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ABHANDLUNGEN

Much Ado About Nothing? Macro-Prudential Ideas and the Post-Crisis Regulation of Shadow Banking

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Abstract Post-crisis, macro-prudential ideas have challenged the epistemic authority of private risk management technologies, declaring them to be pro-cyclical contributors to systemic risk. This discursive challenge has been most critical of the shadow banking system, where private risk management instruments are central. This challenge, however, has not been translated into regulatory tools which reflect these convictions. This paper studies this process of discursive challenge to (failed) regulatory intervention for the case of the repo-market, the heart of the current shadow banking system. It traces regulatory efforts on the global and EU level from regulatory statements to (lack of) action, documenting both the persistent articulation of macro-prudential ideas challenging private risk-management systems and timid to no regulatory intervention. It links this hiatus to international coordination problems, the need for macro-prudential action to span regulatory communities, involving banking and financial market authorities and disagreements between micro- and macro-prudentially oriented regulators. The lack of evidence and the difficulty to generate it are identified as major impediments for regulatory consensus, further aggravated by ambiguities about the goals of anti-cyclical regulation. Beyond governance problems and the persistent appeal of private risk-management systems, the paper thus points to difficulties operationalizing macro-prudential ideas as a major explanatory factor.

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Keywords Financial regulation · Shadow banking · Epistemic authority · Private risk-management

Viel Lärm um nichts? Makroprudenzielle Ideen und die Regulierung von Schattenbanken nach der Krise

Zusammenfassung Seit der Finanzkrise stellen makroprudenzielle Ideen die epistemische Autorität privater Risikomanagement-Technologien in Frage, da diese als pro-zyklische Verstärker von systemischem Risiko ausgemacht werden. Eine solche Kritik ist für das Schattenbankensystem besonders problematisch, da in diesem Bereich private Risikomanagement-Technologien von zentraler Bedeutung sind. Trotz einer solchen Problematisierung konnten sich jedoch diese Überzeugungen nicht in regulatorische Instrumente übersetzen. Vor diesem Hintergrund untersucht der Artikel diesen Prozess der diskursiven Diskreditierung und der fehlenden Umsetzung in regulatorische Maßnahmen für den Markt für Rückkaufvereinbarungen (Repos), dem Herz des gegenwärtigen Schattenbankensystems. Die regulatorischen Bemühungen werden auf globaler sowie auf EU Ebene nachgezeichnet, um sowohl die stete Artikulierung von makroprudenzieller Kritik als auch die nicht erfolgte oder sehr zurückhaltende Intervention zu dokumentieren. Diese Lücke zwischen theoretischen Überlegungen und praktischem Handeln wird auf Probleme der internationalen Koordination, den Bedarf eines gemeinsamen regulatorischen Vorgehens von Banken- als auch Finanzmarktautoritäten für makroprudendenzielle Interventionen sowie Meinungsverschiedenheiten zwischen mikro- und makroprudenziell orientierten Regulatoren zurückgeführt. Fehlende Beweise für prozyklische Effekte und die Schwierigkeiten, diese zu generieren, werden als zentrale Hinderungsgründe identifiziert, welche die epistemische Autorität makroprudenzieller Regulierungen schwächt. Neben den Problemen der internationalen Koordination und dem fortwährenden positiven Nimbus privater Risikomanagement-Technologien, stellt dieser Artikel vor allem die Probleme bei der Operationalisierung von solchen Ideen heraus.

Schlüsselwörter Finanzmarktregulierung · Schattenbanken · Epistemische Autorität · Privates Risikomanagement

1 Introduction

In 2008, private risk management technologies failed spectacularly, and with them, so did the pre-crisis regulatory consensus of market-based governance. The idea that financial stability could be achieved by sophisticated private risk management technologies, which had been incorporated in transnational regulation such as Basel II, was shattered by the financial crisis. The crisis not only questioned the microprudential approach, based on private risk management systems, but also vindicated the ideas of macro-prudential critics, which since the early 2000s had criticized the trust in private risk management instruments, stressing their pro-cyclical contribution to booms and busts (Crockett 2000; Daníelsson et al. 2001, for a review; s. Langley

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2014, p. 110). These critiques pointed to the "self-reinforcing interactions between perceptions of value and risk", that is to say the link between these shifting "attitudes towards risk and financing constraints" which increase risk taking in the upswing and harshly reduce it in the downswing (Borio 2003, 2012). This discourse took center stage after the financial crisis as political leaders, responding to the political pressures, sought to find a convincing policy program which prevents future calamities (Baker 2013a, 2013b, 2014). But, while the macro-prudential view on financial markets was a major change in the regulatory discourse, respective policy tools and instruments have only been slowly forthcoming, if at all (Baker 2015). As such, the fate of macroprudential regulation adds to the general impression of a "status quo crisis" (Helleiner 2014), which has brought about only minimal change (Underhill 2015).

The post-crisis regulation of shadow banking offers a crucial case for understanding this curious fate of the macroprudential idea set, as it is in this part of the financial system where the negative consequences of private risk management systems became most evident. In no other area of financial markets was self-regulation through private risk management practices as pronounced as in the shadow banking system (Mehrling et al. 2013; Kessler and Wilhelm 2013; Pozsar 2015). Evolving outside of banking regulation, this system of credit intermediation lacked the access to lender-of-last-resort function of the central bank that bestows stability on the regular banking system. Its functioning was, hence, based on the capacities of private risk management techniques to generate an equivalent of certainty to lending institutions, thereby facilitating the "money market funding of capital market lending" that characterizes the system (Mehrling et al. 2013). When the financial crisis revealed that those risk management systems, predicted the probability of default for essential assets and derivatives completely wrong, the confidence in the private provision of safety for lenders evaporated and with it the trust in the shadow banking system as a whole. As a consequence, a run on the shadow banking system ensued which led to its implosion (Swedberg 2012). What functioned in boom times as a substantial source of the pre-crisis expansion of credit, exaggerating the boom, now turned into a major source of financial instability, amplifying the defaults in the subprime mortgage market into a global crisis (for a detailed account, Gabor 2016b).

In this paper, we study if and in how far macro-prudential change agents have been able to challenge and amend those private risk management practices which they identified as responsible for the pro-cyclicality of the shadow banking system. Doing so, we draw on discursive institutionalism (Schmidt 2008) and its focus on the discursive coordination of experts, based on the discursive construction of evidence and authority in these technocratic debates. Studying these debates and their results, we focus on the post-crisis regulation of the repo market, the core refinancing market of the shadow banking system that stood at the heart of the crisis (Gorton 2010). The unit of analysis is the formulation and implementation of macro-prudentially inspired reforms for this part of the shadow banking system on the global level as

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well as on the level of the EU.[1] Analyzing these processes, we apply the method of process tracing (George and Bennett 2005; Trampusch and Palier 2016), focusing on the turning points occurring within the evolution of the regulatory policy and the underlying reasons for these developments. We will argue that the limited post-crisis regulatory intervention is not only the result of a splintered governance network and the persistent epistemic authority of private risk management systems, coupled with industry lobbying (adverse ideational selection), but also of the difficulties inherent in the operationalization of the macroprudential idea set.

