Socio-Economic Review, 2026, Vol. 00, No. 00, 1–31
https://doi.org/10.1093/ser/mwag069
Article

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Offshore financial centres and banks' funding responses to liquidity shocks

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Abstract

This article rethinks financial embeddedness by examining how transnational banks respond to funding pressures through the infrastructures of offshore financial centres (OFCs). Using hand-collected information, we construct a novel dataset of European banks across six Eurozone countries from 2009–15. We show that during the sovereign debt crisis, banks engaged in latent network activation, mobilizing offshore conduit arrangements to secure foreign currency funding as market conditions tightened, even when official liquidity support was available. We argue that embeddedness in global finance is dynamic and crisis-contingent, since relationships and organizational infrastructures that appear peripheral in stable periods can become decisive under stress. OFCs emerge not as passive enablers of regulatory arbitrage, but as active infrastructures used by global banks to access cross-border liquidity when conventional funding channels become impaired. This has important implications for the governance and oversight of cross-border liquidity flows and off-balance-sheet funding structures.

Key words: offshore finance; global banking; liquidity shocks; regulatory arbitrage; financial crises; cross-border funding.

JEL classification: G21, F36, G28

1. Introduction

Offshore financial centres (OFCs) are central to global finance and have been examined through diverse disciplinary lenses. Economists have primarily focused on the functional role of OFCs as balance-sheet conduits that facilitate capital flows and liquidity transformation within transnational funding networks. Sociologists and political economists have emphasized the institutional

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reproduction of OFCs through legal engineering, professional expertise, and political negotiation (Potts 2020; Pernell Gallagher 2021; Hoang 2022; Leslie 2025). Ethnographic and sociological research has highlighted how offshore finance is embedded in cultural norms and organizational infrastructures (Ho 2009; Maurer 2011), while classic theories of money and finance stress the importance of relational practices and expectations in shaping financial action (Zelizer 1994; Beckert 2016). Complementing these perspectives, political economy accounts highlight how secrecy jurisdictions, regulatory arbitrage, and financialization are deeply tied to state policy and transnational governance regimes (Sharman 2011; Krippner 2012; Wansleben 2023).

While this literature has collectively advanced the understanding of the socio-legal and institutional foundations of offshore finance, comparatively little attention has been paid to how OFCs function as operational infrastructures during periods of financial stress.

In this article, we study how banks activate dormant cross-border ties to secure liquidity when funding conditions tighten. In this context, liquidity refers to a bank's ability to obtain funds quickly or convert assets into cash to meet its obligations when payment and funding pressures intensify. This challenge is especially acute for banks that depend on wholesale funding, namely borrowing from financial markets and institutional investors rather than relying on customer deposits, which can become scarce during periods of financial stress. As the 2007–08 Global Financial Crisis (GFC) illustrates, wholesale funding in such moments is not merely a balance-sheet issue but a form of social power: it shapes which institutions can continue operating 'as usual', which must delay or ration commitments, and whose risks are ultimately shifted onto counterparties, markets, or the public safety net.

Unlike much of the existing literature on offshore finance, which centres on its use by individuals and corporations to obscure wealth or regulatory exposure (see, e.g., Ogle 2017; Potts 2020; Pernell Gallagher 2021; Leslie 2025), this article highlights a complementary and under-explored dimension: the role of OFCs as critical funding hubs within global banking networks. In doing so, we provide a bank-centred answer to the question of what offshore finance is for and reframe offshore finance not as a peripheral or illicit feature of global capitalism, but as a structural component of international financial intermediation. We show that OFCs perform an important operational function within global banking by providing alternative channels through which banks access liquidity when conventional wholesale markets become impaired. More broadly, we argue that OFCs are not merely passive enablers of regulatory arbitrage, but active infrastructures that global banks mobilize under stress to access cross-border liquidity.

Furthermore, we show how OFCs shape cross-border liquidity networks and mediate the transmission of financial shocks. While studies of embeddedness have largely focused on local, national, or sectoral contexts (Granovetter 1985; Uzzi 1996, 1999; Uzzi and Gillespie 2002; Sun and Mallard 2025), we demonstrate that transnational banks are embedded in global institutional networks whose significance becomes particularly visible during periods of stress.

In such moments, banks activate dormant transnational ties, particularly offshore conduits, to access foreign-currency liquidity. We define this process as latent network activation: the mobilization of pre-existing but underutilized financial relationships that become economically consequential under stress conditions. Crucially, this dynamic reframes embeddedness as both a structural condition and a contingent relational practice.

More broadly, our findings point to a characteristic of offshore finance that has received relatively little attention: its capacity to adapt to changing economic and institutional demands. Like trusts, which evolved from a medieval device for managing landed wealth into a flexible infrastructure for modern finance (Langbein 1997, 2004; Harrington 2017), offshore structures have repeatedly been

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repurposed to serve new functions. Our findings suggest that crisis-time liquidity provision represents one such function, highlighting the strategic flexibility that has contributed to the resilience and persistence of offshore finance.

Drawing on a novel dataset that captures offshore wholesale funding activities, we analyse banks' funding behaviour during a major liquidity shock. We focus on European banks and their use of offshore funding amid a sharp increase in funding costs during the Eurozone sovereign debt crisis. While prior recent work by Beck et al. (2024) investigates the intra-European role of so-called 'onshore offshore' financial centres such as Luxembourg, Ireland, and the Netherlands, our analysis adopts a broader global perspective. We examine the role of OFCs located outside the Eurozone, where European banks issue short-term notes in the form of Asset-Backed Commercial Paper (ABCP) via Special Purpose Entities (SPEs) and access foreign currency liquidity, primarily in US dollars. ABCP conduits are typically unregulated entities that issue short-term commercial paper backed by a portfolio of longer-term assets, through a bankruptcy-remote SPE established by a sponsoring bank. The analysis of this intricate network of banks and conduits allows us to capture the transnational dimension of bank funding strategies and highlight the institutional infrastructure that facilitates cross-border liquidity flows during periods of financial stress.

To empirically investigate global banks' activity in OFCs, we rely on a comprehensive hand-collected dataset on European banks' wholesale funding activity in ABCP markets, covering six Euro Area countries between 2009 and 2015. In the spirit of Cetorelli and Goldberg (2012), we focus exclusively on European global banks whose funding capacities extend well beyond their national borders. Our data is later complemented by aggregate country-level data on banks' assets (e.g., loans) and liabilities [e.g., retail deposits, European Central Bank (ECB) liquidity, and other on-balance sheet wholesale funding sources].

Our final dataset is extensive, capturing on average 66 per cent of US market volume outstanding over the sample period, and up to 80 per cent when excluding 2009. Its distinctive feature is the ability to identify the network of banks, sponsors, and ABCP conduits operating in the market (see Section 3 for further details). For each month, we observe: (1) the identity, business type, and country of the parent financial institution, as well as the sponsor (typically a branch of the parent) and the conduit (a SPE) issuing the ABCP; (2) the primary market or domicile of the assets held in the conduit's portfolio; and (3) the dollar amount of ABCP notes outstanding, disaggregated by currency. Crucially, knowing the country of registration for each conduit allows us to distinguish between ABCP issuance through OFCs and through onshore (non-OFC) jurisdictions. This enables a comprehensive view of the volume, currency composition, and cross-border direction of wholesale funding flows.

To examine how European banks adjusted their funding structures in response to a liquidity shock, we estimate a panel vector autoregression (p-VAR) model. This empirical strategy, widely used in international finance (e.g., Huang and Ratnovski 2011; de Haan, van den End, and Vermeulen 2017; Álvarez et al. 2019), enables us to capture the dynamic interdependencies between funding choices, liquidity conditions, and macro-financial variables.

Our main findings are 4-fold. First, we document a significant increase in banks' reliance on ABCP issuance following a positive shock to the Overnight Index Swap (Euribor-OIS) spread, indicating that when ordinary interbank funding became more expensive, banks shifted towards offshore funding. This shows that offshore infrastructures operate as crisis-time liquidity channels, not merely as tax or secrecy devices.

Second, the effect is present across all countries in the sample and is strongest for Germany, consistent with its pre-existing exposure to cross-border wholesale funding. This highlights that offshore

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embeddedness is uneven, as banks already connected to these infrastructures can activate them quickly under stress. The benefits of offshore finance, therefore, depend not only on access to global markets but also on the institutional relationships and organizational capabilities that banks develop before crises emerge.

Third, while dollar-denominated funding plays a central role during stress periods, the increase in ABCP activity is not confined to USD issuance alone. This suggests that offshore conduits support broader balance-sheet flexibility, even though the USD remains central to crisis liquidity.

Fourth, positions in OFCs account for a substantial share of the observed surge in ABCP issuance during the crisis. This indicates that OFCs function as strategic nodes in global banking networks, shaping who can access liquidity and how. Finally, while ECB monetary policy interventions mitigated some of the funding pressures, they did not fully substitute for liquidity accessed via offshore markets. This finding suggests that public and private liquidity infrastructures perform complementary rather than interchangeable functions during crises.

Overall, these results show that offshore finance forms part of the institutional architecture through which global banks secure liquidity and manage crises, challenging views that focus primarily on tax avoidance, secrecy, or regulatory arbitrage and highlighting the deep interconnections between offshore and onshore financial systems.

2. Literature review and hypotheses development

2.1 Offshore funding and banks' ABCP issuance

While OFCs host a range of financial activities, it is international banking that defines their systemic importance–particularly in facilitating the activities of non-bank financial institutions (NBFIs) across money, repo, and derivatives markets (Fernandes and Wigger 2016). Over time, OFCs have become critical funding hubs within transnational banking networks (Chang et al. 2023), especially for European banks with significant US dollar asset exposures. As the BIS has documented, OFCs now account for nearly 30 per cent of global external financial positions, up from about 15 per cent in the late 1980s, despite being hosted in small economies with limited domestic demand (Pogliani, von Peter, and Wooldridge 2022). This expansion is driven not only by economic fundamentals but also by the regulatory and legal advantages that OFCs offer global banks, which increase the flexibility and speed with which they can adjust their funding structures while requiring minimal disclosure (Ogle 2017; Pistor 2017). These complement the already favourable tax regimes and common-law-based legal frameworks offered by these jurisdictions (Harrington 2017), enabling banks to reduce tax liabilities and regulatory burdens (Garcia-Bernardo et al. 2017; Harrington 2024).

