

Lysandrou, Photis

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The European Banks' Role in the Financial Crisis of 2007-8: A Critical Assessment

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The European Banks' Role in the Financial Crisis of 2007-8: A Critical Assessment

Photis Lysandrou

CITYPERC Working Paper No. 2022-03

City, University of London
Northampton Square
London EC1V 0HB
United Kingdom

The European Banks' Role in the Financial Crisis of 2007-8: A Critical Assessment

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Abstract

Since the outbreak of the financial crisis in 2007, opinion has been divided over whether its root cause was credit arbitrage or safe asset demand. New research on the European banks' role in the crisis may finally help to resolve the issue. Far from being peripheral players in the crisis, European banks were deeply implicated in its causal origins as evidenced by their activities in the two US debt markets that were at the heart of the crisis: those for collateralised debt obligations (CDOs) and for asset backed commercial paper (ABCP). These activities would seem to lend weight to the credit arbitrage story, a conclusion that has been reached by several authors. However, it is a conclusion only made possible by ignoring the connection between the federal funds rate and the rate of ABCP demand from the institutional money market mutual funds (MMMFs) in the pre-crisis era. This paper argues that when this connection is closely examined, it turns out that the evidence surrounding the European banks' role in the financial crisis gives greater weight to the safe asset demand explanation of the crisis.

Key Words: European banks; financial crisis; US debt securities markets; US asset backed commercial paper; safe asset demand; federal funds rate; institutional MMMFs.

JEL Classification: G10; F20

1. Introduction

Since the outbreak of the financial crisis in the summer of 2007, opinion has been divided as to whether its root cause was lax financial regulation that allowed the banking sector to engage in credit arbitrage without due regard to the risks involved or whether its root cause were the external pressures on the banking sector to create extra volumes of US debt securities to meet investor safe asset demand. This division has manifested in differing positions as to what must be done to prevent another financial crisis. Put the credit arbitrage explanation of the financial crisis and it follows that no similar crisis can ever again occur if the whole financial system, rather than some parts of it, is made subject to tight regulation. This is the position taken by many mainstream economists and by a number of international financial bodies including the Financial Stability Board (FSB) and the Bank for International

Settlements (BIS)¹. By contrast, put the safe asset demand explanation of the financial crisis and you thereby include amongst its deeper structural causes some wider imbalances in the global economy such as those relating to income inequality and wealth concentration². In this case, tighter financial regulation will not only not suffice to prevent another financial crisis but may also make such a crisis more likely if financial regulation is not accompanied by other policies aimed at tackling these global imbalances.

New research on the role played by the European banks in the crisis may finally help to resolve the issue. Far from being peripheral players in the crisis, European banks were deeply implicated in its causal origins as evidenced by their pre-crisis activities in the two US debt markets that were at the heart of the crisis: those for collateralised debt obligations (CDOs) and for asset backed commercial paper (ABCP). The European banks' simultaneous and double-sided involvement in these markets, issuing short term paper to buy long term mortgage-backed assets that could be used as collateral for the issuance of more short-term paper the proceeds of which could be used to buy more long-term assets and on so in a continually expanding cycle, would seem to lend weight to the credit arbitrage explanation of the financial crisis. This is the conclusion that has recently been reached by several authors³. However, it is a conclusion that has only been made possible by ignoring the strong connection between the federal funds rate and the rate of ABCP demand from the institutional money market mutual funds (MMMFs) in the immediate pre-crisis era. When this connection is closely examined, it turns out that the evidence surrounding the European banks' role in the financial crisis gives greater weight to the safe asset demand explanation of the crisis. It is true that the European banks greatly expanded their dollar credit intermediation activity in the years leading up to the financial crisis, but what is also true is that the chief purpose of that expanded activity was to help absorb the safe asset demand pressures that were spilling over from the US government and corporate bond markets, pressures that were channelled via the federal funds rate-ABCP demand rate connection.

The layout of this paper is as follows. Section two briefly compares the credit arbitrage and safe asset demand explanations of the financial crisis. Section three details the way that the evidence concerning the European banking sector's pre-crisis involvement in the

¹ Thus, in its 2017 report on shadow banking, the Financial Stability Board argued that as a consequence of tighter financial regulation “ those aspects of shadow banking considered to have contributed to the financial crisis have declined significantly and generally no longer pose financial stability risks” (FSB, July 2017, p.1).

² See e.g. van Treek (2010); Lysandrou (2011); Goda and Lysandrou (2014); Goda et.al (2016).

³ See e.g. McCauley (2018); Hardie and Thompson (2021)

US CDO and ABCP markets has been interpreted to give primacy to the credit arbitrage story. Section four shows that when the pre-crisis federal funds rate-ABCP demand rate connection is given close attention, it is the safe asset demand story that has explanatory primacy. Section five summarises the results of a recent econometric study of the US ABCP market in the period 2001-2007 that provide further empirical support for this explanatory primacy. Section six gives some conclusions.

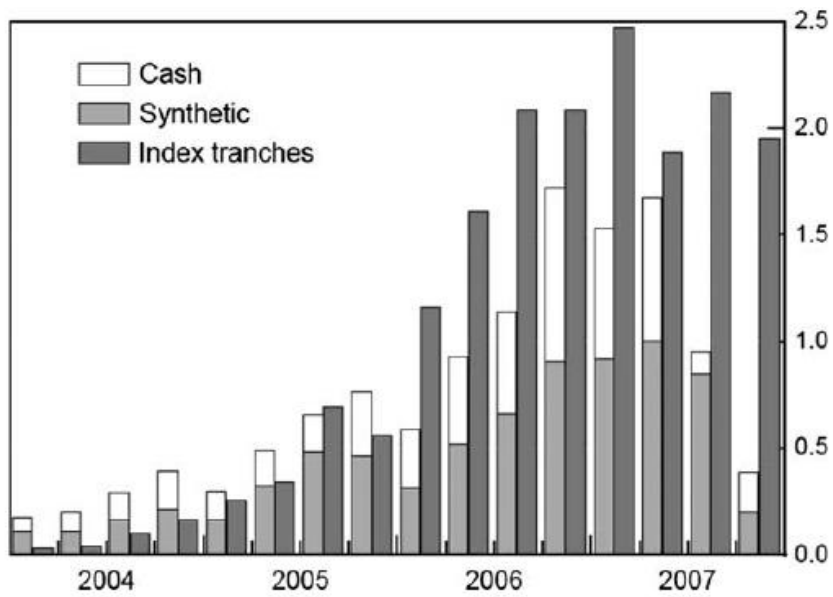
2. The credit arbitrage and safe asset demand explanations of the financial crisis.

The US financial markets at the heart of the financial crisis that broke out in the summer of 2007 were the CDO and ABCP markets. Both markets were comparatively young, dating from the early 1980s, and both remained comparatively small up to about mid-2004 when they then suddenly exploded in size over the next three years, with the CDO market growing twelvefold from around \$250 billion to over \$3trillion (see figure 1), and the ABCP market doubling in size from \$620 billion to about \$1.2 trillion (see figure 2). Had these markets remained as small in mid-2007 as they had been three years earlier, it is doubtful whether the BNP Paribas' announcement on August 9th, 2007, to the effect that it could no longer value the CDOs held by three of its hedge funds would have had the devastating consequences for the global financial system as turned out to be the case⁴. Thus, the question as to what the root cause of the financial crisis was essentially reduces to the question as to what motivated the banking sector to accelerate the rates of production of CDOs and ABCP over this particular short time span.

