MSc International Political Economy (LSE) 2018/2019

Dissertation submitted in partial fulfilment of the requirements of the degree

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From Bazooka to Backstop: The Emergence of a Permanent International Lender of Last Resort

Permanent domestic discount window lending has been established since at least the 20th century as a core feature the central bank provides. We have also historically witnessed numerous cases of temporary international lending of last resort (ILOLR) between sovereign central banks. A permanent backstop to international Eurodollar markets has long been debated and sought for but remained technically impossible (Fischer 1999). The emergence of a permanent ILOLR in the shape of the C6 liquidity swap lines therefore begs explanation. The six major central banks since 2013 uphold this new institution of monetary cooperation through which they provide liquidity to each other at unlimited amounts. My work draws on work by the anthropologist Lévi-Strauss (1966) and understands the emergence of this international backstop as a 'design by bricolage'. Therefore, central bankers followed a (1) dialectical process of agency and structure and (2) creatively re-deployed tools that existed previously. The C6 network therefore is no perfect solution and prone to instability. The presented work thus expands on 'infrastructural entanglement' (Braun 2018) of central banks in financial markets and makes the precise practices (Schatzki, Knorr-Cetina, and von Savigny 2001) visible that constrain and enable central bankers' decision making.

Table of Contents

I would like to put on the table a request for authorization for swap lines. I prefer not to put a limit on it, so I know I've got my own bazooka here.
– Ben Bernanke (FOMC 2008)

Throughout the experience with the crisis, people became more familiar and comfortable with it and were able to say: this is necessary.
– Nathan Sheets (2019)

1 Introduction

The Great Financial Crisis of 2007/08 was global. While extraordinary measures of central banks backstopped banking systems within their domestic jurisdictions, bilateral central bank liquidity swap-lines put a floor under funding stresses in Eurodollar markets (Tooze 2018). In 2013, the US Federal Reserve – together with its partners – announced that it had made a network of unlimited, reciprocal swap-line arrangements a permanent measure. This facility between the six major central banks (C6) therefore provides an international lender of last resort facility to a large proportion of Eurodollar markets and fills a shortcoming that had already been criticized as early as the 1960s. The backstop has just recently been re-deployed when the Bank of England (BoE) activated its swap-line with the European Central Bank (ECB) in March 2019.

We have seen ad-hoc international lending of last resort facilities between monetary authorities numerous times since the beginning of the 19th century (Kindleberger and Aliber 2005). Throughout the 20th century, we have also seen the installation of permanent domestic lender of last resort (LoLR) facilities at modern central banks (Calomiris, Flandreau, and Laeven 2016). What we had never seen, however, is the establishment of a permanent, international lender of last resort facility, although the lack of such a facility was lamented repeatedly (Kapstein 1994; Fischer 1999; Bordo, Humpage, and Schwartz 2015). This thesis therefore asks why such a facility could emerge in 2013.

The C6 swap-line network resembles a solution to a long-debated problem. Many have argued that this feature adds to the 'global financial safety net' (di Mauro and Zettelmeyer 2017; Denbee, Jung, and Paternò 2017). Existing literature on central bank cooperation during the Great Financial Crisis (GFC) are split along the agency versus structure question of International Relations (IR). While some emphasize agency of the Fed during and after the crisis (Sahasrabuddhe 2019; McDowell 2017; Schwartz 2019), others argue that the integrated nature of global financial markets constrained US policymakers (Hardie and Maxfield 2016).

My argument attempts to solve this dichotomy and understands central bankers as agents themselves, who operate within the constraints of financial markets. I will argue that the

design process of the C6 liquidity swap-line network followed a 'design by bricolage'. This theorization refers to work of the anthropologist Lévi-Strauss who understands the 'bricoleur' as constrained by his available tools but able to creatively re-deploy them (Lévi-Strauss 1966, 17). This shifts the study of the design process towards a dialectic understanding of structure and agency that operates through a means-based process (Kalyanpur and Newman 2017; Mérand 2012). Existing formalizations of 'bricolage' as a process of institutional design in IR (Kalyanpur and Newman 2017; Engelen et al. 2010; Cleaver 2002) stress the retrospective re-deployment of existing tools within the process. However, they give little treatment to the agency-structure dialectic implied in Lévi-Strauss' work. This thesis therefore makes a theoretical and an empirical contribution.

First, it will realign the concept of bricolage. This step will use Alexander Wendt's (1987) synthesis of the agency-structure dichotomy and interlink it into a reading of central bankers, who intervene in markets and at the same time are constrained by them (Braun 2018). I will therefore expand the concept of bricolage in IR to account for a synthesis in the agency-structure dichotomy.

Second, this thesis will empirically evaluate this concept. I will use a methodology of process-tracing (Checkel 2006; Collier 2011) to carefully reconstruct the emergence of the C6 liquidity swap-lines. The case of the C6 liquidity swap-line network offers ideal grounds to test the concept because it follows from 50 years of intellectual debate. Therefore, it allows to evaluate precisely where in the dichotomies of institutional design the process was situated. By providing this empirical evidence, I offer the first comprehensive reading of the C6 swap-line network from an International Political Economy (IPE) perspective.

The following provides a brief background on the structure of the Eurodollar market and technicalities of the C6 swap-line network. If we understand the essence of banking as *maturity transformation*, liquidity risks loom large. Maturity risk is difficult to hedge ex ante (McGuire and von Peter 2009) and thus like any such mismatch prone to bank runs (Diamond and Dybvig 1983; Gorton and Metrick 2012). To prevent such squeezes, central banks and deposit insurances provide public backstops. Former Bank of England director and foreign exchange market specialist Sir George Bolton (1963; as cited in Einzig 1977, 17) noted on the lack of such a backstop in the Eurodollar market: "[B]anks participating in the market have to fend for themselves and cannot have automatic recourse to the Central Bank for assistance in case of an awkward stringency." Dollar markets are therefore split in such that are onshore, that is connected to the Federal Reserve, and such that are offshore, that is trading in dollars but possibly not connected to a US bank (Avdjiev, McCauley, and Shin 2015).

Onshore banks that face funding problems turn to the Fed and ask for funding. Eurodollar banks that face dollar liquidity mismatches, however, have no such backstop at their respective central bank. Such situations began to unfold from August 2007 onwards. As was ex post estimated, dollar reserves held by central banks would not have been sufficient for stemming the crisis (Obstfeld, Shambaugh, and Taylor 2009; Allen and Moessner 2010). In a first ad-hoc measure in December 2007, the Fed extended liquidity swap-lines to the ECB and the Swiss National Bank (SNB). The facility was subsequently increased in volume and extended to a total of 14 other central banks, among them four Emerging Market Economies (EME). This paper investigates into the network of six major central banks (C6)[1] that in 2013 announced standing and unlimited swap-lines bilaterally between each other.

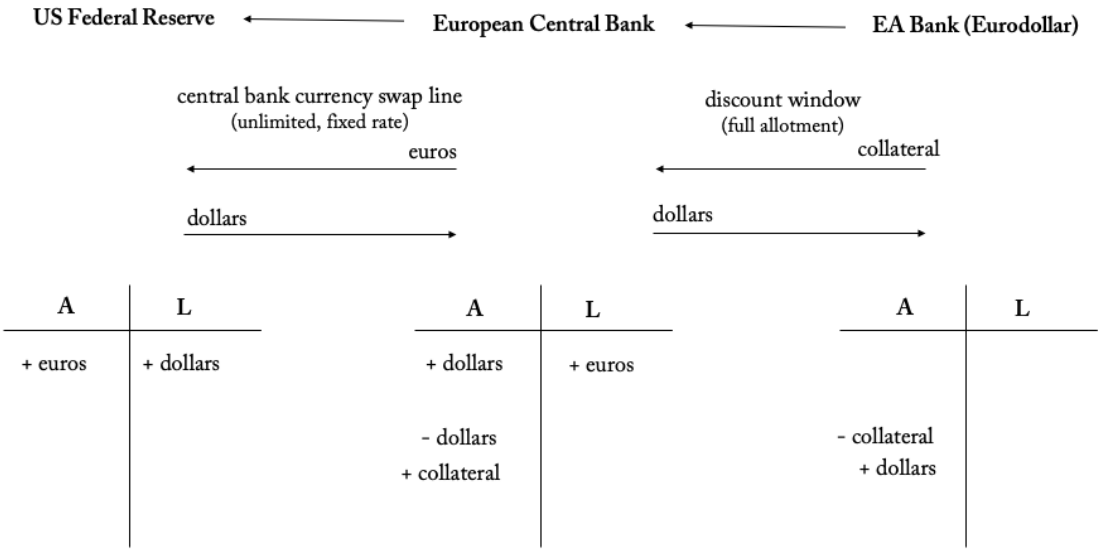

Figure 1 The dollar-borrowing process of a Eurodollar bank through the ECB. The depiction is a stylized version of respective balance sheets and only shows the borrowing step without the principal repayment or interest. Author's depiction