As a result, global banks increasingly structure funding flows across jurisdictions in ways that maintain legal enforceability while avoiding domestic regulatory oversight (Harrington 2017), and OFCs have become primarily populated by non-bank affiliates of large global banking groups, which use these jurisdictions to intermediate cross-border funding beyond traditional supervisory channels (Fichtner 2016; Ogle 2017). These entities, once labelled as shadow banks (Lysandrou and Nesvetailova 2015; Ban and Gabor 2017), have in recent years sought to shed the term's pejorative connotations, with non-bank financial intermediation increasingly portrayed as a legitimate, sophisticated, and complementary mechanism for efficient risk-sharing within the financial system (Aramonte, Schrimpf, and Shin 2023).

NBFIs operate outside the traditional banking framework, yet are deeply interconnected with banks through both functional roles and organizational ties (Casu, Gallo, and Sarkisyan 2025). The role of NBFIs remains largely underexplored in the literature on OFCs, with exceptions including

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Ronen and Nesvetailova (2013), Rixen (2013), and Fernandes and Wigger (2016). These organizational networks, embedded within OFCs, should be understood not simply as operational arrangements but as institutional infrastructures that serve specific economic and social purposes, structuring their behaviour and defining constraints and incentives (North 1990, 1991). Their core function is to raise funds from international markets and channel them back to parent institutions (Murau, Rini, and Haas 2020; Binder 2022). These arrangements enable banks to manage liquidity across borders, fund foreign currency exposures, and operate off-balance-sheet vehicles outside the scope of domestic oversight.

Beyond their technical functions, these conduits constitute key infrastructural nodes through which transnational governance is enacted and maintained. Building on earlier work on economic coordination via networks (Streeck and Schmitter 1985; Podolny 2001), we suggest that OFCs enable decentralized but effective coordination of liquidity across jurisdictions—particularly when conventional hierarchies (e.g., domestic banks or central banks) are constrained. In this sense, the offshore network becomes a parallel governance mechanism that is mobilized to distribute critical resources under stress. While a large body of interdisciplinary literature has emphasized the role of OFCs in enabling tax and regulatory arbitrage (e.g., Ogle 2017; Potts 2020; Pernell Gallagher 2021; Leslie 2025), less attention has been paid to their use as platforms for emergency liquidity management during periods of market stress. This paper addresses that gap by showing how OFCs serve as critical funding nodes for global banks during crises.

It is also important to emphasize a dimension often overlooked in the broader literature on OFCs: namely, that many OFC positions, such as those created through ABCP conduits, represent *banks' liabilities* (not taxed), not asset shelters, suggesting that the primary motivation is not tax avoidance but the ability to expand funding capacity outside the constraints of capital and liquidity regulation. Accordingly, we refer to the 'structural properties' of OFCs as the legal and institutional features that allow banks to issue off-balance-sheet liabilities rapidly and at scale via NBFIs, especially during crises. Unlike on-balance-sheet funding, which is subject to stricter disclosure and regulatory controls, ABCP conduits in OFCs offer faster execution, lighter oversight, and greater flexibility in accessing USD markets. These same features, typically seen as tools for regulatory arbitrage, are what make OFCs effective (emergency) funding platforms.

2.2 Offshore funding during crises

Global banks have long relied on offshore finance, particularly during periods of stress such as the GFC and the Eurozone sovereign debt crisis. In response to acute liquidity shortages, banks were compelled to rethink their funding structures (de Haan, van den End, and Vermeulen 2017; Acharya et al. 2018; Alvarez et al. 2019), increasingly leveraging OFC-based conduits as flexible, cross-border liquidity providers. That said, the GFC and the Eurozone crisis also exposed structural vulnerabilities in the liquidity and risk management practices of international banks operating through OFCs, revealing the systemic fragilities inherent in complex, cross-border funding arrangements dependent on short-term offshore wholesale markets (Acharya and Schnabl 2010; Covitz, 2013; Acharya, Afonso, and Kovner 2017). Recent empirical work confirms that banks with a stronger presence in OFCs also tend to take higher financial risk (Ge et al. 2022), raising concerns about the opacity and resilience of these offshore networks. Yet, while considerable academic attention has been devoted to the opacity and systemic risks associated with offshore finance, the specific use of offshore structures by international banks remains comparatively under-examined, reflecting not only the legal and institutional complexity of these arrangements but also the persistent lack of systematic data, which unveils how liquidity, risk, and ownership are distributed across transnational financial networks.

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This article addresses this gap by making at least three important contributions to the extant literature. First, we extend research on offshore finance by showing that banks actively use OFCs not only for regulatory arbitrage, but also as stable and flexible sources of funding during periods of market stress. We contribute to the literature by analysing the transnational financial practices of NBFIs that operate through offshore financial hubs. In doing so, we bring into view broader structural dynamics of capitalism that are often sidelined in existing accounts of offshore finance (Bryan, Rafferty, and Wigan 2016; Fernandes and Wigger 2016).

In contrast to prior work focused on on-balance-sheet exposures (Giannetti and Laeven 2012), we highlight the role of off-balance-sheet instruments—specifically, ABCP conduits domiciled in OFCs—that expanded significantly during the Eurozone sovereign debt crisis. These entities function as institutional nodes in transnational funding networks, allowing liquidity to be relocated across jurisdictions with minimal regulatory interference (Garcia-Bernardo et al. 2017; Ogle 2017). This resonates with Chang et al. (2023), who studied Russian oligarch networks' use of secrecy facilitated by OFC jurisdictions to avoid war-related economic sanctions, thereby highlighting the complex structure of OFC networks. Banks' use of OFCs mirrors this architecture, characterized not only by geographic dispersion but also by centralized hubs, such as global law firms, sponsor branches, and financial conduits, which coordinate capital flows and provide strategic flexibility during financial turmoil.

These centres serve not just functional roles but are embedded in an international legal order that allows capital to flow freely while regulation remains territorially fragmented. As a result, the degree of embeddedness of the analysed banks varied across institutions (e.g., German vs. French banks), and this embeddedness could be dormant in stable periods but activated in moments of stress, like familial networks activated during personal crises (Granovetter 1985; Uzzi 1996; Podolny 2001). This idea of *latent network activation* complements economic views of arbitrage with a relational account of liquidity infrastructure.

Second, we contribute to the literature on the international role of the US dollar by documenting that the rise in offshore issuance was primarily USD-denominated. This pattern supports the interpretation of OFCs as critical conduits for offshore dollar liquidity, especially in times of stress, consistent with the growing body of research on 'offshore dollar creation' (Awrey 2017; Murau, 2008; Binder 2022). This pattern suggests that offshore liquidity was not intended to support euro-area assets, but rather responded to global funding demands. As such, we show that these centres enable banks to circumvent domestic monetary constraints and gain access to cheaper, more flexible dollar funding, operating outside the direct oversight of US or European authorities. Our findings align with Aldasoro and Ehlers (2018) and Correa, Sapriza, and Zlate (2021), who show that non-US banks increasingly depend on international debt securities markets and NBFIs to source dollar liquidity during crises. Offshore conduits thus emerge as shadow nodes in the global financial system, mediating transnational flows of USD funding and sustaining a decentralized yet hierarchical monetary order (Murau, Rini, and Haas 2020). Seen in this light, OFC-based dollar conduits complemented the official dollar liquidity backstop provided through central-bank swap lines during the crisis (Tooze 2018). Even when central-bank support was available, banks continued to rely on market-based offshore dollar infrastructures because these channels were already embedded in their funding networks and offered a flexible means of securing short-term dollar liquidity when conventional funding sources came under strain.

Third, we examine the relationship between central-bank liquidity provision and banks' use of offshore funding in crisis contexts. While ECB interventions are associated with an increase in onshore euro liquidity (Acharya, Drechsler, and Schnabl 2014; Alvarez et al. 2019), we find that banks

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continued to issue USD-denominated offshore instruments, suggesting a possible partial substitution of monetary accommodation through offshore channels. This persistence of offshore intermediation highlights the enduring role of institutional network architectures in shaping banks' responses to systemic stress. By analysing how OFCs function as structural components of transnational liquidity provision, our study contributes to socio-economic debates on financial governance, the geography of intermediation, and the institutional architecture of cross-border banking.

2.3 Testable hypotheses

These theoretical insights point to OFCs not merely as passive enablers of regulatory arbitrage, but as active infrastructures that global banks mobilize under stress to access cross-border liquidity. To test these claims, we turn to the empirical literature on banks' funding responses during crises and develop four testable hypotheses on how and when banks tap offshore markets.

Extensive research examines how banks adjust funding under financial stress (Huang and Ratnovski 2011; Craig and Dinger 2013; Damar, Meh, and Terajima 2013; Alvarez et al. 2019; Correa, Sapriza, and Zlate 2021). These studies document increased reliance on wholesale funding during crises and the associated risks, such as heightened rollover risk and funding instability. Evidence on European banks shows their deep integration into international markets. Shin (2012) finds that, before the GFC, non-US banks—mostly European—provided more credit in the US than domestic banks, underscoring their dependence on US dollar funding and diversified cross-currency exposures. Correa, Sapriza, and Zlate (2021) report that during the Eurozone debt crisis, tighter US regulation and rising credit risk triggered a 'double run' on European banks' US branches. Similarly, Aldasoro and Ehlers (2018) and Aldasoro, Eren, and Huang (2021) find a surge in USD funding by European banks during stress episodes, including the COVID-19 crisis. Following this literature, we formulate our first hypothesis that European banks rely on cross-border wholesale funding via ABCP markets during a liquidity shock as follows:

> H1: In response to a liquidity shock, banks increase their reliance on cross-border wholesale funding.

Given that the majority of ABCP wholesale funding is raised through SPEs incorporated in OFCs, we examine how banks' responses to a liquidity shock vary by the issuing vehicle's location. OFCs offer legal and regulatory environments that facilitate greater flexibility in structuring and maintaining funding vehicles, especially relative to onshore jurisdictions (Ogle 2017). In particular, they allow for lighter disclosure requirements, favourable tax treatment, and reduced supervisory oversight, which can be advantageous when banks face heightened uncertainty or constraints in traditional funding markets. Therefore, if banks strategically exploit these institutional features under stress, we expect the increase in ABCP issuance to be disproportionately driven by vehicles domiciled in OFCs. This leads to our second hypothesis:

> H2: In response to a liquidity shock, banks increase their cross-border wholesale funding via conduits incorporated in OFCs.

