

# ***Impact of loss of mutual market access in financial services across the EU27 and UK***

February 2018

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# 1 Executive summary

## 1.1 Introduction

Much of the attention in the Brexit negotiations between the UK and the other 27 member states of the EU (henceforth ‘EU27’) has, to date, concentrated on outstanding financial liabilities (the ‘exit bill’) and the transition timeline. Discussions on the future trading arrangements are scheduled to develop in 2018. In the longer term, it is these future trading arrangements which will have far greater influence on the prosperity of both the EU27 and the UK.

There have now been many studies examining the impact of Brexit on the UK and on the UK financial services (FS) sector. Our own study for the TheCityUK showed how the UK FS sector is likely to be disproportionately impacted by Brexit, particularly in the case of a loss of access to the EU financial markets<sup>1</sup>. There have also been a number of detailed studies which have examined the potential impact of disruption to individual aspects of cross-border financial markets, including trading, clearing and insurance. Since the EU referendum result in June 2016, financial services firms’ own Brexit planning has advanced, so there is now a better understanding of the strategic and operational decisions required across different future market access scenarios.

In contrast, there has not been a comprehensive study on the impact of different market access arrangements across financial services on the European economy. This study seeks to address this gap, by preparing a pan-EU analysis of the potential impacts of a loss of mutual market access. It highlights the importance of minimising obstacles to the industry’s ability to conduct business across borders, and implications for the wider EU economy, now and in the future.

In this study, we consider the scenario in which the British financial services sector can no longer access the European market except as an average third country, and vice versa. We identified seven distinct channels through which the financial services sector and its linkages with other industry sectors may be affected under such a scenario, both in the UK and in rest of the EU. We then assessed how these effects would have wider economic impacts on the whole EU economy, using our bespoke Computable General Equilibrium (CGE) model.

Within the context of financial services market access arrangements, we assume that market access currently available to developed economies with third country status will still apply after Brexit: for example, delegated authority arrangements will still be permitted for asset managers across UK and EU27.

This study has important exclusions. We do not assess other Brexit-related impacts on the financial services sector, or the wider economy. For example, we do not assess impacts of restrictions to migration, fiscal transfers and any regulation changes. These are likely to provide further disruptions to the EU and UK economies in both the short and long term. Similarly, we do not incorporate any new trading and access arrangements which the UK and the EU may agree with other countries. In this respect the study has a relatively narrow remit: that of market access in the FS sector, but is broad in scope covering the whole EU economy.

## 1.2 Impacts of a loss of mutual market access

In Section 2 we set out some of the cross-border linkages across the EU financial services system, including cross-border lending and concentration of capital markets activity in London. We show that cross-border relationships are highly valuable and any disruption to these relationships is likely to reduce access and increase cost for financial services users.

<sup>1</sup> PwC (2016), “Leaving the EU: Implications for the UK financial services sector”. Available at: <https://www.pwc.co.uk/industries/financial-services/insights/leaving-the-EU-implications-for-the-UK-financial-services-sector.html>

In Section 3 we introduce our economic modelling approach. We define seven potential impact channels. These are described in Table 1.1 below:

Table 1.1 Impacts of a loss of mutual market access

<b>Channel</b>	<b>Impact</b>	<b>Description of impact</b>
<b>Activity relocation</b>	Impact of economic activity being relocated to the rest of EU	A portion of UK FS sector's revenue is derived from serving EU-based clients. Should mutual market access be lost, we expect there to be a net movement of financial services activity from the UK to the rest of the EU.
<b>Labour productivity</b>	Impact of fragmentation on productivity	The relocation of FS activity in order to retain EU client activity will result in the fragmentation of the industry's labour market, with implications for FS labour productivity EU-wide.
<b>Efficiency</b>	Capital costs from subsidisation	Banks are likely to be required higher levels of capital and liquidity where required to subsidise branch operations in the UK or in the EU following Brexit. Insurers are likely to require more capital where required to subsidise due to the loss of diversification benefits and the need to localise assets under the new structure.
	Higher corporate costs	If financial services firms need to relocate EU businesses, the separation of EU- and non-EU related businesses could result in a duplication of corporate costs, leading to a loss of operational synergies and fragmentation of governance structures, and in some cases requiring a radical change to operating models.
	Higher collateral requirements	The separation of euro-clearing activities could result in the fragmentation of central counter party (CCP) clearing activity in Europe. The loss of multilateral netting benefits will result in increased collateral costs for market participants.
<b>Shrinkage</b>	Reduction in financial services activity	The cost of transition may not be worth the benefit of retaining cross-border activity. Therefore, financial services firms with limited EU27-UK cross border exposure may withdraw their cross-border client business.
<b>Liquidity</b>	Market liquidity/capacity effect from shrinkage	Shrinkage in wholesale and investment banking capacity could also lead to a reduction in market making activity, which would have an adverse impact on the depth of market liquidity (and therefore the ability for financial services users to trade and the cost of finance). Fragmentation of insurance markets also restricts access to deep pools of insurance capacity.

Source: PwC analysis

The loss of market access will require FS firms to relocate those activities necessary to retain the ability to maintain existing client services (e.g. client facing activities and local risk management functions). Relocation will lead to fragmentation and the loss of agglomeration benefits as firms relocate to multiple competing hubs across Europe. This results in a reduction in labour productivity across Europe.

Relocation also leads to higher one-off costs (e.g. restructuring, immigration costs) and ongoing costs for FS firms operating in Europe, reducing the efficiency of the FS sector as a whole. Examples of introduced inefficiencies include higher capital costs for more highly capitalised subsidiaries across pan-EU and UK banking and insurance groups with the added potential of trapped capital. There are also higher corporate costs

from duplicated functions across different UK and EU27 legal entities. Lastly, the fragmentation of clearing activity would significantly reduce efficiency and increase system-wide cost.

Alternatively, rather than relocate, another possible response from firms is to scale down their activities in either the UK or Europe, especially for institutions with commercially marginal activities in one or both of the two markets. Such shrinkage would be a direct loss of economic activity (and has associated multiplier effects), but would also lead to a reduction in market making capacity, with a consequential impact on market liquidity and the cost of finance.

We consider these seven channels cover the main impacts on the EU economy from a loss of mutual market access. There, of course, may be other impact channels and other amplification and mitigation effects.

The precise impact of each of these channels is highly uncertain. For this reason, we have been transparent in our assumptions used to quantify the potential economic impact and impact across the seven channels. This is intended to allow users of this report to form their own conclusions on the overall impact of a loss of mutual market access.

### *1.3 Economic impact of a loss of mutual market access*

Our analysis suggests that disruptions to the level of market access in financial services are economically costly. Indeed we project no ‘winners’. Figure 1.1 sets out the estimated economic gross value impact across different regions of the EU, split into the seven impact channels we have modelled. These figures are in comparison to a continuation of existing market access arrangements (specifically one that mimics the current European Economic Area (EEA) arrangements, as applicable to financial services).

The UK is most negatively impacted, with a Gross Value Added (GVA<sup>2</sup>) impact of -1.3% (or €27.2bn in 2016 values) per annum impact by 2030. This is because all the impacts we have analysed are negative. UK experiences a direct loss of financial services activity and also loses from the wider fragmentation of EU financial markets.

The economic impact for the EU27 incorporates both gains and losses. While Frankfurt has emerged as the likely recipient of the largest amount of relocated activity (particularly from US and Japanese banks), a number of other cities have also been selected, including Paris, Berlin, Amsterdam, Brussels and Madrid. Furthermore, FS-focussed states have also attracted specific operations with Dublin and Luxembourg appearing attractive to UK based banks and asset managers respectively. In the insurance market, Lloyds of London has announced its intention to create its new European subsidiary in Brussels, while insurers have chosen similar bases to banks, with Dublin and Luxembourg gaining a number of relocation moves. This relocated activity provides GVA, employment and wider supply chain benefits to recipients.

However, these gains from relocated activity are out weighted by the impact of fragmentation and loss of efficiency which increases the costs of finance throughout the whole economy. For the EU27, the annual GVA impact is -0.3% (or €33.0bn in 2016 values) by 2030.

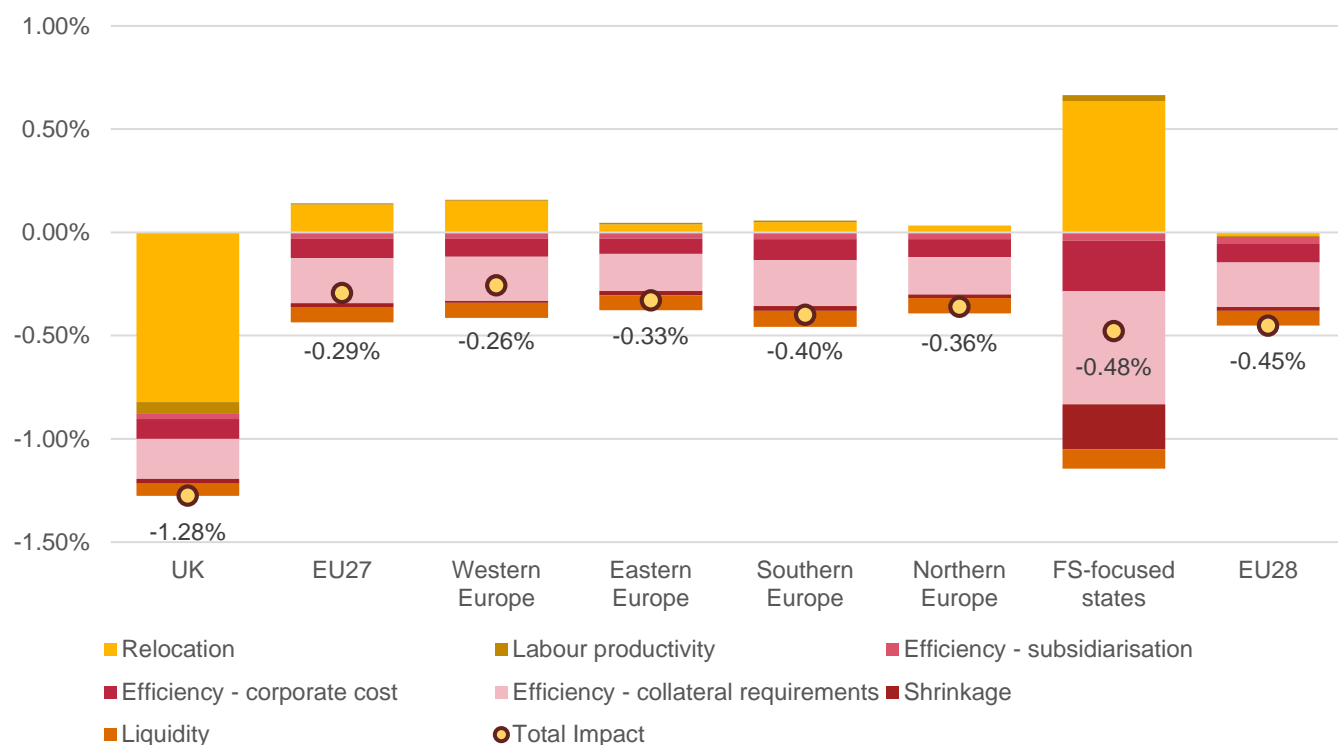
FS focussed states have possibly the most to gain by gaining a greater share of relocated FS activities from the UK, but they are also more negatively impacted from the fragmentation of EU financial markets, so for them the overall impact is still negative.

In overall terms, for the existing EU28, our central estimate is that there would be a negative economic impact of -0.45% of total GVA (or €60.2bn in 2016 values).

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<sup>2</sup> Gross Value Added measures the total value added of all producers in an economy. The difference between GDP and GVA is the net tax (i.e. gross tax less subsidies) on products, such as the Value Added Tax (VAT).