The central bank liquidity swap-lines now in place amongst the C6 can in its easiest form be understood as discount window borrowing of a foreign central bank which provides its own currency as collateral[2]. The lending/borrowing occurs in two stages. First, the foreign central bank borrows the allotted amount of dollars and provides its own currency in terms of current market exchange rates as collateral. In this step, both central banks create the volume of the contracted currency – in the words of former Vice-President of the Federal Reserve Bank of New York, Charles Coombs (1976, 76), – "out of thin air". The amount of international

[1] The C6 major central banks are: The US Fed, ECB, BoE, SNB, Bank of Canada (BoC), Bank of Japan (BoJ)
[2] Depiction according to Fleming and Klagge (2010) or as found on participating central banks' websites.

reserves, i.e. available liquidity, is increased.[3] The borrowing foreign central bank contractually agrees to repurchase its currency at a future date at the spot exchange rate. The contract therefore holds no exchange rate risk for either counterparty[4] (Fleming and Klagge 2010). The foreign central bank then allocates the acquired funds to its prime dealers. At maturity of the contract, the second step, the foreign central bank repays the borrowed sum[5] and retains its own currency. In this stylized form, money supply expands in the first step and contracts at the second (Mehrling 2015), just as private money supplies move elastically in any other form of bank lending (Borio and Disyatat 2011). The interest rate (penalty fee) on these loans is contractually agreed upon.

The remainder of this paper proceeds as follows. The following section will review existing literature on central banking and liquidity swap-line arrangements and build my framework of bricolage. Section three provides the methodology employed and section four holds a thorough analysis of the process tracing. Section five discusses results from this analysis and the last section concludes.

2 Literature & Bricolage

With their far-reaching consequences in stemming the Great Financial Crisis, swap-lines have received considerable treatment in both economics and political science. In this section, I will first review the existing literature on the topic. I will then point out that the IR literature is split along the agency-structure dichotomy. Building on the work by Lévi-Strauss (1966), I then lay out the concept of bricolage as institutional design.

2.1 Literature of Central Bank Swap-Lines

Economists have shown the effectiveness of the swap-line network between major central banks. Deviations from Covered Interest Parity (CIP) are one way to measure funding gaps in Eurodollar markets. Baba and Packer (2009) identified that the early swap-lines the Fed installed with the ECB and SNB significantly ameliorated these dislocations. After being dismantled in February 2011, the swap-line network came back to stem funding pressures in the Euro-crisis in May of the same year. Allen and Moessner (2010) stress that it was specifically the announcement of this renewed facility that calmed markets, even though it was

[3] Adherents to the Quantity Theory of Money may claim inflation risk. Without providing a theoretical refutation of the theory, I disregard such arguments because of a lack of empirical evidence.
[4] Because central banks are no profit-seeking institutions, there is no opportunity cost resulting from exchange-rate fluctuations.
[5] The foreign central bank will be repaid by its prime dealers at maturity as well. This liquidity mismatch of the foreign central bank is not part of the swap-line contract, however.

only little used due to stigma concerns. Bahaj and Reis (2018) show that the swap-line network has put pressure on persisting CIP-deviations even in non-crisis times.

Some political scientists have also worked on central bank liquidity swap-lines. These accounts are state-centered in that the central bank uses monetary policy tools to conduct foreign policy. That is, it uses its power to employ monetary or currency statecraft (Cohen 2018; Hardie and Maxfield 2016). Notably however, most of this work is concerned with swap-lines that connect EME, i.e. the periphery, to the core of the financial system. Figure 1 shows all central bank liquidity swap-lines as of October 2015. It indicates both China and the US as two centers, while the C6 network (in dashed circle) is the only facility with access to dollar-funding and at unlimited volumes. It therefore indicates how peripheral central banks connect into the dollar-network through participating C6 central banks, while having no ties to the Fed themselves.

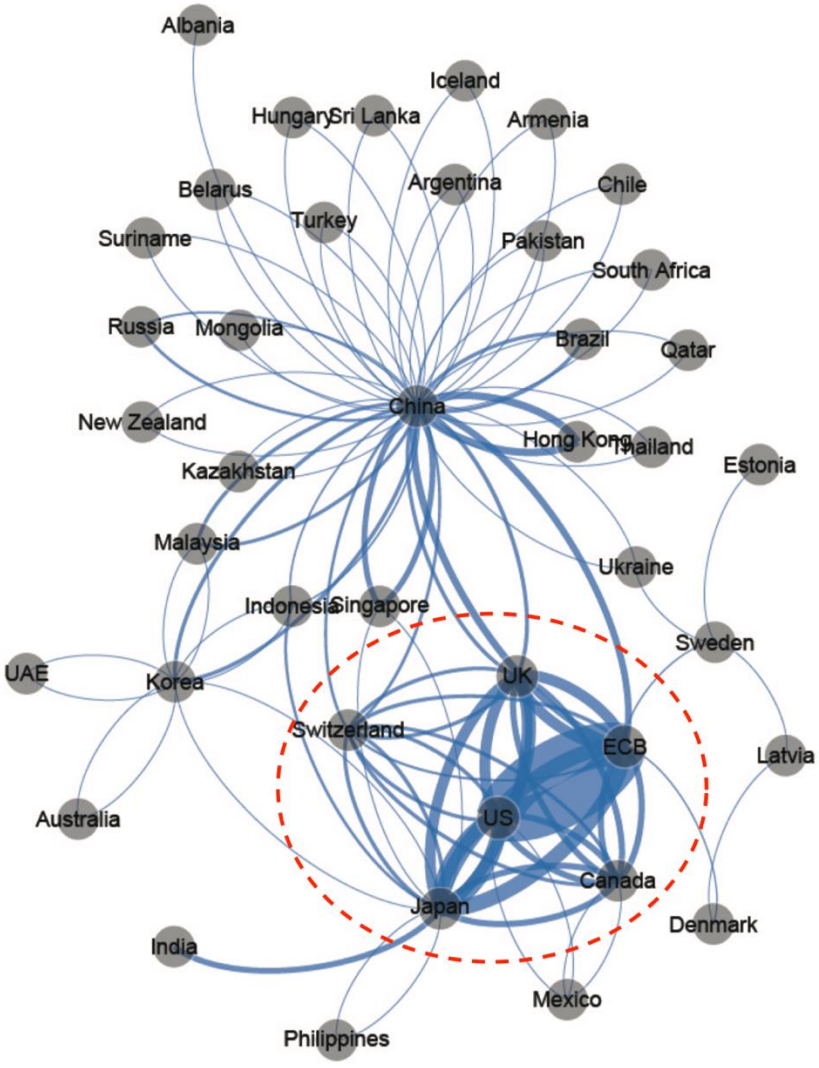

Figure 2 Network of bilateral swap-lines as of October 2015, adapted from Denbee, Jung, and Paternò (2017, 10)

Duran (2015) discussed why emerging market economies did not rely on the institutions they had built throughout the 1990s but rather used ad-hoc bilateral swap-line arrangements to cope with the GFC. In tune with economists Rose and Spiegel (2012), McDowell (2012, 2017) has argued that specifically such EME central banks received swap-lines from the Fed during the crisis to which US financial institutions had particular exposure. In this view, the Federal Reserve protects US economic and financial interests when an IMF-response would either be too small or too slow. Such interest based accounts that follow from defending the US economy from the effects of financial globalization (Helleiner 2014) are complemented by recent work by Sahasrabuddhe (2019), who argues that the Fed's selection of EME counterparties went along policy preferences for greater capital account openness.

However, IPE literature has largely shied away from discussing the "most important swap lines [that] help knit the system together at the global level" (Bernes et al. 2014, 1). These latter are the network of bilateral, unlimited, and reciprocal swap-lines connecting the US Federal Reserve, European Central Bank, Bank of England, Swiss National Bank, Bank of Japan and Bank of Canada. They comprise of the essential feature of the 'global financial safety net' (Denbee, Jung, and Paternò 2017) and set them apart from such economies that have no access to this network (Henning 2015). This club of the six major central banks is the only network of swap-lines amongst central banks that allows for unlimited access to foreign currency funding (McDowell 2019) and more importantly the only lines that allow for US dollar funding. Murau (2018, 7) has argued that the swap-line network is a mere functionalist response to the lack of an international LoLR by stressing that "through gradual institutional evolution, the offshore dollar realm has come to fully mirror the domestic US credit money system".