Building on the expectation in H1–H2 that banks increase their offshore wholesale funding in response to a liquidity shock, we account for the institutional heterogeneity across euro area banking systems. For example, the structural dependence of German Landesbanken on wholesale and foreign-currency funding suggests that banks embedded in more vulnerable institutional configurations may be more likely to resort to offshore instruments such as ABCPs under stress. Consequently,

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we anticipate cross-country variation in banks' responses to liquidity shocks, both in terms of the scale of offshore engagement and in the purpose and currency composition of the funding accessed. To capture these differences, we distinguish between two channels through which banks' liquidity responses may be mediated: the *domestic financing channel*, in which liquidity is sourced from domestic financial markets, and *the cross-border liquidity channel*, through which banks draw on international or offshore markets to meet funding needs.

Through the domestic financing channel, banks facing liquidity scarcity turn to the wholesale markets to finance euro-denominated domestic assets. This aligns with Giannetti and Laeven (2012), who show that banks under stress reallocate liquidity to home markets, increasing 'home bias'. If dominant, this channel leads banks to issue euro-denominated ABCPs to fund local loans during crises.

By contrast, the cross-border liquidity channel highlights the need for foreign currency liquidity, particularly in US dollars, that banks cannot source via traditional channels such as retail deposits or central bank facilities (Shin 2012; Aldasoro and Ehlers 2018; Bellrose and Norman 2019; Aldasoro, Eren, and Huang 2021). Under this view, banks issue US dollar-denominated ABCPs to fund cross-border dollar asset positions. To empirically distinguish between these two channels, we use the currency denomination of ABCPs as the key identifying factor. This leads to our third set of hypotheses:

> H3a: In response to a liquidity shock, banks increase their offshore wholesale funding in domestic currency to meet domestic liquidity needs (financing channel).
> H3b: In response to a liquidity shock, banks increase their offshore wholesale funding in US dollars to meet cross-border liquidity needs (cross-border liquidity channel).

Finally, we examine how monetary policy interventions shape the use of offshore wholesale funding during liquidity crises. Central banks, especially the ECB during the sovereign debt crisis, deployed a range of unconventional tools to mitigate financial distress, including longer-term refinancing operations (LTROs) and expanded collateral frameworks. These measures were explicitly designed to restore market functioning and reduce funding pressures for euro area banks. Alvarez et al. (2019) show that such interventions improved banks' access to traditional funding channels and encouraged a shift towards safer and more stable funding structures. In theory, by alleviating liquidity constraints and reducing the marginal cost of domestic wholesale funding, central bank liquidity provision should diminish the incentive for banks to rely on complex and potentially riskier offshore arrangements, such as ABCP conduits domiciled in OFCs. However, the effectiveness of these interventions in displacing offshore funding is ultimately an empirical question. If central bank measures successfully substitute for offshore market access, we would expect to observe a decline in ABCP issuance from offshore entities following policy interventions. This leads to our fourth hypothesis:

> H4: Monetary authorities' interventions that increase domestic liquidity provision are associated with lower use of offshore wholesale funding by banks.

3. Data

3.1 The cost of funding market liquidity

A commonly used indicator of the cost of market-based liquidity is the three-month spread between the Euribor rate and the Euribor-OIS spread, which we collect from Bloomberg, also used in De Haan and van den End (2013) and Alvarez et al. (2019). It represents the cost (overnight interest rates)

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at which banks on a given day are available to lend to each other for a period corresponding to the duration of the swap, relative to a daily reference rate (the Euribor). The higher this spread is, the higher banks' funding costs, hence their funding liquidity risk, and vice versa when the spread decreases.

3.2 ABCP data

We use bank-level monthly data on ABCP issuances of banks in six Eurozone countries: Belgium (BEL), France (FRA), Germany (DEU), Italy (ITA), Netherlands (NLD), and Spain (ESP). We hand-collect our ABCP data from Capital IQ, analysing the database description of Global ABCP positions. Our dataset ranges from March 2009 to December 2015, as Capital IQ does not provide data on Global ABCP positions after that date. This data includes granular data on the parent banks' outstanding volume of ABCPs. Additional information provided includes:

(1) The name of the conduit (SPE).
(2) The country where the conduit is incorporated (OFC or non-OFC).
(3) The name of the sponsoring bank guaranteeing the ABCP position (typically a branch or subsidiary of the parent bank).
(4) The parent company of the sponsoring bank.
(5) The country of the sponsor and of the parent.
(6) The currency denomination of the ABCP notes issued by the SPE conduit.

The dataset's detail enables us to trace banks and countries sourcing liquidity via ABCP markets. This distinctive feature brings considerable advantages. First, tracking cross-border positions passing through OFC jurisdictions is not a straightforward task (Cobham and Janský 2020). Most other datasets aggregate assets at the intermediate country level, inflating offshore positions. Other datasets instead exclude SPEs' positions from the count of international assets in offshore jurisdictions. They provide a more accurate measurement of ultimate country flows but at the cost of losing track of most assets generated in OFCs (Dellis, Sondermann, and Vansteenkiste 2017; Damgaard, Elkjaer, and Johannesen 2018; Kellard et al. 2022). Recent work has widely documented this effect. For instance, Damgaard, Elkjaer, and Johannesen (2018) estimate that about $12 trillion (40 per cent of all foreign investment) is detained in shell companies in OFC. The bank-level characteristics of our data enable the study to analyse crucially important information on European banks' financing through conduits in OFCs.

Ultimately, research using bilateral data from Organisation for Economic Co-operation and Development (OECD) or International Monetary Fund (IMF) datasets on international cross-border investment can easily incur measurement inaccuracies (Beck, Georgiadis, and Gräb 2016; Damgaard and Elkjaer 2017). For instance, the OECD uses a fair-value approach to compute the market values of firms' equity and liabilities. This method standardizes positions across all countries in the dataset, ensuring cross-country data comparability. However, it neglects the different valuation methods in use worldwide, therefore contributing to geographical volume asymmetries. Bilateral data from the IMF [e.g., Consumer Price Index (CPI) or Coordinated Direct Investment Survey (CDIS)] are stock data, therefore unadjusted for valuation effects (e.g., changes in asset and exchange rate valuation), whose size was substantial during the European sovereign crisis. Data from the IMF International Financial Statistics are flow data; therefore, they are adjusted for valuation effects. However, it does not preserve the bilateral features, which are crucial to this study. The conduit-level characteristics of our dataset, which report each transaction in the currency of issuance, regardless of the issuing jurisdiction, do not incur any of these drawbacks (see Section 4).

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Table 1. ABCP positions above 1 million USD.

Entity	Name of the parent/conduit	Country of incorporation	Total ABCPs (million USD)
European parent bank	Cooperative Rabobank U.A.	Germany	1,184,274
Conduit	Atlantis One Funding Corporation	Delaware	669,080
Conduit	Erasmus Capital Corporation	Unknown	39,615
Conduit	Fox Trot CDO Ltd.—CDO INC. (del)	Delaware/Cayman Islands	53,834
Conduit	Nieuw Amsterdam Receivables Corporation	Delaware	397,173
Conduit	Tempo Finance Ltd.	Delaware	24,572
European parent bank	Credit Agricole S.A.	France	1,088,345
Conduit	Atlantic Asset Securitization LLC	Delaware	523,389
Conduit	Atlantic Asset Securitization LLC (callable ABCP notes)	Delaware	0
Conduit	Atlantic Asset Securitization LLC (callable/puttable ABCP notes)	Delaware	1,230
Conduit	Atlantic Asset Securitization LLC (puttable ABCP notes)	Delaware	49,153
Conduit	HEXAGON Finance a.r.l.	Channel Islands	12,813
Conduit	LMA S.A./LMA Americas LLC	France/Delaware	501,760
European parent bank	Deutsche Bank AG	Germany	1,225,824
Conduit	Aspen Funding Corp.	Delaware	150,508
Conduit	CUTLASS Securitisation Ltd.	Australia	25,276
Conduit	Gemini Securitization Corp. LLC	Delaware	452,807
Conduit	Newport Funding Corp.	Delaware	95,789
Conduit	Northern Pines Funding LLC	Delaware	171,736
Conduit	Okanagan Funding Trust	Canada	26,107
Conduit	Rhein-Main Securitisation Ltd.	Channel Islands	120,040
Conduit	Rheingold Securitisation Ltd.	Channel Islands	101,881
Conduit	SABRE Securitisation Ltd.	Australia	6,847
Conduit	SCIMITAR Securitisation Ltd.	Australia	35,855
Conduit	SPEAR Securitisation Ltd.	Australia	30,751
Conduit	Zheng He Finance S.A	Luxemburg	8,226
European parent bank	FMS Wertmanagement Anstalt des oeffentlichen Rechts	Germany	1,171,083
Conduit	Kells Funding LLC	Delaware	1,171,083

This table presents a subsample of ABCP issuers, whose total ABCP outstanding exceeds 1 million USD in the period 2009–15. Here we present the name, country of incorporation, and total ABCP volume for a selection of European parent banks in our sample. We also present, under each European parent's name, the corresponding statistics for the conduits sponsored by each parent bank for ABCP issuance.

In Table 1, we present information for the subsample of parent banks' ABCP issuances that exceed 1 million USD over the period 2009–15, together with the name, volume, and jurisdiction of incorporation of each conduit set up by the European parent banks in their issuance. Therefore, our

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Table 2. Description of ABCP issuers.

	Total	% Non-OFCs	% OFCs	% US-sponsored	% ROW sponsored	% Domestic (EUR)	% USD	% Non-USD
Panel A: Country of parent bank								
Belgium	230,150	2	98	0	100	2	95	5
France	3,258,143	5	95	31	69	23	72	28
Germany	3,074,800	4	96	79	21	11	85	15
Italy	353,195	0	100	59	41	31	68	32
Netherlands	1,313,046	0	100	85	15	2	96	4
Spain	95,293	100	0	0	100	100	0	100
Panel B: Jurisdiction of the ABCP conduits								
Australia	197,304			0	100	0	0	100
Belgium	5,430			0	100	100	0	100
Canada	26,107			0	100	0	0	100
Cayman Islands	16,253			0	100	0	0	100
Channel Islands	262,199			0	100	97	2	98
Delaware	5,616,781			84	16	1	98	2
Delaware/Cayman Islands	237,181			23	77	29	71	29
Delaware/Channel Islands	158,261			0	100	48	50	50
France	75,830			0	100	69	17	83
France/Delaware	837,903			0	100	59	38	62
Ireland	787,859			0	100	26	71	29
Luxembourg	8,226			0	100	0	100	0
Spain	95,293			0	100	100	0	100
Panel C: Country of the sponsoring bank (subsidiary)								
Australia	197,304	100	0		2	0	0	100
Belgium	633,930	1	99		8	7	90	10
Canada	26,107	100	0		0	0	0	100
France	1,717,045	4	96		21	41	56	44
Germany	423,580	0	100		5	46	53	47
Hong Kong	8,226	0	100		0	0	100	0
Japan	16,253	0	100		0	0	0	100
Netherlands	192,959	0	100		2	11	85	15
Spain	95,293	100	0		1	100	0	100
United Kingdom	221,921	0	100		3	97	3	97
United States	4,792,009	0	100	58		1	98	2
Total	8,324,627	5	95	58	42	16	80	20

This table describes the sample of ABCP issuers. Panel A shows the aggregate amounts of ABCPs issued by the parent banks in the Euro Area. Panel B provides descriptive statistics on the jurisdictions of the ABCP conduits used by these Euro Area banks to issue ABCPs. Panel C instead shows the country of the ABCP sponsor (a subsidiary of the EA parent bank) acting as the liquidity guarantor for the ABCP positions. The off-balance-sheet positions considered in this figure are ABCP issuances in OFC.

data allows us to assess the magnitude and direction of the cross-country liquidity flow (e.g., from an intermediate jurisdiction in Delaware to the ultimate country of the bank in Germany) and understand the currency of issuance and the names of the entities involved. These features give our study

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uniquely detailed insights into cross-country liquidity flows, compared to OECD or IMF bilateral datasets.

