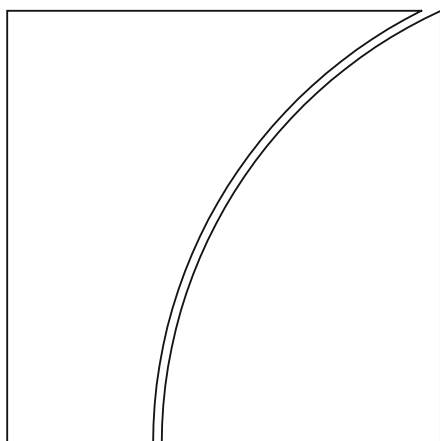




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segmentation, financial integration, regulation,
international cooperation.

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Fragmentation in global financial markets: good or bad for financial stability?

Stijn Claessens*

Abstract

The many regulatory reforms following the Great Financial Crisis of 2007–09 have most often been designed and adopted through an international cooperative process. As such, actions have tended to harmonise national approaches and diminish inconsistencies. Nevertheless, some market participants and policymakers have recently raised concerns over an unwanted and unnecessary degree of fragmentation in financial markets globally, with possibly adverse effects for financial stability. This paper reviews the degree of fragmentation in various markets and classifies its possible causes. It then reviews whether fragmentation is necessarily detrimental to financial stability, suggesting that, as is more likely, various trade-offs exist. To identify and assess the scope for Pareto improvements, it concludes by outlining areas for further analysis.

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Keywords: financial stability, fragmentation, segmentation, financial integration, regulation, international cooperation.

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1. Introduction

The topic of fragmentation in financial markets has recently been receiving more attention from both market participants and policymakers. Fragmentation has many dimensions, and various aspects can be analysed. Fragmentation can differ whether viewed and analysed from a domestic or from a global perspective. Fragmentation can vary by and depend on the specific financial market, eg securities markets or banking markets, or service, eg payments or credit. Although not always acknowledged, fragmentation can arise for many reasons other than financial regulations and oversight, including from natural barriers, market forces, and variations in institutional environments. And aspects of fragmentation to be analysed include the relationships of fragmentation with and effects on the efficiency of financial services provision, including market liquidity; its effects on transparency and consumer and investor protection; and finally, its connection with overall (global) financial stability.

The focus here is on a (small) subset of these issues and questions. Specifically, the paper limits itself to the types of fragmentation that are of a global nature, that arise from differences in financial regulations and enforcement thereof across countries, and that possibly affect the degree of global financial stability. While thus only a subset of issues is reviewed, this subset is arguably important: it concerns a significant global public good – financial stability – and it asks how policy can affect it. At the same time, the relationship between fragmentation and global financial stability has received the least attention in research. Most analyses have focused on how fragmentation affects other, equally essential dimensions, including the efficiency of financial services provision and the allocation of resources. This lack of prior work makes it hard to come to any definitive conclusions in a review paper. But there is value in at least clarifying the debate, including on whether there might exist a trade-off between the degree of fragmentation and financial stability and, relatedly, whether there is scope for Pareto improvements, ie changes that can reduce fragmentation or enhance financial stability without compromising the other objective. No answers are provided, but to guide further and future assessments, the paper identifies some areas requiring further analysis.

The paper is structured as follows. Taking a cross-jurisdiction perspective, it first defines fragmentation.¹ It then reviews the possible causes of fragmentation, identifying four types: natural barriers; market forces; policy actions and interventions other than financial regulatory actions; and finally, financial regulation and its enforcement. This part concludes that while it is difficult to isolate the specific effects of each of these four causes, empirical methods to that end do exist. These have been applied to other objectives, especially to explain differences in prices of equivalent assets across countries and, to a lesser degree, deviations from some benchmarks in quantities or capital flows, ie (changes in) gross or net international investment positions. The paper then proceeds to review the costs and benefits of fragmentation, mainly from a financial stability perspective, using examples from securities markets, international banking, and asset prices across countries. It concludes that whereas in some cases there appear to be no clear costs to financial stability, in other cases there might be some. Importantly, it also suggests there are clearly cases where (some type or degree of) fragmentation can serve to enhance financial stability.

¹ The paper uses the term fragmentation as it has been much used recently, including in official reports (eg FSB 2019). However, other terms, like segmentation, can capture the concept studied better.

The next area covered is how regulation at the global level affects fragmentation. The suggestion is that, in most cases, policy actions have meant fewer regulatory and institutional differences across countries, hence moving markets globally closer to uniformity. This being so, one can surmise that changes in regulations and related actions have broadly reduced fragmentation. And, correspondingly, the complementarities between reducing fragmentation and enhancing financial stability are likely to have been large overall. Still, there may be cases where regulatory actions have implied more fragmentation. Accordingly, there can be cases where trade-offs could arise. The last section builds on this analysis to review what actions may be called for. It argues for the need to develop a framework that can help identify cases where there are potential trade-offs. It then suggests how to go about measuring the costs and benefits. All along, the paper stresses that more cooperation – global in nature, and involving both public and private actions – can lead to (Pareto) gains.

2. What is fragmentation?²

There are various definitions of “fragmentation” in the literature that one could use in a cross-jurisdictional context (FSB (2019, Annex B) provides a review of definitions used by various international agencies). Many definitions focus on the degree to which there are differences across jurisdictions in the prices of economically otherwise identical (or similar) assets, or the degree of free movement of capital across borders, as captured in flows or cross-border holdings of assets and liabilities. Others expand on these definitions to include as market fragmentation cases where foreign market participants cannot offer financial services on the same terms as local firms can (in trade terms, these are called different types of non-tariff measures (NTMs), which can hinder market access). Each of these definitions is examined in turn. The starting point, however, is the typical definition of fragmentation as used in the domestic context.

In the domestic context, fragmentation is often used to refer to how financial markets are configured. This definition is especially often used in securities markets. Trading in a securities market can be “concentrated”, ie when most trading is conducted at one or two trading centres. Or it can be “fragmented”, ie when orders are sent to numerous trading venues that compete with each other. This fragmentation among trading venues occurs of course along more than one dimension. Trading venue systems may vary not just in terms of liquidity and transaction costs, but also in transparency, speed (ie latency) and other attributes important to (specific segments of) the market. Note that many of these forms of fragmentation are not (necessarily) due to any (obvious) regulatory or other policy barriers, and arise from market forces, notably competition. As such, these forms of fragmentation may differ from the ones discussed next, and may also be less relevant when fragmentation is reviewed from a global perspective.

More generally, fragmentation is often used to suggest some forms of imperfect financial market integration. It is, for example, frequently argued that fragmentation obtains when asset prices vary across functionally equivalent products. The interpretation is that differences in prices of similar assets – between markets, jurisdictions or otherwise across some boundaries – indicate limits to arbitrage. More precisely, in the absence of frictions (including those that bring about market

² For a policy focused review, see FSB (2019), on which parts of this paper draw.

fragmentation), one would expect that securities with identical cash flows command the same price, regardless of where they are traded. In other words, in the absence of fragmentation, the “law of one price” should hold, ie the same asset has the same price even when traded across some boundary.