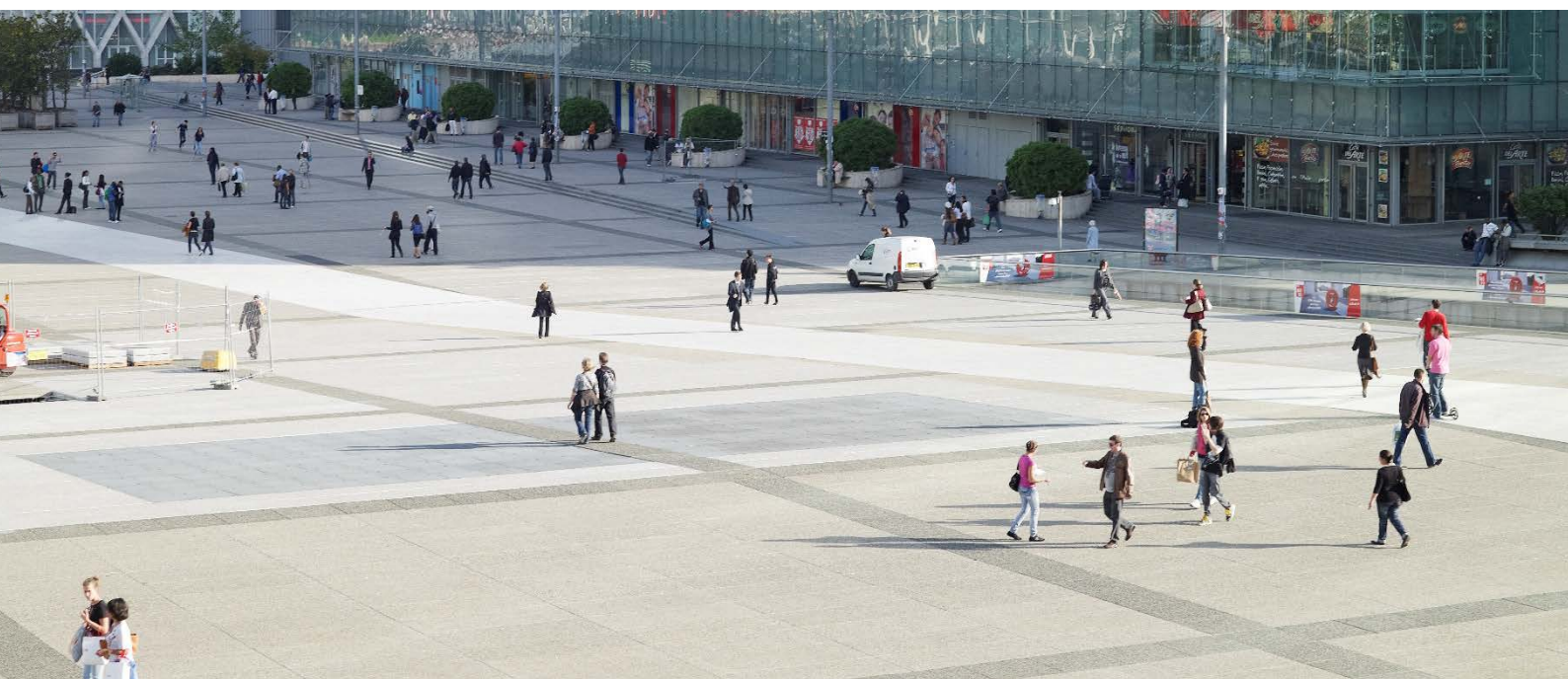
Figure 1.1 Percentage difference of GVA in 2030 in the Loss of Mutual Market Access scenario



Source: PwC analysis

Note: These are central estimates. As is the nature of impact assessment, there is considerable degree of uncertainty in the estimates, and the numbers should be interpreted as an indication of direction of travel.

We conclude that if the financial services in the UK and in the EU27 were to lose mutual market access, there will be a detrimental economic impact on both sides. While the UK would be hit by a net flow of relocation away from its jurisdiction, the EU27 will also suffer from a negative impact due to the loss of financial market integration benefits. Our analysis points to a clear economic rationale for an agreement on mutual market access between the financial services industries of the UK and EU27 after the point of Brexit.





## ***2 Importance of the financial services ecosystem in the EU***

### ***2.1 Introduction***

As an EU member, the UK has benefitted from the creation of the Single Market, where goods and services can be traded freely across borders within the EU. The Single Market is underpinned by the four freedoms, specifically the freedom of movement of goods, services, capital and labour.

The passporting regime in particular was a major enabler in creating a single market in financial services; it enabled banks and investment companies authorised in a Member State to provide services to clients in other Member States by exercising the right of establishment via a branch or to provide services across borders without further authorisation requirements.

Passporting rights cover banking services such as deposit-taking and lending, insurance (life, non-life), reinsurance, investment services, the management and offering of UCITS, alternative investment funds, payment services and electronic money.<sup>3</sup> These passporting rights are set out in eight single market directives and additional regulations:<sup>4</sup>

- Capital Requirements Directive (CRD IV) (2013/36/EU)
- Solvency II Directive (2009/138/EC)
- Insurance Mediation Directive (2002/92/EC), being repealed and replaced by:
- Insurance Distribution Directive (2016/97/EC)
- Markets in Financial Instruments Directive (MiFID II) (2014/65/EC)
- Undertaking Collective Investment Scheme (UCITS) Directive (85/611/EEC)
- Payment Services Directive (PSD) (2007/64/EC)
- Second Electronic Money Directive (2009/110/EC)
- Alternative Investment Fund Managers Directive (AIFMD) (2011/61/EU)
- European Market Infrastructure Regulation (EMIR) (2012/648/EC)
- Central Securities Depositories – Regulation

These rights are supported by the system of mutual recognition of each Member States' prudential standards, as well as efforts to harmonise regulatory requirements across Member States to provide a level playing field for all financial services providers.

Both UK and EU firms, including banks, insurers and asset managers have benefitted from the passporting regime. More than 8,000 EU firms hold at least one passport that enables them to provide services to UK clients (as well as in other Member States), and vice versa, around 5,500 UK-authorized firms have been issued with passports by the PRA and FCA to provide services abroad in other EU Member States.<sup>5</sup> Exports of financial services from one EU country to another (intra-EU exports) reached €96.6bn by 2014.<sup>6</sup> The scale of financial services trade between the UK and the EU also bears this out: the UK exports nearly €31 billion in financial services to the rest of the EU, while receiving almost €5 billion in imports of financial services.<sup>7</sup>

As well as permitting access to customers, access regimes also extend to market infrastructure, clearing and reinsurance. For example, a third country would not automatically be equivalent and therefore a firm in a third country would not have access to cross border reinsurance capacity, limiting its own ability to insure customers' risks.

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<sup>3</sup> See TheCityUK (2014).

<sup>4</sup> Source: PRA – passporting, <http://www.bankofengland.co.uk/pr/Pages/authorisations/passporting/default.aspx>

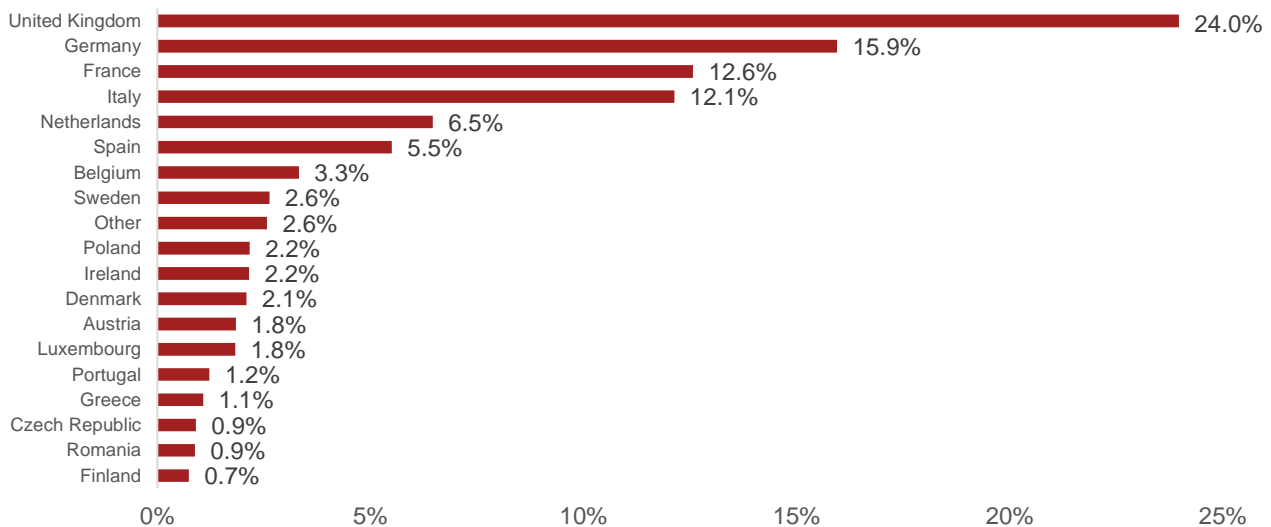
<sup>5</sup> Letter from Andrew Bailey (FCA) to Andrew Tyrie (Treasury Select Committee) on passports, 17 Aug 2016.

<sup>6</sup> Eurostat.

<sup>7</sup> Eurostat.

Importantly for the EU, the UK plays a major role in facilitating access to capital markets for EU corporates and households. The UK hosts the largest financial services sector in the EU, accounting for nearly a quarter of the Gross Value Added (GVA) produced by the EU FS sector (see Figure 2.1).

Figure 2.1: FS GVA as a percentage of overall EU FS GVA, 2015



Source: Eurostat

Much of this UK activity is driven by the UK presence of financial services firms headquartered in other EU Member States and non-EU countries. This concentration in the UK is due in large part to the passporting and mutual recognition regime, which has enabled firms to conduct their EU operations via a single hub location such as London, while being able to access market infrastructure located in other Member States remotely, including trading, clearing and settlement services.

In the following section, we set out in more detail the scale of cross-border financial services activity that takes place between the UK and the rest of the EU.

## 2.2 Household and business lending

The UK FS sector is highly internationalised, with total foreign banking assets accounting for more than a third of total banking assets in the UK, compared to 10% on average across the EU. Banks based in the UK play an important role in lending to households and businesses in the EU, and vice versa. Data from the Bank of International Settlements (BIS) suggests that the outstanding stock of loans issued by UK-based banks (including EU and non-EU owned banks) to EU residents amounted to £1.62 trillion at the end of 2016 Q3. Similarly, lending from EU-based banks to UK residents amounted to £1.63 trillion.<sup>8</sup>

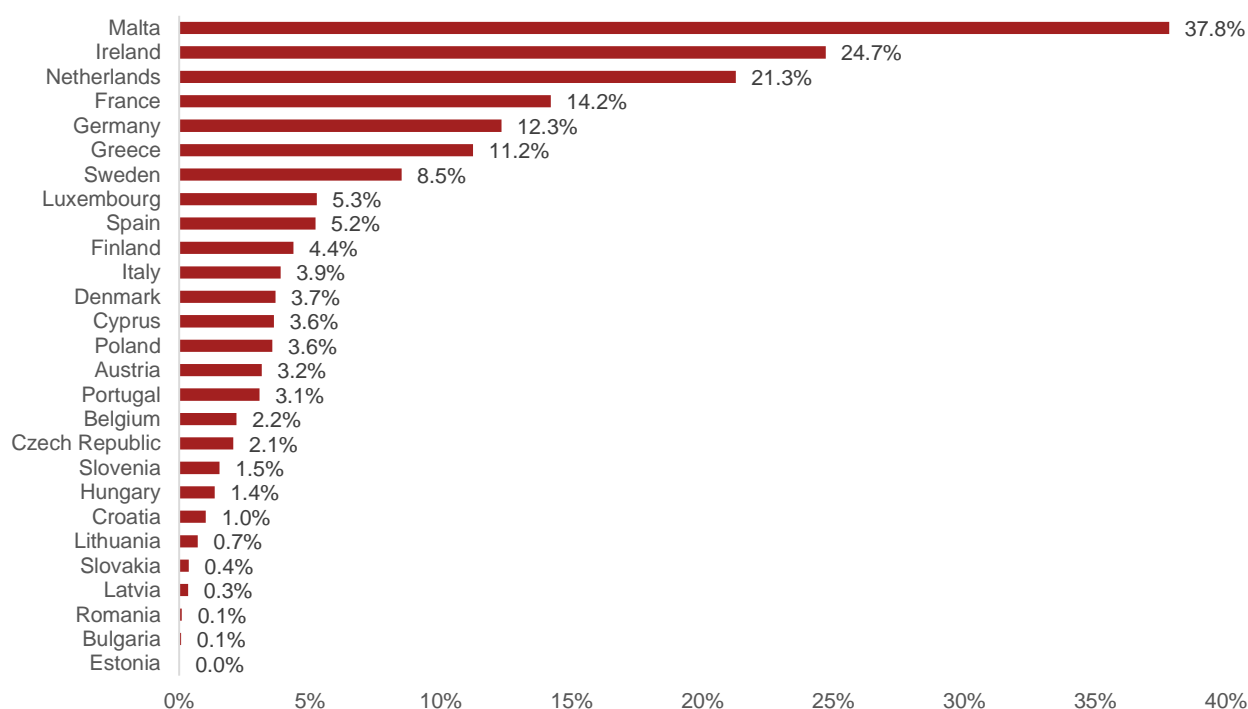
UK-headquartered banks, via their presence in the UK, and branches and subsidiaries abroad, are also responsible for significant volumes of lending in Europe, accounting for 9% of all foreign lending to EU residents. For some countries this share is in excess of 10% (see Figure 2.2).<sup>9</sup>

Conversely, the UK is an important market for credit for EU-headquartered banks. EU-headquartered banks account for more than half of total foreign lending flowing into the UK. The scale of cross-border lending that takes place clearly demonstrates the importance of financial linkages between the UK and the EU.

<sup>8</sup> BIS locational banking statistics.

<sup>9</sup> BIS consolidated banking statistics.



*Figure 2.2: Lending by UK-based banks as a share of total foreign lending, 2016 Q3*

Source: BIS consolidated banking statistics

## 2.3 Capital markets activity and market infrastructure

Although there are various financial centres around Europe that host sizeable capital markets activity, the depth and breadth of London's capital markets plays a unique role in Europe's financial markets, serving as an important gateway for EU corporates who wish to raise capital from both European and global investors. Its markets and participants operate a wide range of trading and clearing activities for currencies, equities, bonds and derivatives (see Figure 2.3).