This paper proceeds as follows: After reviewing the current literature on the regulation of shadow banking post-crisis, we describe the repo-market and its role in the shadow banking system, pointing to the difficulties of translating regulatory discourse into deployable regulatory tools in a splintered transnational field of governance. We then document the existence of a strong macro-prudential discourse demanding an intervention into private risk management practices. Based on documentary analysis and twelve semi-structured expert interviews with regulators involved in regulatory efforts, we subsequently analyze the policy process of the formulation and implementation of regulatory measures regarding the repo-market both on the global as well as the EU level. We document the extensive problematization of the repo-market in regulatory discourse and then its lacking translation into actual regulatory measures, based on lacking regulatory consensus and difficulties of coordination. The article concludes by drawing the lessons from the regulation of the repo-market for explanations as to the limited regulatory change post-crisis and speculates on the future of the macro-prudential program.

2 Explaining the Regulation of Shadow Banking Post-Crisis-Insights from the Literature

The few studies on the re-regulation of shadow banking in the aftermath of the crisis rather unequivocally identify regulation as timid and incremental (Rixen 2013; Kessler and Wilhelm 2013; Engelen 2015; Gabor and Ban 2015; Gabor 2016a), in line with the general perception of, a restorative, rather than transformative regulatory policy post-crisis (Engelen et al. 2011; Bieling 2014). In order to explain this limited intervention, scholars have advanced explanations relating to the neoliberal embrace of markets which allowed private risk management systems to weather the challenge to their epistemic authority and to prevent substantial regulatory changes. A second strand of literature focuses on the difficulties of regulatory coordination in a transnational field of governance characterized by a splintered governance authority, both in terms of over- or underlap of regulatory authorities within nation-states as well as beyond. Those scholars explain this incremental shift by stressing the ideational component within regulatory discourses which tackles the problem of shadow banking. Along these lines, Kessler and Wilhelm (2013) show how the regulatory discourse interprets the failure of shadow banking as a market failure

[1] Being a market of global or at least regional reach, we ignore national solutions which the general literature as well as our interviewees largely saw as pointless.

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caused by market imperfections rather than as the incapacity of private risk management systems to price risks properly. They argue that based on such a framing, regulatory action attempts to correct information asymmetries and other market imperfections, rather than to fundamentally question the epistemic authority of private risk management to read and interpret data properly (ibid, p. 258 f.).

This observation then falls in line with Underhill's statement that market-based governance, the reliance on transparency, market discipline and private risk management systems, persists as the main element of financial regulation post-crisis (Underhill 2015, p. 470). While Underhill points to macro-prudential regulation as an idea set which challenges this system, this challenge to him remains ineffective. Underhill's explanation for this failure is what he calls "ideational adverse selection", arguing that the persistence of private actors involved within the regulatory community leads to the selection of those ideas to foster financial stability that suit their interests. In other words, as macro-prudential regulation is more invasive as it decisively constrains the actions of private actors, it is rejected by their trade associations. In a sense, Underhill thereby presents a processual account of the regulatory capture hypothesis. As we will argue, these accounts not only overestimate the power of private interests, they also underestimate the difficulties of putting an alternative idea set into action.

Another stream of literature has pointed to the splintered governance authority which was instrumental for the growth of shadow banking, both domestically and on a global level. Domestically, research on the development of crucial elements of shadow banking, such as the market for swap derivatives or the ABCP market, have pointed to the regulatory over- or underlap. That is, the fact that this market was not covered by any one regulatory authority, which facilitated its growth (Funk and Hirschman 2014; Thiemann and Lepoutre 2017). Similarly for the ABCP market, the lack of direct regulatory responsibility by banking regulators in several countries meant that the growth of this market was not impeded by regulatory constraints. In addition, the competition for financial activities among states (Rixen 2013) had led to the creation of regulatory loophole by legislatures, enabling the gaming of rules by means of regulatory arbitrage, which was conducive to the growth of shadow banking. Coupled with the impossibility of regulating shadow banking activities on the national level (Thiemann 2014) this resulted in only symbolic politics and limited regulatory intervention.

In this view, the problems of regulatory arbitrage and the lack of international coordination which were at the heart of the pre-crisis growth of shadow banking (Thiemann 2012, 2014) have not been resolved by recent reforms, hence continuing to hamper regulatory action. The emphasis here is less on the lacking problem awareness of regulators, but on the difficulties to translate that knowledge into concrete actions in a splintered global financial architecture. Lastly, academics have pointed to the central banking community and finance ministries that pushed for deregulated repo markets in order to enhance government bond market liquidity. In the same vein that this fostered the growth of the shadow banking system pre-crisis (Gabor and Ban 2015), these forces also impeded re-regulation post-crisis, as they fear market fragmentations (Gabor 2016a, p. 925).

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Overall, although scholars have argued that the crisis triggered an ideational change in banking regulation, the actual post-crisis regulatory environment is rather subject to incremental, if any, change. While scholars have pointed to either regulatory capture or difficulties of regulatory coordination, we suggest that these lines of arguments have to be extended by carefully analyzing how regulators try to operationalize these new ideas. While these accounts capture some important elements to explain the incremental reform steps, they do, as we will argue, pay insufficient attention to the labor involved in transforming alternative regulatory ideas into deployable tools. As we will show, the lack of regulatory change is also caused by difficulties in the operationalization and implementation of these ideas in an evidence-based policy environment. We argue that this is another important obstacle, which adds to the explanation for the current state of post-crisis regulations.

3 The Missing Link: From Ideas to Action

The first element to appreciate in the analysis of the conversion of macro-prudential ideas into action is the rather recent history of macro-prudential discourse and its position at the fringes of the regulatory discourse in Western countries up until the financial crisis (Borio 2009; Baker 2013a; Thiemann et al. 2018). It is only from the early 2000s onwards that the macro-prudential view, which acknowledges that risks to financial stability are endogenously created within the financial system rather than exogenously, has been promoted both by the Bank for International Settlement and some academics (Crockett 2000; Baker 2013a). This means that the hallmarks of this approach, its emphasis on the build-up of systemic risks in the financial cycle, pointing to self-reinforcing feedback loops between market actors both in the up- and downswing (s. Crockett 2000; Borio 2003; BIS 2010) have only recently been (re-)introduced in the regulatory mainstream discourse.

This critique questioned the epistemic and political authority of Value at Risk (VaR) systems, which had become both legitimate practice for private risk management and an important part of the regulatory tool-kit pre-crisis (Lockwood 2015). It pointed out that VaR increased the interdependence of price movements and market outlooks (Daníellson et al. 2001; Lockwood 2015), underestimating risks in the upswing and amplifying the downturn through deteriorating risk assessments, a view corroborated by the financial crisis. Macro-prudential critics from the beginning pointed out that VaR wrongly treats prices as exogenous (Daníelson et al. 2001), underestimating the impact which it itself has on price movements.

However, the suspicion "that the completely normal, regular operational mode of the system, as it is, can lead to the self-destruction of the system" (Willke et al. 2013, p. 19) were largely ignored by the regulatory mainstream, and it is only after the financial crisis in 2008 that they gained prominence, being diffused by a few prominently placed academics and technocrats (Baker 2013a).[2] Until 2008, little-to-no time was spent by regulators in Western countries to focus on these concerns,

[2] Baker (2013) in this respect speaks even of an ideational shift in regulatory discourse, a third order change in Hall's terminology (1993).