In Table 2, we provide detailed disclosure of the amounts of ABCP issued by each Euro Area country banking sector, conduit jurisdiction, and country of the sponsoring bank. We also present the percentages of ABCP issued via conduits based in OFCs vs non-OFC jurisdictions (sponsored by US entities vs non-US entities) and denominated in domestic currency vs foreign currency. Over the entire period, France is the largest issuer of ABCP notes. In more detail, French banks issued about 3.3 trillion USD in ABCPs, 95 per cent of which from OFCs and 72 per cent in USD. Germany follows just behind France, issuing about 3.1 trillion USD in ABCPs, 96 per cent via OFCs, 85 per cent denominated in USD. Among the countries of conduit incorporation, Delaware appears as the most prominent choice for European banks, issuing about 5.6 trillion USD in ABCPs, of which 98 per cent are denominated in USD. We also note that the large majority appear to be sponsored by banks located in the US (about 4.8 trillion USD), even if French sponsoring banks also play a crucial role in guaranteeing ABCPs for about 1.7 trillion USD.

Delaware functions as a financial centre with offshore-like features, including light regulation and anonymity for special purpose vehicles, despite not being an offshore jurisdiction in the traditional geographic sense. The selection of Delaware as the jurisdiction of SPV formation is highly deliberate: it offers well-established and predictable corporate law, broad statutory freedom to modify fiduciary duties, and decades of consistent business court rulings, reducing uncertainty and execution risk for global banks (Romano 1993; Gorton and Souleles 2006; Pistor 2017). The surge in ABCP issuance from Delaware-based conduits during liquidity stress reflects its central role in US dollar funding markets, helping explain why financing flows are stronger and more persistent in Delaware than in other US states or global OFCs.

3.3 Economic and banking sector fundamentals of Euro Area countries and ECB liquidity

Our dataset also includes a combination of macro-economic data, banking sector data, and liquidity provision by the ECB, all measured at the country level. The macro data is collected from Eurostat and includes parent countries' growth rates of the industrial production index and the Consumer Price Index-based inflation rate. The banking sector data includes monthly changes of (seasonally adjusted): banks' assets (loans) and liabilities [retail deposits, traditional wholesale funding (excluding funding via ABCPs), and ABCPs' wholesale funding]. Finally, we measure ECB liquidity provision using the volume of liquidity received by monetary financial institutions (MFIs) from the Eurosystem. This includes liquidity from ECB main and LTROs.

4. Changes in funding liquidity cost and banks' funding mix over time

This section provides a detailed characterization of our main variables and presents preliminary descriptive evidence of European banks' changes in liquidity sourcing in response to a wholesale funding shock. As a result of the GFC and subsequent sovereign debt crisis, banks' access to market-based funding was significantly impaired. The extensive exposure of European banks to their domestic sovereign debt and the drastic increase in sovereign yields during the crisis fed back on the banking sector and significantly enhanced its credit risk (Merler and Pisani-Ferry 2012; Acharya and Rajan 2013). In this context, the greater credit risk of European banks led to a substantial dry-up of wholesale liquidity for these banks in both European and global markets (De Haan and van den End 2013;

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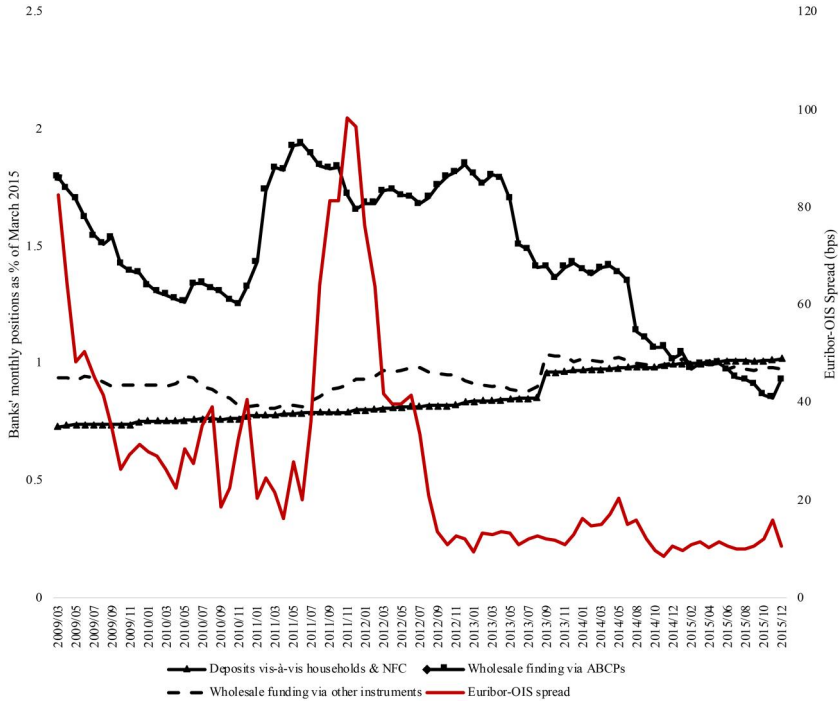

Figure 1. Liquidity distress in the European funding markets. *Source*: Bloomberg, Capital IQ, Statistical Data Warehouse of the ECB.

Notes: This figure plots the Euribor-OIS spread (solid red line), aggregate bank deposits (solid line with triangular markers), traditional wholesale funding (via other instruments) (dashed line), and wholesale funding (via ABCP) (solid line with squared markers) between 2009 and 2015.

Acharya and Steffen 2015; Alvarez et al. 2019). Figures 1–3 display the evolution of banks' funding, focusing on traditional wholesale positions and wholesale funding via OFCs.

The solid red line in Fig. 1 shows that in early 2009, the Euribor-OIS spread started to decline from the high levels that it recorded during the GFC. As Alvarez et al. (2019) point out, this development was associated with the decline in macro risk and the introduction of the fixed-rate-full-allotment by the ECB in 2010. However, starting with Greece, the sovereign debt crisis engulfed the Euro Area nexus between sovereign and banking sectors; risk was reactivated, leading to a large increase in banks' funding costs. The latter ultimately skyrocketed towards mid-2012, with the Euribor-OIS spread growing by about 100 basis points (bps). Eventually, funding conditions improved following the OMT announcement by Mario Draghi in the summer of 2012, and the spread significantly declined.

The large increase in banks' funding costs during this crisis led to significant adjustments in banks' liability structures. In Fig. 1, we observe a significant rise in wholesale funding through banks' ABCP conduits starting in 2010. This type of funding reached its peak towards the end of 2011. It then remained elevated throughout most of 2012, before it started to decrease. On the other hand, wholesale funding via traditional instruments (dashed line) exhibits a weaker increase during the European

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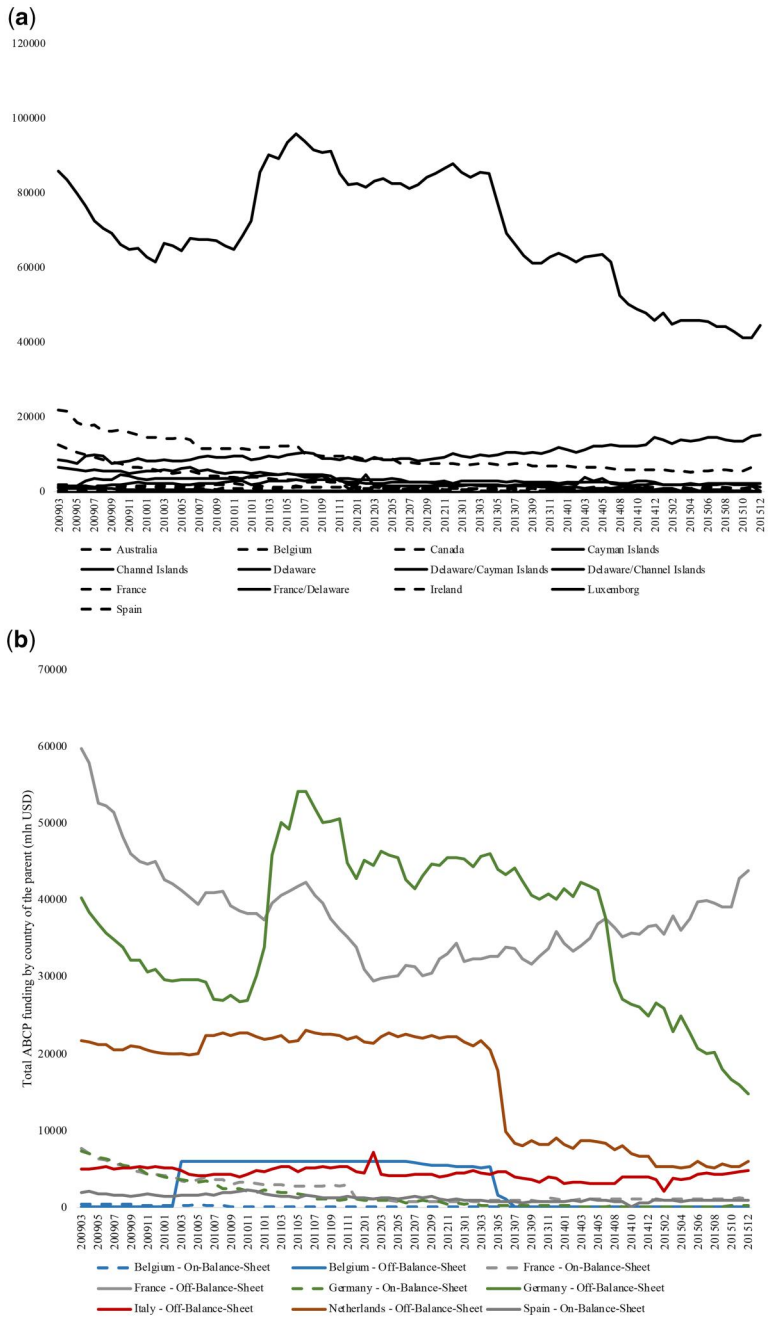

Figure 2. ABCP issuances by country of incorporation of the conduit. (a) Conduit-level display. (b) ABCP issuances by country of parent bank. *Source*: Capital IQ.