⁴ To quote Brunnermeier : "On August 9, 2007, the French bank BNP Paribas froze redemptions for three investment funds, citing its inability to value structured products. Following this event, a variety of market signals showed that money market participants had become reluctant to lend to each other. For example, the average quoted interest rate on asset-backed commercial paper jumped from 5.39 percent to 6.14 percent over the period August 8 –10, 2007. All through August 2007, rating agencies continued to downgrade various conduits and structured investment vehicles". (Brunnermeier, 2009, pp.85-6).

Figure 1

Growth of CDOs: 2004-2007

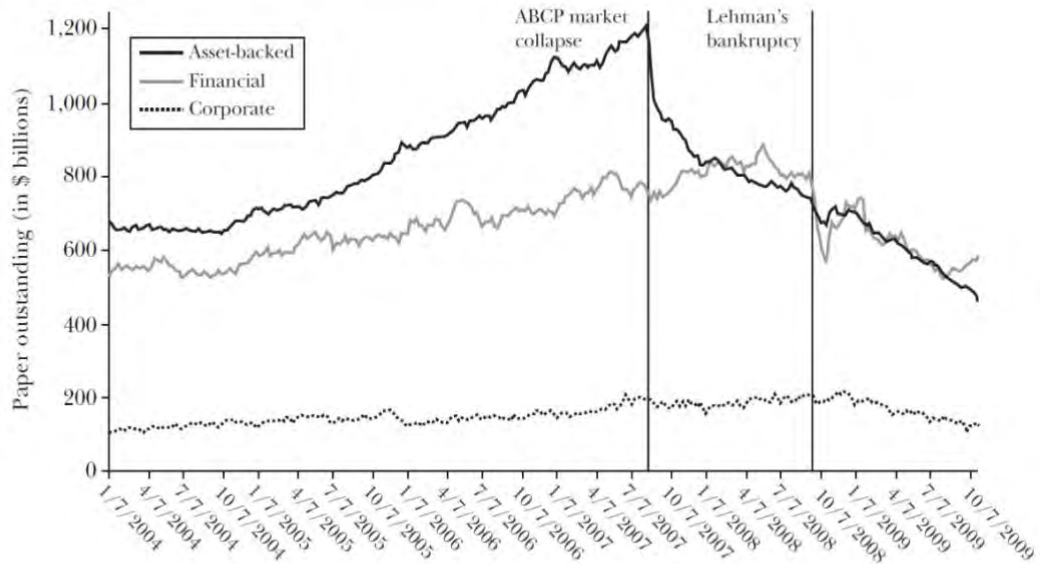


Source: Borio (2008)

Figure 2

Growth of ABCP: 2004-2008

Commercial Paper Outstanding, January 2004–October 2009



Source: Kacperczyk and Schnabl (2010)

There are basically two ways of answering this question: one is to point to internal failings within the banking sector itself, while the other is to emphasise the external investor pressures that were bearing down on that sector. A good example of the first of these positions is to be found in the analysis of the crisis presented by Claudio Borio, chief economist at the BIS. According to Borio, the crisis revealed the financial system's "achilles heel", which is its "excess financial elasticity", a condition that results from "powerful feedback mechanisms" that link together two key limitations in financial agents' behaviour: one concerning their perceptions of value and risk, which "are loosely anchored and highly procyclical" and the other concerning their incentives, which "are inadequate to restrain risk-taking sufficiently during booms" (Borio, 2014, p3). On the basis of these observations, Borio explains how the CDO and ABCP production rates eventually spiralled out of control with a theory that strongly resembles Hyman Minsky's "financial instability hypothesis"⁵. To quote Borio: "As perceptions of risk decline, asset values surge and incentives to take on risk grow, so financing constraints become looser: external funding becomes cheaper and more ample (funding liquidity), and selling assets becomes easier and less expensive (market liquidity). Consequently, as the financial boom proceeds, it feeds on itself, sowing the seeds of its subsequent demise" (ibid). The cardinal problem with this type of analytical framework for explaining the financial crisis is that of *time indeterminacy*: CDO and ABCP volumes had grown rapidly between 2004 and 2007, but why that particular three-year span and not any earlier one, say, 1995-8, or 1998-2001, or 2001-2004? The banking sector had in those earlier periods all the same opportunities, and all the same incentives and techniques, to create CDOs and ABCP on a substantive scale, so why it did it wait until after late 2004 before doing so?

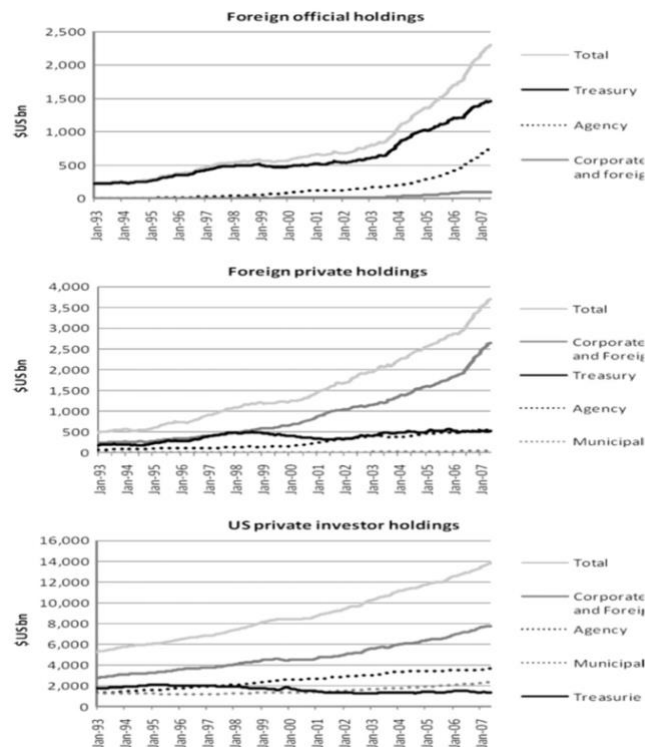
⁵ The developments in the US banking system in the run up to the financial crisis appeared to be consonant with Hyman Minsky's 'financial instability hypothesis' (Minsky, 1977,1982,1986). Its core argument is that prolonged stability in the real sector eventually causes instability in the financial sector because of a progressive lowering of safety cushions generated by the confidence in economic conditions. Although long popular with heterodox economists, Minsky's hypothesis would only come to command serious attention from mainstream economists after the outbreak of the subprime crisis. As Mark Carney, former governor of the Bank of England, observed in a speech given in 2018, following the financial crisis "Minsky became mainstream" (Carney, 2018)