But this law of one price does not always prevail, even when there are no (obvious) barriers. The clearest example of a violation of the law of one price is where the shares of a company trade at different prices in two markets that are otherwise free of restrictions on capital flows. Of course, this is an “easy” case, as it refers to assets with the same cash flows and ownership rights, and thus no differences in risks. Yet, even in these cases, research has not always been able to attribute the difference in price to a single factor.³ In general, the challenge is greater, as one also needs to determine what the “same” asset is. This is not always obvious, particularly in terms of controlling for risk characteristics.

One very fundamental example is the safe interest rate, ie the rate on a short-term, government-issued obligation. Since the interest rate varies across jurisdictions, which at least *prima facie* often appears to be the case, one could conclude there is some fragmentation. However, whether such differences reflect differences between assets in terms of riskiness (with a corresponding risk premium for, say, exchange rate, inflation or default risk), or some form of fragmentation (eg due to limits to arbitrage in the form of capital controls, or differences in taxation), is not easy to establish. Furthermore, even when prices or rates of return are equalised, one may not equate this with fully integrated financial markets. For example, prior to the Great Financial Crisis (GFC) of 2007–09, differences in the yields of sovereign bonds among euro area sovereigns largely disappeared. This was considered proof of a more integrated capital market, ie one where fragmentation was absent or at least limited (ECB (2007)). *Ex post*, however, this convergence was shown to be a market “misassessment”, as it reflected a significant underpricing of sovereign risk.

While (differences in) asset prices are the easiest and most commonly used way to identify (lack of) fragmentation or segmentation, they are not the only way. Barriers to the movement of capital across trading venues, financial intermediaries or jurisdictions can also show up in quantities. For example, the allocation of capital around the world may differ from a “first best” (eg as predicted according to some optimal capital asset allocation model (CAPM)) because of some barriers. In such a case, one could argue that these quantity deviations show that the global market for capital is fragmented. These forms of quantity measures are, however, used less often and not so easily interpreted. This is in part due to data deficiencies (quantity data are less easily available than price data). Relatedly, the theoretical literature on the modelling of “optimal” quantities in an unconstrained world, and the quantitative effects of restrictions on capital allocations, is much less developed than its price-based equivalent.⁴

Despite some of these shortfalls, one can nevertheless conceive of many simple quantity- and quantity-related measures. For example, one can define fragmentation as a case where the international ownership structures of stocks or bonds do not mimic their weights in global market capitalisation - something which is predicted by many models (for example, the international version of the CAPM implies that, in a

³ The case often mentioned and analysed is Royal Dutch Shell, which trades at a different price in London than in Amsterdam (Froot and Dabora (1999); see also Lamont and Thaler (2003)).

⁴ The asset prices based literature is typically partial equilibrium, whereas modelling quantities has to be, by nature, more general equilibrium-based.

fully integrated capital market, investors own, proportionally to their wealth, equal fractions of all stocks or bonds in the world). Indeed, many passive investment strategies have adopted this as a benchmark.

Another quantity-related measure would be to equate the lack of fragmentation to the unconstrained, free movement of capital across borders. The degree of movement of capital can then be defined as de jure financial openness, ie the lack (or severity) of regulations limiting the ability to move capital. A broader, but similarly rules-based definition would then be to say that a market is not fragmented if no (potential) market participant faces any de jure discriminatory ability to access the market and, once having access, does not face differential treatment based on his or her original jurisdiction.⁵ It can also be defined as de facto financial openness, which would then be based on features of assets or local financial services actually being offered that differ (or not) depending on the country of origin of the provider. Or it can be based on measures of actual aggregate cross-border international capital (stocks or flows) to that market relative to some benchmark. Again, the price- and quantity-based definitions can come together when one defines market fragmentation as less than “optimal” cross-border holdings of a (specific or wider) range of asset classes, resulting (in part) in a divergence of related asset prices (or, relatedly, rates of return).

3. What “causes” fragmentation?

There are many factors that can potentially lead to various forms of fragmentation. I differentiate here between four groups: natural barriers; market forces; policy interventions other than financial regulation and related actions; and regulatory and related actions.

- i. *Natural barriers.* Many “frictions” that are an unavoidable part of financial intermediation can show up as (international) fragmentation.⁶ One set of such frictions relates to the operations of financial intermediaries themselves. For example, the internal markets of banks and banking groups, like those of firms, do not necessarily (always) allocate capital or liquidity in a (globally) optimal way (again defined by some benchmark). The causes are multiple and not all well understood, but some appear to arise from arrangements to overcome governance and informational problems. Internal budgeting rules as adopted by non-financial firms for their subsidiaries or other internal units, for example, can be necessary to allocate resources efficiently – to prevent, say, shirking – but can lead to allocations that may appear suboptimal overall (Stein (1997)).

Similar issues may arise in the case of financial institutions. It may be necessary, for instance, to allow a branch executive to manage its local funds in a particular way so as to ensure that her incentives are optimally aligned with those of the

⁵ Baele et al (2004) defines a financial market as integrated “if participants face a single set of rules when they decide to deal with those financial instruments and/or services; have equal access to the above-mentioned set of financial instruments and/or services; are treated equally when they are active in the market.”

⁶ I am using here the term “financial frictions” as those imperfections that stem from information asymmetries, enforcement problems and other agency issues that are fundamental to financial intermediation (see Claessens and Kose (2018) for a review).

shareholders given informational barriers and other agency issues (cf rules to prevent excessive risk-taking; see also Bajaj et al (2018) for a review of how banks allocate capital internally). Banks may segment parts of their businesses (eg IT) to create redundancies. While this type of internal rulebook may generate some inefficiencies, those effects may be the second-best given trade-offs with other business objectives of the bank.⁷ This imperfect internal market can nevertheless imply that liquidity is not optimally allocated in general or in the event of turmoil (see eg Cetorelli and Goldberg (2012) for an analysis). For example, the branch manager may sit on funds that could be used more productively elsewhere. These factors mean that the business models of banks and other institutions – and, of course, any changes to those models – can translate into varying degrees and forms of aggregate fragmentation.

Besides the workings of internal markets and other such frictions, many other reasons have been identified as to why the global capital market may not be perfectly integrated. Home bias and frictions related to distance are key common themes here. For a variety of reasons, investors tend to prefer to invest in assets that are locally issued or otherwise locally sourced, and invest less in international or cross-border assets. This home bias varies by type of asset, including by the currency of the claim (for example, dollar claims reflect less home bias; see Maggiori et al (2019)) and domicile of issuance (clearly, financial centres suffer less from this type of bias). The phenomenon can be described as a form of self-selection in the sense that it does not necessarily relate to formal, ie legal or regulatory, barriers. It seems to arise from a number of factors, including asymmetries in information, cultural affinity, transactions costs, behavioural biases and sometimes political economy, which are all larger or more intense across jurisdictions. It is hard to distinguish the exact drivers, but the degree of home bias (or lack thereof) tends to correlate with physical, language and cultural distance, as well as with some proxies that suggest the importance of such non-formal barriers (eg the level of phone or internet traffic).