With regards to the dollar swap lines, two arguments emerge from the literature that stress either end of the agency-structure dichotomy within IR. Both refer to the inherent interlinkages of offshore and onshore dollar markets (Fichtner 2017). As figure 2 indicates, the share of dollar-denominated liabilities in Europe and Great Britain stood between 37-44% in 2017 (Schwartz 2019).

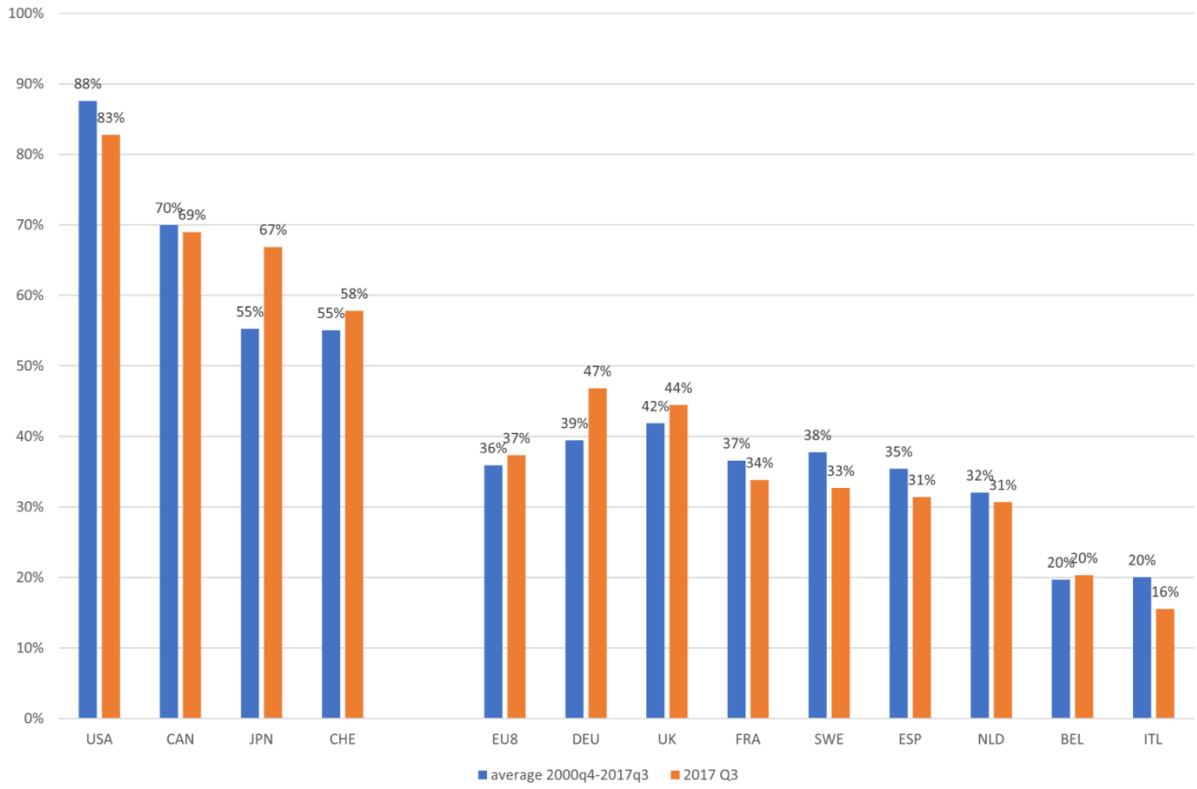

Figure 3 Share of average USD cross-border claims, source: Schwartz (2019, 13)

Hardie and Maxfield (2016) argue alongside the constraints of this structural interlinkage. They maintain that the US' inability to safe its own economy without saving other financial markets, resembles a loss of autonomy to conduct monetary policy. To them, private financial market actors who hold US debt and therefore need to be served are a case in point. Stressing agency of the Federal Reserve, Herman Schwartz (2019) rejects this argument. Rather, he argues that due to the interlinkage, European and British banks become dependent on the Fed as a lender of last resort. In the words of Schwartz (2019, 16): "the US FED could bail out Europe, but Europe could not bail out the United States." This dependency results in a strengthening of dollar hegemony which strengthens US' discretionary agency.

In recent work, Benjamin Braun (2018) resolves this dichotomy of agency of the central bank that is constrained by the structure of financial markets. To do so, however, he disregards a simple understanding of monetary authorities as an agent of *only* the state. Alongside Mehrling (2010; see also Knafo 2013; Pistor 2013), he understands central banks as an essentially hybrid animal that hovers between the state and the financial system. Central banks are "part private bankers' bank and part public government bank, with the proportions shifting over time with financial development and with the exigencies of the state" (Mehrling 2018, 7). Central banks then are 'infrastructurally entangled' into the market they govern (Braun and Gabor 2019). Different from other public authorities, the central banks' governability relies on

functioning money markets (Braun 2018). Hence, the central bank is structurally constrained by the market but with its interventions into the market also has agency there. This understanding dissolves the structure-agency dichotomy and allows for predictive power with regards to which markets central bankers will intervene in. Because central banks are structurally entangled into the markets they govern, they will intervene in those markets that they rely on to be able to conduct monetary policy (Braun 2018). This account, however, cannot explain the cooperative outcome of the C6 swap-line network with regards to its precise form and timing.

In summary, most accounts on swap-lines extended by the Federal Reserve focus on EME-lines and understand them as a form of foreign policy. With regards to Advanced Economy lines, there remains a dichotomy between agency and structure, while the *emergence* of the C6 swap-line network remains unexplained. In what follows, I will draw on IR literature of institutional design and then build the framework for the design by bricolage.

2.2 Literature of Institutional Design

The standing C6 swap-line network comprises of a legally defined (Pistor 2013) set of "persistent and connected sets of rules (formal and informal) that prescribe behavioral roles, constrain activity, and shape expectations" (Keohane 1989, 3), that is an international institution. While changes to the international financial architecture have been largely elaborated on with regards to changes in regulatory regimes (Lall 2012; Farrell and Newman 2010), institutional design by central banks has operated outside of the scope of IPE literature (Adolph 2018). The typology of IR theories of institutional design by Voeten (2019) holds two dimensions. First, theories ask for the drivers of the process either by structure, that is as a "response to the […] economic environment in which institutions operate" (Voeten 2019, 148) or by agency, that is the "values, initiatives, and power of the actors that created the institutions" (ibid.). Second, theories are split between emphasizing the dynamics of the design. While process-based approaches stress the means being used, rationalist approaches focus on the ends of the process, i.e. their contract (ibid.).

Having argued before that central banking begs a synthesis of agency and structure, a framework of institutional design in this realm needs to account for that. Functionalist accounts by economists (Murau 2018; Kuttner 2018) let the C6 swap-line network appear as a rationalist, optimal solution. However, emphasizing that the practices by central bankers are the "result of inarticulate, practical knowledge that makes what is to be done appear 'self-evident' or

commonsensical"[6] (Pouliot 2008, 258), this paper will investigate into the means-based process of institutional design. In the following, I will build the framework of design by bricolage, that combines both the agency-structure dialectic and the means-based design.

2.3 Bricolage

I build on the concept of 'bricolage' first theorized by the anthropologist Claude Lévi-Strauss and subsequently adapted by scholars of IR and IPE (Mérand 2012; Kalyanpur and Newman 2017; Engelen et al. 2010). What is missing from this debate in IR is a dialectic understanding of agency and structure within bricolage. I will rectify this shortcoming by drawing on Alexander Wendt's (1987, 1999) work.

In "The Savage Mind", Lévi-Strauss (1966, 219) offers an empirical study into human thought where he uses the term 'savage' not normatively but as "mind in its untamed state as distinct from mind cultivated or domesticated for the purpose of yielding a return". He juxtaposes 'the scientific' and 'the savage' mind as two forms of thought. The 'scientific' mind begins with an initial problem assessment and then tries to design an optimal solution. The scientist creates innovative results from scratch and can "go beyond the constraints imposed by a particular state of civilization" (ibid., 19).