Notes: This figure plots the amounts outstanding of ABCP issued by European banks between 2009 and 2015 by jurisdictions of the ABCP conduits (Panel a) and parent bank (Panel b), via non-OFCs (dashed line) and OFCs jurisdictions (solid line). The amounts in million USD are aggregated at ABCP conduit-level (in Panel a) and parent-bank level (in Panel b).

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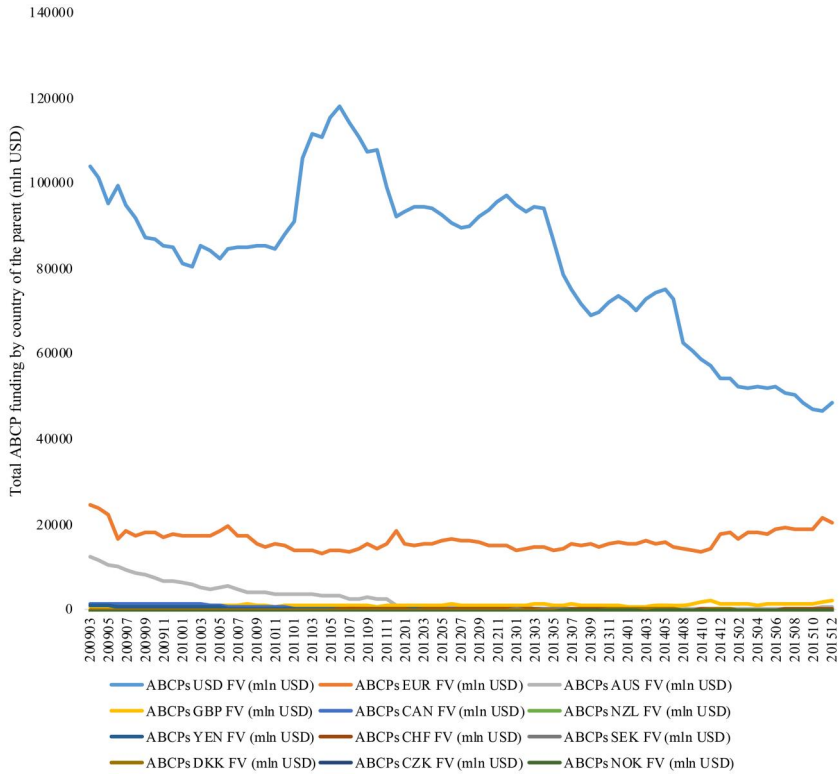

Figure 3. ABCP issuances by currency. *Source*: Capital IQ.

Notes: This figure plots the face value (FV) of all outstanding ABCP issued by European banks between 2009 and 2015 in OFC by currency of the issue. The amounts are converted in USD using end-of-the-month currency exchange rates.

crisis, while banks' deposits (solid line with triangular markers) were largely unaffected. Thus, Fig. 1 supports the role of ABCP structures as a key liquidity tool for European banks during market stress.

To further investigate the role of ABCP wholesale funding during the crisis, in Figs 2 and 3, we break down ABCP issuances by country of Euro Area (EA) parent bank, the jurisdiction of the conduit (Fig. 2) and currency of the issuance (Fig. 3). In Fig. 2a, we categorize ABCP positions based on the jurisdiction of the conduit of origin of the ABCP. In particular, we mark with a solid line ABCP volumes of conduits in OFC and with a dashed line the volume in countries that are not OFC. This helps assess whether the ABCP increase in Fig. 1 reflects off- or on-balance-sheet liabilities. This is relevant because OFC-based, foreign-currency funding is more volatile and heightens liquidity risk. Second, the OFC issuance is much harder to supervise than other offshore issuances, given the secrecy of this jurisdiction, making banks' risk-taking harder to detect, regulate, or incorporate into ECB monetary policies. From Fig. 2a, we observe that the greatest increase in European banks' liabilities is against OFC, mainly reflecting the high volume of banks' positions taken in Delaware. Positions in other jurisdictions, in comparison, appear very marginal and either show a decreasing pattern or do not change substantially throughout our analysis period.

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In Fig. 2b, we repeat the analysis of ABCP issuance's evolution, this time breaking down ABCP positions by the ultimate country of the liquidity recipients (EA countries of incorporation of the parent banks). The underlying idea for this assessment is that if liquidity funding risk is proportional to the perceived credit risk of European banks during the crisis, the country of the bank incorporation could matter in explaining their domestic banks' liquidity sourcing behaviour (the hypothesized financing channel). Indeed, this is what we observe in Fig. 2b. First, we confirm the low (mainly decreasing) change in ABCP positions taken in conduits not incorporated in OFCs. Second, we find that for positions taken in OFCs, the increase observed in Fig. 1 is most likely explained by positions of banks in countries in the core of the EA (Germany, Belgium, and the Netherlands). In all three of these countries (and particularly in Germany), indeed, we notice an increase in ABCP funding in OFCs corresponding with the period of wholesale liquidity dry-up explained before. On the contrary, we find that countries in the periphery of the EA (such as Italy and Spain) have either no position (in Spain) or no substantial growth in ABCP funding in OFCs in the analysis period.

This suggests that the country of incorporation of the bank issuing the asset matters, but that exposure to the crisis does not imply greater wholesale funding through ABCPs.

In Fig. 3, ultimately, we assess the ABCP variation by breaking these down by the currency of denomination. From this figure, we observe that in the period between the end of 2010 and mid-2011, corresponding with the start of the sovereign debt crisis and the initial volatility in liquidity funding costs, European banks accessed ABCP markets via their conduits to obtain an increase in USD funding of about 30 billion USD—most of which was coming from jurisdictions in OFCs. The volume of ABCP issuance remained elevated until mid-2013, when it returned to its pre-crisis level. In other currencies, ABCP issuance remained relatively unchanged during the period.

These figures show that the sovereign crisis forced banks to rethink their liquidity structures due to soaring funding costs. In this context, they achieved this task by drastically increasing wholesale funding via OFC-based ABCP conduits. Given the dominance of dollar funding, our graphical analysis appears to support the cross-border liquidity channel (H3b) over domestic financing (H3a) as the main driver of increased ABCP issuance.

5. Methodology

We use a p-VAR to model interactions between liquidity shocks, banking, and the real economy. This model was introduced by Holtz-Eakin, Newey, and Rosen (1988) and is heavily used in recent international finance and economics literature. The p-VAR methodology combines conventional properties of a VAR approach; therefore, it considers all variables in the system as endogenous, with a panel data approach, allowing for unobserved heterogeneity. The p-VAR chosen for our regressions exploits Arellano and Bover's (1995) Generalized Method of Moments (GMM) estimator, computed using Helmert forward mean-differencing orthogonal transformations of the dependent variable as instruments. This is standard for p-VAR models on unbalanced panel data (Abrigo and Love 2016).

To account for the differences in countries and banking systems' size among the Euro Area countries in our sample, we measure each banking sector and macroeconomic variable in chained terms. Therefore, we divide each measure by its corresponding value in March 2015 (base month). This is a common standardization technique to control for cross-country differences in size and price level and is implemented by default by the data providers (OECD and Eurostat) of our chosen macroeconomic variables (Section 4.2.1)—CPI and European Production Index. Concerning individual banks' ABCP positions, the composition of the conduits used by a parent bank may vary over time. We therefore first aggregate, for each month, the ABCP positions across all conduits associated with a given parent bank. We then normalize

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this aggregate position by the parent bank's positive aggregate ABCP position in March 2015 and calculate the month-on-month log difference of the resulting index, $\Delta\ln(ABCP_{ibt})$. This procedure allows us to examine changes in parent banks' aggregate ABCP positions conditionally alongside changes in the other banking-sector and macroeconomic variables included in the model.

Following Abrigo and Love (2016), we test for stationarity and use Andrews and Lu (2001) to select the lag order of our vector autoregression model. We chose a lag order of one, following the standard information criteria [the Akaike information criteria (AIC), the Bayesian information criteria (BIC), and the Hannan–Quinn information criteria (HQIC)]; hence, selecting the lag order that minimizes their corresponding statistic. Ultimately, we compute the impulse–response function (IRF) of our p-VAR model using Pesaran and Shin (1998) Generalized impulse–response function (GIRF), providing an order-indifferent VAR specification. This allows us to exclude the possibility that our results are driven by the variable order in our Cholesky decomposition (see Sims 1980).

Equation (1) below shows our selected baseline regression specification:

$$Y_{ibt} = A_0 + Y_{ibt-1}A_1 + \varepsilon_{ibt} \tag{1}$$

where: $Y_{ibt} = [\Delta BC_{it}, \Delta CPI_{it}, \Delta Loans_{it}, \Delta Deposits_{it}, Spread_t, \Delta WS_{it}, \Delta ABCP_{ibt}, \Delta Lev_{it}, \Delta ECB_{it}]'$ and A is our vector of regression coefficients. Moreover, in all regressions, the subscript i represents banks' parent country (the six Euro Area countries considered in this study [BEL, FRA, DEU, ITA, NLD, ESP]), b is the parent bank, and t corresponds to our monthly time frequency. In more detail, the variables adopted in the article are ΔBC_{it} that we use as a proxy for the change in parent countries' business cycle, ΔCPI_{it} is the monthly variation in CPI, $\Delta Loans_{it}$ is the monthly variation in banks' loans, $\Delta Deposits_{it}$ is the monthly variation in banks' deposits, $Spread_t$ is the monthly Euribor-OIS spread, ΔWS_{it} represents the monthly change in wholesale funding (excluding wholesale funding via ABCPs), $\Delta ABCP_{ibt}$ is the monthly volume ABCP issued by a Euro Area parent bank through its network of sponsors and conduits offshore, and includes positions taken in all currencies by EA banks. Ultimately, Lev_{it} is the leverage ratio, and ΔECB_{it} represents the change in volume of liquidity provided by the ECB to banks of the parent country (i). A_{0i} is a vector of intercepts and ε_{ibt} dependent variable-specific error terms with the following characteristics: $E[\varepsilon_{ib,t}] = 0$, $E[\varepsilon'_{ibt}\varepsilon_{ibt}] = \Sigma$ and $E[\varepsilon'_{ibt}\varepsilon_{ibt-s}] = 0$ for all $t > s$. All data used for the analysis are flow data (i.e., it reflects period-to-period variation in the outstanding volume of the variable), except for CPI and banks' leverage ratio, for which we computed the monthly change, and seasonally adjusted. In Supplementary Appendix 6, we also assess country-level growth in ABCPs (i.e., $\Delta ABCP_{it}$, rather than parent-bank change in ABCP issuance (i.e., $\Delta ABCP_{bit}$). The results are unaffected by this change in our p-VAR specification.