- ii. *Market forces.* Fragmented markets can reflect investor preferences that emerge endogenously. This endogeneity may be less relevant with regard to the location of investments (eg as reflected in home bias), but more so as to the location of transactions. Again, there can be various barriers preventing integrated markets for trading. An interesting feature in this context, however, is that trading and turnover measures point much less to the presence of barriers, at least in terms of marginal transaction cost, than actual ownership structures do (eg Tesar and Werner (1995)). Rather, in trading, more so than in investing, various developments endogenous to the market, even without any barriers, can give rise to what may appear to be fragmentation. Securities markets are prime examples of how market forces can produce such effects. Investors can have preferences across various dimensions that see them opting for certain trading platforms (eg venues with specific degrees of price and counterparty transparency). These choices of specific (classes of) investors for specific markets can, due to various network externalities and other path dependencies, culminate

⁷ For example, Campello (2002) shows that internal capital markets in financial conglomerates come with investment inefficiencies generated by frictions between conglomerate headquarters and external capital markets. Also Cremers et al (2011) show that, in a large retail banking group consisting of member banks and a headquarter organisation, the more influential banks are allocated more funds from headquarters, with their loan growth proving less sensitive to deposit growth.

in specific market structures (and changes over time to those structures). These may be efficient outcomes in some dimensions (eg low trading costs as measured, say, by bid-ask spreads) and for certain (groups of) participants. But the outcomes are not necessarily preferred from an overall perspective. And importantly in this context, they may, according to given definitions, be classified as forms of market fragmentation.⁸

- iii. *Policy interventions other than financial regulations.* It is obvious that many other, non-regulatory factors can affect international financial transactions and investments. One key example already mentioned is restrictions on the movement of capital or investment across borders, ie capital flow management tools, and other market access rules that explicitly discriminate on the basis of the nationality of the borrower, issuer, investor or intermediary. Another example is taxes, with both their overall level and their structure being important. Tax systems are (mostly) nationally determined and rarely undergoing harmonisation through formal process (except perhaps indirectly for competitive reasons). They can give rise to "fragmentation" that can show up in differences in asset prices (eg deviations from the law of one price) or quantities. Other barriers include (differences in) data privacy and data-sharing rules and constraints. Differences in legal systems and other institutional aspects fundamental to defining a jurisdiction in the first place can be a contributory cause of "fragmentation". Differences in, say, bankruptcy regimes or judicial enforcement are likely to mean that an asset as common as a bank loan may be priced differently across jurisdictions.
- iv. *Regulatory and related policy interventions.* These interventions can lead to fragmentation for three types of reason:
 - a. inconsistencies in both the timing and the substance of the implementation of internationally agreed financial sector reforms;
 - b. implementation of national reforms that have extraterritorial effects and impacts on market participants; and
 - c. incompatibilities between home and host regulatory requirements.

Note that these inconsistencies and differences can arise in spite of the commonly agreed post-GFC reforms.

Examples of the three categories outlined are as follows.

- a. The adoption and implementation of internationally agreed rules such as Basel III can proceed at different speeds depending on, say, the legislative timetables adopted in different jurisdictions. In addition, almost all international standards do allow for some adaption to the local institutional environment. As a result, (minor) differences may occur in the actual implementation of rules, which may end up creating some forms of fragmentation. A further source of differences can be variations in the enforcement of rules, something that is always more subject to discretion.
- b. An oft cited example of how differences in rules can lead to fragmentation is the case of derivatives markets. Without being a direct policy objective, segmentation of derivatives trading can arise due to requirements for (local)

⁸ Note that there are large differences by type of financial service. For example, foreign exchange trading has traditionally been more concentrated than equity trading. Still, a general trend towards more dispersion is apparent.

settlement and clearing. Similarly, barriers to data-sharing, related to national privacy rules, can have an extraterritorial impact, resulting in fragmentation. In banking, structural requirements for (foreign) banks, such as the Volcker and other such rules, can have extraterritorial effects.

- c. There are several examples – especially, but not exclusively, in banking – of rules which, while fully aligned globally, inherently create inconsistencies when a financial institution’s operations span more than one jurisdiction. The risk weights used in the Basel framework, for example, differ in terms of whether they are applied from the perspective of the home country of a foreign bank or from that of the host country where its subsidiary resides. This difference can arise in that certain assets are treated differently for risk weight purposes, eg a local currency claim booked at the (fully owned) subsidiary may receive a higher risk weight at the parent than at the local subsidiary level.

It is clearly very difficult to precisely isolate the effects of these four sets of factors from each other. Furthermore, there are many forces in addition to these factors which can (appear to) affect fragmentation. These include differences in the development of jurisdictions’ financial systems; the overall macroeconomic environment, including the conduct and stance of monetary policies; and the creditworthiness of the country. How policies affect financial intermediation is a general challenge, and one which is being tackled by researchers in many ways (eg Jakovljević et al (2015) survey how to identify the impact of regulations; see also Boissay et al (2019) for a repository of studies of regulatory impact). This identification challenge is already sizeable at a national level, where many of these (other) differences are not present (eg in pace of implementation). Yet even within jurisdictions, it can be hard to explain the degree of fragmentation, as the aforementioned developments in trading in securities markets show. And more generally, the challenges in this type of work are great, as also shown in the FSB-led work on the evaluation of financial reforms (FSB (2017a)).

Some of these challenges are even greater across jurisdictions, including with regard to analysing the drivers of the degree of fragmentation. Many more factors have to be taken into account in general when analysing the effects of financial reforms globally (see also FSB (2017a) in general, and FSB (2018a,b) and FSB-BCBS-CPMI-IOSCO (2018) for further examples of how to analyse the effects of financial reforms). At the same time, differences across jurisdictions can at times enable more precise identification of the effects of various factors, including financial reforms. Similar to how analysis of the differential impacts of financial reform on types of financial institutions, eg large vs small banks, can help identify effects, so too can differential impacts across types of countries help with identification. Moreover, differences in the speed or depth of implementation can help identify the contribution of reforms to outcomes (eg countries that have already implemented reforms can be a control group for other countries).

4. Is fragmentation good or bad for financial stability?

The key question for this paper is whether there are trade-offs between the degree of fragmentation and financial stability. While likely not independent of the cause of fragmentation, there clearly can be adverse effects from fragmentation on financial stability. But, contrary to some views, there may also be benefits from (some degree

of) fragmentation for financial stability. The exact nature of the costs and benefits is likely to vary according to the form in which fragmentation is manifested. Some forms of fragmentation may be more and some less costly in terms of overall global financial stability. Some may have no financial stability benefits, whereas other forms of fragmentation may have far-reaching benefits. Besides the possible trade-off between fragmentation and financial stability, there are other dimensions to consider – for example, is fragmentation harmful to market efficiency? And are less efficient financial markets also less liquid and less resilient, especially in times of stress, and might less efficiency thus be directly and indirectly harmful for financial stability?

Many questions thus arise in this context. Are financial stability concerns limited to fragmentation in some financial markets, or do concerns arise more broadly? Does the fragmentation that shows up only in prices give rise to fewer financial stability concerns than fragmentation in terms of quantities? Does fragmentation that affects only trading pose limited threats to financial stability while fragmentation that (also) shows up in final portfolio allocations generate more concerns? We consider the (limited) evidence for these issues for various types of financial services.

Securities and derivatives markets

In many developed countries, securities markets have become more fragmented in the last decade. For example, the market shares of traditional stock exchanges have declined sharply as new market operators (electronic communication networks) have developed cheaper and faster systems to trade stocks. As of 2017, equity market trading by venue was very dispersed: in the United States, for example, traditional markets such as the New York Stock Exchange and Nasdaq represented only 50% of trading, with the remainder captured by more than a dozen other platforms (Figure 1). Of course, there is much arbitrage between these markets. The interdependence of liquidity providers' inventory is one channel that links trading venues in fragmented markets and prevents (large) price deviations. In this way, cross-market cost linkages may enhance competition and liquidity, with prices not likely to vary much, if at all.

