The Comparative Advantage of the U.S. Shadow Banking System and the U.S. Dollar

Junji Tokunaga

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Abstract

In the 2000’s prior to the Global Financial Crisis (GFC) of 2008, European banks borrowed short-term dollar funds on liabilities side, in part, from the U.S., and then lent part of it back to invest in long-term dollar assets in the U.S. on assets side. What facilitated European banks to expand their USD-denominated balance sheets across the Atlantic in the 2000’s, despite the creation of the euro in 1999? Compared to the amount of studies on why European banks expanded their balance sheets, few studies have indeed been done to analyze what determined the currency denomination of European banks’ balance sheets across the Atlantic in the 2000’s. In this paper, we argue that European banks’ USD-denominated balance sheets across the Atlantic depended, mainly, on the comparative advantage of U.S. shadow banking system over one in the Eurozone. At financial market level, the full development of securitization and wholesale funding in U.S. shadow banking system appeared to provide European banks with the opportunities for profits-making there. This comparative advantage of U.S. shadow banking system could attract European banks to expand their USD-denominated balance sheets across the Atlantic in the 2000’s. At institutional level, the evolution of U.S. Federal Reserve System (Fed) policy reinforced the comparative advantage of U.S. shadow banking system. During the U.S. housing bubble (2004-06), their unprecedented capacity of expanding USD-denominated balance sheets allowed European banks to overstretch USD-denominated balance sheets, achieving their higher return on equity (ROE). Importantly, their overstretch nature of USD-denominated balance sheets could contribute to strong demand for the privately-created debt securities and financial instruments in U.S., resulting in the dollar’s reign in shadow banking system in the 2000’s. In conclusion, as far as the dominant position of the dollar in the shadow banking system, it seems natural to conclude that the U.S. dollar standard system has been as asymmetric as ever in the 2000’s, in the contrary to the view that it has been less asymmetric than it once was, as Bernake [2015] insists.

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I. Introduction

The U.S. dollar has maintained its position as the leading international currency since WW II. The dominant position of the dollar has enabled the U.S. to be the only country whose external liabilities are denominated, largely, in its own currency, that is the dollar, while other countries have typically to repay their liabilities denominated, largely, in foreign currencies. It has been argued that this currency asymmetry has provided the U.S. with the ability to raise cheaper foreign borrowings denominated in the dollar—called by the ‘U.S. exorbitant privilege’—since the Bretton Woods system. (Rueff [1971/1972])

In the Bretton Woods system, the U.S. converted the official reserve denominated in the dollar into gold at $35 per ounce, while other developed nations, such as Western Europe and Japan, were required to fix the value of their national currencies against the dollar within plus or minus 1% of parity by intervening in their foreign exchange markets. On August 15th, 1971, President Nixon formally announced that the U.S. no longer converted the dollar reserve to gold for foreign central banks (that is, the Nixon Shock). Since the Nixon Shock, foreign central banks in other advanced countries have continued to hold the dollar reserve instead of gold, whereas the U.S. has refused to repay its external debt by gold. The demise of the Bretton Woods system transferred global monetary system from the gold-dollar standard system into the U.S. dollar standard system since the beginning of the 1970’s.

The currency asymmetry in the U.S. dollar standard system has gradually declined since the last half of the 1980’s, because the currency denomination in international financial markets has become more diversified. Furthermore, the emergence of the euro in 1999 was considered as the most dramatic change since the Nixon Shock that would accelerate to transform the global monetary system from the unipolar dollar standard system into the multicurrency system in the long run. (Bergstein [1997])

Actually, the euro could establish its position as the second international currency in the 2000’s. (Papaioannou and Portes [2008]) With respect to global banking, European banks have expanded simultaneously both assets and liabilities of their balance sheets denominated in the euro within the Eurozone and with its neighboring countries. Correspondingly, it seems probable that the U.S. dollar standard system has been less asymmetric than it once was, at least to the Bretton Woods system. (Bernake [2015])

On the contrary, it should be noted that the currency asymmetry in global
banking across the Atlantic increased in the 2000’s prior to the Global Financial Crisis (GFC) of 2008. European banks increased sharply the long-term dollar assets in the U.S., while U.S. banks’ need for European currencies’ assets is much smaller. (Baba, et. al. [2009]; Committee on the Global Financial System Markets Committee [2010]) In order to buy the long-term dollar assets, European banks came to rely heavily on short-term dollar borrowings from interbank markets, U.S. Money Market Mutual Funds (MMMFs), and foreign exchange (FX) swaps in the 2000’s prior to the financial crisis. (Acharya and Schnabl [2009]; He and McCauley [2012]; Shin [2012]) Thus, European banks expanded simultaneously both assets and liabilities of their balance sheets denominated in the dollar across the Atlantic in the 2000’s.

What facilitated European banks to expand their USD-denominated balance sheets across the Atlantic in the 2000’s, despite the creation of the euro? Compared to the amount of studies on why European banks expanded their balance sheets, few studies have indeed been done to analyze what determined the currency denomination of European banks’ balance sheets across in the 2000’s. In order to answer the question above-mentioned, it is essential to analyze that European banks’ USD-denominated balance sheets across the Atlantic depended, mainly, on the comparative advantage of U.S. shadow banking system to less advanced one in the Eurozone in the 2000’s.

In this paper, we argue that the comparative advantage of U.S. shadow banking system over the one in the Eurozone facilitated European banks to expand USD-denominated balance sheets across the Atlantic, resulting in the U.S. dollar’ reign in the shadow banking system in the 2000’s.

The rest of the paper is structured as bellow. Before analyzing the main issue in the paper, Section II overviews that European banks expanded simultaneously both assets and liabilities of balance sheets not only denominated in the euro within the Eurozone and in with neighboring countries, but also denominated in the dollar across the Atlantic in the 2000’s prior to the financial crisis. Section III argues that the full development of securitization and wholesale funding over less advanced one in the Eurozone appeared to provide European banks with the opportunities for profits-making in U.S. shadow banking system, attracting them to expand USD-denominated balance sheets across the Atlantic in the 2000’s before the financial crisis. Section IV analyzes that the evolution of the U.S. Federal Reserve system (Fed) policy reinforced the comparative advantage of U.S. shadow banking system. Section V explains that the unprecedented capacity of expanding their USD-denominated balance sheets during the U.S. housing bubble allowed European banks to overstretch USD-denominated balance sheets, achieving their higher return on equity (ROE). Importantly, the overstretch nature of USD-denominated balance sheets could contribute to strong demands for the private-label debt securities and financial instruments in U.S., resulting in the dollar’ reign in shadow banking system in the 2000’s. The final section (Section VI) suggests two implications drawn from the expansion of European banks’ USD-denominated balance sheets across Atlantic in the 2000’s.
II. The Expansion European Banks’ Balance Sheets in the 2000’s

As is acknowledged by many studies, the expansion of balance sheets at European banks was, mainly, attributed with five factors: (1) the diversification of their portfolios geographically since the introduction of the euro, (2) the depreciation in U.S. dollar against the euro from mid-2001 onwards, (3) the generalized search for high returns in advanced countries, (4) the development of European financial integration led by the Financial Services Action Plan (FSAP) in 1999 and the Lisbon Agenda in 2001, and (5) the regulatory arbitrage under the Basel II. In particular, some studies shed light on the last factor (5): the regulatory arbitrage under the Basel II risk-weight allowed European banks to reduce their required regulatory capital ratio, facilitating them to expand their balance sheets in the run-up to the financial crisis. (Le leslé [2012]; Liikanen et. al. [2012]; Shin [2012]; Slovik [2012]; Hills and Hoggarth [2013]; European Systemic Risk Board [2014]) Between January 2001 and June 2007, the total aggregated balance sheet of monetary financial institutions (MFIs) in the Eurozone increased by 83.6%, rising from €16,905 trillion in January 2001 to €31,530 trillion in August 2008. (Estimates from the European Central Bank, Statistics Bulletin, Table 2.1.)

In term of the currency denomination, European banks had expanded their balance sheets denominated in, largely, two currencies in the 2000’s. First of all, European banks had expanded their balance sheets denominated in the common currency, the euro. While the outstanding of EUR-denominated loans increased from €3,703 trillion in 1999 to €7,230 trillion in 2008, the outstanding of EUR-denominated deposits rose from €3,775 trillion in 1999 to €7,695 trillion in 2008. (Figure 2.1)

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1 The compositions of European banks’ balance sheets have changed in the 2000’s. On the assets side, European banks have focused on interbank lending, trading assets and other assets, while the relative importance of loans have fallen. On the liabilities side, they have reduced their reliance on deposits and turned to short-term funding in interbank and wholesale markets. (European Central Bank [2009a], pp.8-10; Ayadi et. al. [2011], p.12; Liikanen et. al. [2012], p.15) Hardie and Howarth [2013, p.24] define these changes at balance sheets of European banks in the 2000’s as a shift of traditional and commercial banking toward ‘market-based banking’.
Figure 2.1: The Outstanding of EUR-denominated Loans and Deposits of Monetary Financial Institutions (MFIs) in the Eurozone (End of year, EUR billion)

Note: The outstanding of EUR-denominated loans to the Eurozone residents includes all currencies. Source: Estimates from European Central Banks, Statistics Bulletin, Table 2.7.