A plausible answer to this question lay in the rate of growth of foreign and domestic investor demand for US bonds for use as safe stores of value, a rate that had remained steady up to about 2004 but then began to accelerate very rapidly from that time on (see figure 3). Despite the large increases in their bond supplies as US corporations and the US government and its agencies sought to take advantage of the rise in investor demand, this remained sufficiently strong over the 2004-7 period as to perpetuate a continuing trend decline in bond yields, a development that then helped to explain the concurrent sharp rise in investor demand for the higher yield CDOs and other private label mortgage-backed securities (MBS). As the MIT based economist Riccardo Caballero summed up these developments: "The entire world, including foreign central banks and investors, but also many U.S. financial institutions, had an insatiable demand for safe debt instruments which put enormous pressure on the U.S. financial system and its incentives... This is not to say that the often emphasized regulatory and corporate governance weaknesses, misguided homeownership policies, and unscrupulous lenders, played no role in creating the conditions for the surge in real estate prices and its eventual crash. However, it is to say that these were mainly important in determining the minimum resistance path for the safe-assets imbalance to release its energy, rather than being the structural sources of the dramatic recent macroeconomic boom-bust cycle" (Caballero, 2010, p.2)

Figure 3

Investment flows into the US bond markets

(1993-2007)



Source: Goda and Lysandrou (2014)

Despite the close time fit between the foreign and domestic flows into the US government and corporate bond markets and the acceleration in CDO production, this was never accepted as sufficient proof of the safe asset demand explanation of the financial crisis by its critics. Claudio Borio, for example, found that the evidence for this explanation “is not convincing” because “strong demand for safe assets in the run-up to the Great Financial Crisis should have led to a widening, not a narrowing, of the spread between safe and risky assets. Associating this demand for safe assets with a search for yield is misleading, since higher demand for safety points to higher, not lower, risk aversion or risk perceptions” (Borio, 2014, p.15). The problem with this argument is its implicit assumption that in the years prior to the crisis the world's investors were faced with a wide choice of different currency denominated bonds in which to store their funds and were thus in a position to demand higher risk premiums on the riskier dollar bonds that they bought. The reality was that they had no such choice because no other currency region was in a position to generate

bond supplies on scales anything like that of the US⁶. Thus, it was entirely understandable that, when, for one reason or other, there was from 2004 onwards a steep increase in the world demand for bonds, this increased demand would find vent in the US bond markets to the point of putting downward pressure on bond yields when the limits on the rates at which the US' government and its corporations could create bonds were pressed. It was also understandable why a further consequence of the excess pressure of safe asset demand spilling over from the US bond markets was the commercial banking sector's acceleration in the rate of its production of asset backed securities (ABS), including MBSs and CDOs, as the means of absorbing that excess pressure.

A more serious threat to the safe asset demand explanation of the financial crisis concerns the US ABCP market. When the CDO market collapsed abruptly in August, 2007, causing panic, it was the ABCP market that was among the very first casualties of this panic and it was its subsequent rapid collapse that served to amplify by orders of magnitude the spread of that panic throughout the entire financial system⁷. Yet in the original presentations of the safe asset demand explanation of the crisis these facts were barely mentioned. The focus of attention was on the link between one set of US long term debt securities markets, those for treasury, agency and corporate bonds, and another set of US long-term debt securities markets, those for MBSs and CDOs. Attention did not stretch to encompass any link between the US long-term debt markets and the US market for short term debt, a major reason for this omission being the failure to look closely at the foreign investment flows into the US bond markets that had emanated from Europe. Figure 3 highlights the point that while the safe asset demand story distinguished between the pre-crisis domestic and foreign flows into the US bond markets, the only further distinction made with regard to the foreign inflows was one according to category of institution, official versus private. Had this story gone on to distinguish between the different regional sources of the foreign inflows, singling out Europe for particular attention, the ABCP market would have most certainly received attention. This

⁶ According to a research report published by SIFMA in November, 2007, between 2002 and March 2007 global bond volumes rose from about \$42 trillion to just over \$70 trillion. Throughout this entire period the world's EMEs accounted for an average of 6% of these volumes while at the other extreme the US on its own accounted for an average of 50% (SIFMA, 2007)

⁷ It was because money market participants became reluctant to lend to each other following the collapse of the CDO and ABCP markets that the financial crisis rapidly engulfed those European banking sectors (e.g. the Irish, Portuguese and Spanish) or those individual banks (e.g. Northern Rock) that had played no part in the US debt securities markets in the run up to the crisis.

did not happen, however, a fact that has been used to full advantage by critics of the safe asset demand explanation of the financial crisis.

The latest addition to this list of critics are Ian Hardie and Helen Thompson, two prominent scholars in the field of international political economy. In their recent paper that called "for greater attention in IPE to European financial developments in the GFC's (great financial crisis) implications" (Hardie and Thompson, 2021, p.775), the main reason advanced for this call was their observation that the geographical locus of the financial crisis was not America, which has long been the consensus view amongst IPE scholars, but Europe. The US may have been home to the market for mortgage-backed securities that was a key financial site of the crisis but, as Hardie and Thompson state: "MBS market weakness did not cause the crisis: rather the problems in MBS markets acted in August 2007 as a trigger for the collapse of bank funding markets... Consequently, the crucial question for conceptualizing the crisis' structural origins has to be the underlying causes of what happened in bank funding markets. These problems were palpably at their most extreme in Europe, where reliance on financial markets for bank funding far exceeded that in the United States" (ibid. p.778) Hardie and Thompson's analysis is framed within a wide-ranging discussion that encompasses such additional claims as that Europe's banks were central to the financialisation process that had been unfolding prior to the financial crisis of 2007-8 and that one important result of that central role was to reduce US monetary autonomy and power. These claims merit serious attention, but the major concern here is with the claim that: "European banks' internationalized operations and these banks' ability to intermediate dollar credit were central to the crisis' causal origins and dynamics" (ibid. pp.776-777). If we accept this particular claim to be correct, then we must also accept the more general conclusion that the "key explanatory variables" as regards the financial crisis were not the external pressures on banks to create safe assets so much as "regulation and banks' business activities (ibid. pp. 776). However, the claim is not correct as we shall show by directing attention to an earlier paper by Robert McCauley of the BIS. While Hardie and Thompson cite several sources in their paper, it is McCauley that they rely on for the data necessary to their line of argument. Thus, in taking issue with this argument it is important that we take a close look at the data used by McCauley and, what is equally important, that we look at the way that he used that data.

3. The European banks' pre-crisis involvement in the US CDO and ABCP markets.

When the volume of foreign investment flows into the US bond markets began to accelerate from end-2004 onwards, the main attention of the US official authorities analysing the likely consequences of this acceleration focussed on the inflows from Asia and from certain other regional emerging market economies⁸. It was only after the outbreak of the financial crisis that their attention was also directed towards the heavy inflows that had emanated from the European advanced market economies. What became clear with this broadening of attention to encompass the 'transatlantic' inflows along with the 'transpacific' inflows was that the differences separating them were substantial. In his 2018 paper on this subject, McCauley listed the key points of difference as shown in table 1. Thus, where Asian central banks and portfolio managers had principally bought US treasuries and federal agency bonds in order to store their savings, the chief source of which were current account surpluses (the 'savings glut' story), the inflows from Europe stemmed from a different sector, namely, that of banking; were directed towards different types of US debt securities, namely, the riskier private label ABSs; were funded by a different source of finance, namely, borrowing on the short term commercial paper market; and, finally, were motivated by a different set of objectives, namely, to boost profits from credit arbitrage in the dollar markets to levels not otherwise attainable in the smaller sterling and eurozone markets (the 'banking glut' story). Given that it was the pre-crisis developments in the US mortgage market that were central to the financial crisis, one can appreciate McCauley's conclusion that: " as an account of key features of the GFC (great financial crisis), the savings glut story comes up short and the banking glut story gives more satisfaction" ..because.. "while the flows into US bonds from surplus countries may well have exceeded those from European banks, the latter better match developments in the US mortgage market" (McCauley, 2018, p.40)