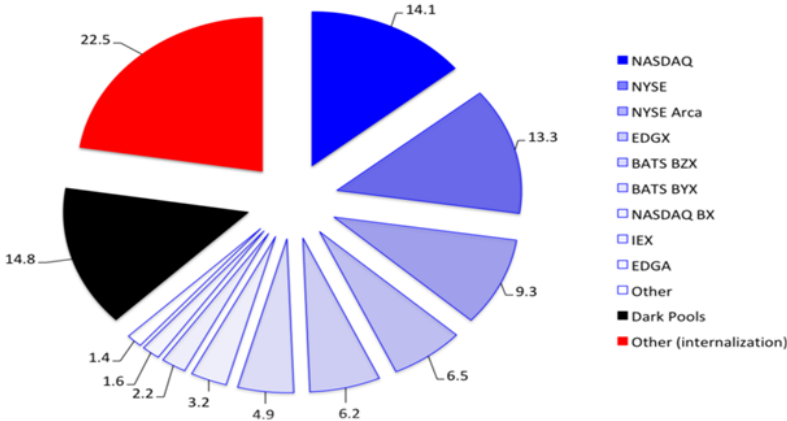
This endogenous development may suggest the (net) benefits of competing, yet still connected trading venues do exceed the (net) benefits of a more concentrated market. At the same time, while reflecting a market-driven development, the emergence of dispersed trading venues could reflect a form of path dependency that may not be the best overall outcome and that may entail some costs. From the standpoint of a final user, ie consumer, the plethora of trading venues can make for complications, besides choosing which platform to use. That there has at times been a need for policy interventions to ensure price efficiency and transparency, such as the US Securities and Exchange Commission's "best price rule" for securities markets, and equivalent rules for other markets, points to the risk of adverse effects occurring.

Whether the presence of multiple trading systems has potentially adverse consequences for financial stability is unclear. Concentrated securities markets can provide great depth, high certainty of order execution and optimal price transparency. Concentrated markets may thus have benefits for financial stability. For example, in times of financial turmoil, such markets may be able to clear markets more easily and allow for a reallocation of ownership that reduces the risk of fire sales. At the same time, concentrated markets can incentivise monopolistic behaviour, which can mean higher trading costs and less innovation. And, concentration can mean greater operational risks. In contrast, securities markets that are fragmented

across multiple trading venues can be hampered by higher search costs, lower overall liquidity, greater execution uncertainty and less price transparency. Fragmented markets may therefore have more difficulty allocating resources efficiently in times of stress. Equally, fragmented markets can mean more competition for order flow and greater incentives to innovate, which can, besides lowering costs, help in diversifying (operational) risks. A greater diversity in trading platforms may indirectly also reduce the risk of contagion. Overall, there may be a trade-off: less fragmentation comes with more stability in some but not all respects, at the same time it implies less innovation.

Equity market trading shares by venue (2017, formal exchanges in blue)

Figure 1



Note: Dark pools are venues allowing for anonymous trading, including selected ATS. Other includes internal dealer systems. Source: Reproduction of Treasury report Figure 5 (attributed to Rosenblatt Securities, July 2017).

Banking

Post-GFC, the global banking landscape has seen numerous changes (eg Milesi-Ferretti and Tille (2011) and BIS (2017); see Claessens (2017) for a review). Many internationally active banks have withdrawn from cross-border banking and redirected funds back home. The number of foreign banking affiliates, notably subsidiaries, has shrunk, as has their spread. More generally, the growth in cross-border banking has lost pace post-GFC, in tandem with the more local provision of bank financing and the greater focus on local funding structures. Patterns are the clearest in terms of the overall amounts of cross-border bank lending, where the growth rate has sharply fallen since the GFC (BIS (2017), Aldasoro and Ehlers (2019, Box A). This decline, though, does not mean that overall capital flows have decreased, since, for many economies, the fall has been more than offset by an increase in non-bank, notably bond, financing. As far as distribution and concentration are concerned, patterns have changed little since the GFC.⁹

⁹ While not addressing fragmentation per se, Aldasoro and Ehlers (2019) document that cross-border bank credit is dominated by a small number of very sizeable links between banks in one country and borrowers in another. They also report that concentration increased up to the GFC and abated only slightly thereafter.

The question posed here is threefold: what causes these developments, whether one should consider them as forms of increased fragmentation and, if so, whether there are concomitant costs and risks to financial stability. In terms of causes, the developments clearly reflect a mixture of supply and demand factors as well as regulatory and other institutional changes. Cerutti and Claessens (2014) try to disentangle these three factors with reference to both cross-border bank lending and local affiliates' lending. Controlling for credit demand, they show that reductions largely varied in line with supply factors. But they also find evidence that the ability to move resources within banking groups became more restricted after the GFC, as drivers of reductions in direct cross-border loans differ from those for local affiliates' lending, especially in the case of impaired banking systems. Home bias induced by government interventions, however, affected the two flows equally. In addition, Amiti et al (2019) show the large-scale role of supply and demand shocks in driving cross-border banking flows. But they also highlight that these factors vary over the period studied (2000–16), concluding that: "during non-crisis years, bank flows are well-explained by a common global factor and a local demand factor. But during times of crisis, flows are affected by idiosyncratic supply shocks to a borrower country's creditor banks." This could mean that what may be interpreted as a downward shift in cross-border lending due to regulatory factors can well be due to impairments to the state of the creditor banking systems following crises or times of stress.

The potential costs associated with the changes in the cross-border banking landscape include greater direct costs for financial intermediation and related inefficiencies. This may mean deviations in prices for financial services and financing conditions across jurisdictions given that resources do not move as easily to places with the highest contributions. Fragmentation can, for example, mean that it costs more to hold capital and liquidity at subsidiaries. Added to that is the related cost of less diversification. Together, it can imply a higher risk-adjusted cost of funding for banks and thus higher external financing costs for borrowers. However, the main risk to financial stability arises in times of stress. Fragmentation may mean that liquidity and capital are trapped, ie they cannot be moved to alleviate stress in other places. Generally, the more constrained the ability of financial institutions to use capital and liquidity to meet shocks to their solvency and funding across different jurisdictions, the greater the detriment to overall banking system resilience (IMF (2018)).

But there is another side too. Bank business models that appear more segmented can in some specific ways and at certain points in time have benefits for both individual banks and overall financial stability. Research has made clear that, for individual banks and banking systems as a whole, local funding structures are the more stable option. For example, Ongena et al (2016) have found that international, wholesale-funded banks suffered more in the GFC. And Hahm et al (2013) have shown that banking systems that are less funded internationally in the form of short-term claims are less vulnerable to a crisis. Some segmentation in funding markets is thus not necessarily bad for financial stability. Relatedly, there can be benefits to the borrowers in terms of their access to finance, eg it has been shown that deposit-financed banks, which tend to be more locally funded, engage more in relationship-based lending and less in transaction-based lending (Ongena and Smith (2000)). Since relationship-based lending tends to be more stable in times of stress (Bolton et al (2016)), there can be economy-wide benefits from more locally funded structures.

