 US$)



NOTE. Total external short-term assets are positions of banks in all BIS reporting countries denominated in all currencies (foreign and domestic) vis-à-vis non-residents. External dollar short-term assets are position of banks in all BIS reporting countries (US included) denominated in US dollars vis-à-vis foreign residents. External non-US dollar assets exclude from the latter the dollar positions vis-à-vis foreign residents of banks located in the US. Source: 1964-1976, BIS Annual Report (printed edition); 1977-2018, BIS Statistical Bullettin (online dataset at www.bis.org/statistics/index.htm). Current US$ series are deflated by using the US GDP deflator. Source: World Bank online data.

Figure 2 shows three different estimates. The first series, External Total Assets, is the real outstanding stock (expressed in 2010 US dollars) of short-term assets of

banks located in all reporting countries vis-à-vis non-resident counterparties and denominated in foreign and domestic currencies. This can be considered as an upper bound for the total size of the global Eurocurrency market, as it includes also external assets denominated in local currencies (part of traditional cross-border banking in the taxonomy of figure 1). The second series, External Dollar Assets, is the real outstanding stock of dollar-denominated short-term assets of banks located in all reporting countries (US included) vis-à-vis non-residents. Again, this does not fit exactly with the conventional definition of Eurodollars, as it includes dollar assets of banks operating in the US vis-à-vis foreign residents (in principle, again, traditional cross-border banking). For this reason, the third series, External Non-US Dollar Assets, is based only on dollar external assets of banks outside the US (which of course includes foreign branches of US-owned banks).

Although the latter measure fits in better with the conventional definition of Eurodollars, there are reasons to prefer the second series (External Dollar Assets) as a more realistic measure of the size of the Eurodollar market. First, before 1983 (when offshore centers began to report directly to the BIS), foreign claims of US banks' branches in offshore centers in the Caribbean area, Central America and the Middle and Far East were reported to the BIS by US authorities. Offshore facilities had been authorized in 1969 by the Federal Reserve in order to give US banks the opportunity to conduct transactions with foreign residents or in foreign currencies without the burden of domestic regulation, supervision and taxation. In some cases, such as Bahamas and the Cayman Islands, offshore branches were simply segregated accounting units ("shell branches") where *entrepôt* business (dollar deposits of, and dollar claims on foreign branches and subsidiaries of US residents, often contracted at head offices in the US) was booked to circumvent domestic restrictions. In other cases, foreign banks had been allowed to establish and operate in special deregulated enclaves, such as the Asian Currency Units in Singapore and the Offshore Banking Units in Bahrain (Cassard 1994). Until the mid-1980s, banking transactions conducted from offshore centers had been growing very rapidly, at an annual compound rate ranging between 30 and 50 per cent. Overall, by 1982 offshore foreign currency assets were estimated to represent approximately one third of world claims on foreigners (Bryant 1987, pp. 134-140). Therefore, dropping data reported from US authorities would exclude the offshore assets of US banks' branches (which were big players in offshore locations), resulting in an underestimation of the size of the Eurodollar market for the period until 1983.

Second, in 1981 the Federal Reserve allowed US banks (and US branches of foreign banks) to operate International Banking Facilities (IBFs), a sort of

onshore-offshore center (Palan 1998, p. 33) that is, a deregulated legal enclave in US territory, under which banks could borrow from and lend to foreign residents without being subject to domestic banking regulation. As a consequence, a large volume of Eurodollar transactions with non-residents which until then banks had booked in the balance sheets of their overseas or offshore branches was shifted back to the US (Key and Terrell 1989). As a matter of fact, IBFs based in New York accounted for approximately 8 per cent of global Eurocurrency claims in the mid 1980s, a share larger than any other individual offshore center (Lewis and Davis 1987, pp. 230-231). Therefore, excluding data reported from US authorities (which include IBFs) would underestimate the size of the Eurodollar market for the period after 1981.

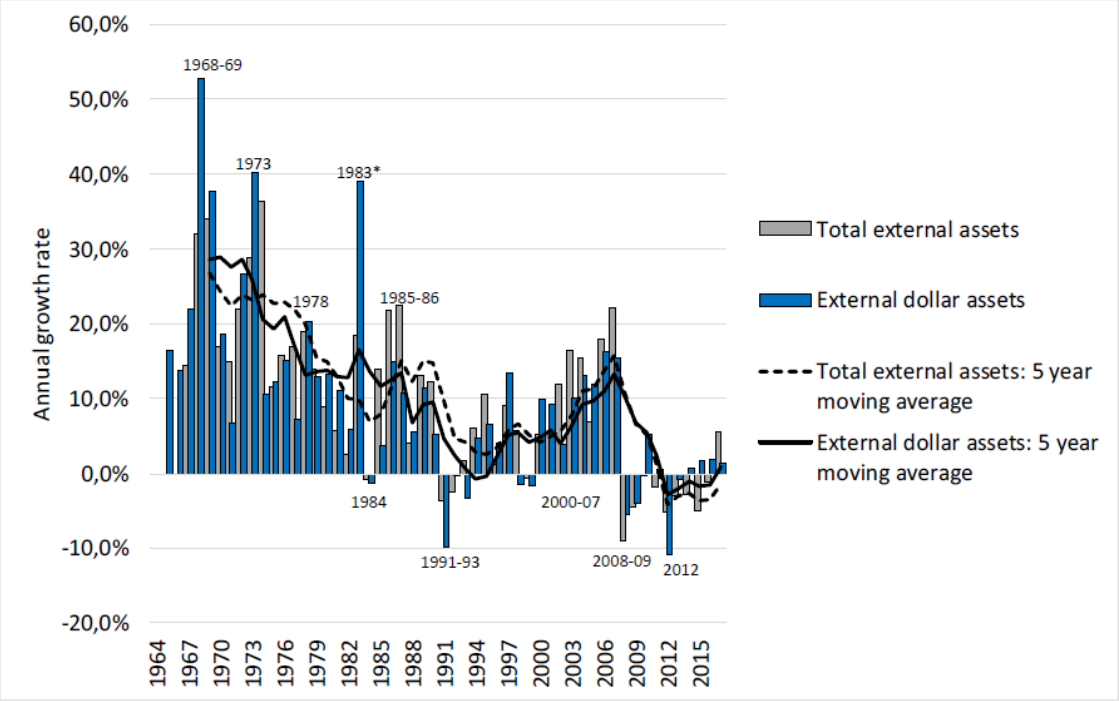
Growth phases

The long-run pattern of growth of the Eurodollar market can be divided into four main stages: a long phase of almost uninterrupted expansion (with a temporary setback between 1982 and 1985), which brought the size of the market to 4 trillion dollars (expressed in real terms as 2010 USD) in 1990; a mild and short-lived reversal in the early 1990s; a new phase of exponential growth between the mid 1990s and 2007, when its size almost tripled in real terms, approaching 11 trillion dollars; a sharp and long-lasting contraction during and after the Great Financial Crisis of 2007-09, when the market failed to recover its pre-crisis level. In turn, other Eurocurrencies (which represented a relatively small share until the early 1980s, when the share of Eurodollars fluctuated between 60 and 80 per cento of the total), took off in the 1980s (as countries such as Germany and Japan liberalized the international use of their currencies) and continued to expand at a faster pace than Eurodollars until the crisis of 2007. This led to a secular contraction of Eurodollars' share in total Eurocurrencies, which fell below 50 per cent between 2000 and 2007 for the first time in history. This of course reflects the impact of the creation of the Euro and the large cross-border activities of banks within the Eurozone.

Figure 3 shows the annual and trend growth of External Total Assets (Eurocurrencies) and External Dollar Assets (Eurodollars). The annual rate at which the two markets expanded experienced a secular decline during the last quarter of the 20th century, falling from 25-30 per cent in the late 1960s to 5 per cent in the late 1990s. The new century reversed this trend, bringing the two markets back to a growth pace comparable to that of the 1970s. The slowing down of Eurocurrencies and Eurodollars in the 1980s is explained by securitization – that is, the emergence of financial innovations that allowed banks and commercial companies to borrow and unbundle different risk factors by issuing new types of short-term liabilities in international money markets. Examples of

securitization included Euronotes, Eurocommercial paper, currency and interest-rate swaps and options, and forward rate agreements (FRAs). In this new context, the role of banks gradually shifted from traditional direct intermediation to services related to the origination, underwriting, and placing of marketable securities, with a contraction of their traditional Eurodollar balance sheets and an expansion of off-balance sheet business (BIS 1986; Bryant 1987, pp. 51-57). However, as we will see in the next section, the new phase of expansion of Eurodollars after the turn of the century was mainly driven by European banks' dollar borrowing from US money market funds to invest in asset-backed securities originated by the shadow banking system in the US (He and McCauley 2012).

Figure 3
Growth of external short-term assets, 1964-2018



1983*: statistical effect as offshore centers enter the group of BIS reporting countries.

NOTE. See figure 2.

Eurocurrencies, globalization and technological innovation

In the Bretton Woods system, the US dollar was the main reserve and intervention currency. This generated a worldwide demand to hold dollar balances with US banks as a means of settling international current and capital account transactions, and to borrow dollars as a medium for deferred payments. The US dollar also emerged quickly as the vehicle currency in foreign exchange

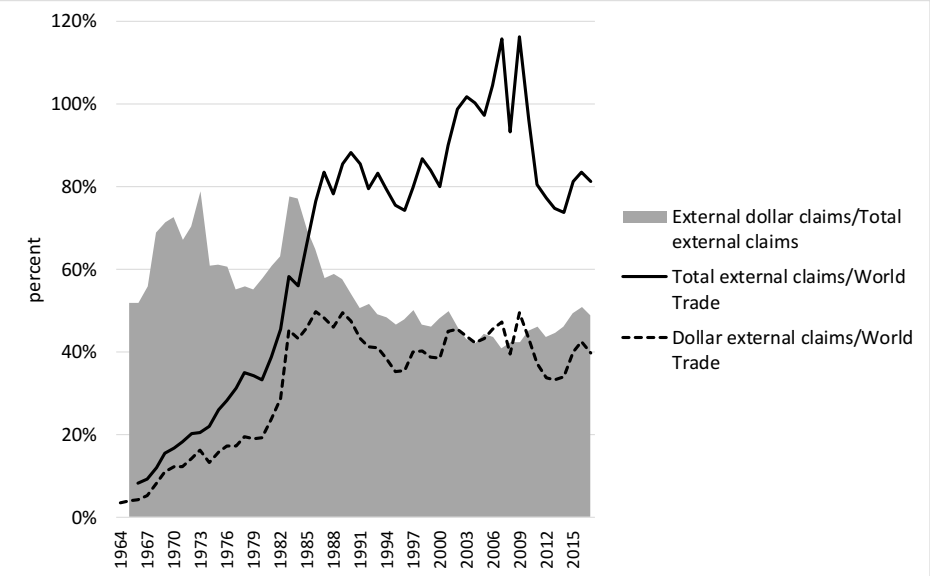
transactions (Lewis and Davis 1987, p. 270). As a matter of fact, the exponential growth of the Eurodollar market in the 1960s coincided chronologically with the period in which Eichengreen et al (2016) detected structural shifts in the determinants of the composition of international reserves. This suggests that Eurodollars may have actively contributed to the dominant role of the dollar as a source of incremental international liquidity in the secod half of the 20th century (He and McCauley 2010; Eichengreen 2012). Therefore, the important (though elusive) question arises to what extent the expansion of Eurodollars and Eurocurrencies in general simply followed the expansion of international trade and the multinationalization of companies, or was instead also an autonomous process driven by othe factors. The latter include technological innovations in the transmission and processing of information, the execution of transactions and payments, and the transfer of funds, which increased banks' sensitivity to cross-border and cross-currency arbitrage and investment opportunitie. Cross-country asymmetries in regulation, supervision and taxation of financial intermediaries were a third crucial factor that gave private-sector agents strong incentives to relocate geographically part of their activities in order to benefit from less constraining environments – a form of "regulatory arbitrage" (Bryant 1987, pp. 62-73) extensively discussed in the next section.