*Figure 2.3: Interdependence of UK and EU capital markets activity*

Sources: PwC analysis based on data from BIS, Bruegel, European Banking Authority, S&P Capital IQ, World Federation of Exchanges, European Central Bank

UK-based banks also play a critical role in facilitating access to global capital markets for EU corporates: our analysis suggests that UK-based banks have facilitated around €400 billion worth of debt and equity issuance activity on behalf of EU corporates, or around two-thirds of total issuance, between 2011 and 2016.<sup>10</sup>

The UK has also benefitted from its hub status, attracting EU and non-EU banks alike to establish their European capital markets trading activities in the UK. UK-based firms account for three-quarters of MiFID passports issued in the EU, which enable them to carry out investment services in other EU Member States. Our analysis of banks' country-by-country reporting shows that around two-fifths of EU capital markets-related revenues are generated in the UK.<sup>11</sup> Analysis by Bruegel shows that major US investment banks use London as a base for their "hub-and-spoke" model for their European capital markets activity, generating more than 80% of their revenues from the UK.<sup>12</sup>

Banks' capital market activities are also supported by a complex ecosystem of market infrastructure providers, such as clearing and brokerage, as well as research and advisory services. The development of the Single Market has enabled these providers to cluster in hubs and to service clients across the EU from a single location, thereby deepening liquidity pools and reducing transaction costs for market participants. Market infrastructure providers in the UK therefore play a key role in providing clearing and settlement services for European capital markets participants. For example, the UK accounts for more than three-quarters of euro-denominated interest rate derivatives clearing activity in Europe<sup>13</sup>, and more than a third of UK-based SwapClear's derivative volumes cleared is euro-denominated.<sup>14</sup> LCH is also responsible for clearing around €6 trillion in euro-denominated government bond trades a month.<sup>15</sup>

## 2.4 Insurance

The insurance sector in Europe is highly international. Data from EIOPA and Schoenmaker and Sass (2014) suggest that EU insurance providers account for one-third, or €84 billion, of gross written premiums originating in the UK. UK-based insurers, on the other hand, were responsible for €31 billion in gross written premiums originating from the rest of the EU, generated on a cross-border basis or via their branches abroad. UK-based insurers are also responsible for managing around €2.3 trillion in assets, or around a quarter of all assets managed by insurance corporations in the EU.<sup>16</sup>

The Bank of England has estimated that six million UK policyholders, and 30 million European Economic Area (EEA) policyholders would be impacted by a loss of continuity of existing cross-border insurance contracts.<sup>17</sup>

The London market, which specialises in insuring against commercial and specialty risk, has brought together capital and expertise to London's unparalleled insurance market place, linking brokers, intermediaries, insurance buyers and underwriters. It is a highly international business, generating £8 billion in gross premiums from European clients.<sup>18</sup>

Both UK and EU insurers have benefitted from the market expansion enabled by the passporting regime for insurers. A study by the ABI shows that there are more than 700 EU-authorised insurers and reinsurers who have passported into the UK, by providing insurance services cross-border, or through EU branches, to 540 UK firms who have passported out into other EU Member States.

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<sup>10</sup> Based on S&P Capital IQ data.

<sup>11</sup> Based on a sample of 10 global banks including US, EU and Swiss-headquartered banks. Data on bank revenues sourced from banks' individual country-by-country reports.

<sup>12</sup> Bruegel (2016) "The United States dominates global investment banking: Does it matter for Europe?"

<sup>13</sup> BIS.

<sup>14</sup> New Financial (2016) "Beyond Brexit: What next for European capital markets?"

<sup>15</sup> LCH repoclear volumes and Bruegel (2016) "Lost passports: a guide to the Brexit fallout for the City of London".

<sup>16</sup> ECB Structural Financial Indicators.

<sup>17</sup> Bank of England (2017), "Financial Stability Review", 2017

<sup>18</sup> Source: LMG (2017), "Proposals for a better trading relationship between EU and UK".

## 2.5 Asset and wealth management

The UK has the largest asset management industry in Europe, providing critical services to insurance companies, pensions funds, governments and individuals to enable capital flows from investors to high-potential businesses looking to grow and expand.

The Investment Association's 2017 Asset Management survey<sup>19</sup> clearly shows the economic value of the industry to the UK economy with 93,500 people employed in activities related to asset management, 37,700 of which are directly employed by asset management firms. As the second biggest asset management centre worldwide, after the US, the UK's assets under management total £6.9 trillion, £2.6 trillion of this is managed in the UK on behalf of overseas investors, £1.4 trillion of which is for non-UK European clients. We forecast global assets under management will almost double by 2025 from US\$84.9 trillion in 2016 in our report 'Asset & Wealth Management Revolution: Embracing Exponential Change'<sup>20</sup> and the UK would significantly benefit from securing mandates to manage this capital in the coming years after Brexit.

The passporting regime has enabled EU-authorised asset managers to conduct regulated activities in other Member States. There are 244 UK asset management firms that have an "outbound" passport, and 139 firms with "inbound" passports (which enable these firms to provide services to UK clients).<sup>21</sup>

Many asset managers tend to operate on a cross-border basis, i.e. providing services to clients abroad without establishing a branch or presence in the country in which their clients are based. The asset management industry in the UK is also highly integrated with the EU: More than £1.2 trillion, or 40%, of assets under management in Europe are managed by UK asset managers.<sup>22</sup> Being part of the Single Market has also enabled firms to set up funds in a variety of forms and under various regulatory structures, for example under the UCITS Directive or AIFMD. It has also enabled firms to establish management presence in the UK while domiciling their funds in other EU countries. Therefore the vast majority of these funds have EU-based fund ranges that are domiciled in Dublin and Luxembourg, who delegate investment management back to the UK.

The UK therefore hosts a vibrant asset and wealth management industry that has benefitted significantly from access to the Single Market as well as the depth of financial expertise on offer. It is also home to the largest institutional investors in Europe, which are an important source of capital for businesses: UK-based firms manage more than half of all pension fund assets in Europe.<sup>23</sup> Private equity (PE) and venture capital (VC) firms also play an important role in intermediating capital. The passporting regime has enabled PE and VCs to raise funds and market to investors across the EU. Data from Preqin suggests that 25% of the value of private equity and venture capital deals in the EU were executed by UK-based firms.<sup>24</sup> A study by the Alternative Investment Management Association suggests that 85% of hedge fund assets in Europe are managed in the UK.

However, in early February, the EU Commission issued a notice<sup>25</sup> to UK asset managers and wider industry stakeholders that stated unless a ratified transition arrangement is put in place by 30 March 2019, then UK UCITS management companies and AIFMs will lose their passporting rights and become treated as 'third country' AIFMs, and UK UCITS and AIFs will become non-EU AIFs that can only be marketed to EU investors through national private placement regimes.

This loss or temporary suspension of regulatory equivalence for the UK is of primary concern to many asset managers and could lead to the loss of ability of UK entities to provide both portfolio management activities and management company functions to EU UCITS funds and AIFs.

Portfolio management is central to the UK's industry role. It is an established centre of talent and at present, as is made clear by the EU Commission, unlike its counterparts in the US, Hong Kong, Singapore and Switzerland

<sup>19</sup> The Investment Association (2017) "Asset Management in the UK 2016-2017"

<sup>20</sup> PwC (2017) "Asset & Wealth Management Revolution: Embracing Exponential Change"

<sup>21</sup> Europe Economics (2016) "FCA's Market Study and Brexit: Next Challenges for the UK Asset Management Industry".

<sup>22</sup> Investment Association (2016) "Asset management in the UK 2015-2016: The Investment Association Annual Survey".

<sup>23</sup> ECB Structural Financial Indicators.

<sup>24</sup> New Financial (2016) "The potential impact of Brexit on European capital markets"

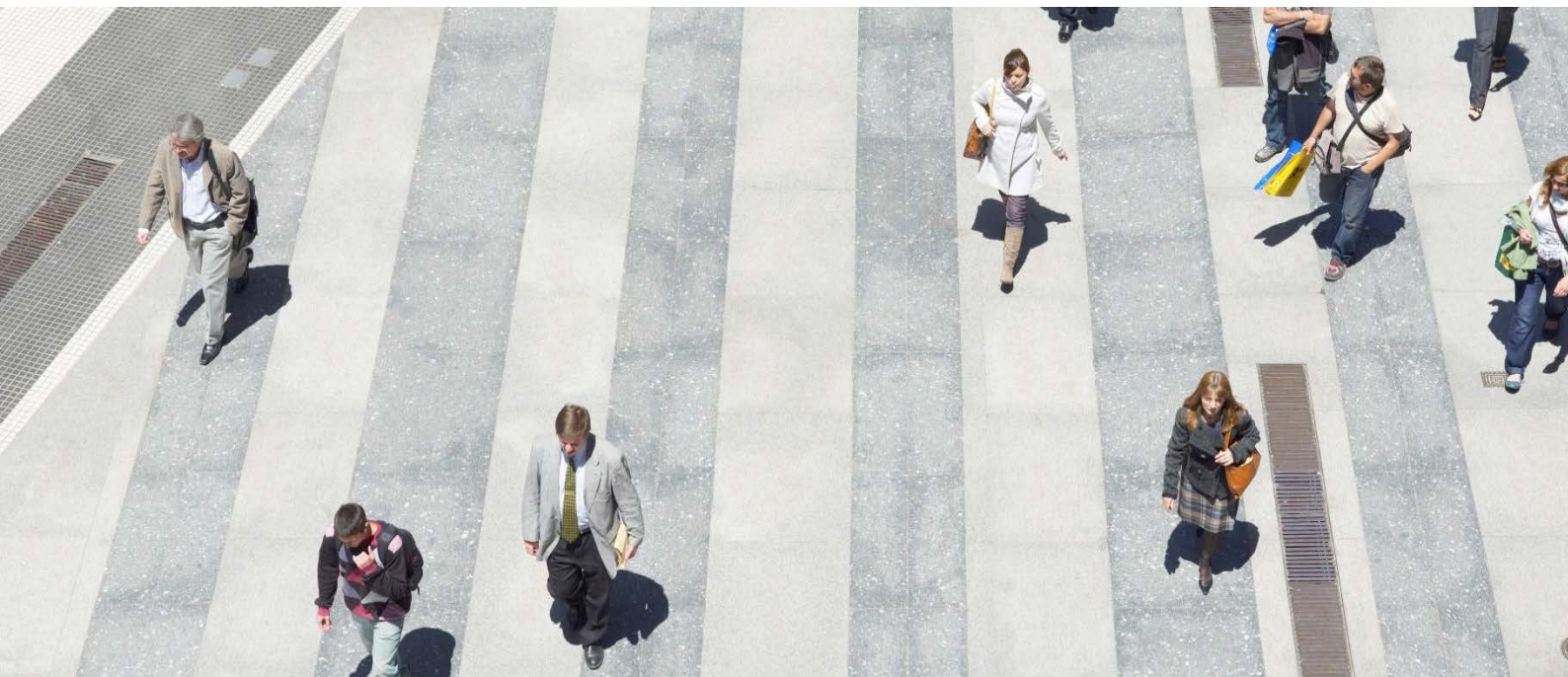
<sup>25</sup> European Commission (8 Feb 2018), "Notice to Stakeholders: Withdrawal of The United Kingdom and EU Rules in the Field of Asset Management"



does not have a signed regulatory cooperative agreement with the EU to be able to continue to provide this function. The loss of that portfolio management activity would result in a significant drop in UK asset management activity as the £1.2 trillion of EU capital managed here would need to be managed in the EU27 or one of the other financial centres with a regulatory agreement. Whilst we understand that such agreements are being prepared, it remains a high priority concern for the industry as they could be at risk in the event of a "hard Brexit" scenario. This disruptive factor may only be temporary, it could be sufficient for firms to move this high value activity to the EU27 or another third country that already has a cooperative agreement in place.

Similarly, whilst management company functions are lower in the value chain, UCITS funds are required to have a management company established in an EU Member State and at present, there is no provision to delegate those functions outside of the EU27. Therefore, unless mutual recognition agreements are put in place, UK asset management firms will need to create new EU based entities, or increase the regulatory permissions and substance of their existing entities to manage their EU funds, potentially causing a further reduction in workforce requirements in the UK.

Despite the downside risks, sentiment in the asset management and wider financial services industry remains broadly positive. This is confirmed by our joint report with TheCityUK; 'A vision for a transformed, world-leading industry: UK-based financial and related professional services<sup>26</sup>'. Interviews with industry leaders that formed the basis for the report demonstrate a readiness to transform in order to develop new markets and remain Europe's global financial centre with a full ecosystem of financial and related professional services. This is predicated on the basis that strong trade and investment links will need to be strengthened and sustained with developed, emerging and niche markets.