These benefits from (some degree of) fragmentation for overall financial stability are backed up by observers. For example, rating agencies and markets more generally do look favourably at funding structures that are more local and less international or wholesale. This shows up in ratings of bank soundness and country creditworthiness,

eg as reviewed by Hahm et al (2013). Fragmentation may also ultimately signify less risk concentration – inter alia, given limits on acquiring positions in a single asset class. And just as exposure limits can make for more robust financial institutions, so too can fragmentation pave the way for a more resilient financial system. But it is unclear whether these and the other possible benefits of fragmentation, eg those associated with less volatile funding structures, will outweigh costs over an entire financial cycle.

Asset prices

Deviations from the law of one price have been more common since the GFC – for instance, in the form of divergences from the covered interest rate parity (CIP) condition (eg Sushko et al (2016), Du et al (2018)) or in bond markets (eg Horny et al (2018)). Such deviations are not without costs for some financial market participants – costs which are passed on to final users or investors, so are not borne by the financial system alone. But the question is whether such deviations nevertheless have benefits for financial stability.

One benefit might be the aforementioned deviation acting as a price signal that the need for arbitrage to close eg the CIP gap does not come for free, as part of the balance sheet needs to be brought into play to achieve such arbitrage. Indeed, Du et al (2018) find that the shadow cost of banks' balance sheet accounts for about one third of CIP deviations. And (large) balance sheets do come with some risks, even if the underlying assets and liabilities (used for the arbitrage) are (near) risk-free. Liquidity risks may arise, and unwinding large positions in the event of distress can be disruptive to the overall market. To the extent that the CIP price signal or other deviations lead institutions to better allocate the (overall scarce) capital within and across institutions, the overall resilience of the financial system can be enhanced. Little is known, however, about this mechanism, let alone about what the optimal size of the wedge may be.

5. The role of regulation at the global level in affecting fragmentation

While, as noted above, it will be hard to identify, there is likely to be a role for regulation to play in affecting the degree of fragmentation. But that role can work in both directions: regulation can reduce fragmentation or it can increase it, either intendedly or unintendedly. I discuss both outcomes, as in practice each is likely to occur (see also FSB (2019)).

Regulations mostly move the system closer to "first-best"

An aim of many regulations is less fragmentation. At the global level, this is clearly the case with the post-GFC regulatory reforms. In many ways, the lead-up to the GFC exposed many of deficiencies in regulation and supervision in the international financial system (see eg Claessens et al (2010a) for a review). And the periods of stress showed that one of the factors behind financial institutions and markets not operating smoothly was barriers and inconsistencies in rules across countries. Authorities, for example, clearly faced imperfect incentives and incomplete tools

when dealing with global systemically important banks (G-SIBs) (see Claessens et al (2010b) for a review). Many of the G20/FSB-led financial reforms put in place post-crisis aim to make the overall financial system more robust and lower the risks of financial crises and thereby reduce directly and indirectly the associated fragmentary effects (such as the sharp reduction in cross-border capital flows after the GFC). Improvements also aim to reduce the number of barriers and inconsistencies in the regulatory framework. In that context, while allowing for some differences in the design and timing of national implementation of standards given institutional differences, reducing fragmentation is a key, albeit often implicit goal of the reforms.

Statements by the various standard-setting bodies (SSBs) reflect this goal. Here is a sample of keynotes from various reports issued by the SSBs (including the Basel Committee on Banking Supervision (BCBS), the FSB, the Committee on Payments and Market Infrastructures (CPMI) and the G20):

“Establishing and promoting global standards.”

“Reducing differences in regulation and supervision and oversight.”

“Improving cooperation.”

“Levelling the playing field.”

“Addressing regulatory and supervisory gaps.”

As part of this objective, much effort has gone into monitoring and assessing the state of implementation across countries, using as far as possible a common methodology. The FSB’s Annual Report to the G20 Leaders (eg FSB (2018c)) is a key example of such benchmarking. It scores the degree of compliance with key international standards. The BCBS and the CPMI together with the International Organization of Securities Commissions (IOSCO) also issue (annual) assessment reports. The BCBS’s Regulatory Consistency Assessment Programme (RCAP), which relies on peer assessments to review countries’ compliance with global capital adequacy and liquidity requirements, is another approach to achieving greater harmonisation. These releases map the progress being made, but also the road that remains, as reflected in the FSB’s latest assessment.

Tensions between ensuring both domestic financial stability and global resilience are likely to remain even after rules (and enforcement) are fully harmonised. This is essentially captured in Schoenmaker’s (2001) financial trilemma, which shows that objectives can be conflicting and that it is not possible to combine regulatory independence and fiscal sovereignty with globally integrated financial markets.¹⁰ Claessens et al (2010b) use the financial trilemma concept in the context of the resolution of global systemically important financial institutions (G-SIFIs). The reason why the failure of a SIB can be disorderly and have adverse cross-border effects is largely that the availability and governance of fiscal resources are questions of national sovereignty. While resolution procedures are predominantly jurisdiction-specific, progress in harmonising the framework of rules does not guarantee globally integrated financial markets or rule out spillovers in the resolution of G-SIFIs.

¹⁰ As an example, a global bank with subsidiaries in multiple jurisdictions will have to satisfy local capital and liquidity requirements, which may imply “trapped” capital and liquidity. The trilemma concept has also been applied to other areas of international economics, the exchange rate, monetary policy and financial markets (eg Rey (2013); see also Obstfeld (2015)).

Certain rules may also introduce (new) forms of fragmentation. For example, the Volcker rule, and similar such laws and regulations in other jurisdictions (eg Vickers, Liikanen), explicitly aim to separate some of the activities of banks into distinctly structured and capitalised entities or subsidiaries in order to lessen the impact of a SIB failure. This purposely creates fragmentation between financial activities at the domestic level. At the same time, they constraint to movement of funds, and more so in times of stress. Some of these rules can be extraterritorial, giving rise to inconsistencies vis-à-vis other countries' regulations and thereby fragmenting markets at the global level. Furthermore, hiving off some financial activities from commercial banking, or discouraging commercial banks from undertaking them by imposing higher regulatory costs, to reduce risks and protect depositors and some creditor classes, might see risky activities moving to other sectors. While these are clearly intended effects, the measures could nevertheless have unintended, adverse implications for global financial stability on account of the fragmentation they bring about (FSB (2014)).

The trading and central clearing of OTC derivatives have, in some parts of the world, become segmented along geographical lines. Some of this fragmentation stems, again, from the national implementation of global reforms. Such reforms aim to encourage the central clearing and centralised platform trading of standardised OTC derivatives, as well as to enhance margining and reporting requirements. As in other areas, however, the post-GFC reforms have come up against differences in the substance and timing of standards implementation at the national level and had to mitigate the extraterritorial effects of national policies. Another potential source of OTC derivatives markets fragmentation has been the limits on data-sharing across borders. It is essential for market participants to be able to process and analyse large volumes of data. High-quality data also support authorities in their monitoring of risks and market functioning, particularly in relation to global financial stability. Significant differences in jurisdictions' data reporting requirements, however, create obstacles to information-sharing, which not only increase the cost (of compliance) to financial institutions but also render financial stability surveillance more difficult.