The savage mind resembles that of an 'bricoleur'. Translators of Lévi-Strauss' work stress that the term has no direct equivalent in the English language but is closer to a "kind of professional do-it-yourself man" than a "handyman" (ibid., 11). Different from the scientist, the bricoleur is constrained by a finite stock of tools available to her. However, the bricoleur can use one tool, re-combine it with another and re-deploy this newly created tool. The available means are therefore time-dependent because they are "the contingent result of all the occasions there have been to renew or enrich the stock or to maintain it with the remains of previous constructions or destructions" (ibid., 17). The bricoleur, therefore, has agency in the creative re-deployment of tools but is constrained by the available means (ibid., 22). However, by interacting with the tools, the bricoleur also transforms the structural constraint, that is she "build[s] up structures by fitting together events, or rather remains of events" [7] (Lévi-Strauss 1966, 22). In the last chapter of the book, Lévi-Strauss argues against Sartre's dialectic reasoning and positions his structuralist account towards the analytical domain. However, this difference accounts to the scientific analysis of human behavior and thought and not to human

[6] Emphasizing the practices, Pouliot argues for a 'practice turn' in social science. For an overview see Schatzki, Knorr-Cetina, and von Savigny (2001)

[7] It should be noted that Lévi-Strauss uses 'structure' broadly as constraints rather than the international system itself.

behavior and thought itself (Lévi-Strauss 1966, 250). As Brown (1978, 173 emphasis in original) notes, dialectics as the "kind of reason *people* use in constituting their cultures" is precisely captured by Lévi-Strauss' bricolage.

Two conditions follow from this discussion. Bricolage is (1) a dialectic process of agency and structure. While being constrained by the world around her and therefore the means that are available, the bricoleur has agency in re-deploying these tools. In doing so she shifts future constrains of the means and, therefore, the world around her. It follows, (2) an inquiry into the precise practices of the means-based process. Some IR scholars (Kalyanpur and Newman 2017; Mérand 2012) have provided theorizations of the second aspect and have set this means-based process in opposition to rationalist design processes. The dialectic of agency and structure, however, remains undertheorized. I will proceed with a short discussion of the literature, then provide a concept of the agency-structure dialectic and finally provide a framework to the practices of means-based design. Figure 3 provides a schematic of design by bricolage.

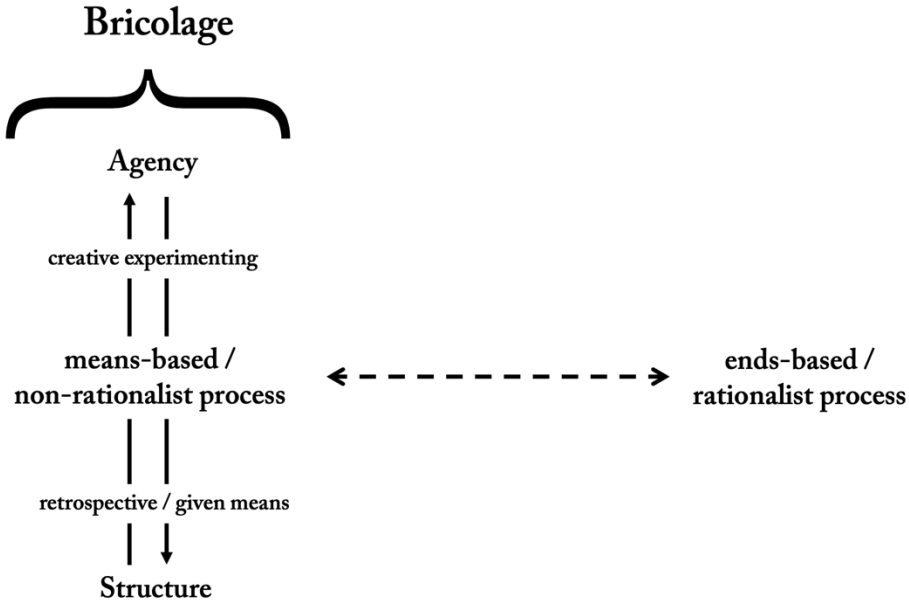

Figure 4 Design by bricolage in opposition to ends-based/ rationalist accounts (author's depiction)

Mérand (2012) has argued that security cooperation in Europe followed a design by bricolage. He draws strong opposition to rationalist approaches that would have assumed an optimal outcome. This is supported by Cleaver (2002) who in the realms of natural resource management uses bricolage to explain sub-optimal outcomes. Because rationalist accounts make assumptions on the information agents have, Beunza and Stark (2003) have analyzed innovation in a financial trading room that was hit in the 9/11 attacks. Under uncertainty, these analysts – like bricoleurs – used what they had and relied on the practices they had employed

before. These accounts investigate into the precise practices within design processes, which according to Mérand (2012, 138) "carries the promise of overcoming the agency-structure problem that plagues much of IR theorizing".

Kalyanpur and Newman (2017, 369) have recently provided a formalization of bricolage as a design process of international institutions where "policy-makers mix design elements to create state-of-the-art combinations". They define a specific set of conditions for the means-based design process. However, the authors strongly emphasize agency of bricoleurs. This stands in contrast to the focus on structural constraints by the available means that are re-deployed in the design by bricolage.

It becomes clear then, that bricolage overcomes the agency-structure problem not by defining it away or by emphasizing only agency. Rather, the dialectic that Lévi-Strauss stressed in his original account provides a synthesis to the problem. However, this is largely overlooked in IR accounts. In this paper, I seek to rectify this theoretical shortcoming and provide a dialectical synthesis of agency and structure.

2.3.1 Dialectic

Alexander Wendt (1987, 340–49) rejected the respective solutions neorealists and world-systems theorists proposed to the 'agent-structure problem in international relations' because both rely on a reduction to either end of the dichotomy. While both provide a structural analysis, neorealists reduce structure to individual decisions of actors (ibid., 340 f.). World-systems theorists on the other side, argue that structures generate actors which reduces agency to structure (ibid., 344 f.). Drawing from structuration theory developed in sociology, Wendt (1987, 356–59) suggests a dialectic synthesis of this individualist-structuralist dichotomy. I propose to understand the structuration-synthesis in two steps. Like structuralist accounts, structuration theory proposes to (1) understand structures as generating its elements. These elements are internally related and "could be agents, practices, technologies, territories" (ibid., 357). Because it generates elements, structure enables the behavior, i.e. practices, of agents. However, unlike structuralists, (2) social structure never exists independently of agency. First, because the practices of agents create and maintain the structure. And second, because structure relies on the reasons and self-understanding of agents. Wendt (1987, 359) concludes: "structures are ontologically dependent upon and therefore constituted by the practices and self-understandings of agents, the causal powers and interests of those agents, in their own turn, are constituted and therefore explained by structure". With reference to International Relations then, structure constrains agents but the latter "also have the power, through their acts, to

transform these same structures" (Braun, Schindler, and Wille 2018, 5). In the following, I show how bricolage explains this transformation.

2.3.2 Means-based Design

Both Kalyanpur and Newman (2017) and Mérand (2012) understand the means-based process of bricolage in opposition to rationalist design. While a rationalist design process would emphasize the initial problem diagnosis to which it finds an optimal solution, this framework "sees the first step as retrospective where actors look back at the available design stock" (Kalyanpur and Newman 2017, 369). The design process, thus, can be seen as a constant evaluation of what has worked in the past. However, bricolage also allows for carefully selecting practices (MacKenzie 2003), rather than randomly picking any tools available. Different from theories of policy learning (Nelson and Katzenstein 2014; Grabel 2018), it emphasizes the initial steps and the pool of resources policy-designers draw from. This is important because it can, therefore, account for the tools policymakers start out with in situations of Knightian uncertainty.

In opposition to rationalist design, I will draw three practices of means-based design from Kalyanpur and Newman (2017:373). They account for three major assumptions for (1) actor orientation, (2) the process, and (3) outcome-bias. Where rationalist designers are (1) forward-looking, (2) use cost-benefit analysis and (3) produce novel institutions, bricoleurs are (1) retrospective, (2) experiment with given means and (3) creatively re-deploy means.

2.3.3 Bricolage and Central Banking

In summary, I have laid out two conditions of bricolage. First, the dialectic interaction between agency and structure and second, three specific practices. Bricolage then is a design process of international institutions, where agents creatively re-deploy a constrained set of means. In doing so, they transform the toolbox and the structure they operate in.

The following tries to offer an example of central bank decision making. Because the central bank (assumed agent) sets short term interest rates, the money market is the structure this transnational actor operates in. This money market makes a certain set of tools available. The structure, therefore, generates practices in that it makes monetary policies necessary. A central bank may be mandated to aim for an inflation-goal. However, the central bank cannot explicitly make or un-do inflation. Rather, the money market makes practices of the central bank possible (Braun 2018). These practices are (1) retrospective, for example because they rely on evaluating past interventions or DSGE-modelling (Tovar 2008; da Silva 2018), they (2) experiment with given means as can be seen with constant re-calibration of interest rate setting

or the ‘taper tantrum’ (Bernanke 2017) and (3) creatively re-deploy means, for example by setting negative deposit rates. At the same time, the money market relies on these practices as they aim to reduce uncertainty. What is more, the practices even create structure. For example, Quantitative Easing *transforms* private banks’ profitability (Demertzis and Wolff 2016) or practices to safeguard the financial system produce an implicit financial stability mandate (Haltom and Weinberg 2017).