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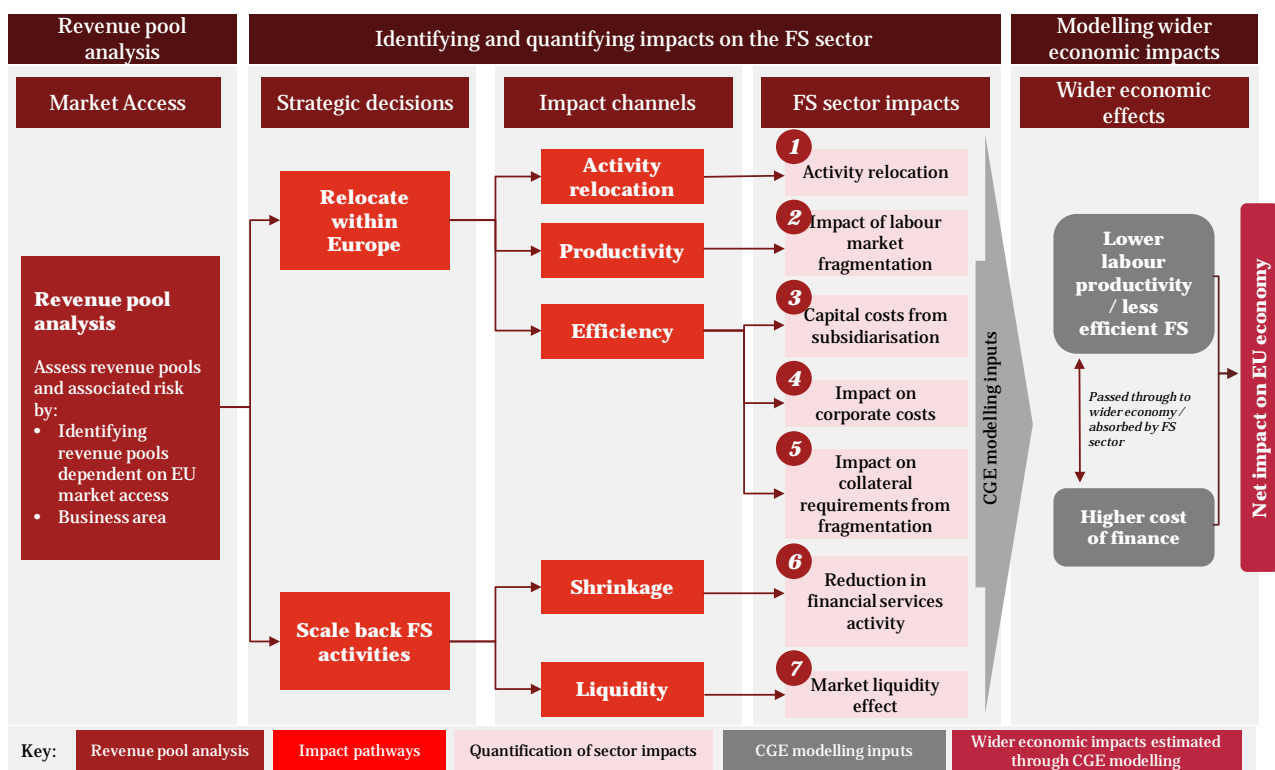
<sup>26</sup> TheCityUK, in association with PwC's Strategy& (2017) "A vision for a transformed, world-leading industry: UK-based financial and related professional services"

### 3 Analysis of economic impacts

Our analytical approach to quantifying the net impact of a loss of mutual market access on the European FS sector is summarised in Figure 3.1 and below:

- Step 1: Revenue pool analysis.** In the first stage of our analysis, we estimated the level of UK FS activity that is EU-related, and therefore the revenues for different FS activities that could be at risk. This was based on Oliver Wyman's (2016) work on Brexit for TheCityUK<sup>27</sup>.
- Step 2: Identification of impact channels.** We identified five core channels of impact (direct effect of relocation, labour productivity, efficiency, shrinkage, and liquidity) as a result of relocation and lower activity level in the FS sector after Brexit. These channels are captured via seven specific impacts, which include broader consequences of FS sector shrinkage and relocation of activity following Brexit. These changes ultimately have an impact on FS consumers, either via an increase in the cost, or reduction in the availability of financial services.
- Step 3: Modelling the wider economic impacts using a computable general equilibrium (CGE) model.** Finally, we developed an EU-wide CGE model to allow us to estimate the net impact on the FS sector and the wider EU economy. We modelled the impact on the FS sector by changing various policy or macroeconomic levers that are available in the model to simulate the economic impacts of a UK exit from the EU. The inputs to our model were informed by our review of the existing evidence and our analysis for each impact channel, conducted as part of step 2.

Figure 3.1: Our analytical approach



Source: PwC

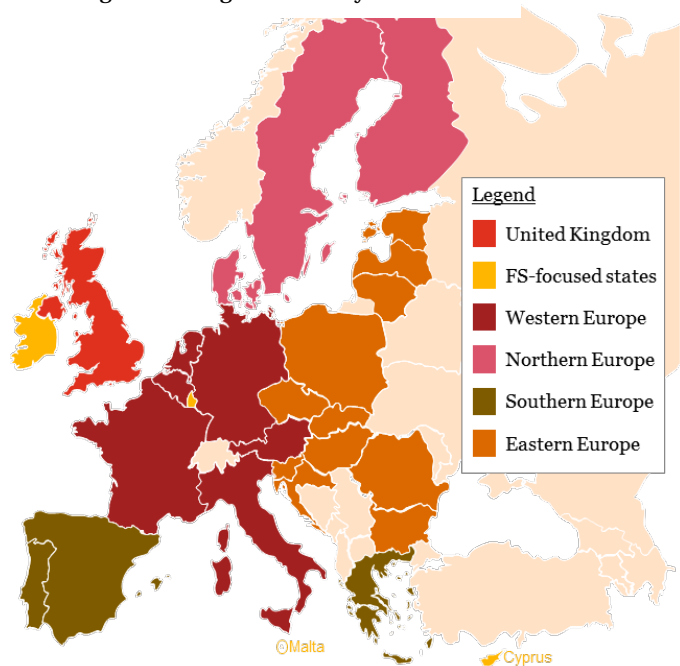
<sup>27</sup> Oliver Wyman, 'The Impact of the UK's Exit from the EU on the UK-based Financial Services Sector', 2016

The scope of our analysis is set out as follows:

- **Scope of services:** We primarily focus on quantifying the economic impacts as a result of loss of market access across the financial services sector. Most of the impact channels we consider, e.g. shrinkage and labour productivity effects, apply to the whole FS sector, but some are more narrow in scope (e.g. clearing activities). We do not consider the economic impact of Brexit via non-FS channels (e.g. potential customs cost on future UK-EU trade in goods, or reduced migration). Wider political, social and cultural effects are also outside of the scope of this study.
- **Mutual Loss of Market Access:** In this study, we consider the impact of a scenario where UK and EU financial institutions can no longer access each others' markets, i.e. no passporting or equivalence. We assume that market access currently available to developed economies with third country status and that international rules will still apply after Brexit, so, for example, delegated authority arrangements will still be permitted for asset managers across UK and EU27.<sup>28</sup>
- **Construction of impact:** We then compare the economic performance in this scenario to one in which the UK and the EU reach a long term agreement to maintain mutual market access in the financial services sector in a way that mimics the current European Economic Area (EEA) arrangement.
- **Time frame of analysis:** Our primary focus is on the long-term effects on the FS sector and the EU economy more generally. In particular, we present our estimated impact on the economy in 2030.
- **Regions of analysis:** In order to understand the differential impacts of Brexit on different regions within the EU, we have developed a regional CGE model formed of seven regions, as illustrated in Figure 3.2. This enables us to assess not only the net impact on the EU as a whole, but to understand which regions are impacted more than others, and by how much. Our modelling regions are:

- **The United Kingdom**
- **FS-focused states**<sup>29</sup>: Cyprus, Ireland, Luxembourg and Malta
- **Western Europe:** Austria, Belgium, France, Germany, Italy and the Netherlands
- **Northern Europe:** Denmark, Finland and Sweden
- **Southern Europe:** Greece, Portugal and Spain
- **Eastern Europe:** All post-2004 member states of the EU unless listed above
- **Rest of the world**

Figure 3.2 Regions of analysis



Source: PwC

<sup>28</sup> While we assume delegated authority arrangements for the asset management remain after Brexit, this is still a key area of concern for the asset management industry, particularly following ESMA's opinion briefing of July 2017. There are also practical challenges which require agreement, such as direct intervention and inspection rights of the supervisor of the delegating country.

<sup>29</sup> For the purpose of this study, we defined 'FS focused states' as the smaller economies which have a high level of FS activities compared to their economy, and/or are expected to benefit most *proportionally* from the relocation of activities away from the UK. This avoids the impact on these states being subsumed with much larger economies.



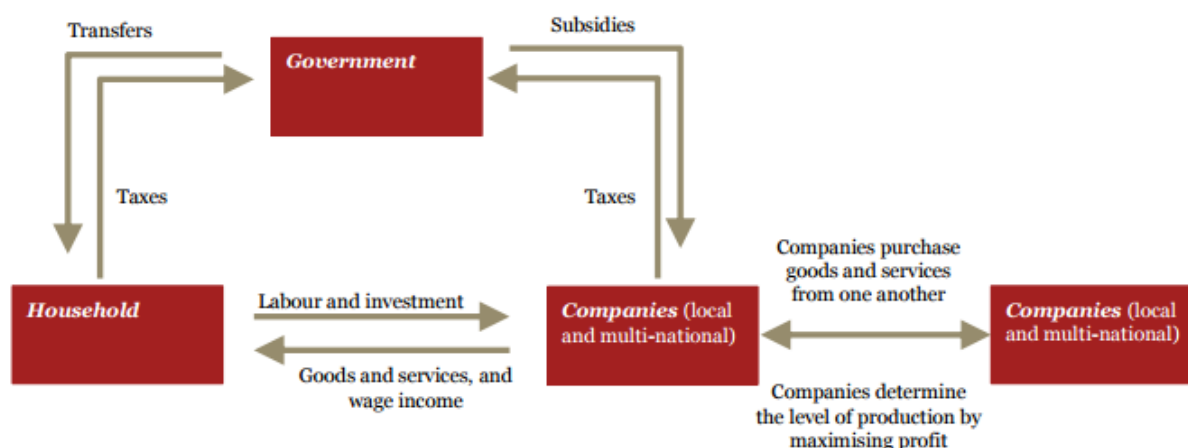
### 3.1 Our CGE model

We use a computable general equilibrium (CGE) model to estimate the impacts on the EU economy arising from the FS sector impacts assessed through our analysis. We only consider the possible economic impacts of the UK's exit from the EU.

CGE models are empirical tools used to capture the overall (general equilibrium) impact of a shock (such as a policy decision) on the economy. Over the past 25 years, CGE modelling has become a standard approach to applied economic analysis, and an established tool to evaluate key policy decisions in the UK. Such models are widely used by government bodies, such as HM Treasury and other international institutions such as the World Bank, IMF and OECD.

CGE models combine economic data and a complex system of equations to capture the economic interactions between the three main institutions in an economy – households, businesses and the government (see Figure 3.3). Each institution is defined and linked through labour market or capital market flows, household consumption, intermediate product demand, taxes or government transfers. These micro-economic interactions are aggregated by the model and are the foundations for the macro-economic relationships in the model.

Figure 3.3 Economic interactions in the CGE model



Source: PwC

CGE models assume that, in equilibrium, demand and supply in each market and sector in the economy is balanced. Hence, they simultaneously “solve” for all markets, institutions and factor resources to find the state of the macro-economy in which all the micro-interactions have worked through to equilibrium (this is general equilibrium). The model combines appropriate economic theory (the functions) for each interaction with historical empirical data (the inputs) to achieve this.

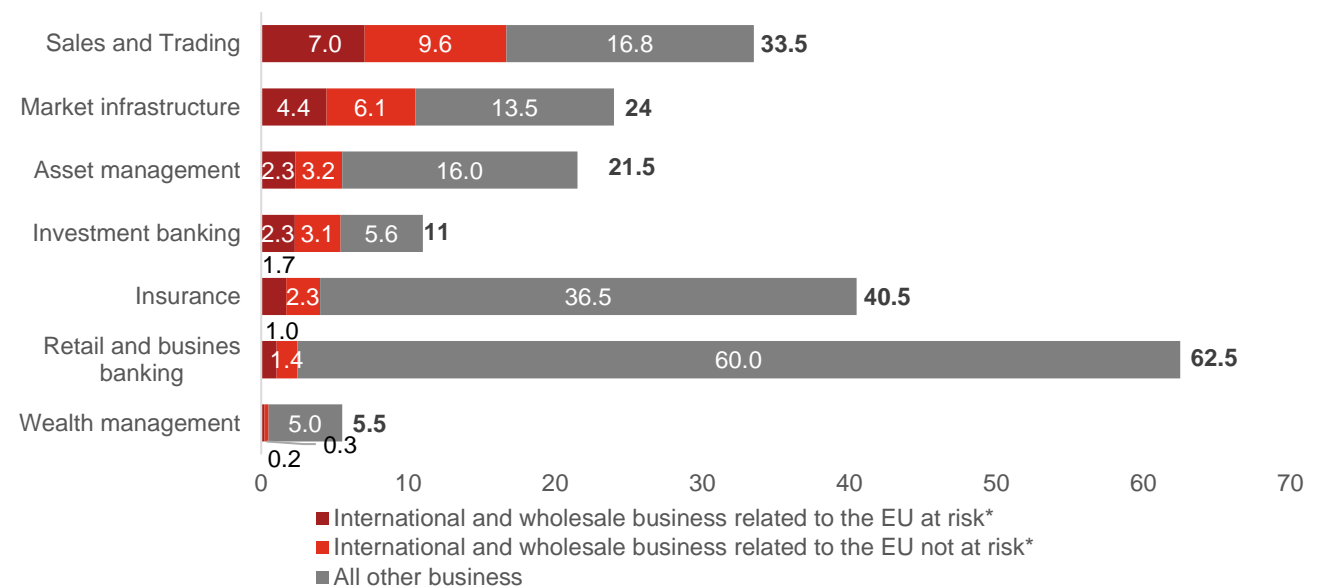
Our CGE model is based on the international economic interactions captured in the Global Trade Analysis Project (GTAP) database, which is compiled by a network of economists around the world and is managed by Purdue University. This allows us to model trade relationships between the UK, regions of the EU, and the rest of the world and how they may change in the wake of higher barriers to trade and investment in the Loss of Mutual Market Access scenario. The model then also estimates the effect on economic performance over the longer term. With a CGE model, we can project the impact of a UK exit from the EU on a range of different macroeconomic variables, including GDP, employment, household consumption, exports, imports and investment.