Another important aspect, though not always acknowledged in the context of fragmentation, is that markets may not deliver first-best outcomes. Indeed, "too much" fragmentation has at times triggered distinct policy responses. In US securities markets, as noted above, this has taken the form of the "best-price execution rule", which obliges financial intermediaries to always quote the most favourable price across multiple trading systems to their clients.¹¹ Similar obligations exist in the European Union under the Markets in Financial Instruments Directive (MIFID). In retail payment systems, public interventions in many countries have forced systems to standardise, so as to allow for interoperability, and have encouraged integration. The interventions addressed cases of externalities and market failures (eg multiple, incompatible payment system), thereby reducing fragmentation, allowing for greater network effects and lowering costs. There have also been interventions for competition policy reasons, such as when various forms of anti-competitive behaviour were being corrected (through eg caps on interchange fees in the United States or the European Commission's requirement for intra-euro area payments to be priced equally to intra-jurisdiction payments). Again, these interventions have often

¹¹ Note that this does not necessarily reduce fragmentation in terms of the distribution of trading across venues. Indeed, Anderson et al (2015) find that US Regulation Alternative Trading Systems – which required venues to display quotes of their best price to all participants as soon as average daily volumes reached a specific threshold – led to more venues.

brought benefits in terms of reducing fragmentation and increasing market integration.

Finally, in the case of banks, banking systems and sometimes also countries, as previously mentioned, markets, rating agencies and other observers often call for less complexity, which can imply less fragmentation. The valuation discount applied to financial institutions for having a very diversified set of activities (Laeven and Levine (2007)) is one such example at the micro level of market forces pushing for less complexity. At the same time, there clearly is value – besides asking for diversification (eg in assets and liabilities) – in having diversity in financial institution business models, which may imply some trade-offs.

Some regulatory objectives can mean fragmentation

While one of the objectives of regulations, especially those implemented post-GFC, is less fragmentation, it should also be understood that overall the financial stability objective can intentionally justify some forms of fragmentation (or segmentation) – within, but also across, financial markets and jurisdictions. As such, fragmentation can be more than a side effect, namely an intended, justified objective, albeit second best. In addition, cross-jurisdictional differences in regulatory standards and supervisory practices can give rise to market fragmentation that may unintentionally strengthen the resilience of domestic financial systems. Differences in rules may spawn unintended benefits – for instance, as systems are more diverse, the financial system globally may be better able to absorb shocks. More generally, fragmentation, even if an unintended consequence of (a combination of) financial and other rules and reforms, may nevertheless be beneficial. I discuss these possibilities below.

As already stated, market failures can trigger regulatory interventions that unify otherwise fragmented markets. But market failures may also precipitate interventions that explicitly segment markets. The clearest example is macroprudential policies, which are part of the post-GFC regulatory paradigm. Market failures have led to the introduction of (price- or quantity-related) macroprudential policies aimed at strengthening financial systems, reducing risk-taking and the build-up of vulnerabilities, and increasing financial resilience to domestic shocks and spillovers from global markets. But at the same time as these policies apply to particular financial institutions, markets or activities, reflecting the specificities of each, they also seek to create a wedge vis-à-vis other institutions, markets or activities.

A clear example is the surcharge for G-SIBs. This set of banks is purposely treated differently, thus (potentially) creating fragmentation in banking markets. Note that there are many aspects to consider here and fragmentation is not a given. For example, to the extent that these banks obtain pecuniary benefits from their status (eg funding cost advantages), the G-SIB surcharge might merely seek to level the playing field in relation to other financial institutions. But insofar as these or other macroprudential policies seek to correct non-pecuniary externalities – eg the increase in overall systemic risks not reflected in funding advantages – they could lead to justified fragmentation. Indeed, there are many other such examples related to macroprudential policies (see eg Claessens (2015) for a review).¹²

¹² For instance, maximum debt-to-income ratios segment real estate markets, as properties used for commercial purposes are treated differently from those used for consumption. The application of very granular types of macroprudential policies, such as the use of different loan-to-value ratios for cities, or specific types of housing, is another example of purposeful segmentation.

These macroprudential policies can also have cross-border repercussions, including fragmentation on an international scale, if, as is very likely, they are not commonly applied over time across countries – reflecting, *inter alia*, economies' varying degrees of financial development; differences in domestic market structures, customs and policy priorities; or differing economic or financial cycles. This uneven deployment of macroprudential policies can cause spillovers to other jurisdictions (eg leakages in the form of larger inflows or outflows, as these may not be subject to macroprudential policies, as documented by Buch and Goldberg (2017); or even changes in (global) interest rates (eg Jeanne (2014))). This is partly because most macroprudential policies are not subject to formal coordination or reciprocity (only the Basel III countercyclical capital buffer is subject to reciprocity). And even if reciprocated, this disparity of treatment across jurisdictions may, intentionally or unintentionally, lead to fragmentation.

An analogous approach, but one more clearly targeted at generating a cross-border fragmentation impact, is capital flow management (CFM). CFM policies can be motivated (justified) by externalities, in which connection they are not dissimilar from macroprudential policies, albeit more related to the exchange rate and capital flows. The upshot of CFM policies will be that financial markets will be fragmented internationally, but again intentionally so (see eg Engel (2016) for a review). One of the challenges here is to ensure that these policies are implemented justifiably and transparently (IMF (2012), Ostry et al (2012), Claessens (2013)).

Absent other (fundamental) reforms, another potential source of fragmentation is the broad set of reforms and regulations designed to enhance global financial stability, a prime example being resolution. Besides operating homogeneous rules, a globally effective G-SIFI resolution framework would need to include some form of common deposit insurance and a joint public safety net. It is well recognised that, for most sets of jurisdictions, this is not (yet) the case. The resolution framework remains largely country-specific, and a common deposit insurance scheme and safety net are typically not in place. The closest thing there is to an integrated set of resolution policies and dedicated resources is the EU banking union. But even that still lacks a common deposit insurance base and sufficient resolution funds (eg Restoy (2019), Carstens, 2019)). Without such policies in place, the most prudent way forward is to ring-fence (parts of) local operations. Note that the latter need exists not just in terms of capital and liquidity, but may also extend to crucial functions within banking groups, such as treasury operations (see also Freixas (2003) and Claessens et al (2010b)).

While, given the lack of other complementary reforms, resolution is a prominent example of the need for some forms of segregation, it is clearly not the only one. Many derivatives markets are organised along national lines and cannot easily be integrated internationally (for information on the implementation of OTC derivatives reforms, see FSB (2018b); see also FSB (2017b)). For example, central counterparties (CCPs) in more than one jurisdiction can typically be used to clear the same instruments. Segmentation may then arise if local market participants are obliged to clear locally while foreign participants choose to clear transactions among themselves at foreign CCPs. There are various motives for clearing locally, most importantly transaction costs, but other barriers too (Benos et al (2018)). While, as mentioned, progress has been made in many areas, important issues such as harmonised standards for data fields still need to be fully resolved by standard setters. The absence of common rules in all dimensions can signify costs and barriers – for example, when transaction-level reporting is required, but individual transactions are subject to multiple reporting.

Financial stability versus fragmentation: is there a trade-off?