Figures 3 shows the historical evolution of the ratio of total external and dollar assets (including interbank positions) to global trade. Although in principle only claims vis-a-vis non-bank end-users should be directly associated with the financing of trade, part of interbank positions also might be driven by trade transactions. In fact, by purchasing a large volume of dollars in the spot market and investing them in Eurodollar interbank deposits with different maturities to match the schedule of future payments, traders would significantly reduce transaction costs (Swoboda 1968; Makin 1972; Johnston 1983, pp. 76-81). Data show that until the mid 1980s and then again in the period that preceded the Great Crisis, the growth of total external short-term claims outpaced the growth of international trade, increasing from 20 to 80 per cent of world merchandise trade between 1970 and 1985, and approaching 120 per cent in 2007. This suggests that, at least in these two periods, cross-border flows of short-term banking funds responded also to factors non directly related to the globalization of trade and production. Since the late 1980s, however, its share remained stable, fluctuating between 40 and 50 per cent of global trade. Interestingly the dollar component of external claims followed a different pattern, as its ratio to international trade reached a peak around 40 per cent in the very early 1980s and then hovered around this level for the rest of period. This suggests that non-trade factors – by instance, portfolio diversification – were especially relevant for cross-border flows in other

international currencies, such as the Japanese Yen in the 1980s and the Euro after 2000.

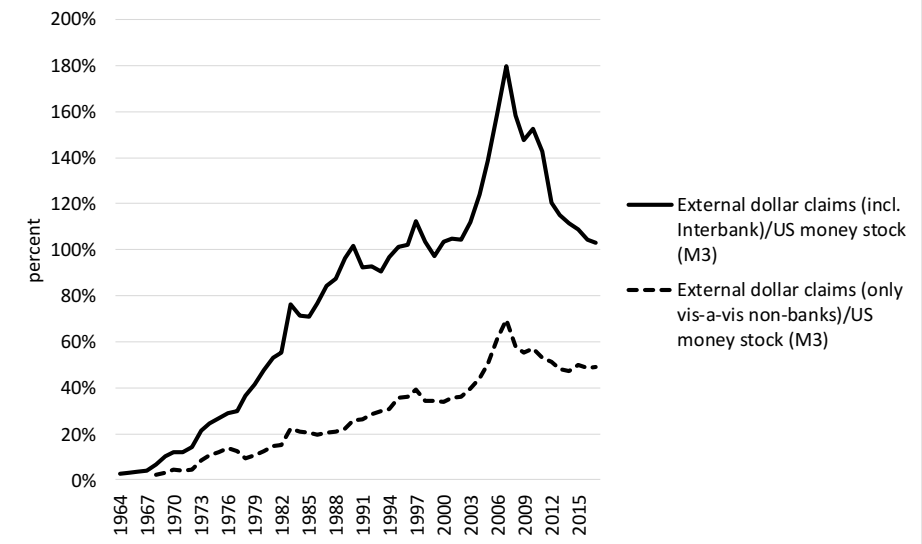
Finally, at least in the case of Eurodollars, the growth of Eurocurrencies was not driven by the expansion of domestic bank money. As shown in Figure 4, between the late 1960s and the early 1980s external dollar-denominated short-term assets escalated from 7 to 48 per cent (including interbank positions) and from 2 to 12 per cent (considering only positions vis-à-vis non-banks) of the US money stock, measured on the base of the monetary aggregate M3. These figures went up to 100 and 35 percent by the end of the 20th century, and to 180 and 70 percent in the run-up to the crisis of 2007-09. This is just one aspect of the "excess elasticity" (insufficient constraints on the availability of external finance and the creation of credit) of a deregulated international monetary and financial system, which systematically favoured the emergence of financial imbalances in response to expansionary monetary policies since the 1990s (Borio and Disyatat 2011).

Figure 3
International banking and world trade



NOTE External dollar claims are short-term dollar-denominated assets of banks from BIS reporting countries (including US) vis-à-vis foreign residents. Total external claims are short-term assets denominated in all currencies (including domestic) of banks from BIS reporting countries vis-à-vis foreign residents. Source: 1964-76, BIS Annual Reports (printed edition); 1977-2018, BIS Statistical Bullettin (online dataset). World Trade is total merchandise exports and imports in current US$. Source: World Bank online dataset.

Figure 4
Eurodollars and US money stock



NOTE External dollar claims are short-term dollar-denominated assets of banks from BIS reporting countries (including US) vis-à-vis foreign residents. Source: 1964-76, BIS Annual Reports (printed edition); 1977-2018, BIS Statistical Bullettin (online dataset). US Money stock is M3. Source: OECD data retrieved from FRED (Federal Reserve Bank of St. Louis).

Structure

Brokers, dealers, tiers

Eurocurrencies are a modern example of international money markets. Their closest historical antecedent was the pre-1914 international money market in London, when the City acted as "the center of world liquidity". In that period, Sterling-denominated bankers' acceptances (bills of exchange endorsed by merchant banks on behalf of foreign borrowers) were not only the key instrument to finance world trade and short-term capital movements – including US international trade (Eichengreen 2011, pp. 14-19) – but also money market assets globally demanded by banks as short-term investment to manage their liquidity and by official institutions (central banks and Treasuries) as a substitute for gold reserves (Flandreau and Jobst 2005; Bignon et al 2012; Flandreau and Ugolini 2013; Accominotti and Ugolini 2019).

A money market works as a clearing mechanism for the surpluses and deficits of funds in an economy, which allows borrowers and lenders to manage liquidity efficiently. Liquidity management (the ability to minimize the holding of idle cash balances in case of liquidity surplus, and access readily available cash to meet payments and other short-term financial obligations in case of liquidity deficit) is an essential function of treasuries and finance departments of both

financial and non-financial organizations. The development of a secondary money market in which short-term debt securities are traded greatly enhances the efficiency of liquidity management. A key role in money markets is plaid by brokers and dealers. Money brokers manage communication networks that allow a smooth flow of information between borrowers and lenders; they act as agents and earn a fee for their service. Money dealers are banks or specialized intermediaries that act as principals and perform the function of market makers by trading on their own account. They bid for surplus liquid funds of wealth-owners by issuing short-term liabilities in the form of indirect securities, such as time deposits and CDs. On the asset side, dealers invest in a portfolio of short-term debt securities issued by economic units with temporary shortages of liquid funds. They make the market by quoting continuously bid and ask prices at which they are prepared to buy or sell, and earn a profit from the spread between borrowing costs and the return on their portfolio.

A large proportion of Eurodollar transactions was linked to foreign exchange transactions, as liquid funds were converted from other currencies into dollars and the exchange risk was covered with forward contracts. In fact, in the early years, most banks in London dealt with Eurodollars and other Eurocurrencies from their foreign exchange dealing rooms (Einzig 1971, p. 138). In a similar fashion, foreign currency brokers (not money market brokers) acted as the main intermediaries. US banks' branches were an exception, as they handled the business from their money market departments since the dollar for them was the domestic currency. The information pooled by brokers was vital in the initial stages of the market, as they allowed banks to save in information and transaction costs, to approach the market on their own terms and to preserve anonymity in the early stage of a dealing. As the market became consolidated, banks built specialized units of Eurodollar and Eurocurrency dealers in order to monitor the market directly, and the intermediary role of brokers was partially replaced by direct dealings between banks. In fact, there were very few banks specialized in Eurodollar and Eurocurrency banking. "Eurobanks" were branches, subsidiaries or specialized departments of domestic banks, and their Eurocurrency book represented a specific compartment of their balance sheets (Lewis and Davis 1987, p. 271).

The market operated on the base of a multi-tier structure, in which tiers reflected differences in creditworthiness and risk assigned to banks. Since the mid 1960s, the top tier was occupied by foreign branches of prime US banks from money centers such as New York and Chicago, who acted as main dealers and market makers. They could always borrow at marginally lower rates, ran large books of Eurodollar deposits and quoted bid and ask rates on a permanent basis. Spreads between tiers (the differential rate at which banks in different tiers could

borrow, with higher rates reflecting the risk premium demanded by depositors) were not constant and tended to become more pronounced during period of liquidity strain. By instance, in 1974 (a year characterized by a number of important banking crises), the market operated on the base of nine tiers, with US banks at the top and Italian and Japanese banks at the bottom (Sarver 1988, pp. 28-30). Tiering also responded to banks' exposure to specific risk; by instance, during the Asian crisis of 1997-98, Japanese banks were heavily penalized and could borrow only at a rate significantly higher than European banks (Stigum and Crescenzi 2007, pp. 849-850).

Transaction technology

Eurocurrency transactions were based on standardized contracts for large fixed amounts, as typical of wholesale banking. In the 1970s deposits of 1 million USD were the norm, but larger transactions (up to 10 million USD) were not unusual, as the market appealed especially to very large depositors in its initial stage. Maturities ranged from overnight to one year, but three-month was the standard and the rate on three-month deposits became the benchmark rate quoted in the market. After 1966 US banks' branches in London introduced in the market Eurodollar certificates of deposits, a negotiable instrument with the same characteristics as the CDs introduced a few years earlier by US commercial banks in the domestic money market. Negotiability allowed holders of Eurodollar CDs to convert easily their investment into cash in an efficient secondary market. This was especially useful in case of unexpected payments or anticipation of adverse movements of the dollar exchange rate – circumstances which could be accommodated only by negotiating option or penalty clauses in a fixed term deposit contract. Eurodollar CDs were mainly issued for smaller amounts than time deposits, mainly in a range between 25,000 and 100,000 USD, with maturities from three months to two years, and with rates at a slight discount compared to equivalent time deposits (Einzig 1971, pp. 155-167; Shawn 1978, pp. 94-113).