Secondly, to understand the composition of European banks' funding mix and their exposure to roll-over risk, we decompose ABCP issuances by currency. Given the large dominance of USD-denominated issuances (see Fig. 3), we contrapose banks' issuance in USD against issuance in all other currencies (including the euro). This analysis is performed using equation (1) displayed below:

$$Y_{ibt} = B_0 + Y_{ibt-1}B_1 + \varepsilon_{ib,t} \tag{2}$$

In this equation, $Y_{ibt} = [\Delta BC_{it}, \Delta CPI_{it}, \Delta Loans_{it}, \Delta Deposits_{it}, Spread_t, \Delta WS_{it}, \Delta ABCP_{FX\,ibt}, \Delta Lev_{it}, \Delta ECB_{it}]'$. B, instead, is a vector of regression coefficients; i represents the banks' parent country, b is the parent bank, and t is the variables' time frequency. In this regression, in addition to the variables explained in equation (1), we decompose ABCPs by currency of the issuance, $\Delta ABCP_{FX\,ibt} = \{\Delta ABCP_{USD\,ibt}, \Delta ABCP_{non-USD\,ibt}\}$ which represents, respectively, ABCP issuances denominated in USD and ABCPs denominated instead in all other currencies (including the euro).

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Similar to the above, B_{0i} is a vector of intercepts and $\varepsilon_{ib,t}$ the dependent variable-specific error terms with the characteristics previously described.

Ultimately, equation (3) considers ABCP positions taken via OFC and non-OFC conduits. This analysis allows us to provide evidence of banks' increased risk-taking in response to greater funding illiquidity risk. Equation (3), adopted to perform this assessment, is disclosed below:

$$Y_{ibt} = C_0 + Y_{ibt-1}C_1 + \varepsilon_{ibt} \tag{3}$$

In particular, in the equation, $Y_{ibt} = [\Delta BC_{it}, \Delta CPI_{it}, \Delta Loans_{it}, \Delta Deposits_{it}, Spread_t, \Delta WS_{it}, \Delta ABCP_{BS\,ibt}, \Delta Lev_{it}, \Delta ECB_{it}]$, where, once again, i represents banks' parent country, b is the parent bank, and t is the time. $\Delta ABCP_{BS\,ibt} = \{\Delta ABCP_{OFFB\,ibt}, \Delta ABCP_{OB\,ibt}\}$ which represents, respectively, the monthly volume of ABCP issued by a Euro Area parent bank through its network of conduits in OFCs and the volume of on-balance-sheet ABCP issued by a Euro Area parent bank through its network of conduits in non-OFC countries. Eventually, C_{0i} is a vector of intercepts and ε_{ibt} the standard error of our baseline regressions.

It is important to stress that our p-VAR framework is designed to capture the dynamic interactions between bank-level balance sheet adjustments and funding shocks, while controlling for bank heterogeneity and the persistence of shocks. This method does not provide causal identification; rather, it allows us to trace how variables evolve conditionally over time, accounting for the endogeneity of many banking flows. Crucially, this econometric framework offers a significant advantage over static approaches by controlling for latent balance sheet characteristics, such as capital structure, bank size, and risk profiles, and allowing the assessment of changes in our regression variables over time. Our findings are further strengthened by the unique granularity of the offshore ABCP dataset, which provides detailed and timely evidence on cross-border funding behaviours during periods of stress.

6. Results

6.1 Banks' funding response to a liquidity shock

In Fig. 4, we display Pesaran and Shin (1998) GIRF of our system variables to a one-time one standard deviation increase in the Euribor-OIS spread. In this figure, we start by considering banks' response to the liquidity shock in the Euro Area and their choices in funding liquidity sources. As in Fig. 1, we compare their exploitation of ABCP wholesale funding structures with wholesale funding in other, more traditional markets and other retail funding markets, typically sources of banks' liquidity (retail deposits, ECB liquidity).

In Fig. 4, we show the banking sector response to a one-time one standard deviation positive shock to the Euribor-OIS spread (spread) up to 12 months ahead. The shock leads to an 8-fold positive increase in funding costs and dissipates slowly, leading to a substantial liquidity dry-up for European banks (see sub-panel spread: spread).

Looking at banks' funding adjustment (i.e., banks' liabilities) in response to this shock, we note that banks' utilization of ECB liquidity increases in the first quarter after the shock of approximately 2 per cent month-on-month (see subpanel spread: d_ecb_index). However, the effect dies out from the fourth month onwards. Likewise, we observe a positive and significant increase in banks' traditional wholesale funding in the first two months after the liquidity shock (see subpanel: spread: d_whole). It amounts to approximately an 80 basis-point increase in wholesale funding as the shock materializes; however, the effect of the shock on this variable quickly dissipates and becomes insignificantly different from zero after two months. Moreover, we find no effect on deposits (see subpanel: spread: d_dep).

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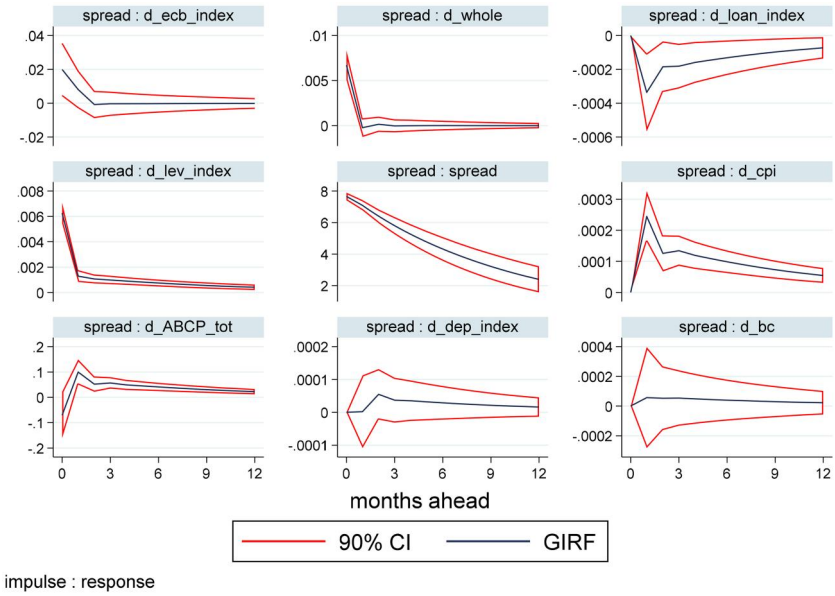

Figure 4. Euro Area countries' response to a funding liquidity shock.

Notes. This figure displays the response of European parent banks' assets and liabilities to a 1-SD liquidity shock using a Generalized Impulse-Response Function (GIRF). For more details on the GIRF variables and on the GIRF table, see Supplementary Appendices 1 and 2. Note that we do not consider differences in the currency of denomination of ABCP issuances. We convert all banks' ABCP positions in currencies other than USD to USD using the end-of-day USD exchange rate and calculate the total as the sum of all ABCP positions. In this figure, the GIRF coefficients are statistically significant at the 10 per cent level in a given period when the confidence interval, shown by the red lines, does not include zero.

Importantly, the most dramatic adjustment in banks' funding mix appears to occur outside traditional funding sources, particularly in funding via ABCPs. Looking at the average response of European banks' funding via ABCPs (spread: d_ABCP_tot), we notice a dramatic increase in ABCP issuance of about 10 per cent in the second month after the liquidity shock. After about 4 months, the effect decreases in magnitude but remains statistically significant and persists in the months ahead. This aligns with Fig. 1, showing banks increased ABCP issuance during liquidity stress and confirms our H1.

To assess which countries are behind the observed effect, as suggested in Section 4, we re-estimate our baseline regression (equation 1) separately for each country. We report our results in Table 3, which show the impulse–response coefficients for variables on banks' liability side of their balance sheets.

The results reveal a strongly positive and persistent response of ABCP to the liquidity shock for Germany. In other 'core' countries, the effect is either insignificant throughout the period following the shock (e.g., Belgium) or only occasionally significant (e.g., the Netherlands). Thus, among ABCP issuers, German banks largely drove the sharp growth in ABCP issuance during the crisis.

A potential explanation for the stronger ABCP response in Germany relates to structural features of its banking system. Unlike other euro area countries, Germany's financial sector is organized around a three-tier system comprising private commercial banks, local savings banks (Sparkassen), and regional

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Table 3. Adjustments in EA banks' funding structures (liabilities) in response to a liquidity shock.