Bastasin [2012] notes, as Hale and Obstfeld [2014] suggest, that German banks had invested in government bonds within the Eurozone in the 2000’s as below:

“German banks could get money at the lower rates in the euro zone and invest it for a decade in higher yielding assets: for much of the 2000s, those were not only American toxic assets but the sovereign bonds of Greece, Ireland, Portugal, Spain, and Italy. For ten years this German version of the carry trade brought substantial profits to the German banks—on the order of hundreds of billions of euros…” (p.10)

It could be clear from the quotation that European banks had expanded EUR-denominated balance sheets, depending on ‘the euro carry trade’, within the Eurozone in the 2000’s.

In turn, focusing on transactions with non-Eurozone residents, the euro has maintained or extended its share of banking activities with the Eurozone’ neighboring countries, including developed countries and emerging European countries, since the creation of the euro in 1999. As of the fourth quarter of 2007, while the euro was the top currency of denomination on deposits side, amounting to 46.2 percent, the euro ranked the second and its share reached 39.0 percent on loans side. (European Central Bank [2008], p.31) In short, European banks had expanded their balance sheets denominated in the euro within the Eurozone and with its neighboring countries in the 2000’s.
Second, European banks had expanded their balance sheets denominated in the dollar in the 2000’s. (European Central Bank [2011a]; European Systemic Risk Board [2013]) The outstanding of USD-denominated assets and liabilities had significantly increased since about 2000, and both reached around $7,000 billion just before the GFC of 2008, as shown in Figure 2.2

![Figure 2.2: Gross and Net US Dollar Positions of European Banks (USD billions; quarterly data)](source: BIS estimates.)

**Figure 2.2** shows the size of cross-border bank claims denominated in the dollar, arranged by region in 2002 and 2007. The size of the arrows represents the size of the claims. In 2002, the arrow from the U.S. to Europe shows $462 billion. While this arrow grew to $1.54 trillion by 2007, the return leg from Europe to the U.S. increased from $856 billion in 2002 to over $2 trillion in 2007. (Shin [2016], p.6)

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2 European banks had expanded USD-denominated banking activities also outside Europe, such as emerging Asian countries, in the 2000’s. Hills and Hoggarth [2013] propose a stylized representation of USD-denominated financial flows by European banks on a global scale.
Who did engage in the mutually cross-border banking flows across the Atlantic? European banks increased sharply the dollar assets in the U.S. in the 2000’s, while U.S. banks’ need for European currencies was much smaller, as shown in Figure 2.4. (Baba et. al. [2009]; Committee on the Global Financial System Markets Committee [2010]) European banks’ foreign assets in all currencies reached $30 trillion in early 2008, which was about 10 times to U.S. banks. (Baba et. al. [2009], p.66) In short, the currency asymmetry in global banking across the Atlantic increased in the 2000’s prior to the Global Financial Crisis of 2008.

Figure 2.3: U.S. Dollar-denominated Cross-border Claims (billions of U.S. dollars)
Source: Taken from Shin [2016], p.6.

Figure 2.4: The Transatlantic Asymmetry in International Banking
Source: Taken from Baba et. al. [2009], p.66.
As will be mentioned in next section, European banks were major buyers of the long-term debt securities, which were issued by the securitization, in the U.S. In order to fund the increase in the USD-denominated assets, European banks came to rely heavily on short-term dollar borrowings from interbank market, U.S. Money Market Mutual Funds (MMMFs), and foreign exchange (FX) swaps in the run-up to the Global Financial Crisis of 2008. (McGuire and von Peter [2009]; Hanson et. al. [2014]) Specifically, European borrowed short-term dollar funds, in part, from the U.S., and then lent part of it back to invest in the long-term privately-created debt securities in the U.S. (Acharya and Schnabl [2009]; He and McCauley [2012]; Shin [2012]) Thus, European banks had expanded simultaneously both assets and liabilities of their balance sheets denominated in the dollar across the Atlantic in the 2000's before the financial crisis.

Overall, European banks had expanded their balance sheets not only denominated in the euro within the Eurozone and with its neighboring countries, but also denominated in the dollar across the Atlantic in the 2000's before the financial crisis. In the next section, we will focus on the latter, that is, the expansion of dollar-denominated balance sheets at European banks across the Atlantic in the 2000’s.
III. Comparison of U.S. Shadow Banking System with the One in the Eurozone

III.I The shortage of global safe assets (SGSA) view

What facilitated European banks to expand their USD-denominated balance sheets across the Atlantic in the 2000’s, despite the creation of the euro? Compared to the amount of studies on why European banks expanded their balance sheets in the 2000’s, few studies have indeed been done to analyze what determined the currency denomination at European banks’ balance sheets across the Atlantic in the 2000’s.\(^3\) In order to answer the question above-mentioned, it is essential to analyze that European banks’ USD-denominated balance sheets across the Atlantic depended, mainly, on the comparative advantage of U.S. shadow banking system to less advanced one in the Eurozone in the 2000’s.

There are a growing numbers of studies focusing on that the development of shadow banking system was, largely, driven by ‘the shortage of global safe assets’ in the 2000’s. According to the shortage of global safe assets (henceforth, the SGSA) view, there was an insufficient supply of U.S. government-guaranteed safe assets such as U.S. Treasuries and U.S. Agencies, in comparison with strong demand for them from foreign investors, including European banks, in the 2000’s.\(^4\) This shortage facilitated U.S. shadow banking system to create endogenously the USD-denominated debt securities with slight high-return almost as safe as U.S. Treasuries and U.S. Agencies. (Caballero [2006]; Caballero and Krishnamurthy [2009]; Gourinichas [2010]; Pozsar [2011]; Prasad [2014]; Gordon [2015]) In this sense, the SGSA view proposes that U.S. shadow banking system has the comparative advantage in responding endogenously to huge demand for the privately-created debt securities denominated in the dollar.

III.II The full development of U.S. shadow banking system

As many studies explain, there are two important functions of shadow banking system relative to those of traditional and commercial banking system: securitization and wholesale funding. (For example, see Pozar et. al. [2011]; Claessens et. al. [2012]) The size of U.S. shadow banking system has steadily increased since the 1990’s, and it surpassed traditional and commercial banking system in the years before the GFC of 2008. (The Financial Crisis Inquiry Commission [2011], p.32) Likewise, assets of other financial intermediaries (OFIs) in the Eurozone, which are proxy for the activities of European shadow banking system, had grown rapidly in the run-up to the GFC. (Bouveret [2011a]; Bouveret [2011b]; Arquiéy and Artusz [2012]; Bakk-Simon et. al. [2012]; European Commission [2012]; Kozak and Teplova [2012]; Maes [2013]; Saguato [2015]; Jeffers and Plihon [2016]) Assets of OFIs in the Eurozone grew €7.2 trillion in the fourth quarter of 1999 to €14.7 trillion in the fourth quarter of 2007, whereas assets of commercial banks increased €15.0 trillion to €27.0 trillion during the period. (Deutsch Bundesbank [2014], p.20) In what follows, we argue whether or not shadow

\(^3\) Maes [2015] points out that the expansion of USD-denominated balance sheets at European banks in the 2000’s seems to outpace any reasonable growth of the standard views about the choice of international currency.

\(^4\) IMF [2012] explains that safe assets serve as various financial transactions in detail. (p.82)
banking system in two sides of the Atlantic could play two important functions sufficiently in the 2000's.