3 Methodology

This thesis will employ process tracing to carefully reconstruct the decisions taken and test the proposed theory (Beach and Pedersen 2013). To this end, it will put forward two hypotheses as to why the backstop came into being in 2013 and discuss counterfactuals for several critical junctures as is good practice in the methodology (Collier 2011). This work specifically identifies an intervening variable, i.e. the causal mechanism (Kay and Baker 2015), to explain the outcome of the permanent backstop. As has been argued, infrastructural entanglement (Braun 2018) will be assumed as an independent variable as established in the literature. However, this thesis will specifically analyze the design process to elaborate on precise timing and form of the outcome.

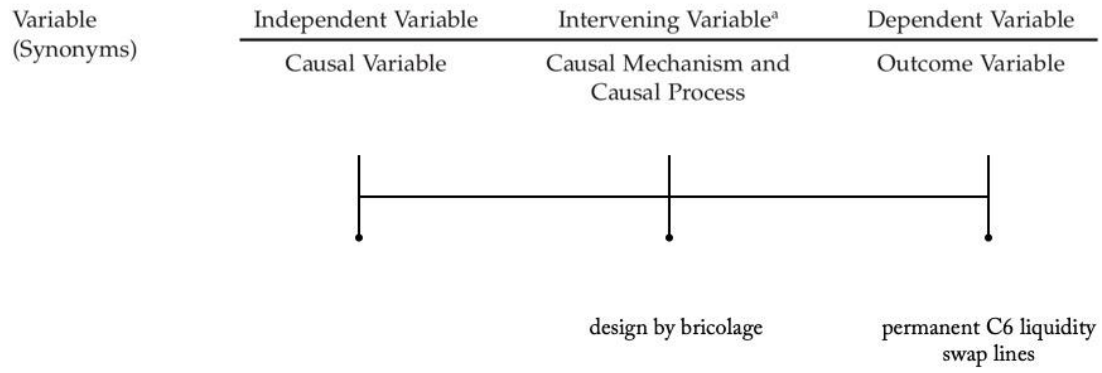

Figure 5 Tracing the process of institutional design, adapted from Kay and Baker (2015)

Process tracing is fitting for the purpose of analyzing the politics of central banking because it yields results even in environments of poor data (Checkel 2006, 365) and with monetary policies being both time and context-specific (Knafo 2013), comparative case studies cannot yield satisfying results. Central banks are opaque institutions with little transparency in their decision-making processes and gaining access to their decision makers is difficult. This is exemplified in the official documents available. Of the six central banks involved in making

the specific decision possible, only the Fed releases meeting minutes to the public. Data has been collected for this study from minutes of the Fed's decision-making body, the Federal Open Market Committee (FOMC). Furthermore, I have conducted eleven non-coded elite interviews to complement the process tracing approach (Oisín 2007). Among them, I spoke to four (former) central bankers, one former US-Treasurer, three market participants and two central banking experts. To highlight, I was able to speak to the Fed's head of international finance division (2007-2011), Nathan Sheets, and the BoE's Executive Director for Markets (2009-2014), Paul Fisher, who were both directly involved in the design process.

I propose a hypothetico-deductive model, which I subsequently test with process tracing. Resulting from the theoretical discussion above, I propose two hypotheses with adjunct alternatives. The causal inference will be "theoretically triangulated" (Kay and Baker 2015, 4). I will present opposing pairs of hypotheses to test the theory of bricolage as a design process.

The first pair of hypotheses derives from the agency-structure dichotomy, which I resolved dialectically. Then, the juxtaposition of hypotheses follows from the negation of strict reducibility of agency into structure and structure into agency. In the given hypotheses, the C6 swap-line network denotes the outcome.

H_0^a : The outcome was *only* contingent on central bankers' agency.

OR

The outcome was *only* structurally defined.

H_1^a : The outcome results from dialectical interplay of agency and structure.

The second pair of hypotheses derives from the opposition of rationalist- versus means-based practices to institutional design:

H_0^b : The outcome results from rationalist design.

H_1^b : The outcome results from design by bricolage.

To identify my respective hypotheses ($H_1^{a,b}$), I follow Collier (2011) and provide hoop tests to falsify the null-hypotheses. Failing such a test eliminates the respective hypotheses because necessary conditions for it are not met. As smoking-gun evidence is difficult to attain in social-sciences, with my mutually exclusive pairs of hypotheses it will be sufficient to provide straw-in-the-wind evidence for the respective H_1 . Proving these two hypotheses as explanatory provides evidence for bricolage as a design-process.

4 Analysis: Designing infrastructure

This chapter will first outline the critical junctures of the design process and then iterate through the advanced hypotheses.

4.1 The Emergence of a Permanent International Lender of Last Resort

This analysis understands the 2013 decision by six major central banks to install a permanent backstop to the Eurodollar market as a culmination of prior decisions. These subdivide into a past, with awareness of the lack of a Eurodollar backstop and historical central bank swap arrangements, ad-hoc decisions during the GFC, decisions during the European Debt Crisis, and the announcement to make the network permanent in 2013.

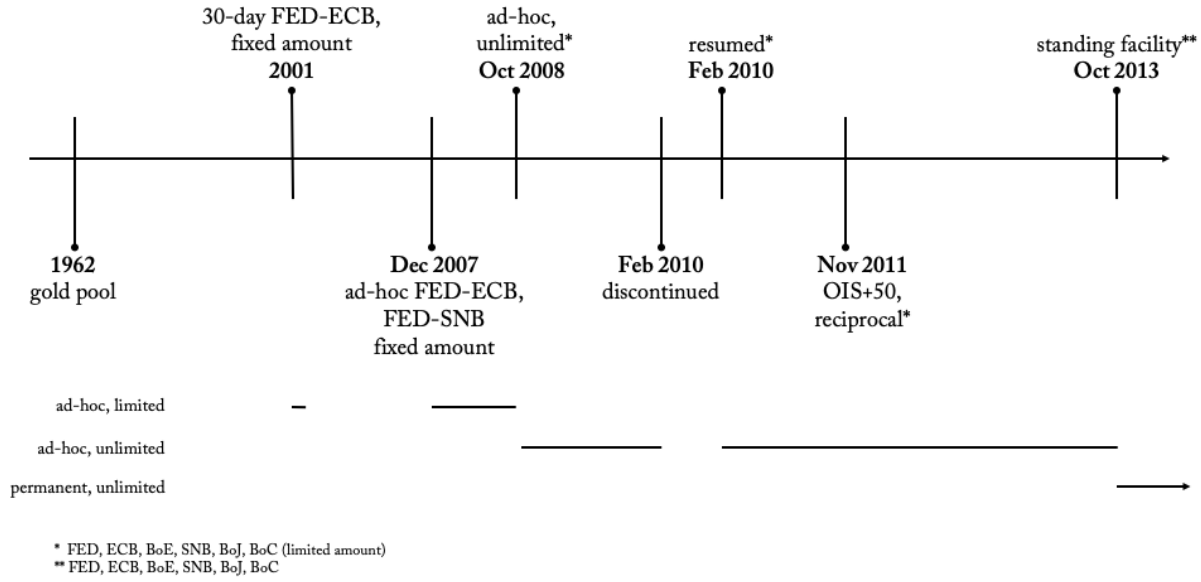

Figure 6 Timeline of selected re-deployments and evolution of C6 swap line network. Not to scale, author's depiction

In the past, central bankers were aware of a lack of an international lender of last resort facility. Kapstein (1994) discusses, how Fed officials in the late 1970s argued for a permanent international LoLR facility for Eurodollar markets, but Bundesbank technocrats turned proposals down for moral hazard concerns. With the failure of Bankhaus Herstatt in 1974, public authorities through the Bank for International Settlements (BIS) for the first time provided an implicit backstop to the Eurodollar market (Goodhart 2011).

Swap-lines are not new to the toolkit of central bankers. In 1962, the Fed installed a network of swap facilities with European central banks to manage gold-parity that was negotiated in Bretton Woods (Bordo, Humpage, and Schwartz 2015:354-60). Then, they were used for foreign exchange interventions. Mexico received a limited amount dollar swap-line

from the Fed from 1967 onwards to stem its international debt issues (ibid., 363). Under the North American Framework Agreement, bilateral swap agreements were in place with Mexico and Canada throughout the 1990s and provided an explicit backstop to these markets. After the Mexican crisis, the FOMC in 1998 was in favor of a mechanism "capable of providing emergency dollar liquidity in the event of a payments-system meltdown" (Bordo, Humpage, and Schwartz 2015, 365). After the 9/11 attacks, the Fed for the first time explicitly – albeit temporarily – backstopped large Eurodollar markets when it extended swap-line lending to the ECB for a maturity of 30 days.