Panel A: Euro Area core

	Germany				The Netherlands				Belgium			
Lags	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**
0	−0.05	0.00	−0.09***	0.00	−0.03	0.00	−0.01	0.00	−0.02	0.00	0.14***	0.03***
	(0.08)	(0.00)	(0.02)	(0.00)	(0.14)	(0.00)	(0.03)	(0.00)	(0.08)	(0.00)	(0.04)	(0.01)
1	0.11*	0.00***	−0.01	0.00*	0.05	0.00	−0.01	−0.01**	−0.01	0.00	0.04*	0.00
	(0.06)	(0.00)	(0.01)	(0.00)	(0.08)	(0.00)	(0.01)	(0.00)	(0.03)	(0.00)	(0.02)	(0.00)
2	0.05	0.00	−0.01*	0.00	0.11*	0.00**	−0.01	0.00	0.05	0.00	0.00	0.00
	(0.03)	(0.00)	(0.01)	(0.00)	(0.06)	(0.00)	(0.01)	(0.00)	(0.04)	(0.00)	(0.03)	(0.00)
3	0.06**	0.00	−0.01	0.00	0.06	0.00**	−0.01	0.00	0.04	0.00	0.00	0.00
	(0.03)	(0.00)	(0.01)	(0.00)	(0.04)	(0.00)	(0.01)	(0.00)	(0.04)	(0.00)	(0.02)	(0.00)
4	0.06***	0.00*	−0.01	0.00	0.08*	0.00**	−0.01	0.00	0.04	0.00	0.00	0.00
	(0.02)	(0.00)	(0.01)	(0.00)	(0.04)	(0.00)	(0.01)	(0.00)	(0.03)	(0.00)	(0.02)	(0.00)
5	0.05***	0.00	−0.01	0.00	0.06*	0.00**	−0.01	0.00	0.04	0.00	0.00	0.00
	(0.02)	(0.00)	(0.01)	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.03)	(0.00)	(0.02)	(0.00)
6	0.05***	0.00	−0.01	0.00	0.06*	0.00**	0.00	0.00	0.03	0.00	0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.03)	(0.00)	(0.02)	(0.00)
7	0.04***	0.00	−0.01	0.00	0.05*	0.00**	0.00	0.00	0.03	0.00	0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)	(0.02)	(0.00)
8	0.04***	0.00	0.00	0.00	0.05*	0.00**	0.00	0.00	0.03	0.00	0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)	(0.02)	(0.00)
9	0.03***	0.00	0.00	0.00	0.04	0.00*	0.00	0.00	0.02	0.00	0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)	(0.02)	(0.00)
10	0.03**	0.00	0.00	0.00	0.04	0.00*	0.00	0.00	0.02	0.00	0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)	(0.02)	(0.00)

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Table 3. *Continued*

Panel A: Euro Area core

	Germany				The Netherlands				Belgium			
Lags	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**
11	0.03**	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)	(0.02)	(0.00)
12	0.02**	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)	(0.01)	(0.00)

Panel B: Euro Area periphery

	France				Italy			
Lags	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**
0	−0.03	0.00	0.04***	0.01***	−0.18	0.00	0.02***	0.00
	(0.15)	(0.00)	(0.01)	(0.00)	(0.12)	(0.00)	(0.01)	(0.00)
1	0.05	0.00	0.02***	0.00**	0.18**	0.00	0.01*	0.00
	(0.09)	(0.00)	(0.00)	(0.00)	(0.08)	(0.00)	(0.00)	(0.00)
2	0.01	0.00*	0.01**	0.00	0.02	0.00	0.01***	0.00
	(0.05)	(0.00)	(0.00)	(0.00)	(0.06)	(0.00)	(0.00)	(0.00)
3	0.04	0.00	0.01*	0.00	0.06*	0.00	0.01**	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)
4	0.04	0.00	0.01**	0.00	0.05	0.00	0.01**	0.00
	(0.03)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)
5	0.02	0.00	0.01*	0.00	0.04*	0.00	0.01**	0.00
	(0.03)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)

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Table 3. *Continued*

Panel B: Euro Area periphery

	France				Italy			
Lags	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**	**d_ABCP**	**d_dep**	**d_ecb**	**d_whole**
6	0.03	0.00	0.00*	0.00	0.04*	0.00	0.01*	0.00
	(0.03)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)
7	0.02	0.00	0.00*	0.00	0.04	0.00	0.01*	0.00
	(0.02)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
8	0.02	0.00	0.00	0.00	0.04	0.00	0.01	0.00
	(0.02)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
9	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
	(0.02)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
10	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
	(0.02)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
11	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
	(0.02)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
12	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
	(0.02)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)

This table shows the response of European parent banks' liabilities to a 1-SD liquidity shock, using a GIRF. More specifically, the table presents the responses of parent banks in each EA country. For further details on the GIRF variables and the GIRF table, refer to Supplementary Appendices A.1 and A.2. Please note that we do not account for differences in the currency of denomination of ABCP issuances. All ABCP positions held by banks in currencies other than USD are converted to USD using the end-of-day USD exchange rate, and the total is calculated as the sum of all ABCP positions. Response coefficients that are significant at the 1, 5, and 10 per cent level are marked with ***, **, and * respectively. Robust standard errors are presented in the parentheses underneath the GIRF coefficients.

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public banks (Landesbanken). The Landesbanken, in particular, were heavily reliant on wholesale and foreign-currency funding prior to the crisis and have been identified as especially vulnerable to US dollar funding shortages (Hardie and Howarth 2009; Acharya 2011; IMF 2011). These institutions often operated ABCP conduits with offshore links, and their exposures to U.S. dollar-denominated assets left them more exposed to global liquidity shocks. In contrast, countries like France, where large universal banks rely more on stable domestic deposits, were likely less pressured to resort to offshore funding solutions such as ABCP issuance. These institutional differences offer a plausible explanation for the pronounced heterogeneity in cross-country ABCP responses observed in Fig. 4 and Table 3 Panel A.

Looking at Panel B of Table 3, we observe that banks in peripheral EA countries (Italian banks) with elevated financial distress receive significantly more support from the ECB than banks in less-stressed EA countries (e.g., Germany or the Netherlands). Banks in Belgium also receive substantial liquidity from the ECB after the liquidity shock. In particular, they increase their use of ECB liquidity by approximately 15 per cent as the shock materializes. This result is consistent with the elevated sovereign distress Belgium experienced during the crisis (see Afonso et al. 2018), indicating that Belgium is among the countries experiencing the greatest sovereign distress. The 'ECB liquidity' variable's response for Belgian banks, however, is substantially less persistent than that of banks in the periphery of the EA (e.g., Italian banks). Traditional wholesale funding is quite limited in scope, except for Belgian and French banks, which tap this liquidity source when the shock materializes and then reduce their exposure after one quarter. Finally, we do not observe large funding adjustments passing through the banks' deposit channel. That confirms our non-statistically significant results in Fig. 4. The only exceptions to this appear to be Germany and the Netherlands, for which we observe minor adjustments. These take the form of a small, short-lived loss of deposits in German banks, counterbalanced by a similar increase in deposits in banks incorporated in the Netherlands.

Overall, our results align with the summary statistics in Fig. 1, suggesting that ABCP issuance during the sovereign debt crisis was an essential source of funding for European banks amid the liquidity dry-up they experienced.

6.2 The role of the USD in ABCP wholesale funding

In this subsection, we re-run our regression models, distinguishing ABCP positions denominated in USD and banks' ABCP exposures in other currencies [see equation (2)]. The latter positions are mostly denominated in Euros (see Table 2). This provides evidence on the channels driving ABCP issuance during the crisis.

Figure 5 shows that banks increase their USD wholesale ABCP funding in response to a liquidity shock. The effect becomes statistically significant at the 10 per cent level two months following the shock and remains significant throughout the next months. The overall pattern and magnitude of the dollar-denominated ABCP response resemble that of the total ABCP observed in Fig. 4. On the other hand, the reaction of ABCP wholesale funding in other currencies is less persistent. More specifically, while ABCP issuances in other currencies (including the Euro) increase in the first month after the shock, starting at the second month, the response declines in magnitude and statistical significance (see also Supplementary Appendix 3 for the p-VAR Table of this regression). Our results highlight the role of dollar liquidity for banks during liquidity distress (see Aldasoro and Ehlers 2018; Aldasoro, Eren, and Huang 2021). At the same time, though, they highlight that the increase in ABCP issuance during crisis periods is not limited to dollars. Thus, overall, our p-VAR results offer more nuanced evidence regarding the transmission channels than the simple graphical analysis in Section 4.

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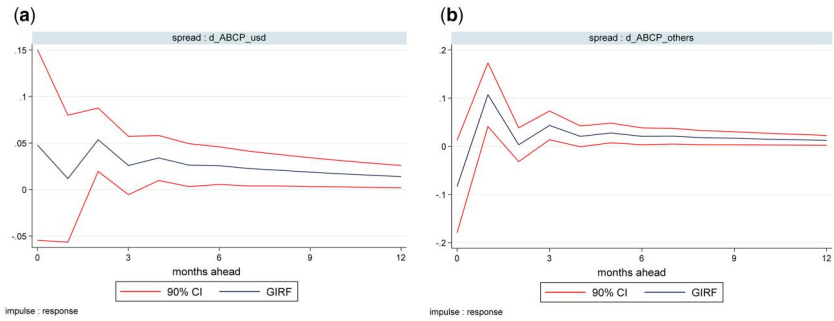

Figure 5. USD ABCP positions vs issuances in other currencies. (a) USD-denominated ABCP issuances. (b) ABCP issuances denominated in other currencies.

Notes: This figure compares European parent banks' ABCP issuances denominated in USD (Panel a) and in all other currencies (Panel b) in response to a 1-SD liquidity shock. Moreover, in both figures, the results are shown using a GIRF. For more details on the GIRF variables, on the GIRF table, and the currencies used in ABCP issuances, see Supplementary Appendices 1 and 3 and Fig. 3. In this figure, the GIRF coefficients are statistically significant at the 10 per cent level in a given period when the confidence interval, shown by the red lines, does not include zero.

Specifically, while the funding liquidity risk channel is operating (H2b), we cannot rule out the financing channel (H2a) given the currency of the ABCPs' denomination.

6.3 The role of OFCs in ABCP wholesale funding

In this subsection, we further analyse banks' ABCP issuance behaviour by assessing the country of incorporation of the conduit from which this alternative wholesale funding is sourced. The assessment of the country of origin of ABCP money flows is an important task, given evidence of the vast exploitation of conduits in OFC for ABCP issuances (see Fig. 2 and Table 2). In Fig. 6, we show that banks increase ABCP issuances via OFCs by about 5 per cent two months after the liquidity shock (Panel a). Moreover, these issuances are both statistically and economically significant thereafter. Other non-OFC ABCP issuances are also occasionally significant, but much less persistent (Panel b). We observe a substantial drop in the latter when the liquidity shock suddenly materializes. However, this drop is very short-lived, as the following month banks increase non-OFC ABCPs by an amount similar to that observed in the initial decrease. Ultimately, these issuances remain small and turn insignificant four months after the liquidity shock.

Comparing Figs 5 and 6, we observe very similar responses of USD positions and OFC positions, and vice versa for ABCP positions in other currencies and non-OFC positions. This holds for both the sign and magnitude of the IRFs, though OFC-based ABCP slightly exceeds USD-denominated ones. This finding supports the stylized facts in Table 2 and Fig. 3, showing that most of the wholesale funding raised by European banks via OFC-based ABCP is indeed denominated in USD, although banks also use the ABCP market to access other currencies. Overall, these results highlight the role of OFC jurisdictions for raising alternative funding and suggest that European banks' exploitation of ABCP structures may be motivated by reasons other than financing domestic assets. Because OFCs are less transparent about banks' exposures, banks' reliance on offshore funding raises concerns about 'shadow' risk-taking during liquidity stress, as it also reduces the information available to policymakers to mitigate the liquidity shock.