The process of securitization is conducted through off-balance sheet vehicles such as special purpose vehicles (SPVs), structured investment vehicles (SIVs), and conduits, which are used by a handful of large complex financial institutions (LCFIs) in the U.S. and Europe, including U.S. commercial banks, U.S. investment banks and European banks. Securitization allows banks to turn illiquid assets into private-label debt securities such as mortgage-backed securities (MBSs), asset-backed securities ABSs (ABSs), and collateralized debt obligations (CDOs). According to the SGSA view, there was an insufficient supply of U.S. government-guaranteed safe assets, compared with strong demand for them from foreign investors in the 2000's. In response, the full development of securitization system could issue endogenously MBSs, ABSs, and CDOs with slightly higher-return almost as safe as U.S. Treasuries and U.S. Agencies in U.S. shadow banking. For instance, global issuances of ABSs reached $17.6 trillion during 1999 to 2008, more than two-thirds of which was by issuers located in the U.S. In term of the currency denomination, almost all ABSs issuances originating in the U.S. were denominated in the dollar (99.5%). (European Central Bank [2009b], p.32)

European banks were major buyers of the U.S. privately-created MBSs, ABSs, and CDOs in the 2000's prior to the financial crisis. The linkages between German banks and U.S. MBSs in the 2000's before the financial crisis is shown in Figure 3.1. German banks used SIVs to invest in ABSs and other structured products backed by residential mortgages and loans. As a result, the share of ABSs in European holdings of U.S. securities grew rapidly from 4.7 percent to 14.0 percent between 2003 and 2007 (Bertaut et. al. [2011], Figure 14)

Figure 3.1: German Banks and U.S. Mortgage-Backed Securities: Linkages and Regulatory Oversight
Note: G-SIFIs are ‘Global Systemically Important Financial Institutions’.
Remarkably, as Bayoumi and Bui [2011, p.8] stress, U.S. debt securities play a dual role in USD-denominated balance sheets. While U.S. debt securities support slightly high-yield on assets side, they are used as collateral assets to raise short-term cheaper dollar borrowing through wholesale funding on liabilities side. U.S. treasuries have played the role of ‘universally accepted collateral’.\(^5\) (Schinasi et. al. [2001], pp.4-5) In addition, U.S. Agencies, all types of private-label MBSs, all types of ABSs, and tranches of structured products has also been used for collateral since the last half of the 1990's (Acharya and Öncü [2011], p.330). Before the GFC, a broad range of U.S. debt securities has been used for universally accepted collateral in wholesale funding markets.

First of all, repo market is a vital source of wholesale funding for banks and non-banks. Total repo activity at its peak level before the financial crisis ranged from $5 to $10 trillion. (Baklanova et. al. [2015], p.1) The use of safe assets as collateral makes their borrowings in repos less costly and less risky than borrowing from unsecured money markets.\(^6\) (Malacka [2014], p.157; Gabor and Ban [2015], p.4) As Hördahl and King [2008] explain, the repo market is comprised from two complementary segments, as cash-driven segment and a securities-driven segment. In the former, transactions are generally conducted against general collateral (GC), a basket of non-specific government securities. The average spread for the three-month maturity between the interbank rate and the GC repo rate in the U.S. was 21 basis points between June 2001 and June 2002, compared with 9 basis points in the Eurozone. (European Central Bank [2002], p.61) And, the GC repo rates were on average 5–10 basis points below comparable Overnight Index Swap (OIS) rates, which provide a near risk-free benchmark, in the U.S. prior to the mid-2007. Thus, the repo rate is close to interbank rate, typically slightly below it. (Hördahl and King [2008], p.42)

Moreover, the asset-backed commercial papers (ABCPs) are important wholesale funding for financial institutions to rely on short-term cheaper dollar borrowing. Many European banks issued ABCPs mainly denominated in the dollar. (Acharya and Schnabl [2010]) As Figure 3.2 shows, ABCPs outstanding from European bank-sponsored vehicles had rapidly grown from 2002, and European sponsored off-balance sheet vehicles accounted for about half of the ABCPs outstanding by June 2007. (Arteta et. al. [2013], p.15)

\(^5\) Gabor [2016b] points out that structural demand for repo financing in modern financial markets would increase demand for government bond as collateral asset.

\(^6\) In this connection, the development of collateral intermediation at central desk of LCFIs supported the mining of primary sources collateral assets from hedge funds, pension funds and insurers, and official accounts, etc. The amounts of pledged collateral which European banks (and Nomura Securities in Japan) received from primary sources amounted to around $5,000 billion in 2007, whose size is almost same to one in U.S. banks. (Singh [2011], p.14)
All in all, while the full development of securitization could issue the U.S. privately debt securities with slightly high-return on assets side, they were also used as collateral that enabled European banks to raise short-term cheaper dollar borrowing on liabilities side. Under the model, it is likely that European banks could find the slight margins between assets and liabilities sides as the opportunities for profits-making in U.S. shadow banking system. In short, it can be presumed that the opportunities for profits-making in U.S. shadow banking system would attract them to expand their USD-denominated balance sheets across the Atlantic in the 2000’s before the financial crisis.

III.III The underdevelopment of shadow banking system in the Eurozone

Likewise, there would be a shortage of safe assets denominated in the euro in the Eurozone in the 2000’s before the financial crisis. Because the issuances of government bonds in the Eurozone has been growing at a slower pace than repo market, there would be an increasing demand to find alternative privately-created debt securities as collateral assets during the period (European Central Bank [2006]). Could European banks respond to the shortage of EUR-denominated safe assets there? The answer appears to be no. The main reasons are that shadow banking system in the Eurozone could not play the functions of both securitization and wholesale funding fully. (Tokunaga and Epstein [2018])

The introduction of euro, the increased demand from institutional investors and financial innovations were viewed to encourage the development of securitization in the Eurozone. (Prati and Schinasi [1997a], p.264; Altunbas et. al. [2007], p.10) The securitization issuances rose in the 2000’s, and reached to the peak in 2008. (Figure 3.3)
RMBSs (Residential mortgage backed securities) issuances accounted for over half of all euro-denominated securitized products, spurred by the housing bubble in several Eurozone countries. (Bakk-Simon et. al. [2012], p.12) However, the securitization activity was smaller in the Eurozone than in the U.S. before the financial crisis. For example, the securitization issuance amounted to €462 billion compared with $1.7 trillion in the U.S., around 5 percent and 12 percent of GDP, respectively. (Bakk-Simon et. al. [2012], p.13) The underdevelopment of securitization in the Eurozone was, mainly, attributed with three factors. First of all, European banks have retained the majority of securitized assets on their on-balance sheets, rather than off-loading the assets to other investors. The main cause is that European banks securitize liquid assets to securitized products, and then hold them on-balance sheets to create eligible collateral for the ECB’s refinancing operations. (European Central Bank [2011a]; European Central Bank [2011d]; Bakk-Simon et. al. [2012]) Second, the development of securitization in the Eurozone has been widespread but remains heterogeneous across countries and sectors. In relative term, the securitization issuances have been strongest in the Eurozone countries which have undergone the housing bubble such as Italy, Spain, Portugal and the Netherlands. And, in term of originators, the securitization market in the Eurozone was overwhelmingly dominated by banks, while the share of securitized products issued directly by non-financial corporations remains very small. (Altunbas et. al. [2007], p.11) Finally, the institutional differences in lending criteria, banking institutions, rating standards and default laws in the securitization still remain. (Hakkarainen [2014], p.3) In short, the disadvantage of the securitization in the Eurozone relative to the one in the U.S. impeded the ability of European banks to create privately-produced debt securities denominated in the euro,

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7 Most EU mortgage markets have expanded since the creation of the euro. (Commission of the European Communities [2005], p.5)
in response to the shortage of EUR-denominated safe assets in Eurozone in the 2000’s. For instance, from 1999 to 2008, the issuance of ABSs in the Eurozone amounted to no more than $1,867 billion, in contrast to $11,983 billion in the U.S. (European Central Bank [2009b], p.32)

On the other hand, wholesale funding was considered to develop in the Eurozone in the 2000’s, spurred by the institutional developments in Eurozone-wide wholesale repo market. The development of repo market in the Eurozone would allow European banks to finance their operations at interest rates below those in unsecure interbank market. (Prati and Schinasi [1997a], p.278; Prati and Schinasi [1997b], p.20) Though the introduction of the euro induced wholesale financial markets to be closely and fully integrated, particularly unsecured money market and government bond markets (Schinasi and Teixeira [2006], p.3), there are still many areas where are insufficient to integrate. As Gabor and Ban [2015, p.7] suggest, “...In an area characterized by a single currency, old rules and market architectures may be unsuited to the task and become instead the main obstacles to the attainment of a higher degree of efficiency. The repo market is a perfect illustration of this problem.” (The Giovannini Group [1999], p.1) Because repo markets in the Eurozone have remained largely national and unevenly developed, there has been very little increase in cross-border repo transactions after the creation of the euro. (Galati and Tsarsaronis [2001], p.4)

In order to support for establishing a Eurozone-wide repo market, the European Commission launched the Financial Services Action Plan (FSAP) in 1999, which were aimed at the legislative-regulatory harmonization policies to tackle the last remaining obstacles for the integration of wholesale market. The FSAP contained 42 key legislative initiatives proposed by the European Commission to update existing EU rules and to extend the level of EU regulatory harmonization. Above all, the FSAP’s legislative agenda included the planned adoption of new directives on the cross-border use of collateral and on market manipulation. (European Central Bank [2012], p.37) As of May 2008, all FSAP directives had been transposed into all EU Member States’ national laws. (Grossman and Leblond [2011], p.417) Additionally, the ECB from the outset has accepted a broader range of collateral than other central banks in its open market operations, in order to promote the development of Eurozone-wide repo markets. (Eichengreen [1997], p.18; Prati and Schinasi [1997a], p.276; Gabor [2016b], pp.931-932) In this connection, the ECB created a euro GC basket called by ‘Euro GC Polling’ that included all EMU government bonds in the same liquidity category, encouraging private repo market activity. This system facilitated repo transactions via a central counterparty (CCP) and offers an automated cross-border collateral management system that allows banks to reuse of GC collateral and pledging of