From August 2007 onwards, the Eurodollar funding market began to seize up (Borio and Disyatat 2011; Tooze 2018). This lack of liquidity can be gauged from deviations in on- and offshore funding costs, i.e. between the Overnight Index Rate (OIS)[8] and Libor-rates, as noted in figure 4.

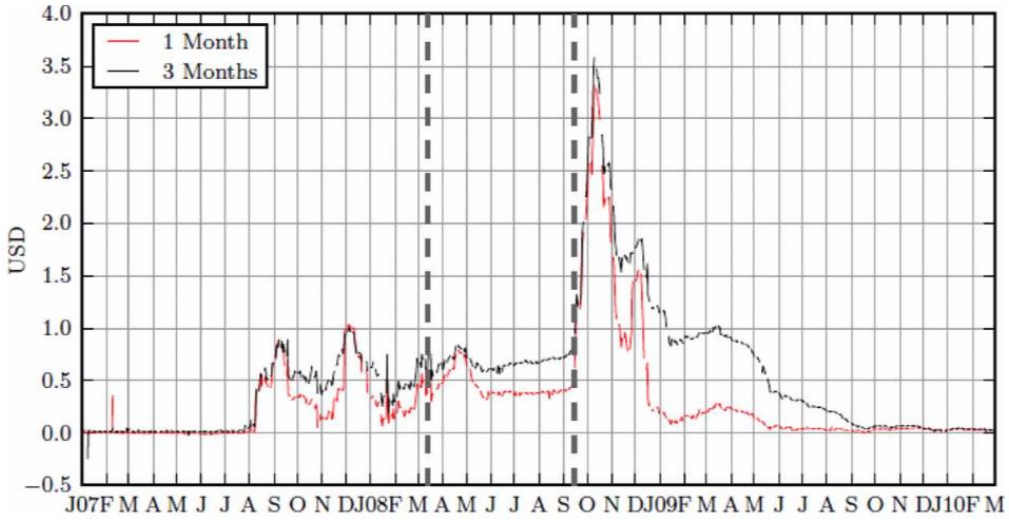

Figure 7 Libor-OIS Spread, source: Mehrling (2015, 318)

After previous discussions on staff level, the FOMC granted limited-amount[9] swap-lines to the ECB and the SNB in December 2007. After Congress in early October 2008 passed legislation that allowed the Fed to pay interest on excess reserves, the US central bank took the volume-caps off its established lines with the ECB, SNB, BoE and BoJ. The latter central banks, thus, had access to unlimited dollar funding and could provide tender-operations in their jurisdictions at full allotment. Subsequently, the Fed extended swap-facilities to a few EME central banks. The latter lines involved borrowing limits, conditionalities and additional safeguards for the US monetary authority. Central banks at its peak in mid-December 2008

[8] OIS can be understood as an implied one-week Fed Funds rate.
[9] The ECB-line was limited to $ 20 billion, the SNB-line to $ 4 billion.

borrowed a total of $580 billion[10] from the Fed (Sheets, Truman, and Lowery 2018). Legal documentation of the facilities show, that they were established for a duration of six months but could be unilaterally revoked at any time. These initial facilities allowed foreign central banks to borrow from the Fed at a rate of OIS plus 100 basis points. Foreign central banks passed these costs through to the banks borrowing at their tender operations. For these Eurodollar banks, thus, it was quite expensive to borrow at this facility. As market conditions calmed and trust in the system was restored, private borrowing through the facilities subsided through 2009.

Fed staff in November 2009 proposed to the FOMC to turn the swap-lines with major central banks into standing arrangements. The proposal was turned down and all swap-line facilities discontinued in February 2010. Only a short time later – with the Eurocrisis unfolding – in May 2010 the Fed re-established unlimited swap-lines at the same pricing with the ECB, SNB, BoE, BoJ and BoC[11]. These temporary arrangements were reapproved by the FOMC continuously. In November 2011 two novelties were introduced. First, the pricing was dropped to only OIS plus 50 basis points to address stigma concerns and encourage the use of the facilities (Murphy and Fisher 2018). Second, the existing swap-lines were turned into reciprocal arrangements. This way not only could the foreign central banks borrow from the Fed, the Fed could also access the other central banks' currencies and lend them out in its domestic market.

Lastly, in October 2013 the FOMC approved to turn this established network into a standing facility, at the same conditions[12] recently negotiated and to be reviewed annually. In a coordinated statement all six participating central banks (C6) announced their network of standing, bilateral swap arrangements. Of all thirty ways to send currency one way, only facilities from the Fed to its five counterparties had been activated until early 2019. All five non-dollar counterparties have held weekly dollar auctions, while only banks at the ECB and at the BoJ have regularly made use of them[13]. In March 2019, amid Brexit pressures, the Bank of England activated its facility with the ECB. British banks can since access euro-funding at the BoE on a weekly basis.

The following sections will iterate through these decisions to test hypotheses on how the design process evolved. It will focus on decisions taken in the FOMC as dollar lines are the most important of them and documentation on Fed decisions is the most comprehensive.

[10] Drawings at the ECB accounted for more than $310 billion, the BoJ for more than $125 billion, the BoE for $50 billion, and the SNB for $16 billion.
[11] The Bank of Canada did not receive an unlimited swap line but one with a limit of $ 30 billion.
[12] To make the facilities "symmetrical", the Bank of Canada's swap line was also turned into an unlimited line.
[13] Drawing-Data is available at: https://apps.newyorkfed.org/markets/autorates/fxswap.

4.2 Agency and Structure

Process tracing the installment of permanent Eurodollar liquidity swap-lines in 2013 offers to open the black box of agency and structure in the design process. This section will first refute the null-hypothesis that strictly only agency or only structure explain the outcome of a permanent backstop (H_0^a). Then, it will provide evidence for the dialectic dynamic of agency and structure.

4.2.1 Not only Agency

My strict hypothesis holds that only agency can explain the C6 swap-line network. To disregard this part of the hypothesis, I show with two examples that structure constrained FOMC members.

First, just as the Federal Reserve is entangled into its domestic financial market to facilitate monetary policy, it is also entangled into global Eurodollar markets. Thus, stress in offshore dollar markets are of concern to its governability just as onshore markets are. This is exemplified in early discussions in December 2007, when FOMC members were concerned about spillovers to US markets from the stress in London money markets (FOMC 2007, 7). This argument becomes specifically prevalent in 2011, when the FOMC discusses to further extend the swap-line network, make it reciprocal and lower the borrowing rate to 50 basis points over OIS. Manager of the System Open Market Account (SOMA) Brian Sack argues that "the [US] financial sector continues to face a range of risks going forward, and it could quickly come under significant pressure in response to a disorderly outcome in Europe" (FOMC 2011a, 8). Furthermore, Chairman Bernanke was aware of research at the BIS that outlines the importance of the European banking sector to US money markets. He recommends to the other board members a paper by his former Princeton-colleague Hyun Shin, that highlights the "transmission of credit from U.S. dollar sources and other dollar sources through the European banking system" (FOMC 2011a, 23). Lastly, Bernanke also argues that lowering the penalty rate on the swap-lines would "normalize the spread between the funds rate and the primary credit rate" (FOMC 2011a, 17), a goal the board had discussed previously.

Second, next to strict spillover concerns, timing inconsistencies in the Fed controlled Fed Funds rate were of concern to the FOMC. The Federal Reserve publishes a target band for its domestic interbank lending rate. However, because this rate is market-determined, it uses daily open market operations to assure that this rate trades within the announced limits. Already in their first conference call on installing swap-lines with the ECB, Bernanke highlights such a connection. Since markets in Europe are ahead of trading in the US, European banks struggle

to gain dollar liquidity and rush into the US market once it opens. Thus, the Fed Funds rate opens at elevated levels in the morning which as Bernanke argues "creates a problem for our monetary policy implementation" (FOMC 2007, 13). Market participants also relate to this timing issue as a reason for continued use of dollar tender operations at the ECB even during times of little to no market stress (Interview 5) and supposedly explains why the Bank of Canada never saw recourse at their dollar facility (Interview 3).

4.2.2 Not only Structure

However, the introduction of standing liquidity swap-lines that would not need bi-yearly renewal was far from inevitable (Interview 10). Bernanke in the early days even was certain that the facility "ought to have a termination point [and] wouldn't last forever" (FOMC 2008, 16). Two aspects highlight agency in the process and counter that the outcome of the design process was structurally defined.