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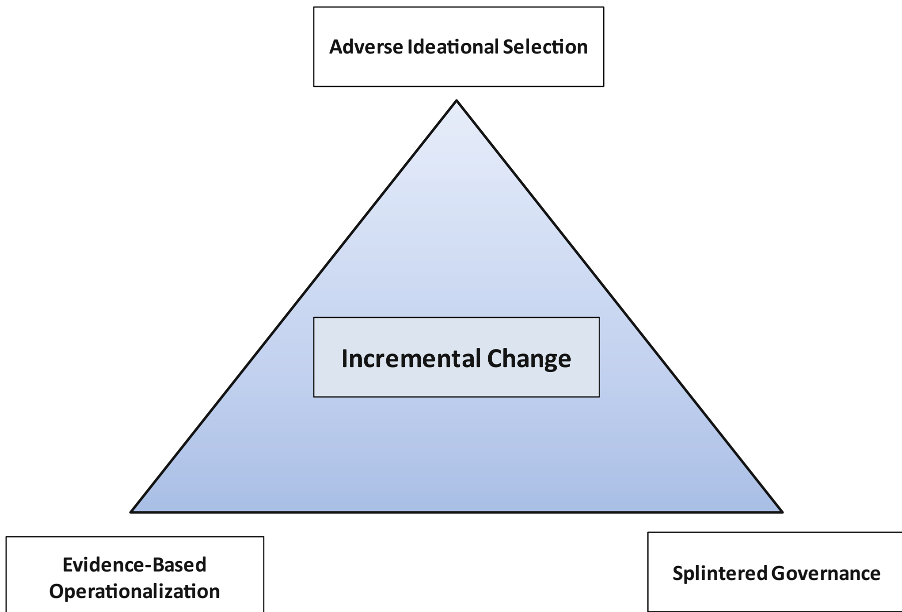

Fig. 1 Factors inhibiting the translation of macroprudential ideas into action

much less to operationalize them. This means that the new macro-prudential view on regulation not only has to challenge the epistemic authority of private risk management systems but also to develop an alternative risk metric based on systemic concerns (Persaud 2014). As we will show, this poses great challenges in terms of intellectual as well as infrastructural work and technocratic craftsmanship. Given this lack of experience, macro-prudential change agents not only need to convince fellow regulators that their concerns are worthy of consideration, but also that their suggested measures cause more good than harm.

In this vein, Baker has analyzed the advent of macro-prudential thinking as an ideational shift in the outlook of regulators upon markets, but has noticed the difficulties in developing metrics and tools to implement it (Baker 2013b, 2014, 2015). He points out that in the course of its implementation, institutional settings as well as interest-based politics have been slowing the pace of change and diluting the macro-prudential agenda (Baker 2013a, p. 52). In addition, macro-prudential regulation has been held back by a lack of data, where change agents often “deliberately decided to embark on a slow moving experimentation with the new regulatory ideas, in order to collect the necessary evidence ... to win the policy debate among technocrats” (Moschella and Tsingou 2013, p. 204). This finding points to the institutional context in which change agents operate (ibid, p. 201), which is characterized by an incremental mode of learning based on data and evidence.

We build on this finding and combine it with the assertion of discursive institutionalism, that in order to understand regulatory change, we need to study “not only the ideational shift, but the complex processes of discursive interactions” that surround it (Wood 2015, p. 8; citing Schmidt 2011, p. 59; s. also Schmidt 2008,

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p. 310). In particular, we focus on the coordinative discourse among technocrats, where debates and contestation among policy experts provide "the common language and framework through which key policy groups come to an agreement in the construction of a policy programme" (Wood 2015, p. 13; referencing Schmidt 2002, p. 171). Quite limited in their deliberative nature, advancement in these discourses is based on the construction of evidence, as evidence based policy has become the unquestioned norm among policy makers (Strassheim 2015). Hence, when explaining the incremental change regarding the regulation of the shadow banking system post-crisis, one has to also pay attention to the discursive labor involved in convincing fellow regulators, based on evidence, of the advantages of these regulatory tools. This embrace of evidence-based policy as the pre-condition for regulatory intervention has been, we will argue a major impediment for regulatory changes.

In the following, we develop an empirical research design that enables us to examine how this triad of factors depicted in Fig. 1 affected the regulatory discussions on the repo market in the aftermath of the financial crisis.

4 Research Design

In order to better understand the influence of the factors identified above on the post-crisis regulation of the repo-market, we combined documentary analysis with expert interviews. We use these sources to trace the regulatory process and to identify causal mechanisms that hampered fundamental changes in the regulation of the shadow banking system (Trampusch and Palier 2016). With this goal in mind, we first conducted a document analysis of the different regulatory responses after the crisis of the FSB and of the European Union and compared them with initially announced policy intentions, reviewing in particular consultation documents and regulatory reviews. We then conducted 12 expert interviews with (former) regulators, supervisors and central bankers involved in the process both in Frankfurt and London in order to better understand and contextualize the identified developments.[3] Furthermore, we attended three ECB conferences in Frankfurt on the topic of shadow banking regulation in 2016, which enabled us to not only grasp what regulators *write* but also *say* about the topic, as they try to coordinate. In this way, we could deepen our understanding of the regulatory processes and countercheck the results of our document analysis by directly observing the communication and regulatory discussions among crucial stakeholders as well as asking them directly about the reasons for reluctant reform efforts. By first tracing the effects of the governance set-up, the influence of private lobby group and the difficulties of developing regulatory tools on the implementation of macroprudential ideas on the global level and then on the level of the more engaged European regulatory response, we can comparatively show the influence of these three factors on the post-crisis reforms.

[3] These interviews were conducted within central banks, at conferences, but also over the phone from May 2015 to September 2016 and lasted between 30 and 95 min. For more information, s. Table 1 in the appendix.

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5 The Repo-Market and its Endogenous Risk

The shadow banking system involves banks and non-banks in an intricate web of financial relationships, which finances long term capital assets with short term money market funding. In a popular depiction of shadow banking, broker-dealers and derivative dealers are seen to be at the center of the shadow banking system. They link risk averse cash-pools, that is institutional investors with a preference for liquidity and security (pension funds, corporate cash of treasurers), with risk-embracing actors, seeking financing to invest. The system is characterized by chains of intermediation which constitute "money market funding for capital market lending" (s. Mehrling et al. 2013; critical Sissoko 2014, 2016), a business strategy executed on the balance sheet of banks (Sissoko 2014) or by hedge funds and bond funds, levering their bond portfolios in order to deliver equity-like returns with bond-like volatility (Pozsar 2015). The investment strategies of these investors are typically based on short-term money market funding, often through the use of repurchasing agreements (Repos). In a repo transaction, one party sells an asset (collateral) to another party, combined with an agreement to buy this asset back in the (near) future. In this way, the seller gets cash without effectively selling the collateral, while