Transactions were dealt with by telephone or telex, and the market was essentially a global network of telephones, telexes and monitor screens connecting banks and brokers in different financial centers (Einzig 1971, pp. 136-139; Lewis and Davis 1987, p. 271). Technological development rapidly reduced information barriers and transaction costs, thus enhancing multilateral trading and the development of an almost perfectly efficient market (Agmon and Barnea 1977; Frenkel and Levich, 1975 and 1977). The efficiency of Eurodollar interbank trading was greatly enhanced in the 1970s by the establishment of computerized international network systems of private clearing such as CHIPS (Clearinghouse Interbank Payments System, managed by the New York Clearing House) and

message transmission such as SWIFT (Society for Worldwide Interbank Financial Telecommunications), and new advanced information services offered to interbank traders by Reuters and Telerate (Sarver 1988, pp. 207-221).

Bid-ask spreads on Eurodollar transactions were narrower than in domestic intermediation. For dollar-holding investors and borrowers, US banks and money markets were the natural outlet and source of funds. As a consequence, banks in the Eurodollar market had to offer competitive terms, that is, higher yields on deposits and CDs, and lower rates on loans. This resulted in margins between 0,125 to 0,0625 per cent or less on annual basis for short-term interbank transactions. In spite of very narrow margins, Eurodollar dealings could generate significant profits thanks to the absence of costs from reserve requirements and other regulatory constraints. They also had very low transaction and information costs thanks to modern communication technologies, and low administrative costs thanks to economies of scale (Frenkel and Levich 1975 and 1977; Agmon and Barnea 1977). However, banks in search of more substantial margins engaged systematically in maturity transformation – the practice of borrowing at short maturities and lending at longer maturities, usually to non-bank borrowers – provided that the yield curve was positive. By doing so, they did not limit themselves to liquidity distribution but became increasingly involved in liquidity production. To some extent, the development of the interbank market for Eurodollar deposits can be seen as an institutional mechanism aimed at mitigating the risk generated by maturity transformation, as it allowed banks easy access to short-term funding on a global scale (Lewis and Davis 1987, pp. 108-110).

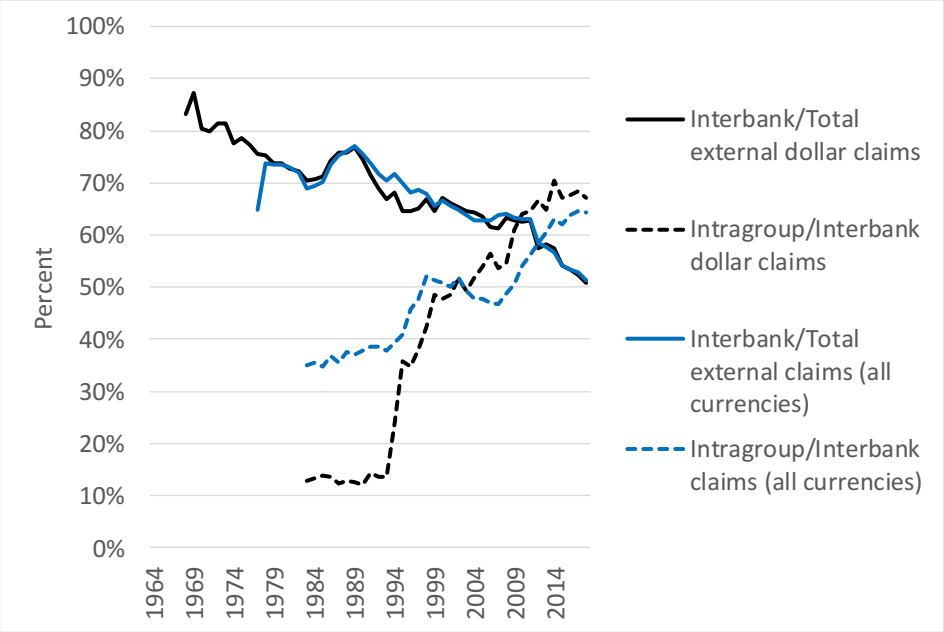
The interbank market

A large share of Eurocurrencies were originated by interbanktransactions, with a long chain of banks located in the same or in different financial centers acting as intermediary between original depositors and final borrowers. Occasionally the practice of interbank borrowing and lending was termed "deposit pyramiding", a term that evoked banking practices of the National Banking Era in the US, when country banks used deposits with New York banks as reserves (Mehrling 2002). The disaggregation of BIS data by counterparties allows a more precise estimate of the size of the interbank and its evolution over time. One should bear in mind, however, that for a long period counterparty information reported only assets and liabilities vis-a-vis non-banks; as a consequence, bank counterparties could be identified only residually, which might overestimate the size of the interbank market. Moreover, some transactions with non-banks (by instance, a forward sale of foreign exchange to a commercial company) did not appear on the banks' balance sheets, but generated interbank transactions as the

bank hedged the risk through lending and borrowing in the interbank market. This also tended to overestimate the size of the interbank market (BIS 1983, pp. 15-22). In turn, since local positions (i.e. vis-à-vis residents) are not included in the estimated Eurocurrency series, they do not take into account within-border interbank dealings (that is, interbank transactions between banks located in the same financial center). This may underestimate the actual size of interbank lending. Finally, until the mid 1970s only European banks reported counterparty information, so that early estimates of the interbank market (for Eurodollars) should be regarded as indicative.

By netting out interbank positions, we can obtain a more precise estimate of the magnitude of credit generated by Eurocurrencies in favour of non-bank users (Mayer 1979; Johnston 1983).

Figure 5
Eurocurrency and Eurodollar interbank markets



NOTE. External dollar claims are short-term dollar-denominated assets of banks from BIS reporting countries (including US) vis-à-vis foreign residents. Interbank claims are obtained by subtracting from this series the positions vis-à-vis non-resident non-banks. Source: 1964-76, BIS Annual Reports (printed edition); 1977-2018, BIS Statistical Bullettin (online dataset). Short-term claims of reporting banks (including US) vis-à-vis non-resident bank counterparties. Source: BIS Annual Reports 1964-1976, BIS Annual Report (printed edition); 1977-2018, BIS Statistical Bullettin (online).

In Figure 5 a downward long-run trend of interbanthe share of interbank positions can be observed, from 80 per cent in the late 1960s to 60 per cent on the eve of the 2007 crisis, with virtually no differences between Eurocurrencies as a whole and Eurodollars. This is consistent with previous estimates for all Eurocurrencies, which suggested that interbank lending accounted for between

60 and 70 per cent of short-term foreign currency assets throughout the 1980s and 1990s (Ellis 1981; Stigum and Crescenzi 2007, p. 827), although figures for "inside area" positions (i.e. those vis-à-vis banks in major financial centres—the "hard core" of the global interbank market) were probably slightly lower (BIS 1983).

The decline in interbank recycling suggests that, as the Eurocurrency market continued to grow, its capacity to provide credit to non-bank borrowers worldwide increased significantly over time. As we will see later, since the late 1990s an increasing share of borrowers from banks in the Eurodollar market were US securities firms and non-bank financial institutions ("shadow banks") raising funds in the repo market. The decline in on-balance sheet interbank positions reflected also the rising popularity of new off-balance sheet instruments – by instance, since the mid 1980s, interbank borrowing on the base of cash Eurodollar deposits was replaced by FRAs (Forward Rate Agreements). However, shrinking interbank transactions were also caused by rising concerns about credit risk and a more general deterioration of the risk environment facing banks, as growing exposure to derivative and other off-balance-sheet instruments and the growing number of participants subject to poor disclosure requirements made it more difficult to ascertain the creditworthiness of bank counterparties. Capital requirements introduced under Basel I also induced banks to reduce interbank exposures that generated low risk-adjusted profits (BIS 1986 and 1992; Lewis and Davis 1987, pp. 115-122).

The interbank market performed four fundamental functions in international liquidity (Johnston 1983, 98-103): liquidity-smoothing, as the existence of large interbank market allowed banks to economise on liquidity buffer (the stock of liquid assets, cash and balances held for precautionary purposes); liquidity transfer, by which market-makers—usually privileged by primary non-bank investors as original recipient of Eurodeposits (i.e. major US banks)—redistributed excess liquidity to banks of minor standing within the same financial centre; currency transfer, the process by which banks matched the currency composition of their assets and liabilities through interbank trading; global liquidity distribution, as transaction costs between peripheral banks in different countries and the Eurocurrency centre—thanks to the existence of branches and subsidiaries—were lower than those between peripheral banks themselves. In general terms, London as the major Eurocurrency centre—by performing functions of liquidity and currency transfer which facilitated the distribution of liquidity between banking systems—acted as "a form of global clearing system for currency flows" (Johnston 1983, p. 101).

More recently, "intragroup" transactions (i.e. positions between branches and offices of the same bank) assumed an unprecedented relevance in

Eurocurrency interbank business. The internalization of the recycling functions performed by the interbank market was especially relevant for large multinational institutions with branches in different financial centers, such as US and European commercial banks. Data in Figure 4 suggest that intragroup transactions remained marginal during the 1980s in Eurodollars (slightly above 10 per cent of total external interbank dealings), but were much more important for Eurocurrencies as a whole, which suggest they played a prominent role in non-dollar Eurocurrency markets. Intragroupd transactions expanded rapidly since the 1990s and accounted for ca. 60 per cent of total interbank dealings on the eve of the Great Financial Crisis of 2007-2009. This, again, can be related to the "global banking glut" of European banks and reflected their practice of borrowing short-term dollar funds in the US money market through their US branches and shipping them to their European headquarters (Shin 2011, pp. 18-19).

Growth

Regulatory arbitrage

As anticipated in the Introduction, unregulated Eurocurrencies offered depositors higher yields and borrowers short-term credit at lower costs. As a consequence, regulatory arbitrage is considered in the literature as a major determinant of the early expansion of offshore deposits (Dufey and Giddy 1978, pp. 133-135; Aliber 1980; Johnston 1983, pp. 86-87; Bryant 1987, pp. 66-68). Regulatory arbitrage is a strategy that generates profits by exploiting functional similarities across financial products or processes (i.e. a time deposits or a short-term loan booked onshore in a US bank and offshore in a non-US bank or a foreign branch of a US bank have a similar functional value for lenders and borrowers, so that they are close although not perfect substitutes) and permanent differences in their treatment under legal and regulatory practices across jurisdictions (Fleischer 2010; Houston et al 2012). In the case of Eurodollars and Eurocurrencies, by locating their wholesale intermediation offshore in London or other financial centers, banks successfully circumvented domestic regulations that increased intermediation costs and constrained their balance sheet expansion.

Eurodollars are a classical example. In US domestic banking, rates on short-term deposits with commercial banks were regulated under the so-called Regulation Q. Introduced during the Great Depression as part of the banking acts of 1933 and 1935, Reg Q applied both to member banks of the Federal Reserve system and to non-member banks insured under FDIC (Federal Deposit Insurance Corporation). It prohibited the payment of interest on demand

deposits, and gave the Federal Reserve the power to set ceilings on interest rates of savings and time deposits, with the aim of reducing competition for deposits and limit banks' investment in risky assets (Benston 1964; Friedman 1975). When tight monetary policy pushed interest rates in domestic money markets (Treasury Bills, commercial paper) above the ceilings, US commercial banks suffered domestic disintermediation, as commercial companies and institutional investors shifted their liquid balance from bank deposits to alternative money market instrument (Baxter 1966 and 1968). The emergence of Eurodollars in London brought the challenge of disintermediation to the international level and reduced their ability to intermediate worldwide dollar liquidity.