⁸ See e.g. Bernanke (2005)

Table 1

Asian savings glut vs European banking glut

Table 1

	Asian savings glut	European banking glut
Size of inflow	\$1.7 trillion or 10% of US GDP	\$0.7 trillion or 5% of US GDP
Direction	One-way	Two-way: European banks borrow dollars
Protagonists	Official reserve managers	Commercial banks
Demand for safe assets	Positive	Negative (ie supply to depositors)
Duration of target bond	Medium- to long-term	Short- to medium-term
Leverage	Most foreign exchange reserves funded with short-term domestic currency instruments	Short-term dollars borrowed from US money market funds and others
Capital gains/losses	Gains on US Treasury bonds; little private MBS	Huge losses on private label MBS

Source: McCauley (2018)

The banking glut story appears to give even more 'satisfaction' as an explanation of the financial crisis when the pre-crisis financial flows into the US bond markets from European investors are contrasted with those from US investors. McCauley lists the key points of contrast in table 2 that compares US and European bond holdings between end-2002 and mid-2007. At the start of this period, the breakdown of US and European bond holdings according to bond category is fairly similar in that in both cases US treasuries and federal agency bonds accounted for over 50% of these holdings and corporate bonds just over 30%, while ABS holdings accounted for relatively small percentage ratios, 13% for US investors and 9% for European banks. By the end of the period, however, the category breakdown of European US bond holdings had diverged quite substantially from that of the domestic US bond holdings, the divergence being particularly marked in the ABS category. Thus, where at end-2002 the ABS percentage share of European US bond holdings was lower than that of the domestic investors, by mid-2007 it had risen above the latter, 23% as opposed to 20%. Even more striking is the fact that when the category breakdown of European bank holdings is measured according to nationality rather than residence (to incorporate the fact that European banks had purchased ABS through their US securities affiliates) the ABS percentage share of European US bond holdings was 32% as against the 19% share for US investors. In sum, these figures indicate that the European banks were not, as McCauley put it, "hapless investors in US MBS in the mid-2000s" (ibid. p.47). On the contrary, like their US counterparts, the European banks had actively manned "the production line of the private label MBS, issuing them as well as investing in them", and, together their US counterparts,

"drove mortgage originators to deliver the raw material" (ibid) necessary for MBS production.

Table 2

Holdings of bonds issued in the United States by European and US investors
At end-2002 and June 2007 Table 5

	End-2002		June 2007			
	USD bn	Share ¹	Residence-based		Nationality-based	
			USD bn	Share ¹	USD bn	Share ¹
European investors						
Treasuries and agencies	575	57%	704	30%	704	26%
Corporate excluding ABS	340	34%	1,119	47%	1,119	42%
ABS	93	9%	558	23%	855	32%
Total	1,008	100%	2,381	100%	2,678	100%
US investors						
Treasuries and agencies	7,324	54%	8,194	45%	8,194	46%
Corporate excluding ABS	4,349	32%	6,324	35%	6,324	35%
ABS	1,807	13%	3,621	20%	3,324	19%
Total	13,480	100%	18,138	100%	17,842	100%
<i>Memo: ABS outstanding</i>	<i>1,978</i>	<i>12%</i>	<i>4,523</i>	<i>19%</i>	<i>4,423</i>	<i>19%</i>

Source: McCauley (2018)

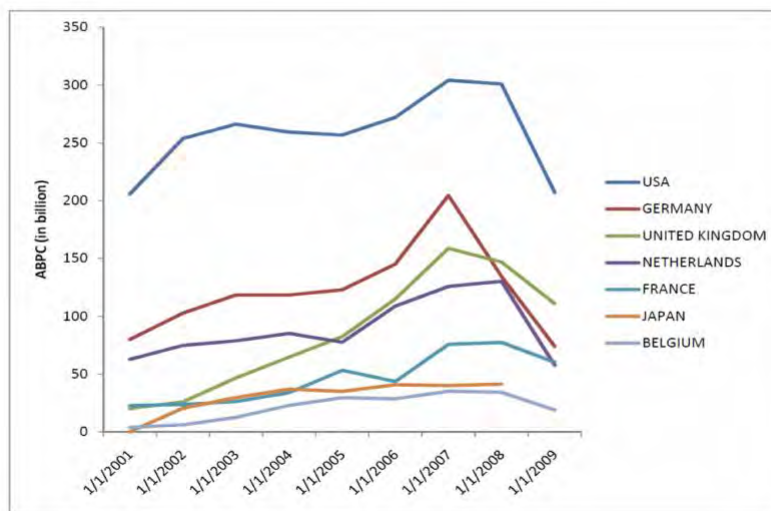
The major difference that separated out the European banks from their US counterparts was that where the latter sold the MBSs and CDOs that they had created to a range of other institutional investors including the European banks, the latter had on the contrary kept the debt securities that they had either bought or created for use as collateral in the ABCP market. As already noted, this market was the youngest of the US markets for commercial paper having only been established in the 1980's, and remained the smallest in size right up to the early 2000s when the situation started to change, first gradually as it began to match the markets for financial commercial paper and corporate commercial paper and then extremely rapidly between 2004 and mid-2007 when it became by this latter date the largest of the commercial paper markets accounting for \$1.2 trillion out a total of \$2 trillion⁹. Of the \$900 billion worth of ABCP produced by the bank-owned or sponsored conduits by this time (various other financial institutions including investment banks and pension funds

⁹ See Brunnermeier (2009) and Arteta et.al. (2013)

had accounted for the remaining \$300 billion), the European conduits were responsible for the majority share of this total (60% as compared with the US conduits' share of 30%, and the 10% share of the remaining conduits). Taken individually, no European country's banks, not even those of Germany, could quite match those of the US in terms of the percentage share of US ABCP supply (see figure 4). This said, it is nevertheless remarkable that, having been on a par with the US banks in the early 2000s, the aggregate percentage share of the European banks should have been twice that of the US banks by mid-2007.

Figure 4

Global ABCP outstanding by country



Source: Arteta et.al (2013)

Alongside the change in the geographical breakdown of the US ABCP market in the run up to the crisis, the other major change was in the programme breakdown of the market. These programmes broadly divide into those where un-securitised credit loans form the major collateral behind ABCP issuance – the principal programmes in this category being the multi-seller, single seller, and loan-backed programmes - and those where securitised loans are the major backing collateral, the principal programmes here being securities arbitrage, hybrid (that combine multi-seller and securities arbitrage characteristics) and SIV. The credit loan backed programmes had always accounted for the majority share of all ABCP up to mid-2007, but what is noteworthy is that the size of that majority had declined appreciably in the preceding two and half years, from 77.1% to 62.8%, while the share of ABCP launched with

securities backed programmes had increased from 21.3% to 32.8% over the same period¹⁰. This development was mostly due to the European bank sponsored conduits that, in collectively taking the lead in accelerating the rate of ABCP supply from 2005 to mid-2007, had resorted to an increased use of securities backed programmes to help maintain that acceleration.