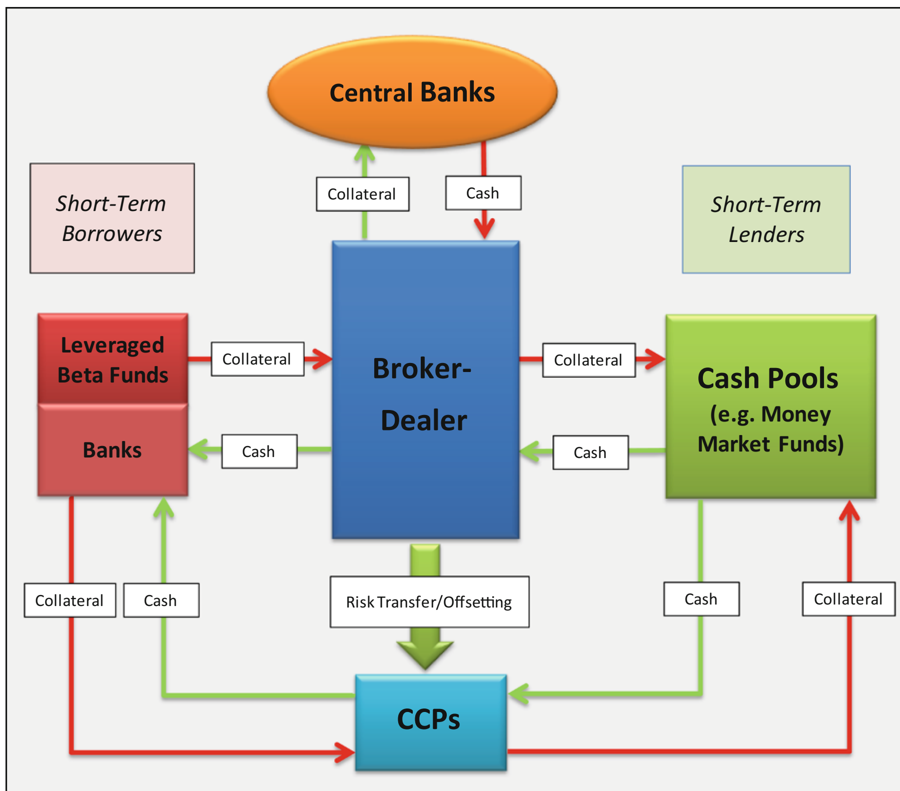

Fig. 2 The Shadow banking system. (Based on Singh 2014)

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Fig. 3 Procyclicality—flow diagram. (Source: FSB 2012a, p. 16)

the buyer receives interest, creating an in-substance securitized loan. As the buyer becomes the legal owner of this asset during the transaction, he can re-use the same asset, in a repo agreement in turn, if he needs short-term cash. This so called re-hypothecation can lead to long repo-chains, increasing the interconnectedness of the financial system. While repos represent an additional channel of liquidity for banks, it is the main source of refinancing for shadow banks (Pozsar 2015). Shadow banks, such as hedge funds, which otherwise face difficulties securing funding, use this instrument to further lever their portfolios. For this reason, the repo-market (cash against collateral) is at the heart of the shadow banking system, as depicted in Fig. 2.

When entering into a transaction, both parties agree on a haircut, that is the difference between the current market price of the security and the money the lender is willing to lend against it. This haircut is supposed to "provide a buffer against market fluctuations and incentivizes borrowers to adhere to their promise to buy securities back" (Gabor and Vestergaard 2016, p. 12) and is calculated by means of VaR. In case that the value of the collateral decreases, the lender can claim additional collateral from the borrower (margin call) to compensate the under-collateralization of the repo transaction.

While haircuts and margin calls provide provide "extra-ordinary security to lenders" (Sissoko 2016, p. 1), this private risk management system translates volatility in market prices for the underlying collateral into fluctuations in margins and haircuts. It is there, where the pro-cyclical dangers of the repo-market reside, as they directly link prices in financial markets (based on market liquidity) to the availability of funding to financial market actors (funding liquidity) (Brunnermeier and Pedersen 2009). In the upswing, when volatility and credit-risk seems to be low while asset prices are gaining, Value at Risk calculations indicate lower haircut requirements, incentivizing further risk taking through additional leverage. This causal chain from increasing market value of assets towards the pro-cyclical amplification of the repo-market on macro-prudential risks is illustrated in Fig. 3.

However, when the cycle turns and volatility rises again, haircuts increase and highly leveraged market participants need to deleverage quickly due to widely occurring margin calls. The crisis moment occurs when highly leveraged market participants are forced to sell off their assets (fire-sales) which puts asset prices under

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increasing pressure. This, in turn, can cause additional fire-sales by other market actors which fuels a further deterioration in market liquidity. This link creates the systemic risks inherent in this form of financing, as violently demonstrated during the financial crisis (Adrian and Shin 2007; Brunnermeier and Pedersen 2009), exposing all the hallmarks of the pro-cyclical amplification of private risk management systems that macro-prudential critiques had criticized early on (Daníelsson et al. 2001).

6 Tracing Post-Crisis Regulatory Efforts: The Macro-Prudential Critique of the Repo-Market[4]

Against this backdrop, it is unsurprising that the repo market and private risk management systems became a focal point in the (macro-prudential) regulatory discourse after the financial crisis. Already in the midst of the crisis, the former Financial Stability Forum (FSF), now the Financial Stability Board (FSB), published a report in which risk measurements were identified as a source, which contributed to the deterioration of the market in the run up and during the crisis (FSF 2008, p. 17). Later, the Bank for International Settlements (BIS) followed up with a note to the FSF, arguing that one fundamental source of the system's pro-cyclicality was the use of private risk measurement practices (BIS 2008, p. 2) and their linkages to margin requirements for collateral (ibid, p. 9). The report argues, that the short-term measurement of volatility, combined with a discretionary adjustment of the margins in times of stress, exacerbated the pro-cyclicality of the system during the crisis. The report finishes with different policy options such as conservative as well as the lesser use of market-value oriented methods for valuation of collaterals, even with time-varying, countercyclical adjustments to margins (ibid, p. 9).

In March of 2009, the prominent Turner report put the pro-cyclical effects of collateral margin calls center stage, linking them directly to the pro-cyclical effects of Value at Risk models (The Turner Review 2009, p. 112). In April 2009, the Financial Stability Forum followed suit and published two reports, one jointly with the Committee for the Global Financial System (FSF 2009; FSF-CGFS 2009), criticizing margins as strongly pro-cyclical and as important factors in the building up of leverage pre-crisis (FSF-CGFS 2009). In the next year, the center of the regulatory discourse on the repo-market moved to the FSB, as the G20 in Seoul decided to task that body with developing an agenda for the regulation of shadow banking in general and of the repo market in particular. In April 2011, the FSB published a first report laying out its ideas (FSB 2011a) and in October 2011 released its recommendations to dampen the pro-cyclicality and other financial stability risks associated with securities financing and repo transactions. A close reading of these FSB reports from 2011 and of a follow up from 2012 shows that securities markets' liquidity is linked to leverage cycles, and systemic instability is attributed to cyclical repo-collateral standards (FSB 2011a, 2012a; s. also Gabor 2016b, p. 986 f.), which are lowered in the upswing and heightened in the downswing.

[4] The following events are detailed in chronological order in Fig. 5 in the appendix.

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Concluding, the global regulatory discourse by the FSB, the BIS, and the CGFS displayed critical analyses of the pro-cyclical effects of the repo-market, repeatedly calling for a macro-prudential intervention. The crisis thus triggered an ideational shift but, as we will show below, regulatory interventions on the global level have been much more timid and less interventionist. In the following, we focus on the regulatory dynamics that can explain this timidity, starting in 2009. We will argue that besides a splintered policy field and lobbying, another reason for the missing transformation of macroprudential ideas into action was the lack of data to justify regulatory interventions in the regulatory community, coupled with a fear of unintended consequences of these measures on market liquidity.

7 From Ideas to (Lacking) Action on the Global Level

Following up on its report, the Committee on the Global Financial System, the forum of exchange of central bankers of the G10 (today G20) installed a working group in spring 2009. It was to record actual market practices in the repo-market and their impact during the crisis and to discuss the feasibility and desirability of the proposed policy options to limit their pro-cyclical effect. The agenda of the working group points to the lack of knowledge on the side of regulators (interview #7), which regulators seek to overcome with the help of expert interviews and surveys. In fact, while academia had established a powerful narrative on the crisis as a run on the repo-market (Gorton 2010), the empirical evidence on which this narrative is based only demonstrates it for a very particular sub-segment of the US-market. Regulators had little further evidence for such dynamics and felt uneasy about imposing measures based on their limited knowledge. As has been argued by a German regulator, "it was difficult to assess what the side effects are because of the bad data" (interview #4, interview #3).