US banks responded by innovating and moving. Domestically, in 1961 they started issuing Certificates of Deposits (CDs), a negotiable money market instrument for which an active secondary market was rapidly organized in New York by specialized dealers. Marketability fully insured large depositors against the risk of liquidity shocks, as they could now manage their position more efficiently by trading CDs in a very liquid market. As a consequence, commercial banks recovered part of their competitive edge. However, the Fed quickly extended its regulatory perimeter by imposing differentiated ceilings on small and large CDs, which would again become binding in periods of very high short-term interest rates (Ruebling 1970; Mayer 1982). The second strategic response was to "swarm" to Europe, mainly by opening branches in London, and to offshore financial centers in the Caribbean and Far East, fully to exploit their natural competitive advantage in the Eurodollar market (Sylla 2002). By the mid-1960s US banks had already overcome British merchant and overseas banks as the dominant players in the London market (Battilossi 2002b, p. 106). Their international expansion would continue at a sustained pace until the mid-1980s, when the number of US commercial banks with foreign branches peaked at 162, although the subsequent phase of consolidation and retrenchment reduced their numbers by half (there were only 92 in 1998) (Houpt 1999).

The interaction between bank regulation, monetary policy and balance-of-payments controls created the conditions for a first cycle of exponential growth in the second half of the 1960s. As monetary policy became restrictive in order to stem domestic inflationary pressures, the Federal Reserve allowed short-term interest rates to exceed by a wide margin Reg Q's ceiling in order to constrain the growth of domestic bank credit. During the credit crunches of 1966 and 1968-69 large interest differentials in favour of the Eurodollar market attracted a massive inflow of deposits into branches of US banks in London and offshore centers both from US residents and foreign countries. In the same period voluntary and mandatory capital control programs enforced by the Johnson administration curbed US banks' ability to lend abroad to US multinationals, which turned

massively to US banks' branches in London as a source of finance. In order to obviate the effect of the credit crunches, US banks borrowed massively in the Eurodollar market through their London-based and overseas branches, then channeled part of these funds back to their head-offices in the USA, part to US multinationals (Kane 1983, pp. 28-50; De Cecco 1987; Woynilower 1980; Meltzer 2009, pp. 739-741). These factors converted for a while the Eurodollar market into a virtual branch of the New York money market (Einzig 1971, p. 143).

Over time, the impact of regulatory arbitrage on the market's growth most likely declined. In 1969 the Federal Reserve, under Regulation D, imposed reserve requirements on net borrowings by US banks in the Eurodollar market, which reduced their incentives to use it in times of domestic tight money (but shifted pressure on the market for bank-related commercial paper, which possible contributed to the crisis of Penn Central in 1970: Meltzer 2009, pp. 739-741). Constraints on exports of short- and long-term capital were abolished in 1974 by the Nixon administration. Regulation Q ceilings on large time deposits (above 100,000 USD) and CDs were completely removed between 1970 and 1973, while ceilings on smaller time deposits and savings deposits were also gradually relaxed. The threat of disintermediation did not vanish completely – in fact on occasions high domestic money market rates made regulation binding again, such as in the disinflation period 1979-82, which led to a new phase of sustained expansion of the Eurodollar market (He and McCauley 2012, p. 39). However, the policy trend favoured regulatory convergence between offshore and onshore markets. Reserve requirements on US banks' borrowing in the Eurodollar market were eliminated in 1978. The Depository Institutions Deregulation Act of 1980 set in motion the phasing out of interest rate regulation, which was completed in 1986 (Calem 1985; Kock 2015). In 1981 the Federal Reserve authorized banks located in the US (either domestic or foreign) to establish International Banking Facilities (IBFs), as already mentioned. In 1990, reserve requirements were finally eliminated on large-denomination domestic time deposits and CDs. Although domestic intermediation costs remained slightly higher than in the external dollar market, due to tougher capital standards, higher deposit insurance premiums, and more active supervision after the wave of banking crises of the 1980s (Goodfriend 1998), the establishment of a domestic deregulatd environment enabled New York to compete successfully with London and, more directly, with Caribbean offshore centers (Key and Teller 1989). Regulatory convergence between onshore and offshore locations was the main factor behind the sharp contraction of outstanding Eurodollar claims in 1991-93 – the first ever since its emergence – as US banks shifted a significant amount of their cross-border assets back to US-based offices. The domestic crisis of Japanese banks and

the reduction of their international business was also an important contributing factor.

Petrodollar recycling

In the 1970s, an additional impulse to the Eurodollar market's expansion came from oil shocks. In this period, the rising demand for external finance by corporate and sovereign borrowers in oil-importing countries, and especially in the developing world, was met by the strong preference of private and public institutions in oil-exporting Arab countries for Eurodollar deposits. These were considered as an investment with higher liquidity, shorter maturities and, importantly, lower exposure to political risk than those offered by banks in the US. The "recycling" of the large cash surplus of OPEC countries to finance imbalances of oil-importing countries fell largely on the Eurodollar market, which provided the main source of funding for a new market of long-term Euroloans arranged by international bank syndicates (Johnston 1983, pp. 25-27 and 144-159; Altamura 2017, pp. 101-130). In this phase, pure offshore transactions dominated in the market, with non-US banks (mostly European) intermediating between depositors in oil-producing countries and borrowers in oil-importing countries (He and McCauley 2012, pp. 35-36).

The 1970s saw also a rapid internationalization of European banks. As highly regulated and cartelized domestic environments provided modest opportunities for growth in retail banking, European commercial banks turned eagerly to wholesale international banking. By the early 1980s, British, German, French, Dutch and Swiss banks had already established branches and subsidiaries in all major international financial centers, either directly or through bank alliances and consortium joint ventures (Ross 2002). They also entered massively into the US market (Bryant 1987, pp. 35-45; Grosse and Goldberg 1991) leading to an unprecedented internationalization of the New York financial center (with more than 350 foreign branches and subsidiaries in 1980 – a higher number than in London: Pecchioli 1983, pp. 154-183) and more intimate connections with US money markets. In this period the fast growth of their dollar balance sheets became a major factor in the growth of the Eurodollar market (Battilossi 2002a and 2002b; Altamura 2017, pp. 55-83). Japanese banks showed a similar pattern, with a fast expansion of their international branch networks and their claims vis-à-vis foreigners. In fact, in the mid 1980s Japanese banks had become the major bank group in London, and accounted for 26 per cent of total international banking (measured as total external assets by nationality of ownership), against 23 per cent of US banks,

and another 22 per cent of French, British and German banks jointly (Bryant 1987, pp. 34-35 and 49-51).

Although the "recycling" function of the Eurodollar market reached an unprecedented scale in the 1970s, it was not an entirely new phenomenon. Early descriptions of the geographic structure of Eurodollar assets and liabilities (Klopstock 1965; Altman 1967) had already emphasized the role of the market as a mechanism that attracted liquidity from developing peripheries. Depositors from the developing world included central banks (for which the interest earned on their foreign exchange reserve assets was a relevant factor in their portfolio composition), commercial banks and non-financial corporations (whose net liquid resources had no domestic money markets to be invested in). On its way to the Eurodollar market in London, part of the international liquidity originated in the Middle East, Latin and Central America reached went through Swiss banks, which were large recipients of foreign liquid balances but lacked a sufficiently developed domestic money market to invest them. A similar role was credited to Canadian banks, which held large liquid balances of US corporations seeking yields above domestic regulated deposit rates. While in the 1960s international liquidity from developing countries had been mainly recycled towards industrial economies, in the 1970s the pattern reflected a South-South flow of funds intermediated by US, European and Japanese banks. In this new circumstance, also Latin American banks expanded rapidly their international presence in New York and London, directly and through consortium ventures, and borrowed extensively in the Eurodollar market to fund domestic business (Alvarez 2015, 2017 and 2019).

A "global banking glut"

The last phase of fast growth that started in the second half of the 1990s reversed a trend of secular decline in the rate of expansion of Eurodollars and Eurocurrencies. In this period, characterized by historically low interest rates and inflation (the so-called "Great Moderation"), European banks plaid a distinctive role. The explosive expansion of their dollar balance sheets was funded by wholesale deposits in the Eurodollar market or in other Eurocurrencies, which were then converted into Dollars in the spot market, hedging exchange risk with swap contracts (a prearranged sale at a forward date and at a specified exchange rate). In many cases, wholesale funds were placed by US residents (including money market funds) with US-based branches of European banks, which then channeled these funds to their headquarters in Europe. These, in turn, invested in dollar-denominated longer-term assets, including structured finance products (i.e. subprime

mortgage-backed securities) originated in the US shadow banking system (Bernanke et al. 2011). As a consequence, during the "global banking glut" of the pre-2007 period – in which European banks expanded credit not only to the US but also to Euro Area countries (Shin 2011) – the Eurodollar market operated mainly as a conduit for offshore round-tripping of funds. This in turn contributed to the easy credit conditions that prevailed in the years before the crisis (McGuire 2005; Allen and Moessner 2011; He and McCauley 2012, p. 35-40). As assets had usually longer maturities than deposits, banks had to renew periodically their Eurodollar funding. In August 2007, a widespread loss of confidence in banks' crediworthiness led to a sudden and widespread "freezing" of the market, during which banks lost access to interbank wholesale deposits, especially for longer maturities. The sharp contraction of the outstanding stock of external dollar claims between 2007 and 2012 was the largest ever in the sixty years of history of the market and reflected a massive deleveraging of European banks' balance sheets.