In the end, it was the European banks' double-sided involvement in the CDO and ABCP markets, selling ABCP to fund purchases of CDOs that could be used as collateral for more ABCP issuance, that explains why these banks suffered immense damage on the outbreak of the financial crisis. This said, what is in question is whether the fact that the European banks had helped to expand the CDO and ABCP markets to dangerously high levels through their credit arbitrage activity meant that this activity and its accompanying undervaluation of risk were the root causes of the 2007-8 crisis. This is the conclusion drawn by Macauley and he would have been correct to do so if what is also correct is his assumption that there had been no connection between those pre-crisis flows into the US bond markets that had emanated from Asia and those that had emanated from Europe. In the absence of any connection between these two sets of inflows, one must of course then decide which set best matches the salient features of the financial crisis and, on this criterion, the European inflows come out on top because the European banks had bought the riskier MBSs and CDOs not only for their yield but also for their use in the production of the ABCP that was sold to the US money market mutual funds (MMMFs). As McCauley observed in his critique of those who had instead given explanatory primacy in the financial crisis to the Asian inflows: "Focusing on the official inflow, Caballero et al (2008) saw it as chasing safe assets that Wall Street had a comparative advantage in producing. In fact, official reserve managers steered clear of risky private MBS, however rated... Instead they hugged the shore of US Treasury bonds and US government-supported agency bonds. Those developing this thesis overlooked European banks' provision of safe assets to US money market funds. These banks invested the proceeds in pseudo-safe MBS, many rated AAA, in a so-called "credit arbitrage" strategy which proved far riskier than expected. Official reserve managers demanded dollar safe assets; European banks supplied them"(ibid.p. 42)

McCauley is right in his observation that the safe asset demand explanations of the financial crisis as originally presented did not expand their analysis to include the provision of short-term safe assets to MMMFs alongside the provision of long-term safe assets to

¹⁰ See Lysandrou and Shabani (2018)

official reserve managers and portfolio investors. However, this observation in no way constitutes proof that the safe asset demand explanation is incapable of making this inclusion. On the contrary, it can be expanded to do so and when this is done it becomes clear that the pre-crisis foreign official and private portfolio demand for US treasuries and agency bonds on the one hand and the MMMF demand for ABCP on the other were not two different stories so much as two parts of the same safe asset demand story. The key development that glued these two parts of the story together was the relentless rise of the federal funds rate from June 2004 onwards.

4. The federal funds rate and the MMMF demand rate for ABCP market in the pre-crisis era.

A key factor in the pre-crisis growth of the US ABCP market was the unusual relation between the yield on treasury bonds and the federal funds rate that developed over this period. From 6.5% in late 2000, the federal funds rate fell to 1% in June 2003 where it remained until June 2004. From that point on, the Federal Reserve raised the rate by a quarter percent at a time in seventeen consecutive months so that by May 2006 it stood at 5.25%. In many of the preceding periods of monetary policy tightening, such as in 1988-9, 1994-5 and 1999-2000, the yield on 10-year Treasuries had broadly kept track with the target federal funds rate. On this occasion it did not. What was already unusual is that while the policy rate fell by 5.5% between 2001 and 2004 the yield on 10-year Treasuries fell by only 3.57%, from 6.77% to 3.2%; even more unusual, was that while the policy rate rose by 4.25% to 5.25% which then held from May 2006 to mid-2007, the yield on 10-year Treasuries rose by only 2% over the same period, to 5.2% (see figure 5). Of the various studies that have investigated what became known as the ‘bond yield conundrum’, several focussed on the role played by investor yield demand and found that the pressure of this demand was a significant factor in helping to constrain the rise in the treasury yield¹¹. At the same time, that demand pressure was also a contributory factor behind the rise in the federal funds rate, albeit that in this case its contribution was indirect inasmuch as it was channelled via the developments in the US mortgage loan market.

¹¹ See e.g. Warnock and Warnock (2009); and Goda et.al. (2013)

Figure 5

US long and short term interest rates, 1990-2007



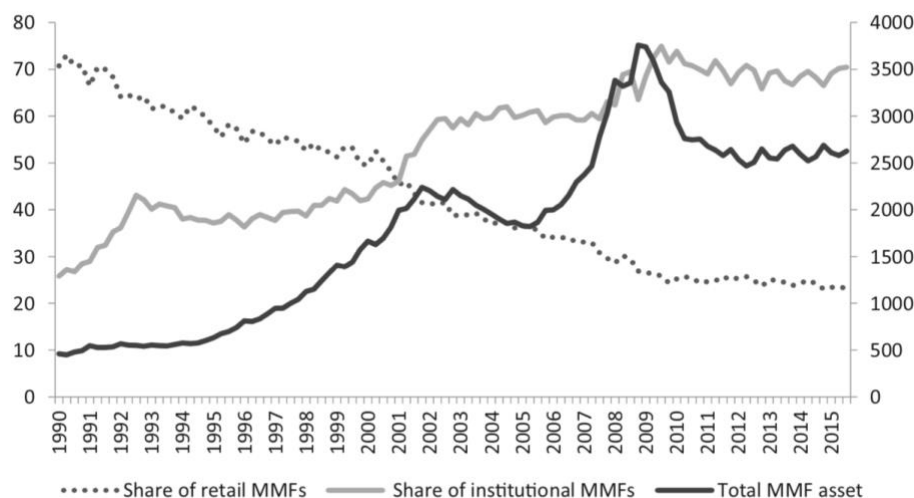
Source: Goda et.al. (2013)

The primary reason why the federal funds rate began to be raised from June 2004 was to contain the inflationary pressures arising out of house price inflation that was largely caused by the sharp rise in residential mortgage loan issuance that was in turn caused by the sharp rise in the demand for the raw material needed for the production of mortgage-backed securities. The ABCP market enters the picture here because the rise in the federal funds rate that eventually caused the CDO market to collapse was also the same factor that had caused the ABCP market to grow to such large proportions by August 2007 as to greatly amplify the negative effects of the CDO market collapse when it too collapsed. The crux of the matter is that the interest rate on ABCP was closely tied to the federal funds rate, so that when these short-term rates rose to levels where they compared favourably with the rates on US long term bonds, ABCP suddenly became a highly attractive supplementary means of satisfying investor demand for yield. The intermediary financial institutions that were pivotal to matching the conduits' supply of ABCP with the demand for yield were the US institutional MMMFs.

MMMFs first emerged in the US in the early 1970s to exploit the opportunity offered by the regulatory cap on the interest that banks could pay on deposits. As the cap was set at a rate below money market yields, the MMMFs provided households with a profitable alternative to bank deposits in that while offering the same level of safety (MMMFs invest only in such short-term assets as to be able to maintain a stable value of \$1 per share) they at the same time provide money market linked yields to clients. However, while regulatory arbitrage was the main driver of US MMMF growth as measured by net asset holdings up until the mid-1990s this thereafter ceased to be the case as interest rate regulation was abolished in 1984 and interstate bank restrictions were lifted in 1994. Rather, the main driver of MMMF growth from that time on was the institutionalisation of this industry's client base. 'Retail MMMFs', which cater to small household investors, were the predominant MMMF type up to the late 1990s, but after that date it is 'institutional MMMFs', which cater to large investors such as corporations, pension funds and insurance companies, that became the predominant type (see figure 6).