First, the 2009 dismissal of standing lines in the FOMC highlights how a permanent backstop was not ex ante inevitable. What is more, the FOMC let all of the lines expire in February of 2010 and the decision in 2013 to permanently install the swap-line network came without immediate funding pressures.

Second, personal relationships between central bankers reflect on the specific shape of the C6 network. Bernanke already in 2007 refers to a private phone call with then ECB-President Jean-Claude Trichet when he brings the issue to the FOMC. This relationship becomes particularly prevalent in May 2010 in the wake of the Eurocrisis. In what Bernanke calls a "personal appeal" (FOMC 2010a, 3), Trichet had called him the day before to ask him to reopen the swap-lines. Just before the FOMC emergency videoconference on May 9th, Bernanke was asked personally by Mervyn King of the Bank of England and Masaaki Shirakawa of the Bank of Japan to reopen the lines (ibid.). What is more, at the same time staff of central banks were meeting at the BIS in Basel and Bernanke sent his Director of International Finance, Nathan Sheets, to knock on doors of his Swiss and Canadian counterparties to ask them whether they wanted "to be part of it like they were before" (Interview 10). The SNB and BoC never drew on their lines which does not speak to imminent market stresses, that is structural constraints, to include them.

4.2.3 Agency-Structure Dialectic

Lastly, I will present evidence on how 'the outcome results from dialectical interplay of agency and structure' (H_1^a). Two mechanisms emphasize this aspect.

The structural disposition of Eurodollar markets generated specific agents and technologies. Each referred to different ideas on how money markets work. On the one side, some FOMC members suggested to have foreign central banks inject their international reserves into their banking systems (FOMC 2007, 18, 2008, 13, 2009, 46). This was met with analysis that proved its disadvantages. First, this would not pour additional liquidity into the markets, second it would not signal international cooperation amongst central banks and third, installing the facility would give the Fed insight into liquidity needs in the foreign markets. President of the St. Louis Fed, William Poole, and President of the Richmond Fed, Richard Lacker, remained especially outspoken with regards to swap-lines. They are also the only ones who ever voted against any of the changes in the swap-line specifics[14]. Reviewing the specific meeting minutes, it is evident that Poole held 'loanable-funds-like' textbook ideas on how the financial system works. Bernanke challenged him and explained liquidity issues in asset funding where "the presumption is that some assets are more liquid and easily fundable than others" (FOMC 2007, 24). Lacker throughout remained skeptical to the theoretical underlying of the swap-line rationale:

> "On the swap lines, I have never been a real big fan of these. My affection rose slightly earlier in the year, but it was a transitory rise. [Laughter] I find my enthusiasm waning. Basically, I don't think they solve an economic problem worth solving. [...] maybe I am just really sanguine about the ability of the system to move dollars around" (FOMC 2009, 41).

On the other hand, the dovish Janet Yellen who in 2009 still was President of the San Francisco Fed, at the time suggested to install a standing swap-line network with more than just the considered major central banks. In the meeting she is the only president explicitly using monetary theory to make her case. Drawing on Gurley and Shaw's (1960) seminal work, she argues convincingly and with much acclaim from her peers (FOMC 2009, 51 et seqq.), that reserves as inside money cannot be sufficient to stem a liquidity crisis. Later, her Keynesian ideas come to the fore when, together with the President of the Boston Fed, Eric Rosengreen, she supports lowering the penalty rate in 2011. Referring to these latter presidents who were closer to the interventions in the payments system, Sheets remembers, "the people who were in the plumbing knew, the plumbing needs dollars" (Interview 10).

Two sets of ideas on resolutions to liquidity crises therefore preceded the GFC and the shortfall in Eurodollar funding was evidenced to all FOMC members equally through metrics like LIBOR-OIS spreads. This structural component of the money market generated the opposing agencies in the FOMC but made just one technology possible. "During the fall of

[14] Poole voted against the ECB and SNB lines in 2007. Lacker voted against the drop in the penalty rate in 2011.

2007, central banks became aware of something on which they had not previously focused" (Cecchetti 2008, 15), or put differently, "the crisis has dramatized the remarkable extent to which financial markets have become globally integrated" (Nathan Sheets in FOMC 2009, 15). Structure made additional liquidity provision necessary, it therefore generated the technology that was employed.

Therefore, the changing structures produced a certain agency and technology. The latter however also created and maintained the structure. Next, I will show how repeatedly re-deploying swap-lines shaped expectations of market participants so that in 2013 "it may have become difficult to shut things down" (Interview 3). One reoccurring theme throughout debates on establishing and re-establishing swap-lines remains to "reduce uncertainty among market participants as to whether and when these arrangements would be renewed" (FOMC 2013, 9). The argument here therefore is, that by introducing the swap-line network, central banks introduced expectations about the technology and thus created structures. With the deepening of the Eurocrisis, Sheets in the FOMC proposed to "try to remind the markets that these swap-lines will still be there" which "will be taken in stride by the markets as something reassuring" (FOMC 2010b, 16). The same concerns are prevalent when Fed staff moved a decision on prolonging temporary swap-lines to an earlier meeting because they were concerned that "as the deadline grew closer, the markets would start to worry about whether the swap-line was going to be there or not" (Sheets in FOMC 2010b, 16). Swap-lines were initially introduced to reduce stress in the market and create certainty about funding. Having the lines in place for an extended period of time in 2011 led staff to argue for a one-year extension of the facility because "allowing the swap-lines to expire [would] seem to create unnecessary risks." (Sack in FOMC 2011b, 58). The decision to transform the temporary measures into standing facilities also resulted from concerns about signaling. As President Kocherlakota points out, any renewal of a temporal line could be understood as the Fed being "concerned about things", while with a permanent facility the FOMC "[doesn't] really have to worry as much about the signaling content of our decision" (FOMC 2013, 12).

In sum, central bankers introduced swap-lines to reduce uncertainty in the market. Later, they re-deployed them and subsequently made them permanent to not introduce additional uncertainty. Then, the precise form of the backstop creates structure that in turn generates future technologies. Market participants have furthermore corroborated this perspective. While one has argued that "the power of the swap-line is psychological" (Interview 1), another has called it "structural aid to smaller banks [of the Eurozone]" (Interview 6).

4.3 Means-based design

After having provided evidence for the dialectic process of structure and agency, I will now point to the specific practices employed by central bankers. This section will refute the hypothesis that 'the outcome results from rationalist design' (H_0^b). Rather, an experimentative, retrospective process of creative re-deploying of tools culminated in the C6 swap-line network.

The process was not forward-looking. First, even though the problem of a lacking Eurodollar backstop had been discussed from the 1970s to the late 1990s, no such permanent action was taken. Second, the lack of Eurodollar funding in the GFC itself marks a lack of foresight by institutional designers and third, dismantling the temporary swap-line arrangement in February 2010 and re-installing in May of the same year provide evidence against an element of forward-looking design. Also, the permanent swap-line network is by no means a novel institution. Rather, as FOMC members themselves argue repeatedly[15], it resembles the facilities that had already been in place between major central banks in the 1960s to stem dollar shortage in the US. However, policymakers do discuss costs and benefits when debating involved risks. But considering the strict legal framework of the swap-line contracts, this debate is moot. These aspects provide hoops-evidence to eliminate the hypothesis of a rationalist design process. The following will provide straw-in-the-wind evidence for a means-based process.

4.3.1 Experimentation

In 2014, the former Governor of the Bank of England, Mervyn King, visited the former Chairman of the Fed, Ben Bernanke. During the resulting conversation – broadcast on BBC – Bernanke said, that during the crisis he felt like a driver during a car accident who just tries to gain control of the wheels (King 2014). This short-sighted *trying* is evident in the language of FOMC meetings during the crisis. In the conference call that first decided on the $ 20 billion swap-line with the ECB, Bernanke – in a bid to convey the voting members – argues: "I think it will send a good signal […] But I don't know for sure. If we do it, we are just going to give it a try and see what happens" (FOMC 2007, 14). In the same meeting, he repeatedly states that the swap-line is no end to itself but rather a process of trial and error, for example when weighing between moral hazard concerns and market liquidity: "the imperative of trying to help markets function more normally and, therefore, support normal economic functioning is stronger" (FOMC 2007, 11 f.). This experimenting to solve immediate issues is summarized by

[15] President Lacker makes repeated remarks that the swap-network in fact is a form of foreign exchange intervention.

a close observer of central banks: “They were just throwing at the crisis whatever they had, hoping some of it would work” (Interview 9).