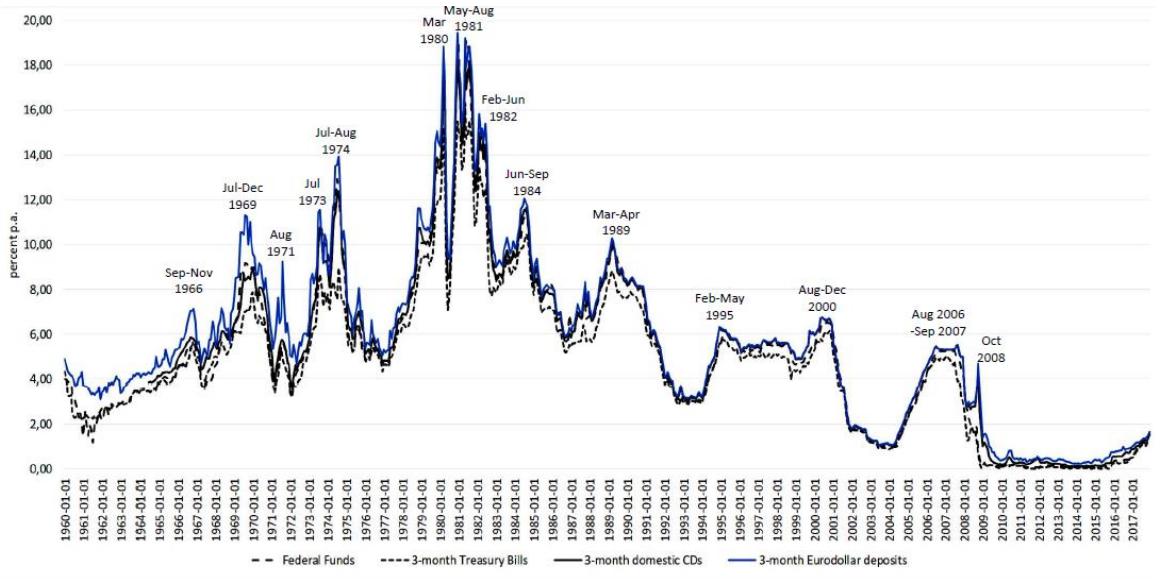
Arbitrage

The Eurodollar premium

During the last 60 years, the interbank rate on Eurodollars – the London interbank offer rate (LIBOR), a compound average of "offer" rates in the London market – has plaid the key role of "true global cost of money" (Stigum and Crescenzi 2007, p. 240). Over this very long period, Eurodollar interest rates exhibited two empirical regularities: they commanded a structural premium on comparable domestic deposits and other US money market rates; and they covaried strongly with US domestic interest rates, suggesting a causal relationship between domestic monetary conditions and the global dollar money market. Both characteristics can be observed in Figure 6, which plots interest rates on 3-month Eurodollar deposits in London against three benchmark money market rates in the US: the rate on overnight federal funds, 3-month Treasury Bills, and 3-month CDs issued by commercial banks. For Eurodollars, as well as other Eurocurrencies, the positive spread between offshore and onshore deposits is generally explained by sovereign and credit risk (Galpin et al 2009). The yield pickup that depositors could earn by investing in Eurodollars rather than in US deposits remained large until the early 1980s. This contributes to explain the rising portion of official dollar reserves held by central banks with banks outside the US. Other factors were litigation risk (i.e. the possibility that US investors demand the seizing of reserves and other assets in case of sovereign debt default)

and infrastructure risk (i.e. diversification of reserve holdings across locations in different time zones to guarantee uninterrupted access to liquidity) (McCauley 2005).

Figure 6
Eurodollar and US money market rates, 1960-2017



NOTE Data from FRED (Federal Reserve Bank of St. Louis) online datasets.

The consensus view in the literature is that the main determinant of both premium and covariance lie in the increasing efficiency of the mechanism of international arbitrage (Dufey and Giddy 1978, pp. 48-106; Johnston 1983, pp. 110-143; Gibson 1989, pp. 68-104). This, in turn, can be explained by technological and institutional changes. The impact of new communication technologies on financial services – which include the processing and transmission of information, the confirmation of transactions, electronic accounting and funds transfer – reduced financial frictions and increased the elasticity with which both lenders and borrowes exploited opportunities for arbitrage across currencies and across boders. At the same time, the unprecedented expansion of multinational banking gave banks direct access to information, arbitrage and intermediation activities in foreign and international markets (Bryant 1987, pp. 64-66). Arbitrage, interest parity and portfolio adjustments (by depositors, borrowers and financial intermediaries) represent the bulding blocks of supply-and-demand models of the international money market (Marston 1974; Dufey and Giddy 1978, pp. 130-135; Gibson 1989, pp. 49-67). The interest parity theory states that, with efficient markets, the differential between interest rates on assets of similar riskness denominated in different currencies should equal the forward

discount/premium, so that arbitrage has no profit opportunities to exploit. In turn the efficiency of arbitrage enhances financial integration – that is, the sensitivity of short-term capital flows and portfolio stock adjustments to changes in interest rates (Gibson 1989, pp. 33-40; Marston 1976 and 1997, pp. 70-104).

US banks' arbitrage

The role of US banks in the process of arbitrage was especially critical. For them, Eurodollar deposits were close and reserve-free substitutes of domestic deposits. Similarly to other innovations – such as money market funds – they allowed banks to minimize their level of reserve holdings and expand their balance sheets without beeing constrained by the supply of reserves by the Federal Reserve. Their transitory arbitrage (triggered by temporary discrepancies of interest rates in the two markets) was mainly outward: banks borrowed CDs or commercial paper (the latter through bank holding companies) domestically and invested these funds in the "external" market at slightly higher rates, until they reached internally imposed arbitrage constraints (such as perceived risk, capital-to-asset and return-on-assets ratios) or interest rate convergence removed arbitrage incentives (Frydl 1982, p. 13). In fact the empirical evidence suggests that adjustments in US banks' portfolios – more sensitive to variations in interest rates than individual portfolios – were the main determinant of the strong covariation between Eurodollar and US short-term rates, while the direction of causality ran from the domestic to the external market (Kreicher 1982; Marston 1997 pp. 53-57). This notion was clear to practitioners too; as expressed by an experienced banker in the market: "Rarely does the tail wag the dog. The US money market is the dog, the Eurodollar market, the tail" (Stigum and Crescenzi 2007, p. 860).

The dissemination of theoretical and practical knowledge about how the market worked also may have contributed to reduce information barriers to arbitrage. By the early 1980s, the global scale achieved by the market guaranteed almost perfect access to private liquidity, and the deregulation of financial systems ensured an almost perfect substitutability of domestic and "external" money market assets. Banks and other market participants had completed their learning curve of portfolio adjustment – what Dufey and Giddy (1978, pp. 54-55) termed "information effect". As a consequence, the interest rate incentive required in order to induce depositors and borrowers to switch from domestic to "external" markets experienced a secular decline, and the arbitrage mechanism became more elastic (Kreicher 1982, pp. 10-23; Johnston 1983, pp. 110-142).

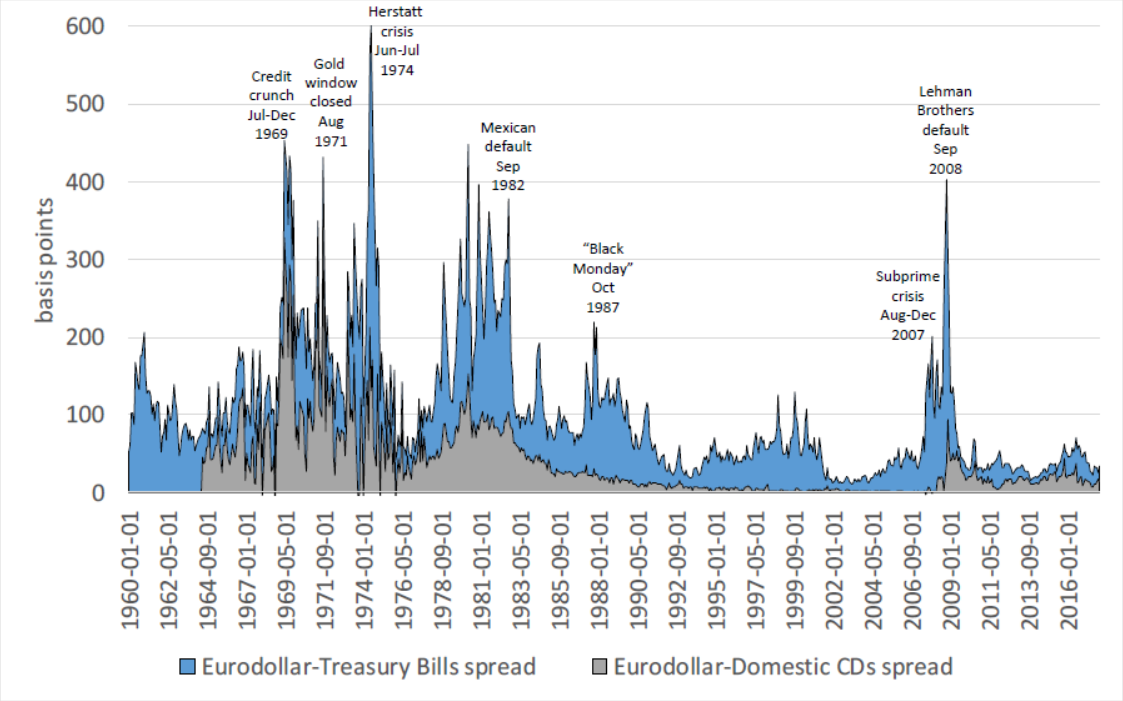
Risk

Market spreads

Figure 7 shows the spread between Eurodollar interest rates and two benchmark rates in the US money market: the rate on CDs issued by commercial banks and the rate on Treasury Bills. At first sight, the large spreads on CDs fron the mid-1960s to the early 1980s – which on occasions greatly exceeded the differential allowed by the cost of reserve requirements on CDs in the US – may cast doubts on the efficiency of US banks' arbitrage to maintain interest parity. However, the spread can be considered a measure of how effective were regulations and capital controls in keeping money market relatively segmented. As we have seen, in the late 1960s CDs rates were rigid under Regulation Q and the prohibition to lend abroad shifted credit demand from the domestic to the "external" market (Formuzis 1973; Marston 1974). As soon as constraints were removed and the onshore regulatory enviroment became much more similar to the deregulated offshore enviroment, interest-rate linkages were strengthened, US banks became net lenders and the efficiency of arbitrage increased. This led to a secular reduction of the Eurodollar-CD spread, which remained close to zero since the late 1980s. In a similar fashion, the removal in 1979 of the British controls that restricted UK residents from investing in Eurosterling deposits in Paris led to a structural fall of the spread of Eurosterling rates on domestic deposit rates (Marston 1997, pp. 45-57).

However, spreads reflected also differences in riskiness. These were determined in part by structural factors – by instance, the fact that offshore dollar deposits were not only exposed to host-country political risk but also were not uniformly subject to US law, which generated legal uncertainty. Until recently, in lawsuits involving the expropriation or freezing of Eurodollar deposits due to political shocks, courts failed to agree on a single legal system ordering and regulating Eurodollar bank liabilities (Windecker 1993, Comizio and Chiachiere 2014). Shifts in perceived risk were another important factor. By instance, Marston (1997, pp. 56-57) explains the persistence of high Eurodollar-CDs spreads in 1974-75 and 1980-83 (which created scope for profitable outward arbitrage) with a higher risk premium demanded by depositors on Eurodollars due to greater default risk.

Figure 7
LIBOR spreads over domestic CDs and US Treasury Bills



NOTE Data from FRED (Federal Reserve Bank of St. Louis) online datasets.