Figure 6

**Retail and Institutional MMMF Assets in USD bn (right scale)
Share in total assets in % (left scale)**



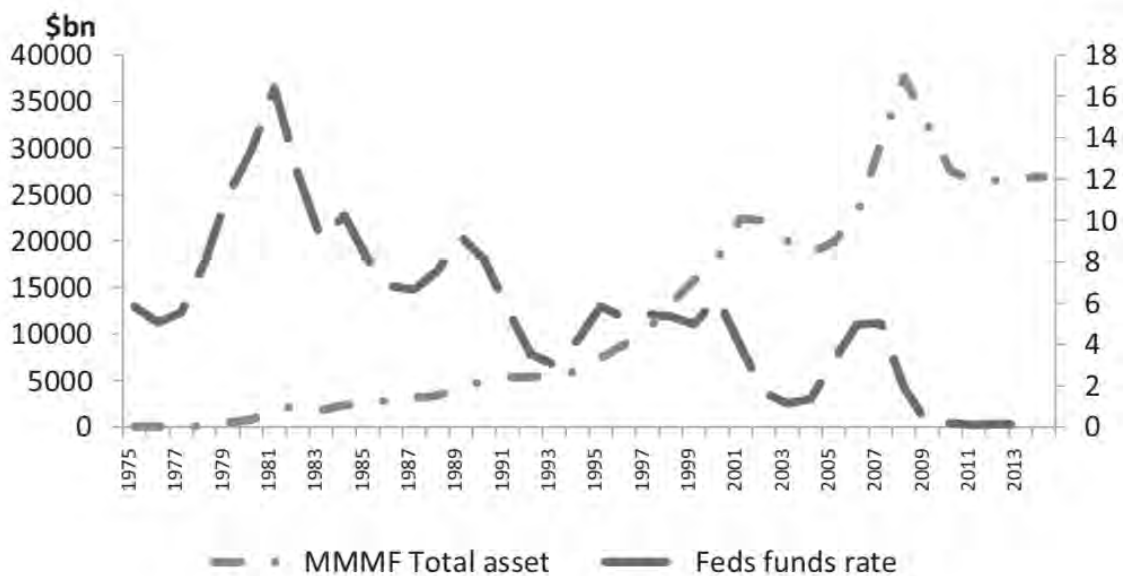
Source: Deutsche Bank (2015)

The most striking outcome of the institutionalisation of the MMMF client base is that changes in the overall size of this financial sector as measured by its total assets begin to

mirror the changes in the federal funds rate (see figure 7). The explanation for this development essentially comes down to the fact that institutional investor demand for MMMF services is far more sensitive to money market rates than is the demand exercised by household investors. For households the relevant short term asset choice is between bank deposits and MMMF holdings, and as long as the yields delivered by MMMFs exceed the interests on bank deposits, households will not withdraw funds from the MMMFs. This is why there is no correlation between the size of MMMF assets and the federal funds rate in the period before the late 1990s when retail MMMFs were predominant. By contrast, the relevant asset choice for institutional investors such as pension funds and insurance companies is not only between different types of short term investments (e.g. between direct holdings of T-bills, corporate commercial paper, CDs and so on and indirect holdings of these instruments via MMMF investments) but also between short and long term investments (e.g. between holding shares in MMMFs and holding bonds and equities). The point is that for many of the large institutional asset managers, holding stocks of cash is a necessary part of the portfolio management process in that these stocks fill in the gaps between the sales and purchases of long-term securities in addition to meeting any other liquidity needs. A further point, however, is that the amounts of these interim cash holdings will tend to fall when short term interest rates are low relative to long term rates in that only the minimum amount needed for liquidity purposes will be held as the yield factor declines in importance, while the amounts of interim cash stocks will tend to rise when short term rates are high relative to the long term rates in that more cash will be held than is usually needed with the excess amount being directed into short term instruments to take advantage of the high yield on them.

Figure 7

MMMF assets (left scale); Feds fund rate (right scale)

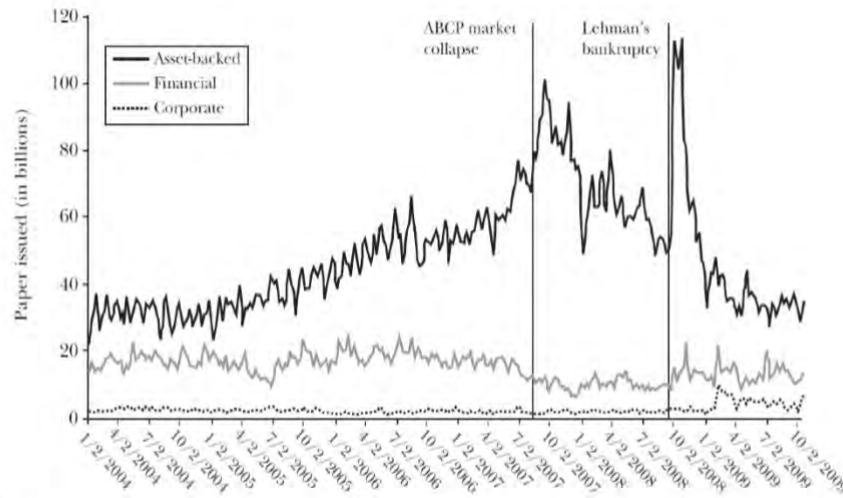


Source: Deutsche Bank (2015)

With the above observations in mind, we can begin to understand what happened between 2005 and mid-2007 in the US ABCP market. Given the increased inflows of cash from institutional investors seeking to benefit from the sharp rise in short term interest rates from mid-2004, the MMMFs had to find equivalent amounts of short-term securities to accommodate these inflows and, in this regard, it was the ABCP sub-sector of the commercial paper market that was by far the most responsive to MMMF demand (see figure 8). The reason why the other sub-sectors were less responsive is that the supplies of financial and non-financial commercial paper are determined not only by the amount of debt that the issuing bank and non-bank corporations wish to carry but also by the structure of that debt. In light of the continuing fall in the long-term rates of return while short term interest rates continued to rise from 2004, many fund-raising corporations chose to lock into the low long-term rates by issuing more bonds and cutting back on their issuance of commercial paper. Thus, faced with an increasing shortage of financial and non-financial commercial paper relative to the amounts needed to accommodate their institutional clients' need for yield, the institutional MMMFs had little option but to turn to the shadow banking system to make good the shortfall.