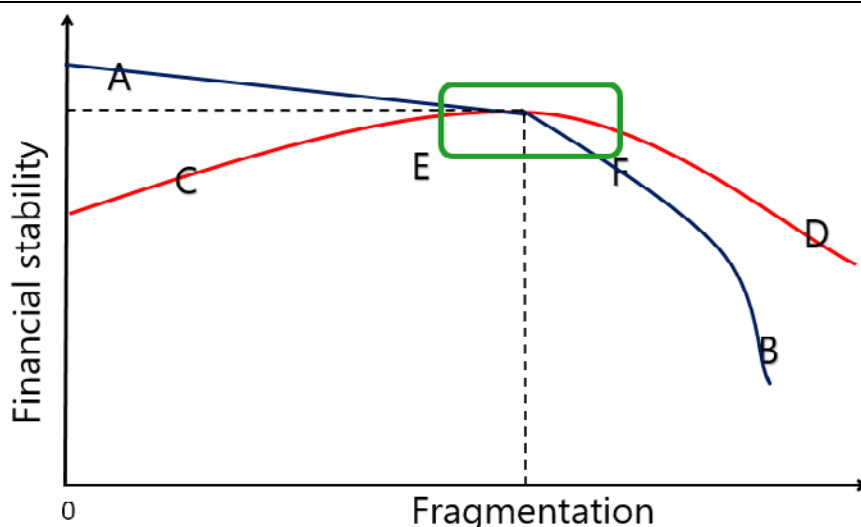
As reviewed, some interventions or regulations – be they general, or specific to jurisdictions, financial institutions, sectors or functions – can justifiably seek to fragment financial markets to enhance financial resilience and stability, or at least in practice end up partly fragmenting them. If regulations can lead to (greater) fragmentation for the benefit of (greater) financial stability, a number of questions arise. Does more fragmentation always lead to fewer risks to financial stability? Or does less fragmentation mean more financial stability? In other words, might there be a trade-off? If so, what is the shape of the “curve”, and where does the optimum lie, ie is there a level of fragmentation that is the right “price to pay” for stability?

Figure 2 depicts this potential trade-off, realising that the real world is much more complex, including by trade-offs possibly varying by financial market, the cause of fragmentation and other circumstances. It shows two possibilities. One curve, A–B (blue line), depicts a situation where there is a uniformly monotonic declining relationship between fragmentation and financial stability. As fragmentation increases, financial stability declines, and at an accelerating rate beyond a certain point of fragmentation. A second curve, C–D (red line), represents a scenario where, given low levels of fragmentation, financial stability increases as fragmentation increases. Beyond a certain point, financial stability declines as fragmentation increases, but not at a very high rate. The A–B curve suggests that as little fragmentation as possible is optimal for financial stability, whereas the C–D curve points to an internal optimal, ie financial stability is the highest at a given level of fragmentation.

While the exact shape of the curve is not known, the discussion above suggests that it is unlikely that no (zero) fragmentation corresponds to the highest degree of financial stability. Indeed, while the debate continues – ever since the GFC, especially – many have come to question the overall welfare benefits of “super-integrated” financial markets. Nor does it appear reasonable to assume that financial stability would deteriorate sharply after a certain level of fragmentation. Thus, the A–B curve seems less likely to prevail in the real world. Rather, it would appear that the C–D curve is likely to be the more relevant of the two.

Financial stability vs fragmentation: a trade-off?

Figure 2



To recognise that there may be a financial stability vs fragmentation trade-off is important in its own right (and this could be extended to include the relationships between efficiency, a third dimension, and fragmentation and financial stability). Framed in this way, however, the question is unlikely to elicit very precise answers as to the shape of the curve. And in any case, current circumstances and policies means that we are likely to be operating in a narrower area, depicted in green in Figure 2, where perhaps more precise answers for specific trade-offs lie. Indeed, some analysis is feasible, with the proviso that answers are likely to vary according to the nature of financial services and circumstances. Below I review three areas that allow relatively greater specificity as to possible trade-offs: securities and capital markets; derivatives markets; and international banking.

The reduced opportunities of fragmentation for cross-market or cross-border diversification in securities markets can be quantified to some degree using standard portfolio models. It is straightforward (see eg Coeurdacier and Rey (2012) for a review of models) to calculate the overall riskiness of the efficient portfolio under different assumptions as to whether markets are fully accessible or not (ie depending on the degree of fragmentation). Resulting limitations on the ability to diversify risks can in turn be assessed as to what they signify in terms of increased financial stability risks.

This may also be feasible in derivatives markets. For example, what are the costs in terms of lost netting and less efficient risk management in the event of specific access constraints that lead to certain forms of fragmentation? And what does this in turn mean in terms of (fewer) risk reduction possibilities? Duffie and Zhu (2011) find that while the central clearing of derivatives can lower counterparty risks, these benefits might shrink if clearing services are fragmented. The authors show that a market in which a single CCP clears both credit derivatives and interest rate swaps gives rise to significantly less counterparty exposure than one where multiple CCPs each clear a single type of derivative. The approach of Duffie and Zhu could be used in other markets, eg for conducting analysis on banking systems, either globally or for specific sets of jurisdictions. The use of such tools, perhaps in combination with stress tests at the banking systems level, could help quantify what any restrictions on intrabank liquidity and capital movements may mean for financial stability.

These types of analysis could indicate whether fragmentation in some types of financial services is more or less costly for financial stability. Analysis could, for example, shed light on whether fragmentation in derivatives markets or sovereign debt markets is especially harmful for financial stability or can actually aid financial stability. For example, stress tests can be carried out as regards to commercial banks' ability to alter their liquidity or capital positions depending on the degree of integration vs. fragmentation in various markets. This would lend support to the presumption that the effects of fragmentation on financial stability are more distinct for wholesale markets and less so in the case of consumer financing. A complementary approach is to take a more aggregate, macroeconomic perspective.¹³

¹³ He (2019), for example, builds a model where a macroprudential policy in the home country induces more external saving. The greater saving requires more borrowing and higher leverage in the rest of the world. This in turn makes the rest of the world more prone to a crisis, with adverse feedback to the home economy. When the more indebted foreign economy deleverages, the home country can end up with lower overall consumption (paradox of precaution). In this framework, fragmentation (induced by a macroprudential policy) can lead to financial instability that can be self-defeating from the perspective of the country that engaged in the prudential policy intervention (the home country

Alongside these more aggregate analyses, work may shed light on how altered incentives to manage risks at the level of individual financial institutions, which may also lead to or be associated with (more) fragmentation, could give rise to aggregate risks. Most obviously, the costs of managing risks at the level of individual financial institutions could be higher than in a fully integrated market. For example, derivatives clearing across borders could be costlier than local clearing because of (institutional) fragmentation, or because netting is less easily available. This can be reflected in various ways, eg higher (required) amounts of initial margins and default fund contributions, or higher capital charges for cross-border trades. This will trigger actions at the level of individual financial institutions in terms of position-taking, with varying, and in some case predictable, effects. Depending on whether local participants in CCPs have highly directional portfolios, for example, these effects can be exacerbated at the aggregate level. Similarly, analysis can be carried out on commercial banks, eg with regard to internal liquidity or capital markets that are less integrated due to restrictions. Here one could weigh up the effects of such constraints in moving funds, which presumably also bind more in times of stress, on funding conditions elsewhere in the group.