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8 Kastu [2003] is a pioneer study to argue the international use of the euro in term of the development of European repo market.
9 The establishment of European repo market can be considered to solve the institutional problem confronting Eurozone countries in a euro government bond market that become a de facto ‘German bund zone’. (Gabor and Ban [2015], p.2)
10 In other words, a euro GC repo market “would effectively manufacture high-quality collateral out of previously illiquid and/or lower-rated EMU government debt on the same funding terms with German debt, without additional regulatory burden.” (Gabor and Ban [2015], pp.8-9)
collateral with the ECB.\footnote{Gabor [2016a] regards the growth of repo market in the Eurozone as “a private-public joint venture” before the GFC.} (Hördahl and King [2008], p.48) As a background, repo participants increasingly used foreign government in the Eurozone as collateral. The share of cross-border euro repos increased their share from 36 percent in 2001 to 48 percent in 2008, while ‘home’ collateral declined from 63 percent to 31 percent during the period. (Gabor and Ban [2015], pp.8-9) As a result, the outstanding of European repo market (repo plus reverse repo positions) has been increased from €1,863 billion in June 2001 to €6,775 billion in June 2007. (Data from International Capital Market Association European Repo Market Survey)

However, similarly to the underdevelopment of securitization, there are still barriers and constraints for the development of Eurozone-wide repo market in the 2000’s. First, EUR-denominated government bonds are main source of collateral assets in private repo market in the Eurozone, due to the underdevelopment of the privately-created debt securities denominated in the euro.\footnote{There is no equivalent to the U.S. Treasuries at the level of the Eurozone, owing to the segmentation of public debt market and the lack of coherent fiscal framework. (McNamara [2008], p.449)} According to Table 3.1, the ECB accepts a broader range of collateral through its open market operation. (Left side of the table) By contrast, the collateral assets usage of the privately-produced debt securities reached only 15.8% in the private repo market in EU, while central government bonds accounted for 84.2% in 2006 there. (Right side of the table)

<table>
<thead>
<tr>
<th>Eurosystem (Source: ECB data)</th>
<th>Repo market (Source: ICMA)</th>
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<tbody>
<tr>
<td>Central Gov</td>
<td>22.50%</td>
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<tr>
<td>Regional Gov</td>
<td>0.60%</td>
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<tr>
<td>Uncov Bank Bonds</td>
<td>31.50%</td>
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<tr>
<td>Cov Bank Bonds</td>
<td>13.20%</td>
</tr>
<tr>
<td>Corporates</td>
<td>6.60%</td>
</tr>
<tr>
<td>ABS</td>
<td>12.10%</td>
</tr>
<tr>
<td>Other marketable</td>
<td>3.80%</td>
</tr>
<tr>
<td>Credit claims</td>
<td>3.70%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

Table 3.1: Average Collateral Usage during 2006 in Primary and Secondary Funding
Source: Reproduced from Ewehart and Tapking [2008], p.54.

Second, the ECB became more selective about government bonds in the Eurozone as eligible collateral in its refinancing operations since December 2005. The ECB intended that the government bonds must have a single A-rating or better from at least one of three rating agencies (Financial Times, November 9, 2005), as Cohen [2011a] suggest. Finally, many barriers to efficient cross-border securities settlement still remained
unaddressed, which meant that Europe could not establish an integrated wholesale funding market (European Central Bank [2014]; International Capital Market Association [2014], p.11). The insufficient integration and fragmented infrastructure for European securities settlements resulted in a higher cost of clearing and settlement in the cross-border EU than in the U.S. and the domestic EU. (Figure 3.4)

- EU domestic costs range from 0.35 to 3.43 €;
- ... and are higher than US (+ 0.10 to 2.90 €);
- Cross-border costs higher than domestic ones (19.5 to 35.0 €).

Source: Oxera, LSE, CEPS

**Figure 3.4 Domestic and Cross-border Settlement Costs in EU**

Source: Taken from European Central Bank [2007], p.6.

Taking these barriers and constraints in repo market in the Eurozone into account, it is conceivable that the underdevelopment of securitization and wholesale funding in the Eurozone could not provide European banks with the opportunities for profits-making fully shadow banking system in the Eurozone.

Therefore, it can be presumed from the comparative analysis of shadow banking system in two sides of the Atlantic that the full development of securitization and wholesale funding appeared to provide European banks with the opportunities for profits-making in U.S. shadow banking system. The comparative advantage of U.S. shadow banking system at financial market level could attract European banks to expand their USD-denominated balance sheets across the Atlantic in the 2000’s before the financial crisis.
IV. The Evolution of U.S. Fed Policy for the Development of Shadow Banking System

IV.I. The greater importance of the function of lender of last resort in the development of shadow banking system

As mentioned before, U.S. shadow banking system has increased since the 1990’s. Because the development of shadow banking system leads its mode of financial intermediation to become longer and more multiple than traditional and commercial banking system, the interconnectedness between various financial institutions, particularly the nexus between banks and non-banks, have increased there. (For instance, see Adrian and Shin [2010], pp.1–5; Claessens et. al. [2012], p.8) The increase in interconnectedness in shadow banking system could create the buildup of systemic risk arising from a bank failure and default, which would lead to recurrent of crisis.13

The recurrent of crisis would require central bank to counter financial distress. Though commercial banks could have access to central bank’s refinancing facilities and deposit insurance in time of financial crisis, non-banks, which plays a critical role in U.S. shadow banking system, could not have access to such liquidity backstops at that time. As shadow banking system develops, it is necessary for central bank to play a function of lender of last resort (LLR) as the countercyclical monetary policy, in order to rescue not only commercial banks but also non-banks facing systemic risk. The function of the LLR, which was recognized by Walter Bagehot in 19th century, refers to central bank’s responsibility to accommodate credit demands for high-powered money from banks in time of crisis. (Humphrey [1992]) Folkerts-Landau and Garber [1992] clearly explain the greater importance of the function of LLR, with the development of securitization and wholesale funding, two important functions of the shadow banking system, as below:

“...financial system with liquid, securitized money and capital markets are more likely to experience liquidity crises than bank-intermediated financial systems. Hence, such financial system has a greater need for a central bank with a lender-of-last-resort function...the greater the extent of securitization, the greater the demands on the wholesale payments system and the greater the need for the central bank to provide daylight credit or to act as a lender-of-last-resort function in case of settlement failure.” (pp.22-23; Underline is mine)

As will be argued later, the Fed has been expanding the scope of the function of the LLR as background of the development of U.S. shadow banking system since the 1990’s. (Herr [2013]) Similarly, because the rapid evolution of European Monetary Union (EMU) promoted European financial markets to become liquid, securitized financial markets, it would be essential for the European Central bank (ECB) to play a role of the LLR in the Eurozone. (Folkerts-Landau and Garber [1992], p.31) Accordingly, it becomes crucial for the Fed and the ECB to play a role of the LLR, as shadow banking system in two sides of the Atlantic develops. In what follows, we analyze the

differences on the function of the LLR between the Fed and the ECB in the 2000’s.\textsuperscript{14}

**IV.II The U.S. Fed’ lender of last resort**

The U.S. Fed understands that the function of the LLR goes beyond the scope of stabilizing U.S. commercial banks, as U.S. shadow financial system develops since the 1990’s. \textsuperscript{15}(Folkerts-Landau and Garber [1992], p.25) Furthermore, the Fed comprehends implicitly that it has responsibilities to play a role of ‘an international lender of last resort’ for non-U.S. banks. \textsuperscript{16} According to Broz [2012, p.8], “the Federal Reserve Act of 1913 gave the Federal Reserve responsibility for both setting monetary policy and for maintaining the stability of financial markets. In the latter capacity, the Fed supervises U.S. and non-U.S. banks and bank holding companies that are members of the Federal Reserve System and provides a role of the LLR to these institutions during financial crises.” As the financial crises from 1982 onwards have showed, the U.S. Fed has effectively played the role of an international LLR. (Strange [1986/2016], p.151; Papaioannou and Portes [2008], pp.71-73; Obstfelt [2009], pp.12-13) In short, the LLR by the U.S. Fed could provide backstops for not only U.S. financial institutions, but also non-U.S. financial institutions in face of financial failure. \textsuperscript{17}

**IV.III The ECB’ lender of last resort**

Next, we discuss whether or not the institutional framework of the Eurosystem could allow the ECB to play a role of the LLR fully in the Eurozone.