Figure 8

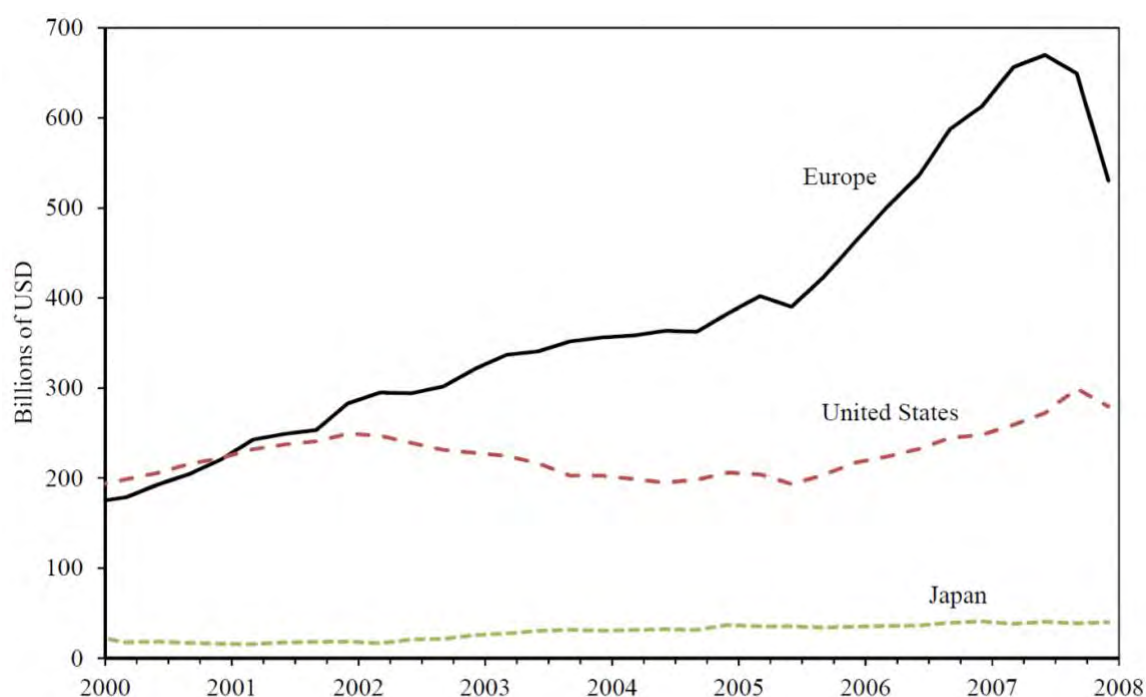
Commercial Paper Issuances: 2004-2009



Source: Kacperczyk and Schnabl (2010)

We come back here to the key role played by the European bank sponsored conduits in the US ABCP market in that it was they, to a far greater degree than their US counterparts, that stepped up the rate of ABCP supply to match the upward spike in ABCP demand from the MMMFs. The European conduits certainly had incentive to do so because they continued to profit from the interest differential between the long-term assets that they held and the short-term paper that they sold. However, that it was the institutional MMMF demand for ABCP that was the principal driving force behind the acceleration in the ABCP supply rate from early 2005 is indicated by the slope of the European ABCP supply curve shown in figure 9. If profit-seeking credit arbitrage had been the driving force behind the European involvement in the US ABCP market throughout the whole period spanning 2002 to mid 2007, then the European ABCP supply curve should have had a steeper gradient before end-2004 when the long term/short term interest differential was far higher than it was after this point. On the contrary, the fact that the European ABCP supply rate rises at a fairly even pace all through the early 2000s before suddenly accelerating from early 2005 only makes sense if one gives primacy to the ABCP demand pull pressure from the institutional MMMFs as the determining factor behind this acceleration.

Figure 9
Global ABCP by Region of Issuance 2000-2008



Source: Source: Arteta et.al (2013)

The upshot of the above series of observations is that was the build-up of the search for yield pressure in the run up to the financial crisis of 2007 that was the root cause of the crisis. The logic is remorseless. The European conduits could not sell ABCP in greater quantities before 2005 than was the case thereafter because there was not at that earlier time any great demand for this paper coming from the institutional MMMFs, and there was not that great demand because the return on ABCP at that time was simply not high enough to appeal to the institutional clients of the MMMFs. It was only from 2005 when the ABCP rate rose to heights that compared favourably with the yields on long term US bonds that institutional investor demand for ABCP, transmitted through the MMMFs, rose accordingly. Thus, the search for yield must have been the principal determinant of the overall pattern of ABCP growth in the pre-crisis era because: (a) if the steep rise in institutional MMMF demand for ABCP only occurred after 2005 in line with the steep rise in the federal funds rate, this rise only occurred because of the inflationary pressures arising out of the US housing market; (b) these house price pressures had only built up to threatening proportions because of the acceleration in the rate of mortgage loan issuance that was needed to feed the

increased production of mortgage backed securities; a development that (c) was propelled by the need to absorb the overflow of the huge amounts of foreign and domestic funds that were being pumped into the US bond markets in the search for yield.

5. Results of a recent empirical study of the US ABCP market in the period 2001-2007

Strong empirical support for the above line of argument has been given by the results of a recent study of the US ABCP market in the period end-2000 to mid-2007 (Lysandrou, Shabani and D'Avino, 2020, (LSD))¹². The study used a panel dataset of ABCP issuance data obtained from Moody's Investor Service that gave quarterly information on programme characteristics and the sponsor details of active conduits. The dataset consisted of all bank-sponsored conduits that issued ABCP in the US market over the period between 2000q4–2007q2, which was a total of 4183 conduits. The main features of the baseline econometric model used were as follows: the dependent variable in the model was the average outstanding ABCP issued in the US market by a particular conduit at a particular quarter over the period from the fourth quarter of 2000 to the second quarter of 2007; the independent variables were the federal funds rate and the total asset holdings of the MMMFs, either by all categories or disaggregated into sub-categories, institutional MMMFs and retail MMMFs. In addition to these two demand factors, the model also controlled for various bank-related factors including leverage, total bank assets, return on assets and the regulatory capital ratio. Finally, the LSD study not only surveyed the overall pattern of events in the US ABCP market between end-2000 and mid-2007 but also compared developments in two sub-periods, the first spanning end-2000 to end-2004 and the second spanning 2005 to mid-2007.

The study presented three sets of results. The first set gave confirmation that the federal funds rate and the volume of institutional MMMF demand for ABCP were between them the two decisive factors determining the ABCP supply rate over the whole sample period: when these demand side variables were relatively low in the first sub-period 2000 to 2004 so also was the ABCP supply rate, and, conversely, when these variables were relatively high in the second sub-period 2005 to mid-2007 so also was the ABCP supply rate. When the MMMF category was split into the institutional and retail subcategories, it was found that institutional MMMFs were chiefly responsible for the strong positive correlation

¹² For a non-technical version of this paper, see Lysandrou and Shabani (2018)

between MMMF asset holdings and average ABCP outstanding volume throughout the whole sample period. The regulatory arbitrage activity of the conduit sponsoring banks was found to have had a secondary positive impact on ABCP volume in the sample period inasmuch as that activity appeared to closely track the general pattern of institutional MMMF demand for ABCP. This close tracking was largely due to the European bank-sponsored conduits, which brings us to the second set of results of the LSD study.