### 3.2 Revenue pool analysis

We start our work by considering how much of the UK FS sector activities are dependent upon the rest of the EU and the revenues that would be at risk in the Loss of Mutual Market Access scenario.

For the purpose of our study, we have estimated the revenues for different FS activities that could potentially be at risk, based on Oliver Wyman (2016)<sup>30</sup>. Figure 3.4 summarises the estimated revenues for the UK FS sector broken down by EU related revenue (both at risk and not at risk) and all other business.

Figure 3.4 Sectoral breakdown of UK FS sector revenues (£bn), 2015



\* Oliver Wyman only provided the FS-wide revenue at risk, which we apportioned across the sub-sectors.

Source: PwC analysis based on Oliver Wyman Report 'The Impact of the UK's exit from the EU on the UK-based financial services sector', (2016)

These estimates of revenues at risk are used in the rest of our analysis to estimate the level of shrinkage and relocation of UK FS activity and the subsequent impacts on the sector.

### 3.3 Main channels of impact

Market access is an important factor in financial firms' strategic decisions. While there is uncertainty over the level of market access between the UK and the EU that would emerge at the end of the ongoing Brexit negotiations, it is likely to be somewhat more restricted than it currently is. Following changes in regulations and access arrangements negotiated between the UK and the EU, financial institutions will need to make strategic decisions regarding the location of their operations. While some institutions may find it acceptable to continue operations as before, others may need to restructure significantly. As a result, as outlined in section 3.2, some revenues currently generated by the UK FS sector will be at risk, as will access from EU27 firms into the UK.

Firms that choose to restructure may choose from, or combination of, two strategic responses:

- **Relocation:** Some financial firms may relocate certain activities from the UK to the rest of the EU to continue to access EU markets (e.g. client facing activities and local risk management functions). Relocation could impact on productivity through fragmentation and a loss of agglomeration benefits as firms relocate to multiple competing hubs across Europe. Relocation can also have implications for efficiency, leading to higher one-off costs (e.g. restructuring, immigration costs) and ongoing costs for FS firms operating in Europe. Conversely, some activity may also move from the rest of the EU into the UK, but we expect the net effect to be a movement away from the UK.

<sup>30</sup> Oliver Wyman, 'The Impact of the UK's Exit from the EU on the UK-based Financial Services Sector', 2016

- **Shrinkage:** Alternatively, another possible response from firms is to scale down their activities in Europe or the UK, especially for those whose cross-border operations are already commercially marginal. Shrinkage could lead to a loss of competition and a reduction in FS service capacity, and a subsequent market liquidity effect.

We have identified five core channels of impact, and within these seven key impacts, through which Brexit is likely to impact on the FS sector. Table 3.1 below outlines the seven potential channels we have identified, which we discuss in further detail in the rest of this section. These impacts are a consequence of the broad impact of FS relocation and shrinkage following Brexit and ultimately have an impact on FS consumers, either through an increase in the cost, or reduction in the availability of financial services.

Throughout our analysis, we consider the impact of the Loss of Mutual Market Access scenario, i.e. no passporting or equivalence between the UK and the EU in the FS sector. As such, our analysis provides an upper limit on the estimated impact of Brexit on the sector and the impact could be lower depending on the form of access that the EU negotiates with the UK.

Table 3.1 Summary of channels of impact

<b>Channel</b>	<b>Impact</b>	<b>Description of impact</b>
<b>Activity relocation</b>	Impact of economic activity being relocated to the rest of EU	A portion of UK FS sector's revenue is derived from serving EU-based clients. Should mutual market access be lost, we expect there to be a net movement of financial services activity from the UK to the rest of the EU.
<b>Labour productivity</b>	Impact of fragmentation on productivity	The relocation of FS activity in order to retain EU client activity will result in the fragmentation of the industry's labour market, with implications for FS labour productivity EU-wide.
<b>Efficiency</b>	Capital costs from subsidisation	Banks are likely to be required to hold higher levels of capital and liquidity where they are required to subsidise branch operations in the UK or in the EU following Brexit. Insurers are likely to require more capital where they lose diversification benefits.
	Higher corporate costs	Where financial services firms need to relocate EU businesses, the separation of EU- and non-EU related businesses could result in a duplication of corporate costs, leading to a loss of operational synergies and fragmentation of governance structures.
	Higher collateral requirements	The separation of euro-clearing activities could result in the fragmentation of central counter party (CCP) clearing activity in Europe. The loss of multilateral netting benefits will result in increased collateral costs for market participants.
<b>Shrinkage</b>	Reduction in financial services activity	The cost of transition may not be worth the benefit of retaining cross-border activity. Therefore, financial services firms with limited EU27-UK cross border exposure may withdraw their cross-border client business.
<b>Liquidity</b>	Market liquidity/capacity effect from shrinkage	Shrinkage in wholesale and investment banking capacity could also lead to a reduction in market making activity, which would have an adverse impact on the depth of market liquidity (and therefore the ability for financial services users to trade and the cost of finance). Fragmentation of insurance markets also restricts access to deep pools of insurance capacity.

Source: PwC analysis



In the next section we set out how we calibrate the size of these different impacts. Where possible, we draw upon the expanding body of existing research and empirical analysis on the potential impact of Brexit, but elsewhere we draw upon research, which has been used for wider financial market and policy understanding, but can be applied to quantifying potential Brexit impacts in this study.

### **3.3.1 Relocation effects**

#### ***Channel 1: Relocation of activities***

The extent of relocation of financial services activities around Europe following Brexit will depend on both the nature of market access arrangements, but also the position of regulators; specifically how much activity they will require be conducted locally rather than relying on cross-border support.

At one end of the spectrum, minimal local activities could be entirely customer-facing and all infrastructure, and risk-bearing capacity could be retained where it currently resides (London is the main hub for a number of international banks and the London Market for insurance risk bearing capacity). This could make use of back-to-back trading arrangements where trading risks are managed centrally, rather than within local operations. At the other end of the relocation spectrum, European and UK regulators are likely to require substantial presence in local operations based on current approach to 3rd country owned entities. This would extend well beyond customer-facing activities and would include local business management, local risk management and balance sheet strength.

To date signals from European regulators such as the ECB, SSM and EIOPA have suggested limited tolerance for “brass-plate” entities with little physical and commercial substance. As we discussed in Section 3.2 and illustrated in Figure 3.4, £45bn of the UK financial services sector’s revenue is related to services provided to the EU, of which around £19bn may need to relocate away from the UK if no agreement were made in financial services market access. There is potential for some relocation from EU27 to the UK<sup>31</sup>, but this is likely to be small in comparison to the relocation out of the UK.

We assess that the relocation would account for around 8% of current GVA of the UK’s financial services sector.

The chosen location of relocated activities has been hotly followed by politicians and the media. It is clear that there will be a fragmentation of activities across Europe, with many institutions relying on their existing EU-wide footprint to minimise the cost of transition. While Frankfurt has emerged as the likely recipient of the largest amount of relocated activity (particularly from US and Japanese banks), a number of other cities have also been selected, including Paris, Berlin, Amsterdam, Brussels and Madrid. Furthermore, FS-focussed states have also attracted specific operations with Dublin and Luxembourg appearing attractive to UK based banks and asset managers respectively. New York is also increasingly mentioned as a relocation option (benefitting from existing US-EU equivalence agreements). In the insurance market, Lloyds of London has announced its intention to create its new European subsidiary in Brussels, while insurers have chosen similar bases to banks, with Dublin and Luxembourg gaining a number of relocation moves.

Informed by recent announcements by major financial services institutions, we assume the net flow of relocation away from the UK to be directed to the different regions according to the following percentages:

- Western Europe: 64%
- Eastern Europe: 2%
- Southern Europe: 2%
- Northern Europe: 2%
- FS-focused states: 20%
- Rest of the World: 10%

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<sup>31</sup> For example, some EU banks’ UK branches may require additional activities (but since these branches typically contain their capital markets activities any additional activity is likely to be UK based risk management and regulatory activities with the PRA. In addition, EU based corporates could establish UK legal entities as funding vehicles, but most have suggested they expect their banks to solve any challenges in accessing finance. (Source: AFME/BCG (2017), ‘Bridging to Brexit: Insights from European SMEs, Corporates and Investors’).

The FS sectors in different regions of the world also demand other goods and services in order to provide their services to customers: for example, they use buildings, legal, IT and communications services. In order to fully capture these supply chain effects, we put our estimated revenue and GVA effects through a model based on the World Input-Output Database (WIOD). This allows us to capture both domestic and cross-border supply chain effects associated with the relocation under the Loss of Mutual Market Access scenario.<sup>32</sup>

In this channel, we only address the effect of activity relocation and their associated supply chain effects. There are also second order productivity and efficiency effects related to the fragmentation of labour and financial markets, which we will address in the next channels.

## ***Channel 2: Labour market fragmentation and its effect on labour productivity***

As discussed above, without the benefits of single market access offered by EU membership, a number of financial institutions may choose to relocate. In the current uncertain environment, no one location presents as the obvious alternative to London and individual firms are, to some extent, basing their plans on where they happen to have an existing regulatory and/or operational presence, as opposed to where they sense a new EU financial centre may form in the long run. Brexit could, therefore, result in a degree of fragmentation of the EU FS sector.

The impact of the relocation of FS activity is, however, not a 'zero sum game' across the EU. Economic theory and empirical evidence suggest the presence of agglomeration benefits, i.e. productivity gains arising from co-location, through the following channels:

- *Localisation economies*: Benefits that arise from firms operating within the same sector locating close together for example, through knowledge spillovers and access to skilled labour.
- *Urbanisation economies*: Benefits that arise from firms operating across sectors locating close together, for example through forward and backward linkages and the development of local infrastructure.

Most empirical studies have demonstrated small but positive agglomeration effects. Brülhart and Mathys (2008), for example, investigate the impact of agglomeration in the FS sector across Europe. While they find little evidence of urbanisation economies, or benefits arising from co-location with firms in other sectors, they estimate that doubling employment density in the FS sector itself can generate a 23-26% increase in labour productivity in the sector. This phenomenon explains why a large number of large European and international financial groups choose to locate some of their key businesses in the UK to benefit from London's infrastructure, its ecosystem of related professional services and supply chains and its abundance of skilled staff. The benefits arising from the co-location of financial firms in London, one of the largest global financial hubs, could therefore be reduced as activity is relocated.

We estimate the potential impacts of the dispersion of UK-based FS activity across the EU using the relocation assumptions set out in the section above. We also assert that other EU regions, with the exception of FS-focused states, are unlikely to observe an improvement in productivity as the scale of relocation is unlikely to create sufficient critical mass in order to fully realise productivity benefits. Our approach to estimating the impact of loss of agglomeration associated with the relocation of FS activity is summarised as follows (see also Figure 3.5):

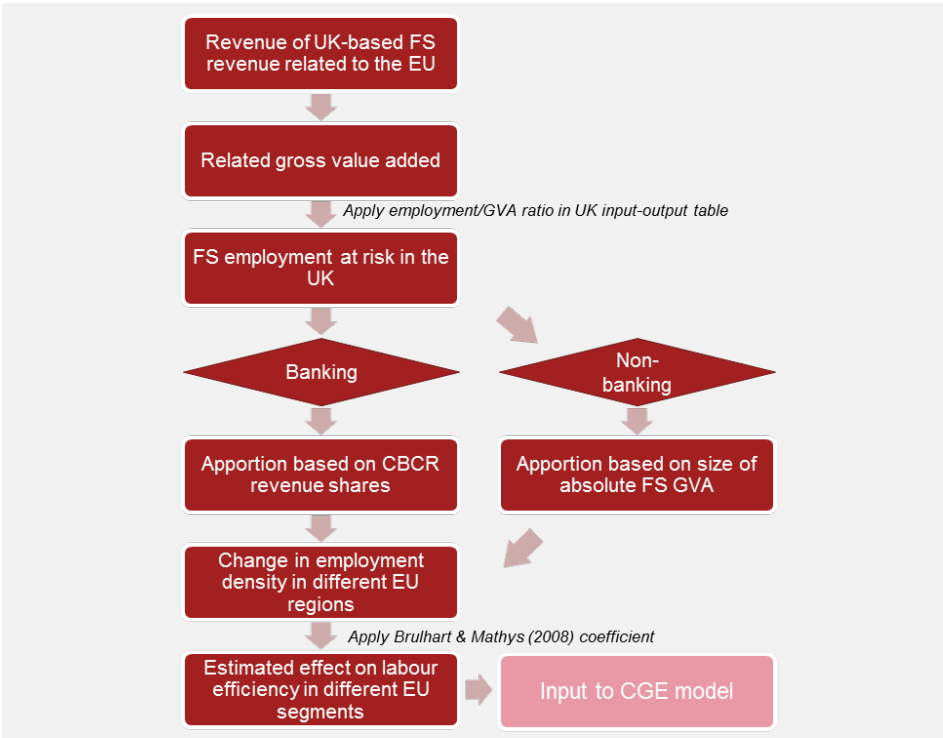
1. **Estimate UK FS employment at risk of relocation:** These are based on estimates by Oliver Wyman (2016) on revenues at risk discussed in section 3.2 and our estimates of shrinkage in capital markets discussed in Section 3.32.