In December 1991, the EU signed the Maastricht Treaty, which was known as the blueprint for progress toward EMU.\textsuperscript{18} The Treaty provides the legal basis for the European System of Central Banks (ESCB), which comprises the ECB and the national central banks (NCBs) of member states of the EU. The ‘Eurosystem’ stands for a subset of the ESCB that comprises the ECB and the NCBs of which introduce the euro. The governing bodies of the Eurosystem are the Governing Council and the Executive Board. (Gerdesmeier et. al. [2007], p.8) According to the Maastricht Treaty, the primary objective of the ECB is the maintenance of price stability. (Article 105.1) And, the basic tasks of the Eurosystem include the implement of monetary policy, conducting foreign exchange operations, holding and managing the official foreign reserves, and promoting the smooth operation of payment systems. (Article 105.2) The institutional frameworks of the Eurosystem seem to be similar to other central banks in advanced

\textsuperscript{14} Prati and Schinisai [1997a] [1997b] compare the daily liquidity management in the U.S. Fed with central banks in Europe in the 1990’s.

\textsuperscript{15} In time of the subprime mortgage crisis in summer of 2007 and the GFC of 2008, the Fed provided the massive amount of the LLR loans to financial institutions that experienced severe dollar funding shortages. (Broz [2012], pp.7-8) Mehrling [2011] explains that the Fed plays ‘the dealer of last resort’ to ensure the liquidity of securities markets amid the GFC of 2008.

\textsuperscript{16} Kindleberger [1978/2005] describes the long history of the international lender of last resort.

\textsuperscript{17} Scott [2015] argues that the Dodd–Frank Act weakens the Fed’s LLR function.

\textsuperscript{18} De Grauwe [2012] explains about both the transition toward the EMU (Sec. 7) and the Eurosystem (Sec. 8). European Central Bank [2001] in its annex section includes two important documents for understanding the Eurosystem: “Excerpts from the Treaty establishing the European Community” and “Protocol on the Statute of the European System of Central Banks and of the European Central Bank”.
countries as the U.S. Fed, but monetary policy in the Eurosystem is decentralized. One of decentralized features of the Eurosystem lies in the separation that while monetary policy is entrusted to the ECB, the responsibility for banking supervision is kept in the hands of the NCBs. (Moutot et. al. [2008], pp.18-19)

This decentralized institutional structure in monetary policy produces the concern that the ECB could not play a function of the LLR sufficiently in time of crisis. Actually, the words 'LLR' do not appear in any official documentation describing the functioning of the Eurosystem. (Garcia-de-Andoain et. al. [2016], p.8) Instead, the Eurosystem provides the Emergency Liquidity Assistance (ELA). European Central Bank [1999] mentions the context of the ELA as below:

“Co-ordination mechanisms are primarily called for within the Eurosystem. This is the case for emergency liquidity assistance (ELA), which embraces the support given by central banks in exceptional circumstances and on a case-by-case basis to temporarily illiquid institutions and markets.

At the outset, it is necessary to stress that the importance of ELA should not be overemphasised. Central bank support should not be seen as a primary means for ensuring financial stability, since it bears the risk of moral hazard. Preventive measures aimed at fostering the adoption of sound risk management practices on the part of financial institutions, and the effectiveness of prudential regulation and supervision in achieving this goal, are the first line of defense against excessive risk-taking behaviour and financial distress.

Furthermore, the provision of ELA has been a very rare event in industrial countries over the past few decades, while other elements of the safety net have gained importance in the management of crises. However, if and when appropriate, the necessary mechanisms to tackle a financial crisis are in place. The main guiding principle is that the competent NCB takes the decision concerning the provision of ELA to an institution operating in its jurisdiction. This would take place under the responsibility and at the cost of the NCB in question.” (p.98; Underlines are mine)

Based on the quotation, while the implementation of the ELA could be considered as the exceptional provision of central bank liquidity to a solvent bank facing temporary liquidity problems, it is unclear whether or not the ECB could enforce the ELA in face of financial crisis. This unclear stance of central bank is called by ‘constructive ambiguity’ that policymakers should recognize that the overly generous LLR assistance might give financial institutions the moral hazard, which might allow them to encourage excessive leverage and risk-taking. (IMF [2014], p.102)

Could the ECB play a role of the LLR in face of Eurozone-wide financial crisis? Papadoa-Schioppa [2000] stresses that the Article 105. 5 and 6 in the Treaty seem to ensure the smooth interplay between monetary policy and supervisory responsibilities as below:19

19 Furthermore, “Protocol on the Statute of the European System of Central Banks and of the European Central Bank” refers to the possibility of mutual communications between the ECB and other authorities as below: “The ECB may offer advice to and be consulted by the Council, the Commission and the
“The ESCB shall contribute to the smooth conduct of policies pursued by the competent authorities relating to the prudential supervision of credit institutions and the stability of the financial system.” (Article 105.5; Emphasizing is mine)

“The Council may, acting unanimously on a proposal from the Commission and after consulting the ECB and after receiving the assent of the European Parliament, confer upon the ECB specific tasks concerning policies relating to the prudential supervision of credit institutions and other financial institutions...” (Article 105.6)

If such articles were to be functioned properly, the concern about the separation between monetary policy and supervisory responsibilities would disappear. Hence, Papadoa-Schioppa [2000, pp.17-18] suggests that the procedure defined by the Treaty could be interpreted as a ‘last resort clause’ which enables the ECB plays a role of the LLR.

On the other hand, Aglietta [2000] insists that the Maastricht Treaty gives a very limited role to the ECB to counter Eurozone-wide systemic risk. Though the possible contribution of the ECB for financial stability is mentioned in the Article 105.5, policies toward this purpose are made by ‘competent authorities’ in this article are not defined. As it turned out, Aglietta [2000, p.47] proposes that the LLR function cannot be clearly identified in the Eurosystem.

Which views are reasonable to explain whether or not the ECB could play a role of the LLR? Prati and Schinasi [1997a] explain as below:

“Even though ‘constructive ambiguity’ about the conditions under which lender-of-last-resort facilities will be available is a necessary element in preventing moral hazard, there should be no ambiguity among policymakers about the mechanisms that will be called upon to manage crisis situations.” (p.296; Underlines is mine)

It can be analyzed from the quotation that it is fundamental for the Eurosystem to create the mechanism in order to tackle Eurozone-wide crisis. As explained earlier, the ELA’s responsibility lies with the NCBs, not the ECB. Above all, any costs and risks arising from the ELA operations are incurred by the NCBs themselves. (European Central Bank [2013]) Hence, the decision concerning the provision of the ELA is determined nationally and, a national responsibility. 20 In short, the ambiguity of the ECB’ stance about the function of the LLR should be considered as destructive rather than ambiguous.

competent authorities of the Member States on the scope and implementation of Community legislation relating to the prudential supervision of credit institutions and to the stability of the financial system.” (Article 25) See European Central Bank [2001], p.114.

20 Beyond that, recall that the ECB focused, mainly, to operate its monetary policy on cutting short-term interest rate and using its normal main refinancing operations to support commercial banks in the time of subprime mortgage crisis in 2007 and until the GFC of 2008 (Herr [2013], p.70). This fact demonstrates that the articles of the Maastricht Treaty and the ELA prove to be dysfunctional for countering the GFC, by which European banks have seriously been damaged.
than constructive.21

In the end of the subsection, we summarize the differences on the function of the LLR between the U.S. Fed and the ECB. First, there is the recognition that the U.S. Fed can be expected to intervene in force to rescue LCFIs, including European banks, when they go in trouble in U.S. shadow banking system. Second, there is the institutional flaw for the ECB to play a role as the LLR fully, although it is able to make decisions on the ELA. 22

IV.II The ‘too-big-to-fail’ policy

In essence, Baghet [1873] suggested the LLR policy rule that central bank should lend freely at penalty rates against good collateral in order to save solvent but temporarily illiquid banks. But the U.S. Fed has increasingly lent to insolvent large banks of doubtful soundness, particularly when such large banks were judged as ‘too-big-to-fail’. As a background, the U.S. Fed and the U.S. government has adopted the doctrine of too-big-to-fail (TBTF) policy since the 1980’s, which goes away beyond the function of the LLR by the Baghehotian rule. Mallaby [2016] mentions that Paul Volker, a chairman of the Fed, introduced the TBTF policy in the face of the crisis the beginning of the 1980’s as below:

“Now even the Churchillian Paul Volker had followed the same path. On Mexico and again on Continental Illinois, he had thrown public money at defaulters and allowed private creditors to escape unscathed. The doctrine of ‘too big to fail’ has been established.” (p.301)

The TBTF policy is based on the belief that the failure of large banks has such negative impact on financial system. In order to reduce the negative impact, central bank and government would do whatever it takes to prevent such a failure, even if financial bailout must be paid by taxpayers in some cases. Sorkin [2009] refers in his bestseller book “too big to fail” to that Wall Street bankers expected U.S. policymakers to rescue by the TBTF policy in the face of the Lehman Brothers’ bankruptcy in September 2008 as below:

“Like most people on Wall Street—including Richard S. Fuld Jr., Lehman’s CEO, who enjoyed one of the longest reigns of any of its leaders—many of those listening to the