The reason why this study separated its sample period into two sub-periods was the observed sudden acceleration in the ABCP supply rate that occurred towards the end of 2004. In several of the earlier studies of the US ABCP market that appeared soon after the financial crisis, the timing of this acceleration was put down to the fact that the year 2004 was roughly when the US financial regulatory authorities had decided against increasing capital requirements for conduit guarantees that they had been considering since the Enron scandal of 2001. The reasoning was that while the threat of such regulation restrained the rate at which the banks engaged in regulatory arbitrage, that restraint was abandoned when the regulatory threat was eventually lifted¹³. This line of reasoning may have indeed been valid had it been the US bank-sponsored conduits that had taken the lead in stepping up the ABCP supply rate from 2005, but this was categorically not the case according to the results provided by the LSD study. On the contrary, the study found that while the US conduits continued to supply ABCP at the same rate after end-2004 as they had they done up to that time, the European conduits had by contrast accelerated their supply rate in the 2005-2007 period to the point where each of them had on average issued \$40 billion more ABCP in this period than did a non-European conduit. This particular finding puts into serious question the primacy of regulatory arbitrage in motivating the pre-crisis ABCP supply rate because the threat of Enron-induced type of conduit regulation that was lifted in the US in 2004 never did apply to the European commercial banking sector¹⁴. Had regulatory arbitrage motivational

¹³ See e.g. Acharya and Schnabl (2010); Acharya et.al. (2013)

¹⁴ As observed by Acharya et al. (2013), although “European banks started to adopt International Financial Reporting Standards (IFRS) in the early 2000s. . .(and) were therefore required to consolidate conduits on their balance once they adopted IFRS. . .most European bank regulators did not change capital requirements in accordance with IFRS. Hence, for the purpose of computing regulatory requirements and risk- weighted assets, conduits were considered off-balance sheet and European banks did not have to hold regulatory capital against conduit assets. As a result, European banks continued to benefit from lower capital requirements for conduits even after reporting financial statements according to IFRS” (2013, p.525).

primacy, one would have expected the European banks to have sharply increased their rate of ABCP supply well before 2004 when the differential between long term and short-term interest rates, and thus the profitable opportunities offered by regulatory arbitrage, were much higher than they were after 2004. The fact that the opposite happened in that the acceleration in European ABCP issuance only began from early 2005 would indicate that, while profiting from regulatory arbitrage, this acceleration was principally a response to the increased pressure of institutional MMMF demand for ABCP.

The third set of results provided by the LSD study concerned the changes in the ABCP conduit programme breakdown over the period 2001–2007. Drawing on information obtained from Moody's Investor Service, ABCP programmes were divided into those backed by un-securitised loans (multi-seller, single seller and loan-backed) and those backed by securitised loans (securities arbitrage, hybrid, SIV, Repos/TRS, and CDO). It was found that while the loan-backed conduits sponsored by European banks issued on average more ABCP in the US market during the whole period 2001q2–2007q2 than did the securities-backed conduits, the latter took the lead in the sub-period 2005q2–2007q2. In actual fact, the European loan-backed conduits issued on average \$1.6 billion less ABCP over this sub-period than did the securities-backed conduits. By contrast, the LSD study found no evidence of any substantive change in the programme breakdown of the US conduits over the sample period in that in their case loan-backed programmes continued to predominate to the same extent in the second sub-period as in the first sub-period. These findings may help to resolve a conundrum raised in a paper published in 2012 by Bertaut et.al. Having observed that the European banks' average aggregate holdings of US ABS in the 2005–2007 period was double the average figure for the 2002–2004 period, these authors wondered why this was the case when the returns on ABS were far higher in the earlier sub-period than they were in the second sub-period. In answer to this conundrum, they advanced as possible explanations: "that house price appreciation had held down delinquencies on subprime mortgages thus allowing ABS to maintain a record of dependability and an illusion of safety; that low yields on other assets had reduced the incentives for investors to switch from ABS to these other assets; and that, more generally, a culture of risk taking had developed amongst European banks as amongst their US counterparts, that centred importantly around securitisation". (Bertaut et al., 2012, p. 224). An alternative possibility is that in the immediate run up to the financial crisis the European banks were buying increasing amounts of ABS principally for use as collateral backing for the ABCP demanded by the institutional MMMFs. The point made in the LSD study is that when the European banks were faced with a sudden upsurge

ABCP demand from 2005, and found that the loan-backed conduit programmes could not supply enough ABCP to keep up with this demand, their response was to rely more heavily on the securities-backed conduit programmes to make good the shortfall.

In sum, the combined results of the LSD study point to the pivotal role played by the federal funds rate-ABCP demand rate nexus in the story behind the European banks' role in the financial crisis. Hide that pivotal role from view, and the investor demand for yield is relegated to a minor role in that story. This is precisely what Robert McCauley does in his 2018 paper when favouring the transatlantic (banking glut) explanation of the financial crisis over the transpacific (savings glut) explanation. Recall that as regards the European contribution to the financial crisis, the two main facts highlighted by Macauley are that in the pre-crisis era the European banks were the lead producers of the ABCP sold to the US MMMFs and that this lead position was maintained through heavy purchases of ABS for use as collateral. These facts are certainly true, but when taken in isolation it then becomes easy to side with McCauley and conclude, as do Hardie and Thompson, that Europe was the geographical locus of the financial crisis, and that credit arbitrage was its structural cause. The picture turns out to be different when two key variables omitted by McCauley are brought into it. The first of these is the federal funds rate. McCauley makes no mention of this variable and thus makes no attempt to explain why it was that the European banks held much larger amounts of ABS around the 2007 period than they did around the 2002 period when the ABS rate-federal funds rate differential (and hence the profit volume from credit arbitrage) was so much higher in the earlier period than it was in the later period. The second omitted variable is the rate of demand for ABCP exercised by the institutional MMMFs. As McCauley makes no distinction between retail and institutional MMMFs, simply lumping them together in one category, he accordingly assigns all MMMFs a passive demand role in the pre-crisis ABCP growth rate. Retail MMMMs were indeed passive buyers of ABCP as was shown above, but this was categorically not the case as concerned the institutional MMMFs. On the contrary, as their ABCP demand rate was highly interest elastic, these MMMFs actively determined the ABCP growth rate pattern in the years before the financial crisis by ensuring that that rate was low between 2002 and 2004 when the federal funds rate was low and then high between 2005 and 2007 when the federal funds rate (and hence the yield on ABCP) was high. Once these omitted variables are re-introduced, it becomes clear that the US, not Europe, was indeed the geographical locus of the financial crisis and that investor search for yield, not credit arbitrage, was the structural cause of the crisis. The profits from credit arbitrage provided the European banks with the incentive to accelerate the

rate of ABCP production in the run up to the crisis, but it was the pressure of the investor demand for yield, transmitted through the institutional MMMFs, that provided them with the cue to make that acceleration.

6. Conclusion

Recent new research into the nature of the European banking sector's role in the financial crisis of 2007-8 has led several commentators to conclude that that role had causal primacy. This conclusion has serious consequences. If correct, then it must follow that lax financial regulation and the credit arbitrage activities of banks were the key explanatory variables regarding the financial crisis, in which case all that is required to prevent a repeat crisis is to tighten financial regulation and subject banks' business activities to closer scrutiny. There is no need to widen the policy scope to tackle any wider structural imbalances in the global economy. There are many good reasons for this undertaking, but the prevention of another financial crisis is not one of them. The truth of the matter is that the European banking sector did not have causal primacy in the financial crisis. That sector's role in the crisis was certainly important. However, it was so only so in a secondary capacity as becomes evident with an explanation of the financial crisis that details all the cross-linkages between all the financial institutions and all the financial instruments concerned. This paper has sought to provide such an explanation.

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Photis Lysandrou is Research Professor in the City University Political Economy Research Centre (CITYPERC), Department of International Politics, City, University of London. Email address: photis.lysandrou.1@city.ac.uk