4.3.2 Creative Re-Deployment

In their discussion on the ad-hoc lines in 2007, FOMC members repeatedly “applaud and support the efforts” (FOMC 2007, 19) Fed staff had made in crafting and recrafting the proposal up to that point. The ad-hoc swap-lines between the Fed and the Bank of England in 2008 relied on legal documents staff had drawn up already in 2005, as an improvement over the hastily stitched together 9/11-lines (Interview 4). This highlights the incremental re-deployment of the arrangement, that becomes more evident when considering the flexibility with respect to volume and counterparties involved.

Chairman Bernanke elaborates in 2007 on the flexibility for re-deployment: “That's the advantage of this – that we can scale it up potentially quite a bit” (FOMC 2007, 25). Nine months later, with the collapse of Lehman, the FOMC uses the existing swap-line but re-crafts them to mimic the open-ended nature of other facilities they had used. At the September 2008 FOMC meeting, SOMA-manager William Dudley, explains the proposal of taking limits off the swap-lines: “I think a lot of the programs that we have are actually open ended. The discount window is open ended in the sense that it’s limited only by the amount of collateral that the banks post there” (FOMC 2008, 17). Policymakers here drew from existing stock of tools and were inspired by the features of the discount window.

What is more, then SOMA-manager Simon Potter in 2013 argued that “[s]tanding swap-lines […] would limit the risk that decisions regarding the renewal of these arrangements would be misinterpreted [by market participants]“ (FOMC 2013, 9). Introducing the swap-line network on a permanent basis would reduce uncertainty because re-approving temporary lines could be interpreted as the Fed sensing market-stress. Thus, adding the element of permanency became another re-deployment in the means-based design process.

4.3.3 Retrospective

When the FOMC discussed to take off the caps from swap-lines at the height of the crisis, William Dudley references recent experience with the Primary Dealer Credit Facility (PDCF). Gauging from past experience with the PDCF, he is in favor of an unlimited swap-line, because “if you provide a suitably broad backstop, oftentimes you don’t even actually need to use it to any great degree” (FOMC 2008, 11). Dudley again uses this retrospective reasoning in 2011, when he references that the track-record of international policy coordination was

"perceived by the market very favorably" (FOMC 2011a, 23), which leads him to support the coordinated effort to establish reciprocal swap-lines with the other central banks.

In this retrospective revisiting of existing tools, FOMC members learned from experience. While the majority of the committee throughout the years remained positive towards the measure, some members continuously pushed back. Policymakers mostly cited political risks of picking counterparties as constraints on their decisions. However, by 2013 they had nearly six years of experience with advanced economy swap-lines. Since counterparty risk with other central banks remained negligible, "people became more familiar and comfortable with it and were able to say: this is necessary" (Interview 10). With "no real cost to having it there" (Interview 3), the swap-lines resemble something "pretty darn close to a free lunch" or a "guaranteed carry-trade" (Interview 10). Realizing this positive-sum situation, central bankers moved to establish the permanent backstop.

5 Discussion

This analysis gives weight to understanding the emergence of the C6 swap-line network through design by bricolage. I have shown how the design process of the backstop followed from both an agency-structure dialectic and means-based practices.

The dialectic interplay of structure and agency has been shown in two ways. On the one hand, the surge in Eurodollar market activity and its lack of a backstop threatened the interwoven net of cross-border financial claims. Dovish and hawkish ideas competed over an interpretation of the liquidity issues in the plumbing of Eurodollar markets. Structure produced these opposing agencies and the crisis generated the technology of the swap-line backstop. This reading is in line with most functionalist readings of economics, where central banking continuously updates its policies in response to structural shortfalls (Murau 2018; Kuttner 2018; Mehrling 2015). However, in its generative capacity, the evidence provided here differs strongly from the argument by Hardie and Maxfield (2016), who see structure merely as a constraint to US monetary statecraft.

On the other hand, by implementing this backstop, central bankers also created and maintained the structure they govern. The evidence in this thesis focuses on expectations that the ad-hoc introduction of the backstop fostered. Central bankers became constrained by their previous actions because market participants had accustomed to the new feature. Taking it back again would have been costly. Already long before the introduction of unconventional monetary policies, central bankers governed through managing expectations (Braun 2015). However, the introduction of the swap-lines made "expectational politics" (Wansleben 2018) necessary

because dismantling the backstop could have put a dent in the fragile web of financial markets. Showing how agency creates and maintains structure, the evidence here is in line with arguments that have stressed that the Fed's swap-lines intent to safeguard US financial interests (McDowell 2017). However, it also moves beyond this argument in showing that the expectational politics did not just safeguard US financial institutions but reduced uncertainty even for such Eurodollar banks that are offshore.

Giving evidence to the means-based process of institutional design, this paper has argued against rationalist approaches. It showed that central bankers relied on practices of experimentation, creative re-deployment and retrospection to design the C6 swap-line network. Two implications follow from this understanding. First, it explains sub-optimal aspects of the institutional design. Even though this may not be intended, increased protection of banks through LoLR innovation has led to heightened occurrence and depth of banking crises (Laeven and Valencia 2013; Calomiris and Haber 2014). What is more, just as other shadow-banking entities benefit from increased backstops (Birk and Thiemann 2019), Eurodollar banks through the permanent swap-line network attain the advantage of decreased uncertainty in their business. Second, because the design-process evolves in a trial and error fashion, bricolage lets us rethink the current narrative of central bankers as the "new masters of the universe" (Giles 2017; Sentance 2015). While Bernanke, Geithner, and Paulson (2019) amongst others have tried to establish a heroic narrative of their superior ingenuity in the crisis, Jacobs and King (2016) have framed central banks as "power-hungry institutions run by professionals who took advantage of their skills and know-how" (Krampf 2017, 1). Understanding the design-process during the crisis as bricolage, takes away both the praise for ingenuity (Engelen et al. 2010) and, vice versa, the blame of power-grabbing.

6 Conclusion

While ad-hoc international lending of last resort had been practiced since the 19th century and discount windows permanently safeguarded domestic financial systems, the standing liquidity swap-lines between the C6 central banks in 2013 introduced a permanent International Lender of Last Resort. This thesis has argued that such a backstop could emerge through design by bricolage. Central bankers in a dialectic interplay of their agency and the structural constraints of financial markets re-deployed a tool that they had used already in the 1960s. While then it then was used for exchange rate interventions, it came back in 2007 as an international discount window. Because they fostered expectations in market participants and offered a positive-sum solution, the swap-line network in 2013 was made permanent.

Emphasizing the design by bricolage, this work relates to the 'practice turn' in social sciences (Schatzki, Knorr-Cetina, and von Savigny 2001). Then, the C6-network appears as a functionalist response to the integration of dollar-markets. However, this appearance masks the dynamics bricolage can uncover. Just as the argument presented here does, Minsky (1992) emphasized the dialectic interplay of the structure of financial markets and agency of central banks. Then, the permanent C6 swap-lines may have rectified the structural shortfall of a missing International Lender of Last Resort for participating jurisdictions. The cooperative arrangement amongst major central banks is a backstop at the very top or core of the hierarchical international monetary system (Mehrling 2013). However, with rising fragility in Emerging Markets (Shin 2013), i.e. the periphery of this system, that specifically relies on the top for stability (McCauley, McGuire, and Sushko 2015) the C6 standing liquidity swap-lines are far from the end of the story of financial stability.

This paper has largely investigated into the design process of the International Lender of Last Resort facility from the US perspective. This is problematic as the GFC is mostly discussed as a US phenomenon, while evidence shows the importance of European lending practices towards the fragility (Borio and Disyatat 2011; Tooze 2018). Future research should therefore investigate into the process from the perspective of one of the other participating central banks. As the dialectic interplay developed in this thesis re-connects with growing research around 'infrastructural entanglement' (Braun 2018; Braun and Gabor 2019), future studies could further examine power effects the financial sector gains from liquidity swap-lines. Lastly, the aspect of competing ideas remains underdeveloped in this paper. This highlights the importance of further investigation into the rise of 'global liquidity'[16] as an idea in finance scholarship.

[16] See constructivist work by Pape (2017); for neoliberal institutionalist work on ideas in central banking see Morrison (2015).

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8 Appendix 1: List of Interviews

1. Central Bank Expert at Financial Times, 20 June 2019, London
2. Central Banker at ECB, 2 July 2019, via phone
3. Central Banker at BoC, 2 July 2019, via phone
4. Former Central Banker at BoE, 10 July 2019, via phone
5. Market Participant, 10 July 2019, London
6. Market Participant, 17 July 2019, Frankfurt
7. Market Participant, 28 June 2019, Frankfurt
8. Central Bank Expert at OMFIF, 23 July 2019, London
9. Central Bank Expert at LSE, 1 August 2019, London
10. Former Central Banker at Fed, 30 July 2019, via phone
11. Former US-Treasurer, 31 July 2019, via phone