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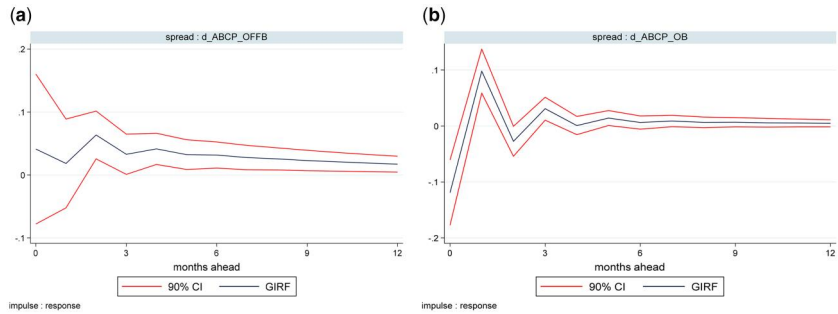

Figure 6. Non-offshore centres vs offshore centres and ABCP positions. (a) OFCs-based ABCP issuances. (b) Non-OFCs-based ABCP issuances.

Notes: This figure compares European parent banks' ABCP issuances from OFCs (Panel a) and ABCP issuances in other jurisdictions (Panel b) in response to a one-standard-deviation liquidity shock. Moreover, in both Figures, the results are shown using a GIRF. For more details on the GIRF variables, on the GIRF table, and the conduit location used in ABCP issuances, see Supplementary Appendices 1 and 4 and Fig. 2. In this figure, the GIRF coefficients are statistically significant at the 10 per cent level in a given period when the confidence interval, shown by the red lines, does not include zero.

6.4 ECB liquidity provision and economic and monetary union banks' funding responses

In this section, we assess whether banks' ABCP responses differ according to the level of ECB liquidity provision during liquidity stress. To examine whether banks' reliance on alternative funding sources differs with the level of ECB support during liquidity dry-ups, we follow the approach of Towbin and Weber (2013), Sá, Towbin, and Wieladek (2011), and Banti and Phylaktis (2019).

In our study, we use the volume of liquidity received by MFIs from the Eurosystem as indicator variables and condition the impact of funding liquidity shocks on banks' increase in wholesale funding on the volume of liquidity provided by the ECB. To perform this analysis, we start by re-estimating our equation (1) for periods when banks received 'high support by the ECB'—hence, when the amount of ECB liquidity received by banks is greater than its median calculated for the entire period of analysis—as opposed to periods with 'low support by the ECB'. This approach allows us to exploit the time and cross-sectional variation in banks' available liquidity (provided by the Eurosystem) and assess whether funding liquidity needs alone motivate the observed increase in wholesale funding. Greater Eurosystem support implies easier access to liquidity, while lower support corresponds to tighter funding conditions.

Figure 7 shows that the ABCP response is smaller during periods characterized by higher ECB liquidity provision. Comparing the responses of banks in months with low and high Eurosystem support, we find that, in both cases, the liquidity shock leads to an increase in ABCP funding. Surprisingly, during periods of high ECB support, we also observe an increase in banks' traditional wholesale funding (even if short-lived). Crucially, whilst we cannot claim causality, we find that ECB policy mitigated the rise in ABCP issuance. In fact, during periods of low ECB support for the EA banking sector (Panel b), banks issue twice as many ABCPs as during periods of stronger ECB support for banks (Panel a). These results support H4, but only in a qualified sense. Higher ECB liquidity provision is associated with a smaller ABCP response, yet the effect is partial because Eurosystem support primarily supplies euro liquidity, whereas a substantial share of conduit-based ABCP funding

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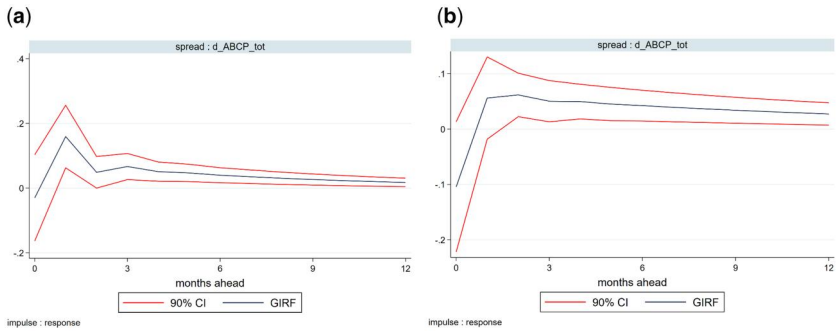

Figure 7. ABCP issuances in periods of high vs low ECB liquidity provision. (a) Periods with high ECB liquidity provision. (b) Periods with low ECB liquidity provision.

Notes. This figure shows the aggregate European parent banks' ABCP issuance in periods characterized by above-median ('high') ECB liquidity provision (Panel a) vs below-median ('low') ECB liquidity provision (Panel b) (see Section 6.4). Moreover, in both figures, the results are shown using a GIRF. For more details on the GIRF variables see Supplementary Appendix 1. In this figure, the GIRF coefficients are statistically significant at the 10 per cent level in a given period when the confidence interval, shown by the red lines, does not include zero.

is denominated in U.S. dollars. Domestic central-bank liquidity and offshore dollar funding are therefore imperfect substitutes, which helps explain why ABCP issuance remains positive even during periods of high ECB support. It is also consistent with the view that central bank liquidity provision (e.g. official swap lines) and private offshore dollar infrastructures coexist within the broader funding structures of dollar liquidity provision (Tooze 2018). At the same time, though, they suggest that the difference in the estimated ABCP response between periods of high and low ECB liquidity provision is substantial but less than what has been suggested by previous work analysing only Euro-denominated wholesale funding (see, e.g., Alvarez et al. 2019).

Conceptually, these findings reinforce our argument about latent network activation. Specifically, it highlights that domestic central-bank support only partially offsets funding stress, as banks continue to mobilize pre-existing offshore conduit networks to access liquidity. Accordingly, this shows that OFCs are not marginal to crisis financing but operate alongside public liquidity provision as private, cross-border infrastructures of emergency funding.

We perform numerous robustness checks to verify the validity of our results. For space reasons, we report these in Supplementary Appendix 6; however, in all instances, our results remain robust.

7. Conclusion

This article has shown that OFCs are not peripheral anomalies but central institutional infrastructures within global banking networks. Drawing on a novel dataset of ABCP issuance by European banks, we document a significant shift towards offshore funding conduits during the acute liquidity stress of the Eurozone sovereign debt crisis. We show that banks' responses in such a context were not random or opportunistic; they were embedded in a pre-existing network architecture of liquidity, structured through legal, institutional, and professional ties (Granovetter 1985). These ties, while sometimes

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dormant, become activated under stress—transforming passive embeddedness into active network coordination.

Our findings, whilst not causal in nature, highlight the structural role of OFCs as governance mechanisms tailored to the needs of global banks. Consistent with our first hypothesis, we document a significant increase in ABCP issuance following a deterioration in funding conditions, indicating that banks actively turned to cross-border wholesale markets as an alternative source of liquidity. Furthermore, our results demonstrate that this adjustment was not evenly distributed across jurisdictions. In line with our second hypothesis, the expansion in ABCP funding was disproportionately channelled through conduits domiciled in OFCs, underscoring the role of these jurisdictions as critical network nodes in global liquidity intermediation. Turning to the currency composition of funding, we find that ABCP issuance during the crisis period was primarily denominated in US dollars, indicating that banks sought to meet cross-border dollar liquidity demands. By contrast, euro-denominated issuance rose only briefly, suggesting that domestic financing was not the main driver. Finally, our analysis examines whether ABCP responses (i.e., banks' reliance on offshore wholesale markets) differ between periods of high and low central-bank liquidity provision. Consistent with our last hypothesis, we find that unconventional ECB liquidity provision was associated with a reduction in ABCP issuance. However, this mitigating effect was partial: banks continued to issue ABCPs through OFC-based conduits even during periods of high Eurosystem support. This indicates that offshore markets fulfil liquidity needs that domestic monetary policy tools do not fully address.

Taken together, these findings contribute to a more nuanced understanding of banks' liquidity management during periods of systemic stress. Evidence that European banks relied on OFC-based dollar conduits during times of stress contributes not only to debates in international banking but also to wider discussions about inequality, governance, and the social foundations of global capitalism. Scholars of economic sociology and political economy have shown that offshore finance entrenches systemic hierarchies and redistributes risks in ways that shield elites while exposing states and citizens to new vulnerabilities (Potts 2020; Pernell Gallagher 2021; Hoang 2022; Leslie 2025). Ethnographic and historical accounts underscore that OFCs are not neutral conduits but infrastructures maintained through organizational logics, legal innovations, and political bargains (Ho 2009). From this perspective, the reliance on OFCs during crises is not simply a technical adjustment but a process that deepens opacity, undermines democratic oversight, and institutionalizes financial dependency (Sharman 2010; Krippner 2012; Wansleben 2023).

Accordingly, this study highlights the broader stakes of our analysis. Whilst OFCs may stabilize banks' balance sheets in the short run by providing access to alternative sources of liquidity, they may also weaken regulatory transparency and complicate democratic oversight of cross-border financial activity. Our findings, therefore, suggest a tension at the heart of contemporary capitalism: the same offshore infrastructures that enhance the resilience of individual financial institutions may simultaneously create challenges for the public governance arrangements on which stable financial systems depend. In this sense, offshore finance can support private balance-sheet stabilization while raising important questions about the institutional foundations of financial order.

By reframing offshore banking conduits as institutionalized, network-based infrastructures, we contribute to a more critical understanding of financial globalization. Crucially, we show that OFCs serve systemic functions, but in ways that potentially undermine regulatory coherence, exacerbate global financial asymmetries, and shield powerful actors from democratic oversight. Recognizing their institutional logic is the first step towards devising policy responses that do not merely close loopholes, but confront the transnational legal and professional architectures that sustain them.

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Supplementary data

Supplementary data are available at *Socio-Economic Review* online.

Conflict of interest statement. None declared.

Funding

None declared.

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Socio-Economic Review, 2026, 00, 1–31
https://doi.org/10.1093/ser/mwag069
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