Another widely used indicator of perceived risk in the Eurodollar interbank market is the spread between LIBOR and the yield on US Treasury Bills – better known by its acronym TED. As already explained, money markets are exposed to counterparty risk, that is, the possibility that the some of the debt-issuing banks might default on their contractual obligations. As a consequence, banks that rely massively on risk-intolerant market funding are especially vulnerable to liquidity risk. For money markets to develop a high level of liquidity, debt securities must be unanimously regarded by participants as safe assets – that is, close substitutes for money that can be taken at face value "with no questions asked". In terms of modern financial economics, a safe asset does not require investors to produce any information about its underlying value – it is "information insensitive". Bank debt (deposits) is an example: they are privately produced, money-like securities widely accepted as means of payments and short-term store of value "without extensive and costly verification of its value" in spite of the fact that its underlying collateral (the bank's loan portfolio) is risky. This is possible because banks debt has short maturities and must be rolled over regularly, which allow investors to check frequently the quantity and quality of the underlying assets, thus decreasing risk. Another factor is banks' opaqueness – the value of their loan portfolio is difficult to observe, so that outsiders have no incentive to produce private information. By reducing information asymmetries,

opaqueness makes trading in bank money very liquid (Gorton 2017; Dang et al 2017).

Even safe assets – such as bank debt – however are vulnerable to runs when rational doubts arise about the quality of the underlying collateral. Then, near money suddenly becomes information-sensitive and loses its money-like characteristics, the convertibility option loses its credibility and holders scramble for "real" cash. A run on a systemic player in the market can be propagated to the rest of participants when the interbank portion of the money market is large – that is, when in a large share of transactions banks act not only as intermediaries but also as borrowers from and lenders to other banks. Given the dense web of financial contracts negotiated in the interbank market, shocks that generate widespread uncertainty about the solvency of some systemically relevant counterparty or the quality of the collateral behind the securities traded can lead to a complete "freezing" of the interbank market, in which banks hoard liquidity and wholesale funds are rationed. Then, banks find themselves unable to roll-over their short-term debt and cannot borrow even against good quality collateral – a situation of funding illiquidity in which the debt capacity of an asset falls to a small part of its fundamental value (Acharya et al 2011) – nor can liquidate assets quickly with only a minor price-impact (a situation of market illiquidity) (Brunnermeier and Pedersen 2009). In such circumstance, the TED spread increase as rates in interbank market remain high and a large number of investors switch their liquid funds into Treasury Bills – the safe asset par excellence, – bringing their yields down.

Risk factors

The TED spread suggests that the average level of perceived risk increased significantly in the 1970s compared to the previous decade. As a rule, the risk that US and foreign investors attached to Eurodollars was significantly higher than that of equivalent US deposits (with the exception of very safe deposits placed with foreign branches of top US banks). Deposits in the offshore market were not insured and many of them were issued by foreign banks with no access to the lender-of-last-resort facilities of the Federal Reserve (Dufey and Giddy 1984, pp. 577-588). An additional source of perceived risk was maturity transformation. In its initial stages, Eurodollar transactions were relatively simple business that banks could carry out from their traditional foreign exchange offices, normally small departments offering trade finance services and dealing with correspondent banks. As the market matured, banks began to use interbank transactions also for domestic purposes, that is, to adjust their reserve position in domestic currency, to back loans to corporate customers (both in national or foreign currency), to support and make less dependent from national

regulations their traditional foreign-exchange banking activities and to undertake covered interest arbitrage in the foreign exchange market (i.e., covering in the Euro-dollar market forward transactions undertaken on behalf of corporate customers). Thanks to the relatively stable nominal exchange rates of the 1960s, currency risk was low. Similarly, liquidity risk remained modest, as the share of interbank business increased and transactions with nonbank borrowers maintained their traditional short-time self-liquidating characteristics (McKinnon 1977, pp. 17-18; Davis 1979, pp. 82-86).

An upward shift in riskiness took place in the 1970s. Risk perceptions could be heightened by recurrent policy discussions about the introduction of unilateral or multilateral regulations and controls, the alarm raised by an increased frequency of bank failures, the persistent weakness of the US dollar during and after the breaking of the Bretton Woods system, and repeatedly voiced concerns about the possibility of a sudden contraction or collapse of the market. Volatile exchange rates increased currency risk and created scope for substantial losses from foreign exchange exposures. Higher and more volatile interest rates increased interest risk, as sudden fluctuations in the cost of short-term funding could cause losses on fixed rate loans with long maturities. Banks reacted by adopting marginal pricing in roll-over lending at floating rates, which adjusted assets to potential liabilities and separated interest risk from liquidity risk. However, this implied that interest risk was now passed on to borrowers, thus harming their ability to service debts and adding to banks' credit and default risk for banks (Harrington 1987, pp. 46-48). At the same time, keener competition narrowed lending margings, and banks sought actively to expand profit margins by engaging in more maturity transformation and net liquidity creation. This could be achieved by funding loans of longer contractual maturity through short-term deposits, as well as by mismatching or short-funding rollover deposit maturities in order to increase the profit yielded, which increased funding risk (Heinevetter 1979; Kane 1983, pp. 101-103). Data published by the Bank of England about the maturity mismatch of London banks in their Eurocurrency business confirm the existence of an upward trend in riskiness. Between 1973 and 1985, their share of foreign currency claims with maturities longer than one year increased from 13 to 24 per cent of total claims, whereas liabilities with the same maturities had remained stable around 5 per cent of total liabilities (Gibson 1989, pp. 226-233).

In this period the Eurodollar market developed also important links with the Eurobond market, where international bank syndicates managed, underwrote and placed bonds issued by corporate and sovereign borrowers. Here, investment banks, securities firms and commercial banks financed part of their underwriting commitments by borrowing in the Eurodollar and other

Eurocurrency markets, especially when low short-term interest rates created large profit opportunities on Eurobond investments. After 1973, the fast growth of medium-term dollar lending to developing countries through syndicated loans pushed in the same direction. However, falling interest spreads on syndicated loans between 1977 and 1982 suggest that banks failed to fully appreciate the risk taken, possibly because of their increasing confidence in the depth and resilience of the Eurodollar market as a source of funding (Gibson 1989, pp. 160-195) or because implicit guarantees provided by governments of industrial countries and multilateral organizations such as the IMF generated a major problem of moral hazard (Altamura 2017, pp. 109-120).

The crisis of Herstatt Bank 1974

The crisis of Herstatt Bank (a relatively small German bank involved in heavy foreign exchange speculation) in June 1974 is considered the first episode that brought to light the vulnerability of the Eurodollar interbank market to sudden shift in confidence. The liquidation of the troubled German bank caused a sudden contraction of liquidity, a sharp increase in interbank rates and a widening of spreads across tiers (Busch 2009, pp. 100-102; Sarver 1988, pp. 28-30). As shown in Figure 7, the TED spread jumped to 600 basis points in June and July 1974, signalling very severe money market pressure. The crisis also revealed the global range of interbank linkages through which contagion could be transmitted, and showed the serious impact that relatively minor funding shocks could have on larger counterparties in key markets such as New York and London (Guttentag and Herring 1985). In UK and West Germany the crisis also exposed the serious limitations of traditional approaches to bank supervision, based on informality and mutual trust, when confronted with the complex regulatory and jurisdictional issues raised by the growth of international money markets (Schenk 2014; Mourlon-Druol 2015). Yet, its effect was short-lived and did not represent any significant setback for the expansion of the market in the medium run; in fact, maturity mismatch in the market (the risk stemming from funding long term assets on the base of short term liabilities) increased in the years after the crisis (Gibson 1989, pp. 142-159).

This can be explained by the fact that national monetary authorities of G10 countries arranged emergency facilities in favor of domestic banks and collectively assured market participants that, without assuming formal responsibility for the market, they would be prepared and willing to provide lender-of-last-resort assistance "if and when necessary" (as stated in the the Basle communiquè of September 1974) (Altamura 2017, p. 134). In the aftermath of the crisis, market participants upgraded internal checks and control mechanisms, and US banks extended the principle of corporate liability to assume legal

responsibility for the exposure of their foreign branches and subsidiaries (Heininger 1979). With the Basle Concordat of 1975, central banks simply committed to improve monitoring and prudential supervision (Dufey et al 1979; OECD 1985, pp. 48-72). However, as the recycling towards developing countries gained momentum in the second half of the 1970s, new alarms were raised about banks' overexposure to sovereign borrowers, the unsecured nature of syndicated lending, the rising degree of maturity transformation, the generalization of unsound banking practices, the risk of contagion through the interbank market, and the possibility of a "disorderly scramble for liquidity in Eurocurrency markets" (Bryant 1983, p. 29) in the absence of an international lender of last resort. New initiatives for a multilateral regulation of Eurodollar and Eurocurrency banking emerged in this period (see the next section), motivated both by policy and prudential issues, but failed to produce sufficient international consensus (Greenberg 1983, Hawley 1984).

The debt crisis of 1982

The outbreak of the debt crisis of developing economies materialized all the concerns of the previous years. The crisis, initiated by the Mexican moratorium of August 1982, brought US and European banks on the verge of collapse. The growth of the Eurocurrency market had been slowing down since 1980 and went into standstill in the second half of 1982, with the usual symptoms of rising market illiquidity: a strong contraction in interbank positions, shortening of interbank lending maturities, widening spreads across tiers and a generalized upsurge in interest rates. In this occasion, the TED spread approached 400 basis points – a level already hit in various occasions since 1980. Latin America banks, which had heavily borrowed in the US and Eurocurrency interbank markets at short-term floating rates to fund longer-term loans at fixed rate, lost access to the market and their default was avoided by freezing their interbank positions at the pre-crisis level for almost a decade as part of the process of negotiations on debt rescheduling.

The crisis also triggered a controversial policy discussion about who should bear the responsibility of supporting illiquid or insolvent banks from developing countries with branches operating in the New York and London money markets (Alvarez 2015 and 2017). As already in 1974, the potentially systemic consequences of a crisis located in relatively peripheral corners of the international money market were brought clearly to the fore, but no widespread contagion was observed (Guttentag and Herring 1985). The response of national authorities was similar to what had been seen ten years earlier: a new commitment to cooperate on the supervision of international banks, formalized by the Basel Committee on Banking Supervision in 1983, but with less practical

consequences as far as sharing information among national supervisors was concerned (Schenk 2014, p. 1156).