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<sup>32</sup> We do not consider equilibrium effects of the relocation channel. This is because we assume that the relocation of jobs and activity is permanently lost from one country and gained in another. It is possible that employees will not follow the relocated jobs, in which case there may be an increase in labour supply back into the FS or other sectors helping to mitigate the impact of relocation. The reverse will then be true for the country gaining relocated jobs as this could reduce labour supply in their own FS or other sectors.

- 2. **Apportioning relocation from the UK to different parts of the EU:** We next apportion the relocation of UK-based FS employment across the EU based on relocation assumptions set out in Section 3.3.1.
- 3. **Deriving the corresponding change in labour productivity:** Based on the relocation of employment across the EU estimated in stage 2, we estimate the corresponding change in employment density, measured as the number of workers per square kilometre (Eurostat data). We then apply the estimates derived by Brülhart and Mathys (2008) on the empirical relationship between changes in employment density and changes in labour productivity.

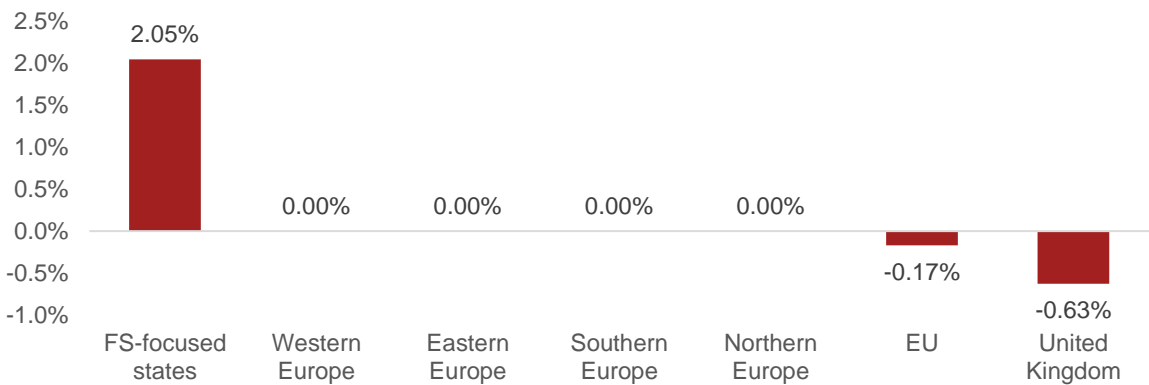
Figure 3.5 Approach to estimating the effects of agglomeration associated with the relocation of FS activity



Source: PwC

Our analysis suggests that labour productivity in the UK will decrease by 0.6% (see Figure 3.6) while small FS-focused states will enjoy an increase in productivity of around 2% due to the current presence of hub effects. While this suggests that there could be opportunities from the Brexit disruption for some regions, the overall economic impact across Europe of moving away from the status quo in financial services is estimated to be net negative. Our analysis estimates a €1.3bn reduction in EU GVA (or 0.2% of EU GVA).

Figure 3.6 Potential change in FS productivity, by region



Source: PwC analysis, using Oliver Wyman (2016) revenue pool analysis and Brülhart and Mathys (2008)



The relocation and/or restructuring of FS activity is expected to increase the one-off and ongoing costs to firms, impacting on efficiency across the EU. The higher cost and lower efficiency may be partially passed on to the users of financial services across the European economy, leading to wider economic impacts.

As we discuss below, we consider three potential ways in which relocation and the restructuring of FS activity can impact on the sector's efficiency.

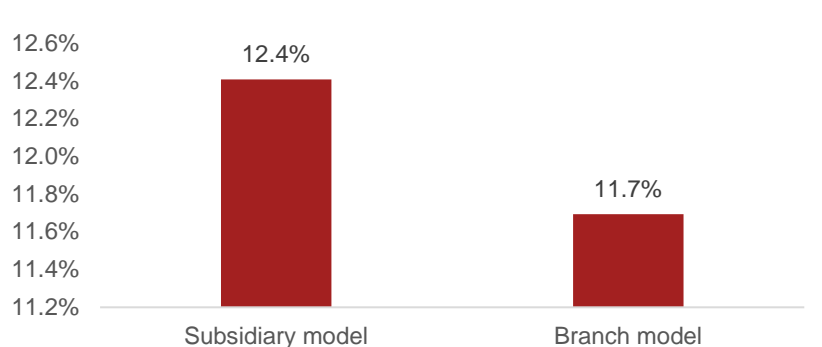
### **Channel 3: Efficiency impact as a result of subsidiarisation and increased capital costs**

Global banks operate internationally using either a branch model or a subsidiary model. While a branch is not a separate legal entity from its parent, subsidiaries are separate legal entities from their parents and are required to be separately capitalised, with constraints on the fungibility of capital, funding and liquidity. As a result, subsidiarisation tends to result in a higher level of capital being held relative to assets. For example, the Bank of England<sup>33</sup> estimates that UK ring-fencing requirements (which involves subsidiarisation of banks' deposit-taking activities) could result in a £2.2-3.3bn increase in capital requirements.

Brexit negotiations resulting in a change in regulatory regime and a loss of UK's passporting rights could mean that international and European banks currently operating in the UK, and UK banks currently operating in the EU, under branch models will need to subsidiaries, and therefore increase their equity capital holdings.

Based on a sample of banks, we show that banks with subsidiary operating models have, on average, a 0.7pp higher Common Equity Tier 1 (CET1) ratio<sup>34</sup> than banks with branch models (see Figure 3.7). As well as higher capital ratios, subsidiary model banks also face higher capital deductions than branch models, which further increases the amount of capital required in subsidiary models.

Figure 3.7 Average Common Equity Tier 1 ratio for banks operating under subsidiary and branch models



Source: PwC analysis using bank annual reports, based on a sample of 14 UK, EU and non-EU banks

If no market access agreement were made, Oliver Wyman (2017)<sup>35</sup> estimated that following Brexit, US\$30-50bn of additional capital may be required across the whole EU. Boston Consulting Group (2017)<sup>36</sup> estimated that across Europe, financial institutions would require €20bn additional Tier 1 capital and €40bn in terms of total capital (including Tier 2 capital, TLAC debt and capital buffers).

For our modelling purpose, we assume an increase in equity capital required of €30bn. This takes into account all the analysis we discussed above. An increase in capital held by banks has macroeconomic consequences: BIS (2010) suggests that a 1pp increase in the capital ratio raises loan spreads by 13bps<sup>37</sup>. Given the amount of additional equity required and the level of RWA across the EU, we evaluate that loan spreads will be around 3-4 bps. This is then applied in the CGE model as a higher cost of capital for all industries across Europe.

<sup>33</sup> Bank of England (2016) 'The implementation of ring-fencing: reporting and residual matters' (CP25/16).

<sup>34</sup> The Common Equity Tier 1 Ratio is the ratio of Common Equity Tier 1 Capital to risk-weighted assets

<sup>35</sup> Oliver Wyman (2017), 'One year on from the Brexit Vote: A Briefing for Wholesale Banks'.

<sup>36</sup> Boston Consulting Group (BCG) (2017), 'Bridging to Brexit: Insights from European SMEs, Corporates and Investors'.

<sup>37</sup> Bank of International Settlements (2010), 'An assessment of the long-term economic impact of stronger capital and liquidity requirements'

Insurers face similar capital challenges. Under Solvency II, insurers and reinsurers are required to hold enough capital (i.e. essentially an excess of assets over liabilities) to meet the Solvency Capital Requirement (SCR) and to serve as a buffer against unexpected losses. The SCR calculation takes account of portfolio diversification benefits, which explain why many insurance groups have sought to aggregate portfolios into a few 'hub' entities. The loss of market access means portfolio aggregation benefits will be reduced (for both UK and EU entities). The capital impact will vary across insurers and depends upon their individual portfolios of risks insured and future legal entity structure. We have not found any detailed analysis of this potential impact, but note that insurance sector GVA and insurance capital impacts are lower than banking, and so we expect to have captured the main economic impact within Channel 3. However, the omission of potential insurance sector capital impacts means that our quantification is likely to be an underestimate.

#### ***Channel 4: Efficiency impact as a result of higher corporate costs***

European Directives stipulate that a subsidiary must not only have its own financial resources, but it must also have non-financial resources such as governance arrangements including a board, a risk management framework and fit-for-purpose systems.

Where financial services firms are required to establish separate subsidiaries in the EU to host EU-related business as discussed above, there will be a loss of synergies, especially in areas of shared services, for example, risk management and governance and the duplication of finance, IT, infrastructure, HR and procurement costs. Governance spread across multiple entities also risks confusion about responsibility and accountability.

As an illustration of potential impact, the PRA estimates that the additional costs for ensuring continuity of service under the UK ring-fencing requirements could amount to £120m for the average large bank. In addition, the need to engage with multiple regulatory regimes with different requirements could also increase costs. The separation of EU- and non-EU related business could therefore result in a significant increase in ongoing corporate costs for banks and other financial institutions.

Sabine Lautenschlaeger, vice-chair of the board of the Single Supervisory Mechanism, the ECB's bank watchdog has repeatedly said she will not accept *"shell companies, which are overly reliant on other group entities from outside the EU"*. EIOPA has also issued an opinion that it expects UK based insurers setting up an EU undertaking will demonstrate an appropriate level of corporate substance, proportionate to the nature, scale and complexity of the planned EU business. This includes appropriate presence of the administrative, management or supervisory board (AMSB) members and key function holders in the EU member state.<sup>38</sup>

A key determinant of banks' corporate cost/income ratio is its size, due to the relatively large fixed cost component of the cost base. Based on a sample of 16 global banks, we find a negative relationship between the cost/income ratio and revenue, which suggests that banks benefit from scale economies; a €100m reduction in revenues is associated with a 0.004pp increase in the corporate cost/income ratio. We use this same relationship for insurers and market infrastructure providers, but with the effect scaled to their smaller proportionate amount of UK-EU27 activity. We therefore estimate that an increase in the cost/income ratio could increase corporate costs across the sector by around €1.6bn (see Table 3.2).

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<sup>38</sup> EIOPA (2017), "Opinion on supervisory convergence in light of the United Kingdom withdrawing from the European Union"

Table 3.2 Illustrative estimates on the increase in corporate costs

Segment	Increase in corporate cost/income ratio (pp)	Increase in corporate costs (€m)
Banking	1.08	1,422
Insurance	0.26	125
Asset and wealth management <sup>39</sup>	Negligible	Negligible
Market infrastructure	0.26	78
<b>Total</b>		<b>1,625</b>

Source: PwC analysis. Note that the impact on the asset and wealth management sector is assumed to be zero as we assume that there are minimal impacts from the Loss of Mutual Market Access scenario due to alternative access arrangements.

This increase in corporate costs is an inefficiency in the FS sector and we incorporate into the CGE model as a downward productivity adjustment (as the same amount of output can only be delivered with more corporate resources).

### **Channel 5: Efficiency impact as a result of higher collateral requirements**

The separation of euro-clearing activities could result in the fragmentation of CCP activity in Europe and increased costs of risk management, which will ultimately be borne by end-users.

A single CCP operating across multiple jurisdictions and currencies can provide efficiencies and reduce risk through multilateral netting of exposures across counterparties in different jurisdictions. Conversely, fragmentation of business across multiple CCPs is likely to result in greater costs and greater liquidity demands for market participants.

Duffie, Scheicher and Vuilleme (2014) <sup>40</sup> showed that an increase in the number of CCPs reduces the netting and diversification benefits of a reduced set of CCPs, therefore implying a higher collateral demand. In their model, they show that with full clearing, an increase in the number of CCPs from 2 to 4 results in a 7.2% increase in collateral demand if CCPs are specialised, and otherwise an increase of 22.4%. Given that the current initial margin posted on SwapClear is currently around €44 billion, a 7.2% increase from doubling the number of CCPs is equivalent to additional margin posted of €3.1 billion.

In addition, the regionalisation of liquidity pools may have the result of trapping liquidity, as EU counterparties may need to trade derivative contracts on trading venues administered by the EU. Benos, Payne and Vasios (2016) <sup>41</sup> show that the move from an OTC to a centralized, competitive market structure is associated with a substantial increase in liquidity and reduction in execution costs.