21 The remarks of the former presidents of the ECB about the function of LLR at the ECB are as below: Willem Duisenberg, the first president of the ECB, response to a question regarding the role of the ECB as a the LLR in 1998 as below: “The Governing Council has this issue well under control but will never make anything public in this regard” as Pollard [2003, p.19] suggest. When the Eurozone faced the Greece default in 2011, the ECB has taken measure to stabilize the euro-denominated government bonds markets. (Atkins [2011]; Barber and Atkins [2011]) At that time, Jean-Claude Trichet, the second president of the ECB, stresses that “the ECB has done all it could to be up to its responsibilities in exceptional circumstances … The ultimate backstop is, of course, the governments.” So he makes clear that “the ECB will not act as a ‘lender of last resort’ to governments.” (Barber and Atkins [2011])

22 De Grauw [2013] insists that the ECB should play a role of the lender of last resort in government bond markets of the monetary union.
call assumed that the government would intervene and present its failure.” (p.2)

Inevitably, the TBTF policy would give Wall Street financial institution and large European banks the implicit protection that their USD-denominated assets could be protected by U.S. policymakers in face of financial distress. (Obstfeld [2009], p.11) Carbo-Valverde et. al. [2011] find that large European banks and U.S. banks enjoyed higher ex-ante safety-net benefits by the TBTF policy in 2003-2008. As a result, the de-facto insurance by the TBTF policy might support them to enjoy cheaper funding to increase their leverage on liabilities side, and to engage in riskier activities on assets side, as illustrated in Figure 4.1.  

![Figure 4.1: Effects of Too-Important-to-Fail Protection on a Simplified Bank Balance Sheet](image)

Source: IMF staff.

Note: SIB = systematically important bank; TITF = too important to fail.

Figure 4.1: Effects of Too-Important-to-Fail Protection on a Simplified Bank Balance Sheet
Source: Reproduced from IMF [2014], p.103.

All in all, it seems practical to infer that the TBTF policy would give European banks the implicit protection that their dollar assets in U.S. shadow banking system must be supported by the U.S. policymakers in face of financial crisis.

IV.III ‘Greenspan put’

In addition, the Greenspan’s Fed executed a peculiar monetary policy in the 2000’s. The Fed had cut short-term federal funds (FF) rates aggressively since the collapse of Long-Term Capital Management in 1998 and the burst of the tech-bubble in 2000. Just

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23 The implicit subsidies in term of funding cost advantage for large banks, led by the development of the TBTF in advance countries, have been estimated large since the GFC, especially 2008 to 2009. (IMF [2014], pp.103-104)
after the burst of the tech-bubble, the U.S. Fed began to cut the FF rate by 50 basis points in early January 2001, and then eased intermittently, bringing it down to 0.98 percent in December 2003. (Figure 4.2)

Figure 4.2: Effective Federal Funds Rate (Monthly, Percent, Not Seasonally Adjusted)
Source: Federal Reserve Bank of St. Louis, Economic Research.

This is the example of what came to be known as the ‘Greenspan put’ that the Fed cuts the FF rates sharply each time after burst of bubble.

The Greenspan put is based on the experience of deflation in Japan in the 1990’s. 

24 Greenspan [2007] in his official autobiography suggests as below:

“Japan had figuratively opened its money taps, driven interest rates to zero, and run a large budget deficit, yet its price level had continued to fall. The Japanese seemed unable to break the grip of deflation and must have been quite fearful that they were in the type of downward spiral that nobody had witnessed since the 1930s...We wanted to shut down the possibility of corrosive deflation; we were willing to chance that by cutting rates we might foster a bubble, an inflationary boom of some sort, which we would subsequently have to address.” (pp.228-229; Underline is mine)

It is understood from the quotation that the Fed considered that deflation in Japan in the 1990’s could be avoided, if Bank of Japan (BOJ) implemented monetary easing more powerfully. Based on the view, it is proposed that the Fed was willing to cut the FF rates drastically in order to avoid the Japanese-type deflation after the burst of the tech-bubble. 25

24 Ahearne et. al. [2002] describes as below. “…had the BOJ lowered short-term interest rates by a further 200 basis points at any time between 1991 and early-1995, deflation could indeed have been avoided.” (p.4)

25 Donald L. Kohn, a governor of the Fed, applauded that Greenspan put enabled the central bankers to
O'Driscoll Jr. [2009] and Buttonwood [2017] mention that the Greenspan put can be regarded as ‘the asymmetric ignorance’ policy. The Fed would not stop asset bubble, because it professes not to know when financial markets are in bubble territory. On the contrary, the Fed is sure to cut the FF rate drastically to prevent deflation when the markets had fallen too far.\(^\text{26}\) Greenspan [2002] said as below:

“...the Federal Reserve has focused on policies that would, as I testified before the Congress in 1999, ‘...mitigate the fallout [of an asset bubble] when it occurs and, hopefully, ease the transition to the next expansion.’ The Federal Open Market Committee chose, as you know, to embark on an aggressive course of monetary easing two years ago once it became apparent that a variety of forces, including importantly the slump in household wealth that resulted from the decline in stock prices, were restraining inflation pressures and economic activity.”

In response, Wall Street financial institutions were welcome to the Greenspan put, as Johnson and Kwak [2010] explain as below:

“...the ‘Greenspan put’—the idea that if trouble occurred in the markets, the Fed would come to their rescue...Wall Street appreciated Greenspan’s monetary policy, because it meant that he would not raise interest rates preemptively to choke off a boom...” (pp. 101-102)

Notably, the very low interest rates for an extended period of time after the burst of the tech-bubble sowed seeds to pump up the next assets inflation, that is the U.S. housing bubble, in the 2000’s. (O'Driscoll Jr. [2009]; Ryan [2014]) In short, the Greenspan put would give LCFIs the perception that the Fed’ monetary easing each time after burst of bubble would revive trigger the housing bubble, thus reviving their financial profits.\(^\text{27}\) Summary of comparative analysis of the shadow banking system in two sides of the Atlantic is show in shown in Table 4.1. As the table demonstrates, U.S. shadow banking system has the comparative advantage over less advanced one in the Eurozone in term of both financial market and institutional level.

\(^{26}\) There are variations to express the Greenspan put as below: the ‘mopping-up-after strategy’ (Blinder [2008]) and the ‘clean up after bubbles’ approach (The Economist [2009]).

\(^{27}\) According to the Nikkei [2018], a bond trader at Lehman Brothers says that Lehman’s executive instructed their staffs to take more risk-taking in 2006, because the Fed stopped to raise the FF rate in 2006.
Table 4.1: Summary of Comparative Analysis of Shadow Banking System in Two Sides of the Atlantic

Summing up what we argue in this section, the evolution of the U.S. Fed policy for shadow banking system not only give European banks the implicit insurance that their USD-denominated assets would be protected by U.S. policymakers in face of financial distress, but also trigger next assets bubble, thus reviving their financial profits. Therefore, it is implied that the evolution of U.S. Fed policy would reinforce the comparative advantage of U.S. shadow banking system over the one in the Eurozone in the 2000’s.
V. The U.S. Dollar’ Reign in Shadow Banking System in the 2000’s

V.I The self-expansion mechanism of USD-denominated balance sheets during the U.S. housing bubble

The U.S. economy experienced the housing bubble from 2004 to 2006, in that housing prices surged rapidly during this period. As stressed earlier, U.S. debt securities play a dual role in both supporting slightly high-yield on assets side, and using them as collateral to raise cheaper short-term dollar borrowing on liabilities side. Under the model, the increase in prices of the U.S. debt securities, driven by the U.S. housing bubble, led LCFIs to expand their USD-denominated balance sheets. Specifically, the U.S. housing bubble led LCFIs to have excess capacity, in the sense that its equity is larger than the amount required to meet its Value-at-Risk (VAR) constraint. In response to this excess capacity, LCFIs actively adjusted their balance sheets in order to expand their overall size, rather than paying out the surplus equity in form of higher dividends. (Adrian and Shin [2010], pp.17-18; Shin [2010], pp.119-120) Thus, LCFIs, including European banks, reached unprecedented capacity to expand their USD-denominated balance sheets during the housing bubble, thus leading them to leap the opportunities for profits-making fully in U.S. shadow banking system.