Amid these conversations, the lacking conviction of US regulators concerning the imposition of counter-cyclical haircuts became evident. While European regulators openly embraced through the cycle haircuts and even possibly anti-cyclical haircuts, the British participants being the most vocal (interview #5, interview #11), US regulators were pointing to the possibilities for regulatory arbitrage by market agents (a powerful theme of American regulators since the 1990s, s. e.g. Jones 2000). In addition, US regulators doubted whether regulators could identify the right haircuts better than market agents (interview #4). As a result of this quarrel, the option of setting minimum haircuts as well as of counter-cyclical add-ons by regulators to dampen pro-cyclical effects was not directly recommended by the group but only recommended "for consideration". [5]This initial opposition against interventions in private risk management systems by the US and the subsequent emerging gridlock would prove decisive for the further regulation of risk management practices in the

[5] This recommendation applied both to direct bilateral repos, as well as to repos cleared through central counterparties (CCPs), whose increasing use, should be seriously considered due to their mitigating effect on counterparty risk (CGFS 2010, p. IX).

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repo-market, both for direct bilateral repos as well as for those cleared in CCPs at the global level.

Based on its analytical work, the FSB identified in 2011 three main areas of possible direct intervention for regulators (FSB 2011b, p. 22):

a. Macro-prudential haircut requirements, "such as minimum margin or haircuts to mitigate procyclicality"
b. Possible limits for re-use and re-hypothecation
c. The improvement of market infrastructure for the settlement and clearing of repos, in particular through Central Counterparties (CCPs)[6]

By October 2012, these areas had further crystallized into a work program. On the one hand, this agenda included the task to calibrate minimum haircuts and to introduce minimum standards for collateral management in order to reduce the pro-cyclicality of the system. On the other hand, specific measures should be developed which ensure minimum standards of transparency and a set-up of private risk management regimes that reduce pro-cyclicality. Most of these measures, however, did not involve material changes in market practices, rather benchmarking to best practices (such as extending the historical data based upon which these haircuts were to be calculated (FSB 2013, p. 25)). In essence, those measures solely seek to improve market practices, rather than fundamentally changing them. An eminent reason for this timid revision of current practices had been possible unintended consequences regarding market liquidity, as the FSB pointed out at this moment (FSB 2012b, recommendation 7): a lower level of market liquidity could increase the fragility of the financial system. Importantly, this pressure for restraint originated from an internal opposition within central banks. In the ECB, the policy development for the FSB was under the mandate of the DG Market Operations, which shared those concerns, but also feared additional market fragmentation in the Euro-Zone as well as the negative impact of these measures on monetary operations (interview #10).

Most prominently, the issue of lacking data and the fear of endangering the liquidity of the markets impeded stricter bilateral haircuts and margin requirements. In 2013, the idea of minimum haircuts materialized into an official table of proposed numerical haircuts (FSB 2013). However, these measures, both in terms of the actual minimum haircuts imposed as well as their coverage are very limited. Therefore, this was a disappointing outcome for macro-prudential regulators (interview #6; see also Tarullo 2013, p. 15). In its final form, the regulation does not apply inter alia to government bonds as well as to transactions which involve CCPs. Hence about 80% of repo-transactions in Europe, which are backed by sovereign debt (ICMA 2015, p. 13) and all bilateral repo trades, which involve CCPs had been excluded. Furthermore, the required minimum haircuts were much below average haircuts at that time and were thus not constraining for market actors (interview

[6] CCPs were recommended as they mitigate the risks of contagion and interconnectivity in the financial system in a straightforward, mechanical manner, substituting one bilateral trade with two trades with the CCP. However, recent research in this area (Friedrich and Thiemann 2018) stressed that the substantial shift of OTC business to CCPs, combinded with an increasing competition among clearing houses, also raises concerns over regulatory and supervisory arbitrage.

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#8). They were set at approximately half the level deemed appropriate by macro-prudential change agents (interview #8, #10). On the one hand, the difficulty to observe the pro-cyclicality of the repo-market based on a very limited data set was an important restriction in the calibration exercise (interview #8). On the other hand, this timid intervention was partially an outcome of concerns by regulators over the impacts these interventions might have on market liquidity. In particular, they were fearing to unintentionally cause market disruptions (interview #10; s. also 09.2013 Global Investor: Analysis: FSB shifts focus to re-hypothecation), a fear aggravated by limited data availability at this point in time.[7] Macro-prudential change agents hope that these measures might function as an initial intervention that can be increased once the regulatory community achieves a better understanding of how these measures affect markets (interview #8). Particular hopes are pinned on the major data collection exercise which starts in 2018.

A similar dynamic of regulatory self-restraint can be observed with respect to the possible limits for re-use and re-hypothecation envisioned in 2012. The FSB's main focus shifted to re-hypothecation (FSB 2013, recommendation 7 and 8) where US and European regulators were "particularly keen to reduce the pro-cyclicality of repo markets by limiting the build-up of excessive leverage in the financial system resulting from re-hypothecation" (Euromoney 2013; Global Investor 2013). However, these measures only crystallized into three market-friendly recommendations seeking to improve market discipline and transparency rather than fundamentally changing it. In particular, these measures were asking intermediaries to provide sufficient disclosure to clients regarding re-use. The re-use of client assets (re-hypothecation) should exclude proprietary trading while "only entities subject to adequate regulation of liquidity risk should be allowed to engage in the re-hypothecation of client assets" (recommendation 9).

Based on these recommendations, the FSB installed a working group on re-hypothecation in 2014, which first undertook a stock-taking exercise of existing legal definitions of re-use and re-hypothecation before examining their possible global harmonization (FSB 2015b, p. 10). It also undertook extensive interviews with market participants to get a better understanding of the market, while also seeking to gain knowledge of possible consequences and feasibility of certain regulatory measures, such as data collection by industry (Interview #7). Despite an attempt by EU officials and certain European central banks within that working group to push for further measures,[8] these proposals could not overcome the resistance by the US representatives as well as by certain European central banks, which did not pursue the EU position (interview #7). While repo-chains were clearly perceived as a possible source of contagion and interconnectedness, the US was reluctant to pursue further regulation as it already had a balance sheet constraint for primary brokerage and did not want any further measures constraining the market.

[7] The calibration of the minimum haircuts in 2013, for example were based on only three data points for 17 large banks and broker-dealers (FSB 2015a, p. 14).

[8] Such as balance sheet constraints imposed upon balance sheets of banks.

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This internal gridlock, caused by the difficulties of international coordination and lacking data meant that the statement by the FSB that "[r]e-use of collateral may give rise to increased interconnectedness and contribute to the build-up of leverage" (FSB 2015b, p. 11) merely attained the status of a working hypothesis. As a regulator involved put it, "we have said that there are these risk for financial stability, leverage, pro-cyclicality, interconnectedness, etc. and when we will have the data we are supposed to verify in how far repos, in particular the re-use of collateral contributes to leverage" (interview #7). So, the data which will be collected from 2018 onwards shall give a "feeling about the size of the market" (interview #7) while the exact effects of these presumed mechanisms are to be discerned by the subsequent data analysis. This stance explains the focus of the Working Group on how to measure cash collateral re-use and on how to exploit the data newly to be collected (FSB 2016), rather than exploring possible new measures.