In a speech in June 2017 <sup>42</sup>, Mark Carney was noted that in Japan, where the clearing of yen-denominated swaps by certain Japanese firms must take place onshore, these firms face a clearing cost of 1-3 basis points higher in the onshore market as a result of lower liquidity. As a corollary, he also noted that a 1 basis point increase in clearing cost may cost EU firms €22bn per year.

<sup>39</sup> Given the assumption that wealth and asset managers may still delegate fund managements to other developed economies, we expect the additional corporate cost to the asset management industry to be minimal.

<sup>40</sup> Duffie, D., M. Scheicher, and G. Vuilleme (2014), 'Central Clearing and Collateral Demand'. European Central Bank Working Paper Series, No. 1638.

<sup>41</sup> Benos, E., R. Payne and M. Vasios (2016), 'Centralised trading, transparency and interest rate swap market liquidity: evidence from the implementation of the Dodd-Frank Act'. Bank of England Staff Working Paper No. 580

<sup>42</sup> Mark Carney, 'A Fine Balance', given at the Mansion House, London on 20 June 2017.

In our modelling for the Loss of Mutual Market Access scenario, we assume that as part of regulatory divergence, the clearing liquidity pool would become more fragmented across Europe. As a result, there would be an increase in clearing cost of around €22bn per year. We translate this into the CGE model as a higher cost of using financial services products as an input for all businesses across Europe, both financial and non-financial, by around 0.04%.

### **3.3.2 Shrinkage**

Access to the EU's single market attracts international financial institutions to set up subsidiaries in the UK. The potential loss of this market access as a consequence of Brexit will mean that these institutions will need to reassess the importance of EU-related client business carried out in the UK (and vice-versa for EU institutions carrying out business in the UK).

#### **Channel 6: Direct effect of shrinkage**

The Oliver Wyman study for TheCityUK showed that around 40-50% of EU-related activity could be at risk of relocation under the Loss of Mutual Market Access scenario<sup>43</sup>. While some institutions may continue to find it worthwhile to retain their EU operations and relocate to alternative locations to continue to access European markets, institutions for whom EU client business is commercially marginal may decide to withdraw their European FS activities completely rather than undertake the time-consuming and costly process of potential relocation and of navigating the new regulatory frameworks once these are in place. This pressure to shrink is also enhanced by the low returns price to book ratios across the EU financial services industry. In June 2017, Vítor Constâncio, Vice-President of the ECB, suggested that, in the euro area, listed banks' aggregate return on equity (ROE) stood below 3% in 2016 and price to book ratio of 0.77.<sup>44</sup>

As part of our study for AFME of Banks' Brexit operational planning we observed how a number of banks were considering shrinking their cross-border activities within their scenario and response analysis.<sup>45</sup>

In the insurance sector, many entities in London would no longer do business in certain EU states, harming the ability of many EU clients to secure the necessary coverage; likewise, EU firms may cease to have a presence in the London Insurance Market.

Shrinkage would have a direct impact on the economic output generated by the FS sector.

To investigate this potential effect further, we use debt and equity issuance activity conducted by UK-authorized institutions to illustrate the variation in importance of EU-related activities undertaken by banks. As illustrated in Figure 3.8 below, there is a tail of banks with limited EU-related operations. Changes in market access following Brexit requiring a change in operating models may mean that it is no longer worthwhile to continue conducting EU-related business.

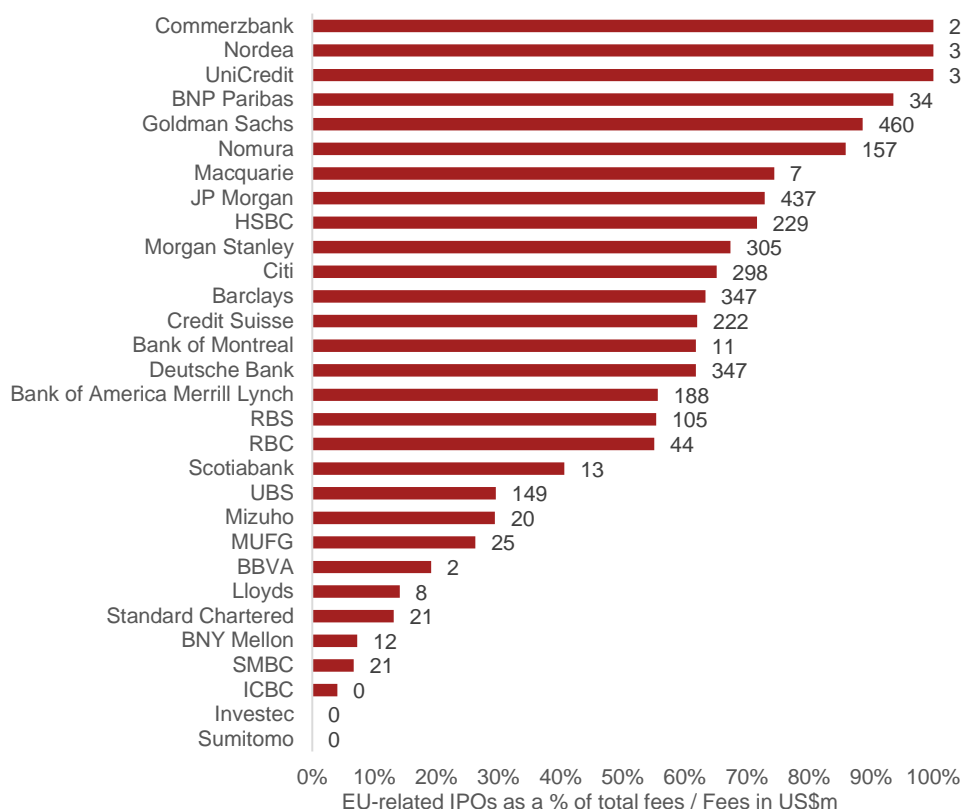
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<sup>43</sup> Oliver Wyman, *The Impact of the UK's Exit from the EU on the UK-based Financial Services Sector*, 2016

<sup>44</sup> Speech by Vítor Constâncio, Vice-President of the ECB at the Risk & Supervision 2017 Conference organised by Associazione Bancaria Italiana, *Challenges faced by the European banking sector*, Rome, 14 June 2017

<sup>45</sup> PwC (2017), *Planning for Brexit – operational impacts on wholesale banking and capital markets in Europe*



*Figure 3.8 Illustration of banks' exposure to EU-client business, debt and equity issuance in 2015*

Source: S&P Capital IQ

Note: the length of the bars represent the percentage of EU-related IPOs as a percentage of total fees, while the numbers to the right represent the absolute level of the fees earned by each financial institutions on EU-related IPOs in 2015.

It is difficult to assess the threshold for when too little cross-border activity becomes not commercial sustainable, as this will depend very much on the specific circumstance of institutions involved.

Based upon a long tail of institutions with relatively small amounts of cross-border activity, we assume a withdrawal of around 7% of capital markets activity, equivalent to a loss of €0.9bn in revenues based on Oliver Wyman (2016) estimates of capital market revenues. From our conversations with industry, we also understand a similar percentage of withdrawal would be likely in the wholesale insurance sector. This is equivalent to a loss of €0.14bn in revenue.

We consider the shrinkage effect to be akin to an increase in non-tariff barriers (NTBs) to financial services trade – indeed, the shrinkage would be mainly driven by regulatory divergence that drives non-tariff barriers. Therefore, we modelled the shrinkage effect as an increase in friction in terms of UK FS exports to the rest of the EU by a ratio between (i) the estimated revenue loss of €0.9bn, and (ii) the total demand for FS services from the rest of the EU from the UK, by both businesses and consumers, which is in turn sourced from the World Input-Output Database (WIOD).

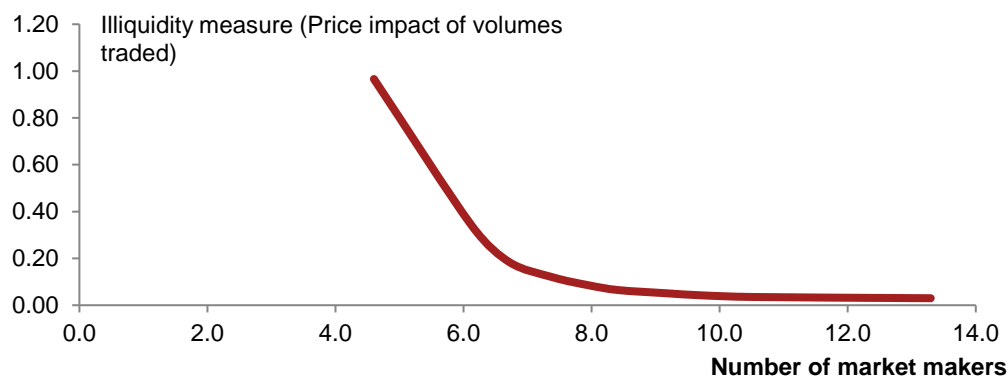
### **Channel 7: Liquidity/capacity effects of shrinkage across the EU**

The shrinkage in wholesale and investment banking activity, discussed in the section above could have implications for banks' secondary market making capacity which could be associated with a reduction in market liquidity.

Liquidity conditions in financial markets have important implications for financial stability, the efficient distribution of risk, as well as corporates' cost of financing and risk management. A low liquidity premium lowers issuance costs for corporates<sup>46</sup>

Our study on financial market liquidity for GFMA (PwC, 2015) shows that the number of market makers has a statistically significant relationship with the liquidity risk premium for corporate bonds.<sup>47</sup> The IMF found a similar relationship between balance sheet size and the probability of a low liquidity regime, where reduced assets held by broker-dealers contributed to a weaker liquidity environment.<sup>48</sup>

Figure 3.9 Relationship between the number of market makers and illiquidity



Source: PwC analysis using Trax data

There is therefore a risk that banks' withdrawal from capital markets trading activity results in a reduction in banks' market making capacity. This will be expected to increase the liquidity risk premium, which is incorporated into the cost of borrowing for businesses.

Dick-Nielsen (2013)<sup>49</sup> estimate that a 1 percentage point reduction in corporate bond dealer inventory as a % of total corporate bond market size is associated with a 7 bps increase in transaction costs. Assuming that the 7% reduction in capital markets activity is applied directly to dealer inventories of European corporate bonds, this is associated with a reduction in the share of dealer inventories of 2 bps, which results in an increase in transaction costs of 14 bps (equivalent to an increase in trading costs of €2.4bn).<sup>50</sup>

To estimate the wider economic impact of higher liquidity cost, we borrowed from the extensive policy and academic literature concerning Financial Transactions Tax (FTT) over the last decade. Indeed, the effect of higher transaction cost in the capital markets would be comparable to an FTT without fiscal benefit to any government. Following Matheson (2012)<sup>51</sup>, we derived that a 14 bps increase in transaction costs would be associated with a 4.6 bps increase in cost of capital for all corporates, assuming the average holding period for securities to be 3 years. The cost of capital effect is then used as an input into our CGE model to derive wider economic impact on the global economy.

Without continued access there will also be implications for the London Insurance Market and its clients with potential loss of access to insurance and reinsurance underwriting capacity, particularly for the range of specialist insurance sectors including, aviation, marine, satellite communications, ship building, nuclear power and energy infrastructure, deep sea cabling and tunnelling<sup>52</sup>. Lack of market access poses a medium-term threat to the clustering of expertise within London's insurance ecosystem which currently provides UK, EU and global clients with access to concentrated capital, expertise as well as the ability to secure global coverage in one

<sup>46</sup> Damodaran (2015), 'The cost of illiquidity'

<sup>47</sup> PwC (2015), 'Global financial market liquidity study'

<sup>48</sup> IMF (2015), 'Market liquidity – resilient or fleeting?' Global financial stability report, October 2015, Chapter 2

<sup>49</sup> Dick-Nielsen (2013), 'Dealer Inventory and the Cost of Immediacy', Paper presented at 2013 Fixed Income Conference at Darla Moore School of Business.

<sup>50</sup> There is potentially a similar impact on sovereign issuers. However sovereign bonds are typically far more liquid than corporate and therefore any impacts are likely to be markedly smaller.

<sup>51</sup> Matheson, Thornton (2012). 'Taxing Financial Transactions: Issues and Evidence', IMF Working Paper WP/11/54.

<sup>52</sup> London Markets Group (2017), "Proposals for a future trading relationship between the EU and UK"

place. These insurance gaps are unlikely to be filled by domestic insurers, meaning that companies will need to 'self-insure', or withdraw products and services. We have not quantified capacity impacts in insurance. This impact is likely to be concentrated in specialist sectors, rather than being widely dispersed. We also note the relative size cross-border specialist insurance compared to cross-border wholesale banking is much smaller, so this is a comparatively small omission in our analysis.

### 3.4 Results

Our analysis assesses a **Loss of Mutual Market Access** scenario in which there is no agreement for financial services cross-border market access and regulatory cooperation. The UK and EU therefore to treat each other as a typical third country.