How did European banks respond to their unprecedented capacity of USD-denominated balance sheets? One possible answer is that European banks have pursued excessive leverage, boosting a banks’ return on equity (ROE), given their slight margin in balance sheets. Exact margins at European banks are estimated only between 10 and 30 basis points (Thiemann [2012], p.44). On the assets side, the off-balance sheet vehicles set by European banks sought to purchase long-term U.S. debt securities as almost safe as U.S. Treasuries and U.S. Agencies. In response, Wall Street financial institutions could endogenously create MBSs, ABSs and CDOs, largely, through the origination and securitization of subprime mortgages and ‘Alt-A’ mortgages in U.S. shadow banking system. As a result, the gross issuance of global private-label securitization reached to peak at almost $5 trillion in 2006. (IMF [2011], p.13) Additionally, high credit ratings could enable LCFIs to sell successfully U.S. debt securities, which were securitized from subprime mortgages, to other investors. (White [2009]) What is more, LCFIs bought large amounts of Credit Default Swaps (CDs) on ABSs and CDOs written by insurance companies, such as AIG (American International Group), in order to hedge credit risk associated with the underlying assets as subprime mortgages. The main counterparties of AIG were LCFIs in the U.S. and Europe, including Société Générale, Deutsche Bank, Goldman Sachs, Merrill Lynch, Calyon, Barclays, and UBS. (IMF [2011], p.9) In turn, on the liabilities side, the U.S. housing bubble accelerated the rising market values and the erosion of haircuts/margins of U.S. debt securities as collateral, enabling European bank to raise cheaper short-term dollar borrowings further. In June 2007 when just before the subprime mortgage crisis, the erosion of haircuts/margins of the prime private-label debt securities, such as MBSs, ABSs, structured products, investment grade bonds, recorded less than 10 percent. (Table 5.1)
Table 5.1: Typical Haircut on Term Securities Financing Transactions

| Source: Reproduced from The Committee on the Global Financial System [2010], p.2.
| Note 1: Prime counterparty.
| Note 2: Non-prime counterparty.
| Note 3: Hedge funds and other unrated counterparties.
| Original Source: Study Group survey.

In this connection, the intensive growth of collateral intermediation at central desk of LCFIs supported the ‘mining’ of collateral assets and the re-use of collateral (i.e., re-hypothecation) that could allow European banks to raise a large amount of cheaper short-term dollar borrowing. (Singh [2011])\(^{28}\) An example of repeated use of U.S. Treasury bond as collateral asset is illustrated in Figure 5.1. The same U.S. Treasury bond has been used three times as collateral, from the hedge fund to the money market fund through Goldman Sachs and Credit Suisse. Thus, the re-hypothecation of collateral generated dynamic chain of the intra-financial sector transactions in U.S. shadow banking system.\(^{29}\)

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\(^{28}\) European Commission [2013] stresses that the re-hypothecation of securities contributes to both increase leverage and strength the pro-cyclical nature of the financial system in the EU. (p.11)

\(^{29}\) Epstein and Montecino [2014] explain that the intra-financial sector lending comprised more than half of all financial sectors lending in the U.S. in the run-up to the GFC of 2008.
Figure 5.1: An Example of Repeated Use of Collateral in a Dynamic Chain
Source: Reproduced from Claessens et. al. [2012], p.15.

The development of re-hypothecation, driven by the intra-financial sector transactions, could enable European banks to pursue excessive leverage. Table 5.2 shows two of the elements of this breakdown for LCFIs in the U.S. and Europe: financial leverage and unit risk. The ratio of financial leverage in European banks was much larger than U.S. commercial banks and U.S. dealer banks in the end of 2007. For instance, the ratio of leverage in UBS and Deutsch banks reached over 50 times. (See also European Central Bank [2010]) As a result, the level of ROE at LCFIs in the U.S. and Europe was consistently at or above 20% which was roughly double ROE in the nonfinancial sector. (Haldane [2010], p.13) Thus, the excessive leverage enabled European banks to achieve a higher ROE, even if they faced the slight margins in the USD-denominated balance sheets.

Table 5.2: Summary of Component Factors of Decomposition of LCFIs’ ROE
Source: Reproduced from Haldane [2010], Table 4.

<table>
<thead>
<tr>
<th></th>
<th>Financial leverage</th>
<th>Unit-risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2007</td>
<td>Change 2007/04 %</td>
</tr>
<tr>
<td>Citi</td>
<td>24.5</td>
<td>22.9</td>
</tr>
<tr>
<td>Bank of America</td>
<td>20.6</td>
<td>19.1</td>
</tr>
<tr>
<td>JPM</td>
<td>17.6</td>
<td>4.4</td>
</tr>
<tr>
<td>Barclays</td>
<td>37.8</td>
<td>36.4</td>
</tr>
<tr>
<td>RBS</td>
<td>31.2</td>
<td>22.1</td>
</tr>
<tr>
<td>HSBC</td>
<td>21.3</td>
<td>11.8</td>
</tr>
<tr>
<td>UBS</td>
<td>58.1</td>
<td>16.5</td>
</tr>
<tr>
<td>Deutsche Bank</td>
<td>52.1</td>
<td>15.7</td>
</tr>
<tr>
<td>SocGen</td>
<td>43.2</td>
<td>49.9</td>
</tr>
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<td>BNP Paribas</td>
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<td>18.2</td>
</tr>
<tr>
<td>Credit Suisse</td>
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<td>-11.6</td>
</tr>
<tr>
<td>Merrill Lynch</td>
<td>35.3</td>
<td>-</td>
</tr>
<tr>
<td>Morgan Stanley</td>
<td>27.8</td>
<td>-</td>
</tr>
<tr>
<td>Lehman Brothers</td>
<td>27.6</td>
<td>-</td>
</tr>
<tr>
<td>Goldman Sachs</td>
<td>25.0</td>
<td>-</td>
</tr>
</tbody>
</table>

Taking our arguments about the aggressive pursuit of European banks toward
excessive leverage into account, it is reasonable to suppose that there could be the self-expansion mechanism in European banks’ USD-denominated balance sheets during the U.S. housing bubble. A stylized example of the self-expansion mechanism in their USD-denominated balance sheets is illustrated in Figure 5.2.

![Diagram](image)

**Figure 5.2: A Stylized Example of the Self-Expansion Mechanism of European Banks’ USD-denominated Balance Sheets during the U.S. Housing Bubble**

Note: Tokunaga and Epstein [2018, sec.7] describe that the ultimate lenders which accumulate abundant dollar funds consist, mainly, of cash pools held by institutional investors in advanced countries and dollar reserve held by central banks in emerging countries.

As we have seen, long-term U.S. private-label debt securities, which were created by securitization, play a dual role in both supporting slightly high-yield on assets side, and using them as collateral assets to raise short-term cheaper dollar borrowing on liabilities side. In turn, European banks’ SIVs steered their dollars for investing long-term U.S. private-label debt securities again. Importantly, the U.S. housing bubble would accelerate European banks to amplify the self-expansion mechanism in USD-denominated balance sheets, as long as the U.S. housing bubble drives the increase in the debt securities prices in U.S. shadow banking system. Specifically, the continuous increase in the securities prices, as well as their erosion of haircuts/margins, expanded their dollar borrowing in wholesale funding on liabilities

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30 The mechanism is explored in detail by Cömert [2013]. Similarly, some literatures also suggest characteristics of the mechanism as below: ‘pro-cyclical mechanism’ (Adrian and Shin [2010]), ‘positive feedback effect’ (The Committee on the Global Financial System [2011]), and ‘feedback loop’ (European Systemic Risk Board [2014]).

31 Baglioni et. al. [2012] explain that the pro-cyclical leverage of European banks, which have universal bank nature, is even more entrenched than U.S. banks, by investigating a sample of European major banks over 2000-2009.
side, and then allowed them to use the dollars for expanding investments toward the long-term U.S. debt securities repeatedly on assets side.

Overall, during the U.S. housing bubble, European banks had unprecedented capacity in their USD-denominated balance sheets which would enable them to leap the opportunities for profits-making fully in U.S. shadow banking system. Thus, European banks achieve a higher ROE there, thus resulting in the overstretch nature of their USD-denominated balance sheets.

### V.II. U.S. dollar’s reign in shadow banking system

In turn, the overstretch nature of USD-denominated balance sheets could contribute to sustain strong demand for long-term private-label debt securities and short-term financial instruments in U.S. shadow banking system.32

First of all, USD-denominated ABS issuances increased unprecedentedly. The share of the dollar in ABS issuance rose from around 65 percent in 1999 to 75-80 percent on the eve of the financial crisis, while the share of the euro increased gradually from around 15 percent to in 1999 to about 20 percent, respectively. (European Central Bank [2011], p.52, Chart 25) Second, USD-denominated financial instrument such as ABCPs grew rapidly in the 2000’s. In total, with respect to ABCPs outstanding by the funding currency as of January 2007, $714 billion out of $969 billion, or 73.7 percent, was denominated in the dollar, whereas $ 219 billion, or 22.6 percent in the euro. (Estimates are from Acharrya and Schnabl [2010], p.55, Table 4) Notably, most European banks financed their off-balance sheet vehicles by issuing ABCPs denominated in the dollar rather than in the euro. Third, the dollar has played the dominant role as collateral asset in global repo market in the 2000’s. According to the liabilities and equity of the U.S. domestic economy and amounts held by rest of world as of June 2007, foreign holdings of Treasury bonds made up the largest percentage of the amount outstanding (45 percent), the share of Agency bonds, corporate bonds (non-asset-backed), and corporate ABS+ABCP reached 21 percent, 25 percent, and 22 percent, respectively, which represents a higher share than total foreign holdings (13 percent).Taking the higher share of foreigners in the holdings of U.S. debt securities into account, a broad range of U.S. debt securities has been used for universally accepted collateral in global repo market in the 2000’s. Finally, the dominate position of the dollar in FX swaps market facilitated European banks to borrow massive dollars. When non-U.S. banks raise U.S. dollars through secured transactions, they often use FX swaps to exchange their domestic currency for dollars. For instance, European banks can raise dollars for a certain period by selling euros to buy dollars in spot exchange market, and then selling dollars to buy back euros in forward exchange market. These transactions can be considered as collateralized dollar borrowings, due to funding of dollars by providing the domestic currency (i.e. the euro). Table 5.3 presents that the use of U.S. dollar and the euro in European foreign exchange markets in April 2007. Most European currencies, such as Danish krone, Norwegian krone, Polish zloty, and Swedish krona, traded more against the euro than against the dollar in spot market. By contrast, FX

32 Most of the materials in this subsection were draws on Tokunaga and Epstein [2018].
swaps markets in Europe traded more against the dollar. In short, it is possible that European banks relied on more FX swaps in order to obtain dollars against the euro and other European currencies.