The liquidity crisis of 2007-08

The approval in 1988 of a set of new prudential regulations under the so called Basel I agreement, together with the stable macroeconomic environment that characterized the Great Moderation, brought perceived risk in the Eurodollar market to its historical mínimum in the 1990s and the early 2000s. Possibly for these reasons the suddent freezing of the interbank Eurodollar market (and other international markets for short-term bank debt, such as repos and commercial paper) in 2007-08 was perceived as a "black swan" – an extremely rare and totally unexpected event (Taylor and Williams 2009). This apparent insensitivity to risk factors is especially surprising in light of a growing evidence that structural changes in international banking had caused a major upward shift in riskiness. International reports (BIS 1986 and 1992) warned that banks' growing exposure to off-balance-sheet instruments had diminished their transparency and increased counterparty risk in interbank positions. Linkages between different sectors of the financing industry as well as between banks and non-financial firms had been strengthened, blurring the separation between interbank and general wholesale intermediation. Markets had become more concentrated on a relatively small group of highly rated banks, whose role as dealers and market makers had become more prominent, while at the same time increasing the dependence of smaller banks. Funding liquidity and market liquidity were problematic for a number of participants. Banks found pricing credit risk increasingly difficult, which led to a generalized used of quantity rationing (i.e. credit limits) and a lower propensity to support troubled counterparties. These trends spelt trouble in case of sudden shocks to confidence. Banks with complex positions in derivatives relied on a "presumption of liquidity in a number of markets" – a presumption that could easily become "illusory in time of stress, with a consequent impact on other markets" (BIS 1992, pp. 2-3).

Many of these elements emerged in the liquidity crisis of 2007-08, the most recent example of money market panic. Twenty years earlier, Guttentag and Herrig (1986, pp. 16-20) correctly anticipated that liability management, by increasing banks' dependence on the international interbank market, had dramatically increased both their vulnerability to funding shocks in case of bad news and the probability of a "contagious loss of confidence" that could threaten the stability of the international banking system. The surprising absence of contagion in the debt crisis of 1982 however had allowed banks to maintain their "operating assumption … that the positive benefits from liability management outweigh[ed] the dangers". The crisis of 2007-08 made this assumption obsolete.

The sudden evaporation of global liquidity kept interest rates on interbank short-term lending unusually high and volatile for a long period, challenging established approaches to monetary theory and policy (Taylor and Williams 2009). As the "freezing" travelled through all international markets for interbank funding in dollars, the Fed was called upon to mitigate an incipient global "dollar shortage" by acting as an international lender of last resort. Foreign banks in the Eurodollar market used balances with their US correspondents as reserves; these in turn added pressure on the market for Federal Funds. In order to block this transmission channel, the Fed arranged foreign exchange swap lines with the most important foreign central banks, which allowed them to supply dollar liquidity to money market dealers and banks operating in their jurisdictions (McGuire and von Peter 2009; Fleming and Clagge 2010). The crisis of 2007-08 brough to light the fact that the safety of the global dollar money market depends on the Fed's unconstrained ability to create both domestic and international dollars, so that "the whole world treats dollar deposits at the Fed not only as good as dollar currency, but also as the ultimate world reserve in a time of crisis" (Mehrling 2011, p. 29).

Political economy

Origins of Eurodollars and the British state

The origins of the practice of "borrowing" and "lending" dollar deposits by British banks in the 1950s was initially surrounded by an aura of mistery. According to Paul Einzig, one of the most influential financial analysts of the time, its existence was initially "hidden from economists and other readers of the financial press by a remarkable conspiracy of silence", which banking circles in the City were "emphatically" fond of preserving (Einzing 1965, pp. vi-vii). This fear of publicity is not surprising in a context, such as the second half of the 1950s, dominated by a continuous pressure on a weak Sterling in foreign exchange markets. In fact recent research based on archival records show that initial concerns by British authorities, as they tried to grasp the nature and implications of this new practice, focused on its possible consequences for the external value of the Pound.

The attitude of the Bank of England and the British Treasury towards the emerging Eurodollar, and more generally the relationship between the British state and the City, is the subject of a lively debate. Some interpretations contend that British authorities played an active role in promoting and encouraging the development of Eurodollar banking as a "conscious act of policy" to enhance London's ability to compete with New York as an international financial center.

Special relevance is attributed to the outward-looking regulatory tradition that prevailed at the Bank of England. In this perspective, they allowed Eurocurrency business of foreign and British banks (with the exception of domestic clearing banks) to grow free of binding regulations in order to allow the City to revive its historical role as an entrepôt center for international finance, although detatched from the international role of the Pound (Forsyth 1987, pp. 144-149; Helleiner 1994, pp. 83-84; Palan 1998, pp. 632-633; Schenk 2002; Saadma and Vaubel 2014).

Alternative interpretations assign British authorities a more passive role, as they simply tolerated the development of a new line of business that market actors had discovered and promoted by exploiting loopholes in the existing regulatory framework. Their permissive attitude was conditional to the absence of negative spillovers from Eurocurrency business to their overarching policy objectives. British clearing banks were subject to a severe regime of financial repression (Allen 2014); this included a cartel arrangement that capped deposit and loan interest rates, and binding constraints (both qualitative and quantitative) on commercial banks' sterling asset portfolios. UK residents were also subject to binding capital controls that strongly limited their direct and portfolio investment abroad as well as their holdings of foreign currency deposits. Controls also prevented UK banks from lending in foreign currencies to residents. The purpose of controls was to prevent speculative pressures on the Pound (a weak currency under continuous threat of depreciation in the 1950s and 60) and British international reserve, especially in light of the large sterling balances held by Sterling Area governments that could be converted into Dollars (James 1996, pp. 185-186; Schenk 1994, pp. 33-35). Therefore the Eurodollar market in London was allowed to grow insofar as its developments did not threaten exchange rate stability, did not spillover on domestic credit conditions or did not generate negative externalities for the role of the Pound as an international currency (Capie 2010 pp. 182-185; Schenk 2010).

In its relationship with the banking system, the Bank of England continued to follow a supervisory approach based on gentlemen's agreements and moral suasion, to which the City usually responded with a cooperative attitude (Schenk 2004). Internal debates about its possible regulation through reserve requirements in the early 1960s led to a renewal of a vote of confidence in the City's ability to self-regulate (Schenk 1998, pp. 233-234; Burn 1999, pp. 240-243). The wave of bank failures of the mide 1970s in the USA and Western Europe, often caused by fraudulent behaviour, shook mutual confidence between bankers and regulators. Their effects of contagion, transmitted through the global network of interbank linkages created by the Eurocurrency market, posed complex issues of supervision, regulation and jurisdiction. However, the Bank of England remained wary of switching to statutory regulations in its relationship

with the banking sector – a step it gave only at the end of the 1970s (Schenk 2014, pp. 1154-1155).

In a political economy perspective, Burn (2006, p. 170-190) suggests that the debate about the ultimate responsibility for the development of Eurocurrencies – whether it was driven by markets in their attempt to escape the regulatory grip of the State, or by a conscious policy action by the British authorities – is misleading. In UK, the State-market boundaries were blurred, and the Bank of England acted as an interface between them ("poacher and gamekeeper" at one time). In fact, the existence of the Eurodollar market revived an institutional structure that strongly resembled the State-Bank-City nexus that had characterized the heyday of London as "the center of world liquidity" until 1931. Others (Green 2016) however argue that this interpretation is too inward-looking and neglects the deeper consequences of the Anglo-American financial and institutional interactions that made the post-1945 period profoundly different from the past. In this alternative view, the Eurocurrency market is seen as the "construction of an offshore political-economic space" led by British merchant banks and the Bank of England. In this space, the convergence between the "regulatory embrace" of British authorities and the "regulatory escape" of US financial interests weakened national monetary regimes and regulatory orders both in the UK and US, and strengthened Anglo-American institutional interdependence. The "Anglo-American financial synthesis" produced by the Eurodollar market in the City is seen here as the main driver of the reconfiguration of the international regulatory order promoted since the 1970s by the Basel Committee, which provided the bedrock of the more recent expansion of global finance.

The failure of international regulatory coordination

The debate of the 1970s among central bankers over the regulation of Eurocurrencies sheds light on important aspects of the process through which this new international regulatory order was forged. As already discussed, the absence of regulation was a key determinant of the initial success of cross-border wholesale banking. However, whether or not it should remain unregulated soon became a major source of controversies. In the second half of the 1960s Eurocurrencies were vehicles of large international flows of short-term capital, which made it more difficult for monetary authorities to achieve their objectives. We already mentioned how US banks successfully used the Eurodollar market to counteract the effects of the domestic credit crunches enforced by the FED in 1966 and 1968-69. In Europe, countries with strong currencies—such as West Germany—also found it increasingly difficult to pursue restrictive monetary policy, as high interest rates induced offsetting capital inflows (Porter 1972;

Toniolo 2005, pp. 464-465). On the other hand, countries with weak currencies—such as Italy—found it more difficult to implement expansionary monetary policy without suffering capital outflows (Argy and Hodjera 1973, Argy and Kouri 1974).

Under the Bretton Woods system of adjustable pegs, the compatibility between fixed exchange rates and a degree of monetary autonomy – that is, the ability of central banks to gear monetary policy towards domestic objectives (by instance, to set interest and inflation rates at variance with those prevailing internationally) – rested on the effectiveness of capital control in reducing capital mobility (Obstfeld 1993, pp. 215-20). As capital flows' sensitivity to arbitrage and speculative opportunities increased, and responsiveness of stock adjustment to changes in information and expectations improved, the scope for national monetary independence was eroded (Obstfeld 1980; Obstfeld and Taylor 1998, pp. 391-3). Monetary control proved particularly difficult for small open economies, whose monetary conditions were substantially affected by changes in monetary conditions in reserve countries, such as the USA, rapidly transmitted to the international money market, in which interest rate fluctuated sharply (Gibson 1989, pp. 34-5).

Policy-makers viewed in the revival of short-term capital flows a proof that the international money market had turned into "an unregulated juggernaut 'out of control'". Central bankers complained that its "unbridled expansion and contraction" undermined their ability to control monetary and credit aggregates, caused instability in exchange rates and domestic interest rates, and enhanced the international transmission of inflation. As a consequence, they felt urged to "do something about the unregulated Eurocurrency market" (Bryant 1983, pp. 8-9 and 15). Their first response between the late 1960s and the mid 1970s had been the introduction of unilateral controls as a shelter against "disequilibrating short-term capital flows" (Argy 1971; Bordo 1993, pp. 55-60; Eichengreen 1996, pp. 120-2). Attempts to isolate domestic monetary and credit conditions from international disturbances took the form of direct regulation of banks' net external position (to limit outflows), or the prohibition of paying interest on non-resident bank deposits and the application of reserve requirements and mandatory cash deposits (*Bardepot*) on external borrowing (to limit inflows, as in the case of West Germany, Switzerland and Japan, whose governments tried to limit the international use of their currencies) (Mills 1972; Marston 1997, pp. 45-69). The effectiveness of these measures was limited. In the West German case, for example, controls on banks were offset by non-bank transactions (as German companies resorted to massive external borrowing), while banks circumvented controls by transferring lending to German residents to their offshore branches and subsidiaries in Luxembourg. At that time the Bundesbank complained that

the Eurocurrency system had turned into a sort of "substitute central bank" (*Monetäre Nebenregierung*) (Hewson and Sakakibara 1975, pp. 57-8; Emminger 1977; Obstfeld 1980, p. 22).