Regulators now face the daunting task of aggregating the data and providing meaningful results. The data collection exercise does present tremendous challenges to the ways these data will be aggregated and made available for statistical analysis, a fact further complicated by potential discrepancies between data collection efforts of the different private data repositories (interview #4). In the end, the qualitative problematization of the inherent pro-cyclicality of the repo market had been translated into a quantitatively-driven research project, rather than a project of regulatory intervention. However, the regulatory community is as of yet not sure how exactly to analyze the data, considering the ambiguity of how to properly conceptualize the cycle in analytical models (interview #9). Furthermore, given that the data will become available by 2018 at the earliest, it is unclear how much time will be needed to generate sufficiently clear results from the data to convince the regulatory community of the need for action (interview #6). Here, problems of exact causal specification in regressions might pose severe challenges. Most likely, data that would proffer anti-cyclical action will only become available once a full cycle is completed as only a new tail event, such as a financial crisis, would permit to complete those calculations.

Examining the regulatory agenda of the FSB on the repo-market and its results, one can state that the process itself has been characterized by incremental, tepid reform steps, which hardly changed the way private risk management systems operate.[9] Regulatory efforts were hampered by US regulators, which acted as veto players with respect to new measures that challenged the predominance of private risk management system. Clinging to the pre-crisis notion of the private sectors' superior capacities to assess risks, they also pointed to a lack of data as a major impediment. In contrast, EU regulators have been vocal actors for more counter-cyclical interventions by public authorities. Accordingly, the EU was the first jurisdiction to fully implement the suggestions by the FSB from 2015, setting up a major data collecting and transparency effort as well as the proposed limitations on re-hypothecation. Furthermore, the EU was weighing additional steps, such as

[9] Its challenge to pro-cyclical risk management practices ended in minimum haircuts, which most of the time do not pose any constraint to the market. Limits to re-hypothecation and re-use of collateral, which builds the cornerstone of the private risk management system have not been imposed.

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the imposition of macro-prudential anti-cyclical add-ons to the minimum haircuts proposed by the FSB. In the following we will focus on these reform efforts in the EU that tried to go beyond the FSB agenda.

8 The EU and the Project of Counter-Cyclical Haircuts

In the EU, the task of macro-prudential change agents face a governance field almost as splintered as on the global, based on a maze of distributed responsibilities and regulatory under- and overlap (Lombardi and Moschella 2016). In this maze, change agents, including the financial stability division of the ECB and the secretariat of the European Systemic Risk Board (ESRB)[10] jointly pushed for the development of the tool of anti-cyclical haircuts in the EU since 2012, but had to confront skeptical, microprudentially-minded banking regulators and market regulators. Their efforts to control the pro-cyclical character of the repo-market mainly focused mainly upon repos traded with Central Counter-Parties (CCPs), which take up a substantial proportion of the bilateral repo trades in Europe (ECB 2015, p. 16).[11]

The centerpiece of European regulatory efforts regarding CCPs is EMIR—the European Market Infrastructure Regulation—has hence been the main goal of regulatory interventions by macro-prudential change agents. Begun in June 2012, EMIR largely bases itself upon the Principles of Financial Market Infrastructure (2012), which were jointly developed by the Basel Committee on Banking Supervision (BCBS) and the International Organization of Securities Commissions (IOSCO) and published in April 2012. EMIR delegates the task to deal with the pro-cyclicality of private risk management systems to CCPs which are required to set margins as well as haircuts conservatively in order to build up a buffer, preventing sudden pro-cyclical adjustments (EMIR 2012, p. 10, 37). Already in summer 2012, the ESRB (2012a) stressed that, beyond the resilience of CCPs themselves, the impact of their pro-cyclical behavior on the larger system requires further regulation. Therefore, the European Systemic Risk Board invited competent authorities to consider opportunities for the use of counter-cyclical instruments for the first review of EMIR in 2015. The goal of setting counter-cyclical haircuts was reiterated in four subsequent recommendations by the ESRB (ESRB 2012b, 2013, 2014, 2015).

In its review of 2015, the ESRB questions the capacity of CCPs to set counter-cyclical haircuts head on. The report concedes that any evaluation of the way counter-cyclical haircuts are implemented by CCPs, suffers from the extremely short time span for which the respective data is available (EMIR only went into force in 2014). Hence, the actual data analysis does not permit the detection of pro-cyclical haircut behavior by CCPs (ESRB 2015). Instead of basing themselves upon data, the ESRB

[10] The ESRB is a EU-level consultative body focused on macro-prudential supervision and systemic risks, which brings together banking and market regulators in Europe.

[11] As shown in Fig. 4 in the appendix, the overall percentage of bilateral trades cleared through CCPs rose to about 65% in 2015, a development largely caused by the structural changes to the regulation of banks and their broker dealer desks. This is in contrast to the US, where the triparty repo-market dominates (Adenbaum et al. 2016).

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therefore advances theoretical reasoning that points to the incentive structure of CCPs, which opposes high (through the cycle) margin requirements. To counter these tendencies of competitive "undermargining", among CCPs, it sees "a potential role for competent authorities to set margin and haircut requirements that go beyond the minimum requirements laid down by EMIR after appropriate involvement of the macro-prudential authorities" (ESRB 2015, p. 23). In other words, the ESRB suggests counter-cyclical add-ons, adjusted by authorities, which could be linked to the business or credit cycle. To do so, the ESRB points to the need to develop indicators and triggers, which "may encounter objective implementation difficulties due to a wide spectrum of financial instruments" (ibid).

Since then, macro-prudential change agents face opposition against the implementation of such counter-cyclical instruments even within the ESRB. This is due to the fact that the ESRB consists only to a third of staff from the financial stability divisions of central banks. They in turn face micro-prudential supervisors of central banks, market supervisors and the monetary policy division of the ECB, which to date show little inclination to embrace this macro-prudential project. In this institutional context, macro-prudential change agents find it very difficult to advance the project, as the other regulators are skeptical of the need for intervention and would like to see evidence that justifies it before proceeding (interview #2). In addition, they are concerned about the competitiveness of CCPs within the EU, pointing to the fact that CCPs are already overburdened and stand in competition with CCPs from the USA (interview #4).

Seeking to deal with the diverse legal and practical challenges, the project is for the moment on hold. On the one hand, appropriate trigger points and indicators have to be identified. On the other hand, the continuing debate regards the question of who exactly the competent authority for such an intervention would be and upon which legal basis it would operate.[12] The change agent, who most forcefully seeks to overcome these difficulties and vies for the position of a potential competent authority is the financial stability division of the ECB. Since 2012, this division has been the most vocal agent for the project of such counter-cyclical haircuts. In their own review of EMIR (ECB 2015), the ECB strongly recommends a broad encompassing use of macro-prudential haircuts and margins, for all transactions and institutions. Following this extensive proposal for the haircut measure, it is also the ECB which has sought to maintain further momentum for the policy measure, proposing models and measures in order to provide the indicators and triggers for regulatory actions. In its most concerted effort to date, the ECB published in a special feature of the ECB Financial Stability Review (2016) a theoretical model on leverage cycles in conjunction with an empirical analysis of pro-cyclical margins for stocks.