<table>
<thead>
<tr>
<th>Currency</th>
<th>Total turnover vs USD</th>
<th>Total turnover vs EUR</th>
<th>Spot turnover vs USD</th>
<th>Spot turnover vs EUR</th>
<th>Swap turnover vs USD</th>
<th>Swap turnover vs EUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgarian lev</td>
<td>29</td>
<td>201</td>
<td>22</td>
<td>185</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Czech koruna</td>
<td>2,406</td>
<td>1,070</td>
<td>239</td>
<td>554</td>
<td>1,648</td>
<td>299</td>
</tr>
<tr>
<td>Danish krone</td>
<td>13,020</td>
<td>9,335</td>
<td>1,054</td>
<td>2,509</td>
<td>10,849</td>
<td>5,794</td>
</tr>
<tr>
<td>Estonian kroon</td>
<td>22</td>
<td>749</td>
<td>3</td>
<td>72</td>
<td>18</td>
<td>677</td>
</tr>
<tr>
<td>Hungarian forint</td>
<td>2,906</td>
<td>775</td>
<td>55</td>
<td>587</td>
<td>2,827</td>
<td>113</td>
</tr>
<tr>
<td>Latvian lats</td>
<td>72</td>
<td>186</td>
<td>7</td>
<td>92</td>
<td>64</td>
<td>88</td>
</tr>
<tr>
<td>Lithuanian litas</td>
<td>35</td>
<td>538</td>
<td>19</td>
<td>398</td>
<td>15</td>
<td>136</td>
</tr>
<tr>
<td>Norwegian krone</td>
<td>15,831</td>
<td>2,696</td>
<td>259</td>
<td>1,220</td>
<td>14,850</td>
<td>1,174</td>
</tr>
<tr>
<td>Polish zloty</td>
<td>4,589</td>
<td>1,831</td>
<td>189</td>
<td>1,287</td>
<td>4,274</td>
<td>239</td>
</tr>
<tr>
<td>Romanian leu</td>
<td>100</td>
<td>1,654</td>
<td>77</td>
<td>735</td>
<td>12</td>
<td>830</td>
</tr>
<tr>
<td>Russian rouble</td>
<td>23,598</td>
<td>1,125</td>
<td>17,149</td>
<td>837</td>
<td>5,482</td>
<td>246</td>
</tr>
<tr>
<td>Slovak koruna</td>
<td>3,098</td>
<td>314</td>
<td>3</td>
<td>212</td>
<td>3,094</td>
<td>94</td>
</tr>
<tr>
<td>Swedish krona</td>
<td>12,988</td>
<td>8,720</td>
<td>451</td>
<td>2,270</td>
<td>12,233</td>
<td>5,835</td>
</tr>
<tr>
<td>Swiss franc</td>
<td>52,676</td>
<td>13,680</td>
<td>29,104</td>
<td>8,476</td>
<td>21,022</td>
<td>3,891</td>
</tr>
<tr>
<td>Turkish lira</td>
<td>1,804</td>
<td>266</td>
<td>430</td>
<td>55</td>
<td>915</td>
<td>185</td>
</tr>
<tr>
<td>Pound sterling</td>
<td>240,301</td>
<td>39,388</td>
<td>51,054</td>
<td>16,082</td>
<td>173,323</td>
<td>17,241</td>
</tr>
</tbody>
</table>

Table 5.3: The Use of U.S. Dollar and the Euro in the European Foreign Exchange Markets in April 2007 (millions of U.S. dollars)


In conclusion of our arguments in this section, the overstretch nature of USD-denominated balance sheets, underpinned by the self-expansion mechanism of USD-denominated balance sheets during the U.S. housing bubble, could contribute to strong demands for the long-term private-label U.S. debt securities (MBs, ABSs, and CDOs) and the short-term U.S. financial instruments (repos, ABCPs and FX swaps), resulting in U.S. dollar reign in the shadow banking system. As a consequence, as far as the dominant position of the dollar in shadow banking system, it seems natural to conclude that the U.S. dollar standard system has been as asymmetric as ever in the 2000’s, in the contrary to the view that it has been less asymmetric than it once was, as Bernake [2015] insists.33

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33 Cafruny [2003] explains that European Monetary Union serves to reinforce Europe’s subordinate relationship with the U.S. in sphere of finance and geopolitics.
VI. Implications

The final (Section VI) section suggests two implications drawn from the expansion of European banks’ USD-denominated balance sheets across Atlantic in the 2000’s.

First, it could be understood from the expansion of European banks’ USD-denominated balance sheets that they played a role of USD-denominated global financial intermediary, as U.S. banks did in the 1960’s. (Kindleberger et. al. [1966]) Both the U.K. banks from the mid-19th to the early 20th century, and the U.S. banks since WWII played a role of global financial intermediary denominated in own currency, the pound sterling and the U.S. dollar, respectively. (Black [1990]; Tavlas and Ozeki [1992]) By contrast, European banks played a role of global financial intermediary across the Atlantic denominated in foreign currency, that is the dollar, not the euro, in the 2000’s. To say the least, as far as U.S. shadow banking system in the 2000’s is concerned, European banks relent the dollars across the Atlantic, whose role is similar to that Japanese banks played a role of USD-denominated global financial intermediary in the second half of the 1980’s. (Nakao (1991/1995))

Second, it is suggested that the benefits of U.S. exorbitant privilege, supported by the dominant position of the dollar in the shadow banking system, were, largely, steered for meeting credit demands associated with the U.S. housing bubble, rather than for promoting productive investments in the U.S. economy. The dominant position of the dollar in the shadow banking system facilitated by far U.S. privately capital inflows from Europe during the U.S. housing bubble (2004-06). U.S. privately capital inflows from Europe surged from $644 billion in 2001-03 to $1,503 billion in 2004-6, which increased from 43.6 percent to 50.0 percent, respectively, in total of U.S. privately capital inflows. (Estimates from U.S. Bureau of Economic Analysis)

G.W. Bush government propagated a confident that U.S. capital inflows could be used for higher domestic investments. According to Council of Economic Advisors [2004], “…the availability of foreign investment permitted the United States to maintain higher investment rates than it could have funded relying solely on domestic financing. These capital inflows have helped finance U.S. investments, expand U.S. productive capacity, and strengthen U.S. economic performance.” (p.260) In fact, it is likely that U.S. privately capital inflows during the U.S. housing bubble not only allowed the U.S. household sector to accumulate massive debts beyond their means, but also sustained Wall Street financial institutions to depend on their excessive leverage, enabling them to achieve a higher ROE in the 2000’s, which we argue in the paper. With respect to the latter, on the one hand, the largest recipient of foreign credit just before the financial crisis was U.S. financial sector. On the other hand, as of the mid-2007, around 60 percent of U.S. private-label debt securities outstanding were

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34 Cohen [2010b] suggests that the multicurrency system in the 2000’s, consisting of the dollar and the euro, can be regarded as ‘one-a-half’ global monetary system. And, Posen [2008] describes that the euro is unlikely to displace the dollar from its global role, owing to not only structural weakness in the Eurozone, but also the limitations of Europe’s ability to project security relationships beyond its borders and the slow improvements in the financial or economic advantages of euro usage.

35 Epstein [1981] refers that the benefits of U.S. exorbitant privilege were not distributed equally overtime or across groups in U.S. economy. (p.148)
owned by U.S. financial sector. (Bhatia and Bayoumi [2012], p.15, p.23) Put the pieces together, it would be interpreted that the credit demand by U.S. financial sector to purchase a part of the U.S. private-label debt securities were, partly, financed by U.S. capital inflows from Europe, supported by the dominant position of the dollar in the shadow banking system. Accordingly, it is plausible that the dollar’ reign in the shadow banking system can maintain at the expense of promoting productive investments in the U.S. economy in the 2000’s.

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