During their meetings at the BIS, G10 central bankers had been discussing the growth of the Eurodollar market and its possible implications for capital mobility and financial stability since the mid 1960s within the framework of multilateral surveillance, but the general sentiment was of benign neglect. The BIS also intervened to moderate the level and volatility of interest rates by drawing from its dollar swap lines with the Federal Reserve to increase the supply of deposits in the market in periods of strong demand. However, after the market's explosive growth of 1966-69, concerns escalated and the idea that coordinated actions were necessary in order to limit the impact of international banking activities on domestic monetary conditions gained consensus (Toniolo 2005, pp 452-462; Yago 2013, pp. 163-172). Proposals for more forceful interventions were presented and discussed in the Standing Committee on the Euro-currency Market, created in April 1971 by G-10 central banks' governors. Its meetings became the main forum in which proposals of coordinated controls were debated.

Between 1971 and 1973 the struggle to preserve the Bretton Woods system of adjustable pegs was the background of the committee's discussions. The debate proved ultimately inconclusive as no agreement could be reached between conflicting stances of central banks (Toniolo 2005, pp. 465-469; Schenk 2010; Altamura 2017, pp. 89-97). Initially, the Bundesbank and the Nederlandsche Bank (both presiding over strong currencies that attracted large capital inflows) pushed for a coordinated use of reserve requirements to constrain the growth of the Eurocurrency "monster". The Bundesbank also insisted on the need to better coordinate monetary policies if controls on the Eurocurrency market were to be effective. The Banque de France and the Bank of Italy supported the view that surveillance should be tightened and controls "at both ends" should be introduced. On the other side, the Bank of England denied the necessity of regulatory interventions, emphasised the efficiency of the system, reaffirmed its confidence on the "judgement and self-discipline" of market actors, and insisted that the introduction of coordinated regulations at G-10 level would simply displace the market from London to offshore centers. US authorities were initially sympathetic with the Bundesbank (in 1969 the FED had introduced reserve requirments on US banks' borrowing from their foreign branches in the Eurodollar market), but in the end supported the British view that coordinated controls were unnecessary and possibly counterproductive. The Committee's discussions had reached a standstill, when the currency crisis of March 1973 and the generalized

transition to floating exchange rates took most of the heat out of the issue. A few months later, the first oil shock and the huge volume of international liquidity necessary to finance the large balance-of-payments deficits of oil-importing countries made the Eurocurrency market suddenly look like a resource rather than a problem.

The issue of coordinate intervention on the Eurocurrency markets re-emerged in the late 1970s in a different macroeconomic context. While economists generally agreed that it played a relatively marginal role in the creation of new money and credit, with modest inflationary consequences (Niehans and Hewson 1976, Mayer 1979, Grabbe 1982), some central bankers switched from benign neglect to a more energetic regulatory and supervisory approach. In the US, the fast expansion of the Eurodollar market was regarded as a key factor behind the confidence crisis of the Dollar in 1978 (Hawley 1984, pp. 145-154). One year later, with the monetarist reorientation of monetary policy, US authorities switched from a keynesian demand-management approach to an explicit anti-inflationary approach (Hetzel 2008, pp. 150-171; Meltzer 2009, pp. 1025-1033). In order to restore its credibility in the fight against inflationary expectations and the pursuing of price stability, the Federal Reserve abandoned interest rate targeting and began to use monetary aggregates as intermediate targets – an approach followed also by the German Bundesbank and the Swiss National Bank in Europe. Here, again, the Eurodollar market complicated its task. Similarly to other money market innovations of the period (such as repurchase agreements and money market funds), Eurodollar deposits allowed investors to place funds outside the domestic banking system without limiting its capacity to generate deposits. Being free from reserve requirements (which had been introduced in 1969 but lifted in 1974, since they were easily circumvented), Eurodollars, by decreasing the effective reserve ratio, provided an additional "avenue for the growth of credit" not directly constrained by the supply of federal reserves (Aliber 1980; He and McCauley 2010, p. 9). As already shown (Figure 4), by then the volumen of external dollar claims vis-a-vis non-banks – a measure of the credit generated by the Eurodollar market – was already equivalent to more than 10 per cent of the US money stock as measured by M3. As dollars held abroad were not counted in the US monetary aggregates, unpredictable changes in Eurodollars reduced the usefulness of conventionally-defined money stock targets (Frydl 1982). Moreover, in the 1970s the number of branches of foreign banks in the US had expanded enormously, to the extent that in 1979 they held 40 percent of commercial and industrial loans in the balance sheets of banks in New York and California. Yet, most of them operated only in the wholesale and money markets, and their dominant source of funding was the global

interbank market (Buttril-White 1982). The International Banking Act of 1978 had brought foreign banks under the supervisión of the FED, but banks and non-financial institutions still enjoyed large scope to exploit "ambiguities in the domain of surveillance by different central banks and governments", which made the effects of monetary policy less predictable (Hester 1981, pp. 153-155).

To fix the problem of monetary control, the FED contemplated alternative options. One was taking Eurodollars into account in the targeting of monetary aggregates, which however met technical difficulties. The alternative was to put the external dollar sector on an equal foot with the domestic sector; this would eliminate the risk-adjusted differential in favor of Eurodollars and the incentive for US residents to use them, so that the growth rate of the domestic and external component of money would converge. Since unilateral reserve requirements had failed to achieve this objective, the idea of coordinated controls was brought back to life. In May 1979 the FED and the Bundesbak launched their joint proposal of "a uniform Euro-reserve requirement" on Eurocurrency intermediation (both in dollars and other currencies, to limit scope for further regulatory arbitrage), which kicked off an intense debate among different committees at G10 level (Johnston 1983, pp. 248-278; Clement and Maes 2015). At the same time, a Eurocurrency Market Control Act was introduced in the US Congress, which envisioned a system of temporary Eurocurrency reserves elaborated in coordination with the FED, to be gradually phased out in three years (Helleiner 1994, pp. 135-139; Saadma and Vaubel 2014, pp. 339-357; Altamura 2017, pp. 199-203). In parallel, the Monetary Control Act (finally passed in 1980), which aimed at extending reserve requirements to all depository institutions (including savings and loans banks and credit unions, which were not members of the Federal Reserve System), was being discussed in Congress. By then, the FED had also agreed on the plan proposed by New York bankers for the establishment of International Banking Facilities (previously discussed) as a way to attract back onshore part of the reclycling mechanism that until then had been intermediated through London and other offshore centers. This, the FED hoped, would give US representatives a upper hand in the international negotiations with Britain (Hawley 1984, p. 156; Helleiner 1994, p. 138). However, the proposal met strong opposition domestically from American bankers, who lobbied energetically against it, and internationally from central banks of countries hosting large financial centers (UK, Switzerland and Luxembourg). Eventually the idea of an international regulatory cartel was abandoned (Hawley 1984, pp. 155-160). As an alternative to the regulatory approach promoted by the Fed and the Bundesbank, the Bank of England

proposed a macro-prudential approach aiming at slowing down the growth of international bank lending through the adoption of prudential measures, such as limits on banks' maturity transformation and exposure to exchange and country risk, the adoption of special balance-sheet provisions for involuntarily rescheduled loans and capital ratios. This approach did not meet sufficient support either (Clement and Maes 2015). In the end, the mountain of G10 central bankers gave birth to a mouse in the form of a Euro-markets committee in charge of "regular and systematic monitoring of international banking developments" (Johnston 1983, p. 278).

The failure of international attempts to introduce coordinated controls on Eurocurrencies has been explained as a consequence of conjunctural factors – i.e. shifting policy priorities in the wake of the two oil shocks – and structural changes – i.e. a profound redefinition of the relationships between markets and the state and a rising confidence on the markets' ability to self-regulate. The defeat of the Eurocurrency regulatory proposals of the early and late 1970s is also given a prominent role not only as a locus of the clash between opposed visions of international finance, but also as a turning point in the competition between states on deregulation and the rise of financial globalization (Saadma and Vaubel 2014; Altamura 2017, pp. 247-254). However, a realistic assessment should acknowledge the nature of public good of international cooperation and its exposure to free riding by individual nations, which prevents them from pursuing "cooperative responses to systemic global problems" (Bryant 1983, p. 35). It should acknowledge the "formidable" technical problems that the implementation of the reserve requirements scheme would have encountered (such as the uniformation of bank reporting, or jurisdictional conflicts on the regulation of overseas subsidiaries and consortium banks) and the disintermediation effects that non-interest bearing reserves would generate for G10 banks (which would require a global and uniform scheme) (Johnston 1983, p. 277). It should also consider the degree of coercion required to impose cooperation on reluctant participants, the incentives of governments and banks to break from the agreement which undermined its credibility, and the difficulties to impose sanctions on countries that failed to abide by its terms. Against this background, "it [was] extremely unlikely that an international agreement [was] a feasible solution to the regulatory dilemma created by Eurodollars" (Greenberg 1983, p. 1510).

Moreover, Eurocurrencies were just one of the manifold manifestations of the increasing financial interdependence among national economies. As such, they reflected, but were not at the origins of deeper macroeconomic forces that affected a globalizing economy, such as shifts in investors' confidence in different currencies, differences in monetary policy objectives and preferences, and

adjustments in asset portfolios driven by an expanding set of investment opportunities. As Bryant (1983, p. 15 and 36) posited, "those problems [would] not go away regardless of what might conceivably be done to regulate the Eurocurrency market", as "inhibiting one channel … [was], by itself, merely likely to force the interdependence into other channels". As a consequence, even a successful implementation of Eurocurrency regulations would "generate false expectations about what could and should be accomplished". The Eurocurrency market "acted primarily as an international transmission mechanism"; although it might "blunt the effectiveness of certain domestic monetary policy instruments" or "exacerbate conflicts between external and domestic requirements", the only feasible solution to these problems was "greater international coordination of policies and instruments" (Mayer 1979, p. 65). As the post-2007-09 policy debate on regulatory reforms of international finance revived the interest in possible multilateral schemes for Eurocurrency reserve requirements (Fowler 2014, pp. 856-859), a critical assessment of the experience of the 1970s would be instructive.

Conclusions

In 1959 an obscure new kind of business in which a bunch of British banks in the City of London "placed" and "accepted" short-term dollar deposits spawned for the first time the interest of the financial press. In the following sixty years, Eurodollars and other Eurocurrencies continued to hit the headlines as powerful agents of structural changes in international finance. They promoted the adoption of an entirely new approach to bank intermediation based on wholesale banking and liability management. This created unprecedented scope for leverage, which allowed banks to expand balance sheets faster than ever, but also immensely increased their vulnerability to shocks. Eurocurrencies favoured the distribution and creation of international liquidity while at the same time creating new channels for the international transmission of monetary and financial disturbances. They allowed the financing of enormous balance-of-payments imbalances, but also generated moral hazard on global scale. They were praised as a paradigm of efficient markets and blamed as a source of systemic instability. Their history is a privileged prism through which the virtues and vices of financial globalization can be observed and assessed.

Cross references

International currencies in the lens of history
International monetary regimes: the Bretton Woods system
The evolution of monetary policy (goals and targets) in Western Europe
The evolution of US monetary policy
The Asian dollar market

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