These micro effects can then be scaled up across financial institutions and countries to assess how overall financial stability may be affected. This would help clarify – even if fragmentation clearly means less micro risk management benefits – whether financial stability risk will increase and, if so, by how much. Is it indeed the case that a lesser ability to mobilise resources across markets and borders will hinder the orderly resolution of institutions as the liquidity and capital support needed is harder to mobilise? And, given that there are more limits to arbitrage, may fragmentation increase the likelihood of fire sales? Or would the effects be negligible? Then again, constraints might not be highly correlated across financial institutions, meaning that the overall financial stability implications would be minimal. These effects would also have to be assessed in relation to what markets can and will in any case do in period of stress. In practice, there are very strict limits to how far the private sector is willing to deal with liquidity shocks. Ultimately, there is often need for a lender or market-maker of last resort.

Micro analyses can also identify the sources of fragmentation, which can lead to further insights. For example, Aldasoro et al (2018) find that heterogeneous implementation of international regulatory standards (in their case, the Basel III leverage ratio) can have an outsize effect on dollar funding markets, influencing the price of dollar funding and contributing to market fragmentation. Some of the regulatory differences they analyse relate to whether requirements were assessed using end-of-period value or period averages, with the specific rule varying across jurisdictions.

These types of analysis may show that in some cases no costs arise from fragmentation in terms of global financial stability, only benefits. Other cases may attest to limited financial stability costs. Yet others may showcase fragmentation as being far costlier. Some may also show how easy it is for fragmentation to be reduced. For example, the scenario of different reporting period requirements is one which is relative easy to solve in principle, in that both price differences and fragmentation are reduced and the efficiency of financial service provision is likely increased, yet at the same time global financial stability is enhanced.

does not necessarily internalise this possibility; and the effects depend of course on relative country sizes). I would like to thank Gianluca Benigno for providing this example.

Steps going forward

The review above suggests that there are complementarities where actions are able to reduce fragmentation and enhance financial stability. Such actions importantly include greater consistency in the implementation of international standards. But there are also likely to be cases where fragmentation results, with private and social benefits and costs, given regulatory goals related to the enhancement of financial stability globally. How can the set of regulatory complementarities be maximised for the first set of actions and the overall costs be balanced relative to social benefits for the other? These questions are clearly germane to many aspects of regulation, but not easy to answer (see, again, FSB (2017) for an analysis framework). A three-step approach to how fragmentation can be related to financial stability and systemic risks is suggested below.

The first step in the approach is to consider the scope for beneficial complementary or conflicting relations between private and regulatory objectives at the micro level. A starting point might be to determine what individual financial institutions and the market want. While not uniform, financial institutions and the market will have views on what the more and less desirable forms of fragmentation are. For example, some forms of subsidiarisation may be attractive to the industry. Drawing on such views from the markets and the private sector, analysts could compare what the various forms and degrees of fragmentation considered beneficial by the industry may or may not mean for financial stability risks globally. A match would help identify easy wins.

The second, complementary approach is to carefully consider the benefits and costs of fragmentation, static and dynamic alike. Besides market desires, certain forms of fragmentation may be socially less costly than others. Fragmentation in consumer lending or deposit markets may be less costly to the industry (although it could still mean welfare losses for users) than say fragmentation in securities trading, yet it could offer significant financial stability benefits. For some other forms of fragmentation that do entail financial stability benefits, institutions and markets may find it easy to adapt (eg in the presence of various trading venues, competition in order flows may overcome some fragmentation-related barriers more easily than, say, in interbank markets). Of course, some of this may amount to regulatory arbitrage, so that overall financial stability may not be reduced. This step thus needs to assess the fragmentation costs of regulatory interventions relative to benefits.

A final step would be to consider the benefits and costs of further global harmonisation and integration. Some types of market fragmentation might be a by-product of measures to improve domestic resilience. While they reflect domestic policy mandates and responsibilities, and correspondingly viewed to have national benefits, they may result in cross-jurisdictional differences in regulations and supervisory practices that lead to fragmentation. More harmonised rules and greater international cooperation could help mitigate fragmentation and reduce any negative effects on financial stability. At the same time, the global regulatory system is complex as it is, with significant compliance costs and scope for unintended effects and unwanted outcomes. One way to proceed is to explicitly review the unintended costs and risks (eg as in the FSB-led evaluations). Another is to consider more explicitly the costs of compliance. At any event, the two likeliest ways to facilitate improvements at the lowest cost are: greater cross-border communication and information-sharing among authorities, including via existing forums such as supervisory colleges and crisis management groups; and enhancing the capacity of authorities to compare regulatory regimes across jurisdictions.

Conclusions

Market fragmentation can arise for a variety of reasons. Fragmented markets can reflect a range of natural barriers and frictions. These can include investor preferences as to the location of their investment (eg home bias) or transactions (eg for trading at venues with specific price and counterparty transparency). Fragmentation can also reflect differences in the development of financial systems (eg the depth and breadth of capital markets, relative sophistication of banks) and financial cycles (eg their lack of synchronicity). And finally, it can reflect a range of domestic policies (eg taxation and competition).

Besides these factors, market fragmentation can also arise due to (differences in) financial regulation and supervision. It is not just national or regional rules that can generate frictions in financial activities that are international in nature. Fragmentation may also result from differences in the implementation of international principles or standards across jurisdictions or from overlapping or inconsistent implementation of international standards by financial institutions' home and host regulators and supervisors. As a consequence, market participants may choose not to engage in some forms of cross-border activity to avoid the associated duplication of costs and supervisory burdens.

Fragmentation may be bad for financial stability. But fragmentation and financial stability themselves may also be subject to a trade-off. This review makes clear how little we know about the existence of any trade-off and its exact parameters. The paper makes the following proposals by way of a more formal approach to reviewing and, possibly, undertaking policy actions.

The starting point is more thorough analysis. What is the degree and type of fragmentation? What are the causes of fragmentation? What degree of fragmentation is good for financial stability? What is "bad"? What needs to be assessed here is the overall social costs and benefits of fragmentation, and this needs to be done across jurisdictions. The related question is whether the "bad" elements of fragmentation are prone to escalate to the level of systemic risk. Some may, but the rest may not. A joint assessment of the causes and a possible trade-off could supply us with a menu of policy options.

The second step is to select from that menu the options that can reduce fragmentation while also improving financial stability. The aim is to identify improvements along the upward sloping part of the "iso-quant" financial stability-fragmentation curve. All the drivers involved, not just regulation, would need to be assessed. Such a review may well conclude that the answer to many of the outstanding questions is to continue harmonising regulation and implementation, and enhancing information-sharing processes regarding possible policy actions and the like. This is an extensive agenda, including on cooperation, information and data-sharing, but much of it is already under way.

Another, parallel step would be to encourage the private sector to provide (more of) its own solutions to complement public interventions. There are many examples of the private sector already using cooperative models to address fragmentation at the global level. For example, CLS Bank is playing a role in wholesale cross-border payments. Consideration is being given to developing more such private (interbank) settlement systems. Policymakers can only welcome that and other private sector approaches.

A final step is to intervene using the right tools. There are a number of elements to this. One is to choose the most efficient instrument with which to intervene. For example, there can be differences between price- and quantity-related regulations in terms of effectiveness and benefits in the presence of uncertainty (Weitzman (1974)). There is also much to learn from private sector solutions, which can be built on. Another element is to allow for some state contingency in applying the instrument chosen, eg barriers to the allocation of liquidity and capital are clearly more costly in times of stress. Analysing and then addressing these elements will help ensure that the public sector intervenes not just when necessary, but also with the most effective tools.

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