The special issue stresses the potential benefits of macro-prudential interventions through anti-cyclical margin requirements and sums up the efforts of the ECB to produce both theoretical and empirical evidence since 2013. In several speeches, Vítor Constâncio, the Vice-president of the ECB and responsible for the financial stability division, drew attention to this analytical and empirical work (Constân-

[12] Background conversations in the ESRB point to the need for treaty changes on the EU level in this respect.

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cio 2014, 2016), arguing for the expansion of macro-prudential powers. However, the position of the ECB's macroprudential division has not become the position of the entire European Central Bank. In particular, the department of market operations represents a strong veto player within the ECB against the implementation of counter-cyclical instruments, arguably fearing both market fragmentation and frictions as well as showing concerns over the competitiveness of CCPs, located in the EU (interview #10). In addition, to date the empirical and theoretical work of the ECB has failed to even fully convince macro-prudential change agents from other national central banks in Europe. While these theoretical and empirical models are appreciated as valuable contributions, they are not deemed compelling enough to decisively move the argument in favor of macro-prudential regulation. In the end, only empirical work nough to decisively move the argument in favor of haircuts in the repo-market empirical work nough to decisively move themicroprudential regulators within central banks as well as market regulators (interview #4). Yet, the data needed for such an analysis will only become available from 2018 onwards.

Even once such data becomes available, however, it is still unclear exactly what question these regressions will be used to answer (interview #2). This epistemic uncertainty regarding the effects macroprudential change agents should be looking for relates to a missing unifying conceptual framework for macro-prudential regulation. This framework would have to clearly define the overall goals of the policy measures and the ways it is supposed to be achieved (cf. Tucker 2016 for a critical review). As one regulator involved in the ESRB pointed out, the persistently deadline driven work of macro-prudential authorities, with the agenda set by the timeline of reviews of legislation by the EU, prevents the necessary contemplation to establish such a coherent framework (interview #2). Instead of seeking for conceptual clarity and internal consistency, these committees are dominated by the search for compromises in the face of time constraints. This lacking conceptual agreement contributes to further debate and lack of clarity among macro-prudential change agents within the ESRB over the exact goals and feasibility of anti-cyclical measures for the repo market.

In particular, questions are raised whether those measures should aim to temper the whole cycle or only to address the worst excesses during the upswing. Furthermore, if the goal of the measure is to address the whole cycle, there is continuing confusion among macro-prudential agents regarding the approximate length and the best indicators for this cycle. Repeatedly in interviews, the debate between the ECB and BIS over the length of the financial cycle was mentioned, adding to the confusion among macro-prudential agents. In addition, the related practical question to determine the best indicators for excessive liquidity, arguably the most appropriate indicator for the anti-cyclical intervention in repo-markets, are also daunting. This cacophony regarding the understanding of the financial cycle and the most appropriate indicators (email exchange regulator, 15th of September 2016) hinders coordination and agreement of policy makers. This lack of agreement regarding concepts and their measurements, in particular when considering the most extensive versions of tempering the financial cycle, prevents the unity among change agents needed to generate momentum for anti-cyclical regulatory measures.

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Arguably, however, even if such momentum among macro-prudential change agents existed, the political decision by the European legislative bodies to grant such authority to an agency is likely to be weighed down by the internal opposition within European bodies as well as by the persistent fear of regulatory arbitrage due to lacking international coordination. Both of these themes were on full display at the ESRB conference on anti-cyclical margin and haircuts regulation, held in June 2016 in Frankfurt. At this event, the aim of macro-prudential change agents to install anti-cyclical haircuts became evident. ECB Vice-president Constâncio wholeheartedly embraced macroprudential measures, presented by the ESRB and academics. At the same event, those tools only received a very lukewarm response by ESMA officials. In particular, they argued against the risks of moral hazard of regulators taking over the risk management function of private agents, as CCPs would no longer themselves monitor developments. Furthermore, the sheer amount of risk factors to be considered and the necessary granularity of data needed for regulators to calculate those measures made the task seem hardly achievable (also interview #6). In addition to these difficulties of implementation, they pointed to the problem of lacking international convergence and issues of regulatory arbitrage as another reason to not move forward on this issue, neither for bilateral repos nor for CCP regulation (author notes, conference attendance 06/06/2016). These points were further supported by the secretary general of the FSB, Svein Andresen at the same event, anticipating that such measures would only be implemented in the distant future (ibid).

9 Discussion and Conclusion

Albeit being part of the regulatory debate early on after the crisis (The Turner Review 2009; CGFS 2010; FSB 2011b, 2012a), policy tools able to restrain the easing of funding conditions in the repo-market in the cyclical upswing, such as counter-cyclical margin and haircut requirements, have largely disappeared from the regulatory agenda. To date, there is no counter-cyclical regulation of haircut requirements, neither on the global level nor in the EU. The different implementations of the new macro-prudential ideas, challenging the epistemic authority of private risk management systems, have remained largely ineffective. Indeed, through the cycle measures applied to repo markets are too weak to pose an effective constraint to private market activity. Why is that the case? Theories of ideational adverse selection suggest that it is the involvement of regulators, close to the market with close ties to industry associations that leads to the choice of a market-based system of regulation. While this is partially true, it underestimates the difficulties inherent in implementing alternative non-market based risk-management systems, in particular generating consensus in the technocratic debate.

Tracing the regulatory efforts of the FSB and ECB/ESRB in implementing macro-prudential ideas, we have identified two recurring themes. The first theme relates to real governance problems and the challenge to overcome the belief in private market authority, embedded with central players. Here, the fact that the US is skeptical of such interventions is of high importance, as this causes a lack of international coordi-

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nation and creates the threat of regulatory arbitrage. As a result, neither the working group on minimum haircuts nor the working group on the re-use of collateral was able to fundamentally challenge market practices. In the case of minimum haircuts, the lack of evidence regarding general pro-cyclical effects within the market, as well as the continued belief by US regulators in the superiority of the knowledge-processing capacities of market participants diluted regulations. Similarly, the US insisted that the lack of data impeded an assessment in how far regulations on the re-use would endanger the proper functioning of the market, leading to a lack of constraints on the re-hypothecation and re-use of collateral on the global level.

In addition to those problems of global coordination, the case of the EU is highly informative regarding the practical problems such a new regulation faces, as this case relates to both governance authority and epistemic authority. True, the failure of setting counter-cyclical haircuts at the global level weakened the position of change agents in Europe significantly. However, this was not the only cause that prevented its implementation. While these measures have been pursued as a legislative project by the ECB and the ESRB, these change agents could not overcome the opposition both within their institutions and beyond. On the European level, the regulatory dialogues are mainly shaped by tensions between macro-prudential change agents and veto agents within and among regulatory institutions. Veto agents argue that any market intervention must be necessarily justified by empirical evidence (interview #1) and cling to the notion that no superior competent authority would be able to make a better decision than market participants themselves. Amidst this regulatory quarrel, the legislative creation of such competent authorities remains dim.

The second theme, which we identified, was the intra-regulatory debate regarding the epistemic authority of the macro-prudential idea set. To gain authority in front of micro-prudential banking regulators as well as micro-prudentially inclined market regulators, this reform program needs to generate evidence for the pro-cyclical effects of repo markets. However, it is the generation of such evidence which is a major impediment for the macro-prudential regulatory effort. First, the current lack of empirical evidence motivates the collection of further data. But, even if such data becomes available, processes of social learning within the regulatory community are not assured, a fact which is linked to the specific time scale of the macro-prudential regulatory framework. In contrast to private risk management systems, which operate on the basis of millions of data points, macro-prudential regulation is seeking to prevent or at least to cushion tail events within a financial cycle, which lasts over years. The production of numerical evidence, thus, faces the difficulty of the limited number of tail events and financial cycles, making it difficult to generate such evidence in the near future (Interview #4).

This problem of generating evidence points to the possibility that the purpose and intent of macro-prudential regulation might be incompatible with a modus operandi of social learning in regulatory communities, which pursues science-driven evidence based regulation that aspires objectivity (Jasanoff 2011, p. 308). As macro-prudential regulators are seeking to deal with tail events produced by an ever-changing financial system, their argumentation is based on logical reasoning and caution, rather than evidence, the accumulation of which might prove be very costly. As another regulator put it, in the end, all these scientific measures are weak, the decision to make such

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regulatory interventions can be made politically, but one cannot decide it based on evidence (interview #5). Instead of such intervention, what we observe in our case is that the macro-prudential agenda has been transformed from a regulatory program, aiming for direct interventions, into a research program which transforms macro-prudential change agents into regulatory scientists, exploring data to prove pro-cyclical effects.

Overall, through processing the observable feature of the post-crisis regulatory debate (documents, conferences) in combination with expert-interviews, our analysis shows that the triad of a splintered governance network, adverse ideational selection, that is the persistent belief in the superiority of private market practices, in combination with a lack of data and evidence needed for operationalizing the regulatory tools impeded the process of implementing fundamental reforms. While regulatory change agents strongly pushed for macro-prudential ideas to become part of the post-crisis regulatory reforms, winning the internal technocratic debate was limited by a missing coherent framework, the lack of evidence and the persistent belief in the superior capacity of private agents to assess risks, expressedd in the continued reliance of regulators on private market participants (CCPs) to control pro-cyclical effects. Indeed, this increased reliance on CCPs, which have become major agents for the clearing of repos post-crisis, is a good example of how current regulatory measures have changed the infrastructure of financial markets.

The increased use of CCPs has been promoted after the crisis by macro-prudential change agents (e.g. the financial stability division of the ECB, s. Constâncio 2012) as well as by typical veto agents (e.g. the market operations division of the ECB, s. Cœuré 2013) and can be viewed as the only enforceable compromise between both. However, the business model of CCPs draws heavily upon private risk management technologies. Instead of a direct intervention, regulators delegated the task of dealing with the pro-cyclicality of risk management systems to these CCPs themselves, urging them to actively mitigate their potentially pro-cyclical behavior (interview #2). This entails a paradox: while private risk management systems are seen as deficient, only private agents themselves are seen as capable of correcting them. In that sense, the epistemic authority of private risk management systems and of market-based governance is not broken, but may even be restored through such interventions, with all its potential for the pro-cyclical acceleration of booms and busts.

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Appendix

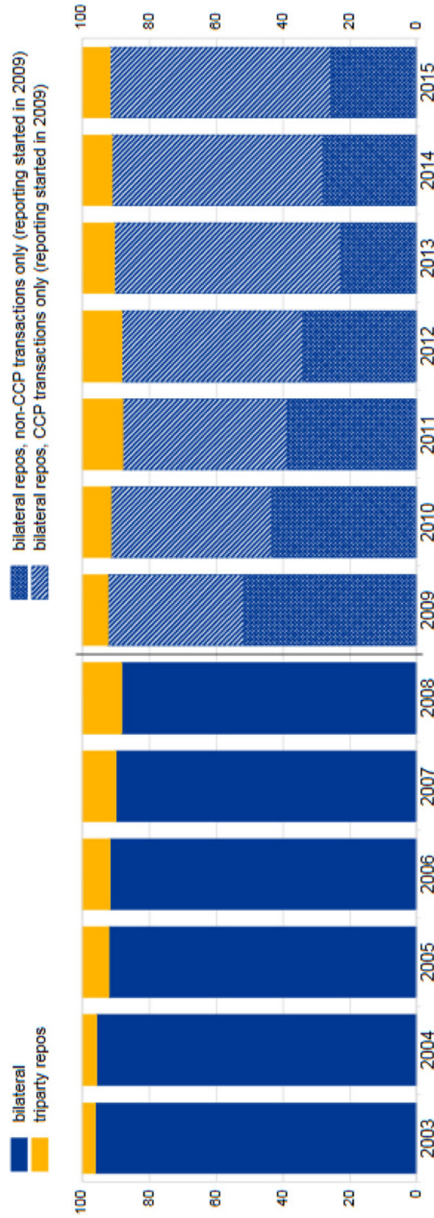

Fig. 4 Breakdown of total secured market. (Source: ECB 2015, p. 16)

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Table 1 List of Interviewees

	Function of Interviewees	Date	Country	Location
Interview #1	Two Central Bankers	9 July 2016	Germany	Frankfurt
Interview #2	Two Regulators	19 July 2016	Germany	Frankfurt
Interview #3	Central Banker	21 July 2016	Germany	Frankfurt
Interview #4	Central Banker	25 July 2016	Germany	Frankfurt
Interview #5	Central Banker	27 July 2016	Germany	Frankfurt
Interview #6	Former Central Banker, Academic	17 August 2016	UK	London
Interview #7	Central Banker	24 August 2016	Germany	Frankfurt
Interview #8	Central Banker	20 September 2016	Telefon (Skype)	
Interview #9	Central Banker	23 September 2016	Germany	Frankfurt
Interview #10	Central Banker	26 September 2016	Germany	Frankfurt
Interview #11	Central Banker	26 September 2016	Telefon	
Interview #12	Supervisor	11 October 2016	Germany	Frankfurt

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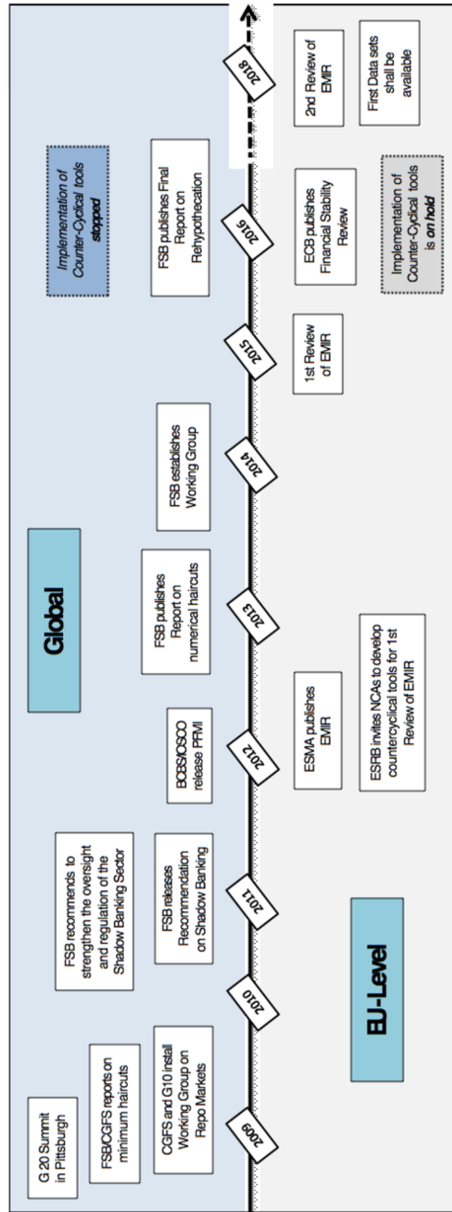

Fig. 5 Overview of regulatory Milestone

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