We estimate the economic impact of this scenario by comparing it to a 'counterfactual' case in which the UK and EU agrees on an agreement that effectively preserves all features of the single market in financial services.<sup>53</sup> More specifically, we assume future access mimics the current European Economic Area (EEA) arrangements.

Our analysis shows that, compared to a case where the current single market arrangements were replicated, loss of mutual market access is estimated to result in the GVA of the current European Union (henceforth "EU28") to be 0.45% smaller in 2030. This impact is equivalent to **€60.2bn** in 2016 values.

- Of this impact, around **€27.2bn** or 45% of the impact will be borne by the UK. In percentage terms, we estimate the UK's GVA to be 1.28% smaller in the Loss of Mutual Market Access scenario in 2030.
- We estimate 55% of the total impact will fall in the EU27. This amounts to **€33.0bn** in 2016 values. However, this is only equivalent to 0.29% of the EU27's economy, which is more than five times larger than the UK's.

We present more details of our modelling exercise in Table 3.3 and Figure 3.10 below.

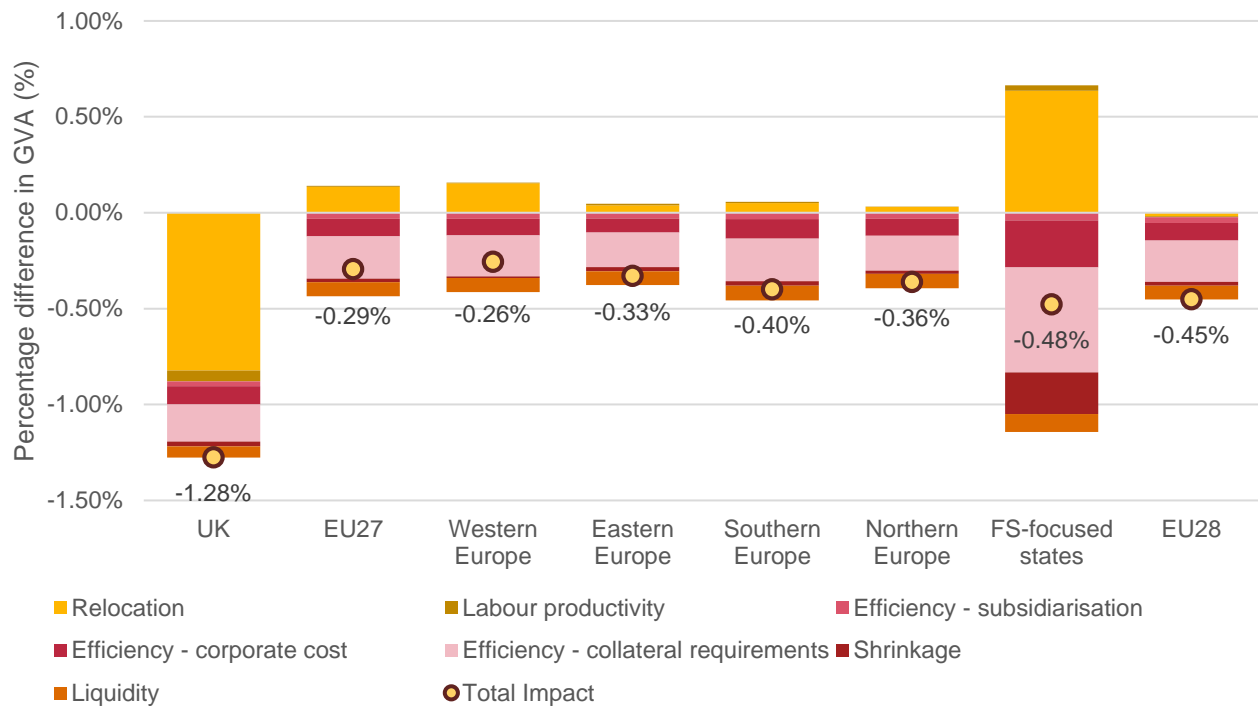
Table 3.3 Central estimates of impacts on economy-wide GVA in the Loss of Mutual Market Access scenario

Channel of impact		UK	EU27	of which					EU28
				Western Europe	Eastern Europe	Southern Europe	Northern Europe	FS-focused states	
<b>Relocation – direct impact</b>		-0.82%	0.14%	0.15%	0.04%	0.05%	0.03%	0.64%	-0.02%
Labour productivity		-0.06%	0.01%	0.00%	0.01%	0.01%	0.00%	0.03%	0.00%
Efficiency	Subsidiarisation	-0.02%	-0.03%	-0.03%	-0.03%	-0.03%	-0.03%	-0.04%	-0.03%
	Corporate cost	-0.10%	-0.09%	-0.09%	-0.07%	-0.10%	-0.09%	-0.24%	-0.09%
	Collateral requirement	-0.19%	-0.22%	-0.21%	-0.18%	-0.22%	-0.18%	-0.55%	-0.22%
<b>Shrinkage – direct impact</b>		-0.02%	-0.02%	-0.01%	-0.02%	-0.02%	-0.02%	-0.22%	-0.02%
Liquidity		-0.06%	-0.07%	-0.07%	-0.07%	-0.08%	-0.08%	-0.09%	-0.07%
<b>Total Impact (in % terms)</b>		-1.28%	-0.29%	-0.26%	-0.33%	-0.40%	-0.36%	-0.48%	-0.45%
<b>Total impact (€ in 2016 values)</b>		-27.2bn	-33.0bn	-19.6bn	-3.5bn	-5.3bn	-3.0bn	-1.6bn	-60.2bn

Note: Only central estimates are presented in this table, and the counterfactual in this exercise is that a comprehensive agreement between the UK and EU were to be made such that trade and regulation in financial services remain as it was.

<sup>53</sup> Note that we did not make any assumption with regards to trade, investment or regulatory arrangements in other industry sectors.

Figure 3.10 Percentage difference of GVA in the Loss of Mutual Market Access scenario



Source: PwC analysis

Further analysis of the impacts by channel shows that:

- From a **EU28 perspective**, the direct impact of activity relocation between the UK and the EU27 largely offset each other, and the aggregate impact is therefore small – only -0.02%. However, relocation would also disrupt the financial services industry and increase the cost base of businesses in the sector across Europe. We estimate that as a result of efficiency loss through subsidiarisation, higher corporate cost and higher collateral requirement, EU28's GVA would be €45.1bn smaller in 2016 values. This accounts for 75% of the total impact in EU28.
- On the other hand, **for the UK**, relocation of FS activity to outside the UK accounts for 64% of the long term economic impact.
- Across the **EU27**, while the economy may benefit from activity relocated from the UK, that benefit is more than offset by the effect of fragmentation, lower efficiency and activity shrinkage across Europe.
- While the **FS-focused states** such as Ireland and Luxembourg may benefit most in percentage terms from financial services activity being relocated away from the UK, the fact that their economies are already highly dependent on the FS sector also means that they are likely to suffer most from disruptions and loss of efficiency across the whole EU FS sector. This is also evident in our analysis: indeed, while our analysis shows that activity relocation may boost their economies most in percentage terms, the effect is more than offset by shrinkage of and lower efficiency in the FS sector.

We conclude that a loss of market access for financial services firms between UK and EU27 countries will be detrimental, and the continent loses out due to the disruption to its relationship with the UK.

Our analysis points to a clear economic rationale for an agreement on mutual market access between the financial services industries of the UK and EU27 after the point of Brexit.



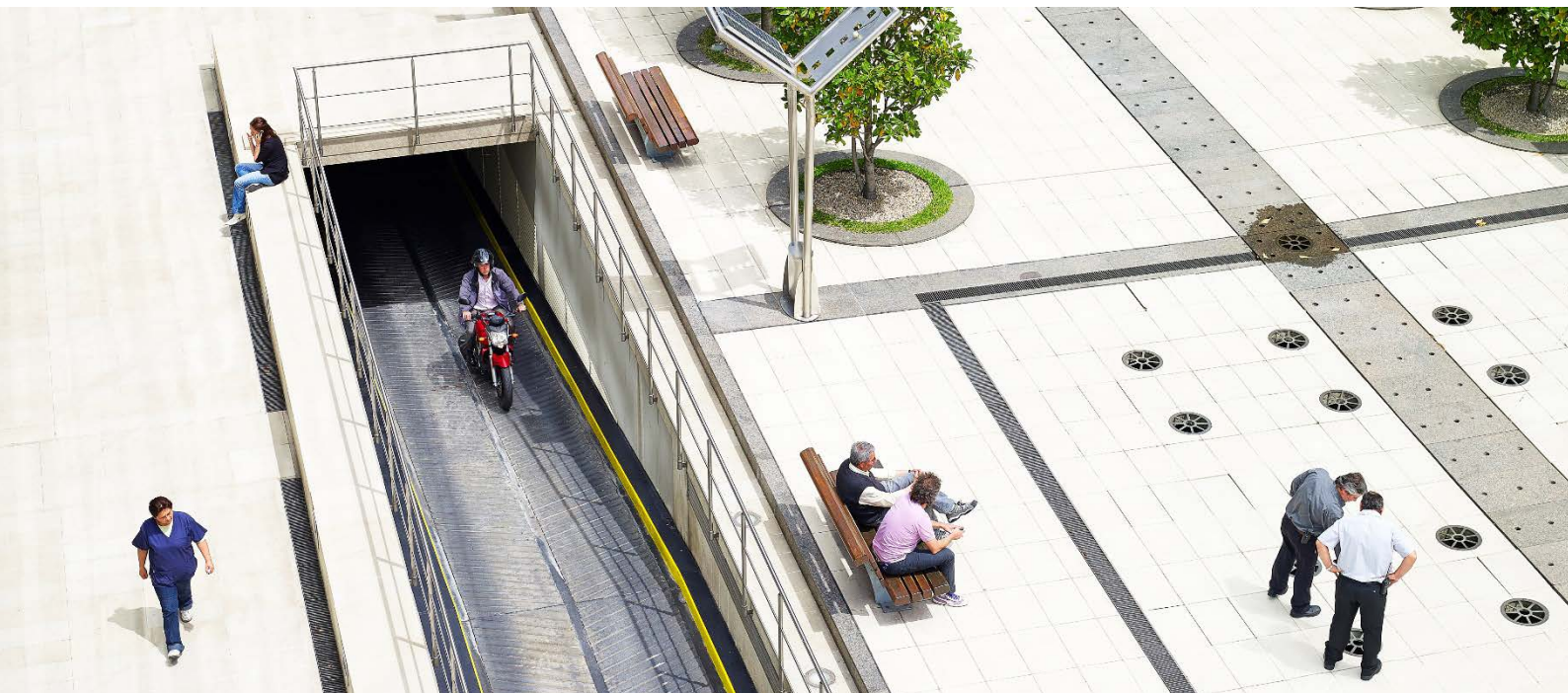
### 3.5 Additional considerations

We recognise that there are many areas of uncertainty relating to our results. Firstly, it is possible that the UK-EU market access regime after March 2019 would neither fully replicate the level of market access available before Brexit, nor imply a total loss of mutual market access<sup>54</sup>. Indeed, it is likely for the ultimate outcome of the ongoing negotiations to result in an arrangements that replicate some, but not all, of the benefits of the single market. Therefore, our estimation should be interpreted as an upper bound of the long term economic impacts.

Secondly, there could be additional behavioural and policy responses that we have not been able to fully capture in our analysis. As such our estimates can only be indicative of the broad direction and order of magnitude of economic impact that could arise. Specifically we have not taken into account any quickening of new trade and access arrangements by the UK or EU-27 with the rest of the world after Brexit.

However, and in contrast to the two points above, we do not purport to have considered an exhaustive list of channels that Brexit-induced disruption in the FS sector could have on the EU economy. Indeed, due to data limitations, we did not fully consider some of the channels, e.g.:

- **Insurance activities:** currently, the London insurance markets serve clients not only across the EU, but on an international basis. It is likely that EU27 users of insurance will continue to access the depth of the London market after Brexit. However, future regulatory and market development may potentially induce European users of wholesale insurance products to source them within EU27 at a higher cost.
- **Asset management activities.** Under current and announced EU regulations, it is possible for asset managers to delegate investment management to a non-EU manager under certain rules. As a corollary, we expect the impact through this to be small. We did not attempt to make projections with regards to the evolution of European financial regulation, and assumed that the ability to delegate investment management to persist between now and 2030.
- **Novating/replacing contracts with new legal counterparties.** We did not explicitly account for the administrative cost of updating contracts (or creating new contract) with new counterparties in the appropriate jurisdiction, which is a particular concern for the insurance industry. We expect this cost, while could be substantial in the short term, to be transitory in nature and will not have a significant impact in the long term.



<sup>54</sup> For example the International Strategy Regulation Group report: “A New Basis for Access to EU/UK Financial Services Post-Brexit” published in September 2017 sets out a model of market access based upon alignment.

## Appendix – A more detailed introduction to our CGE model

Computable General Equilibrium (CGE) models are a class of economic model which use economic data to estimate how an economy might react to policy changes or external shocks. Shocks to the economy often have significant general equilibrium effects, even when the direct impact is confined to one sector. Hence CGE models are widely used by international policymakers to assess the full consequences of policy changes and estimate the effect of these changes in one part of the economy on the wider economy. For example, the effect of a one-off increase in cost of capital or the tariff on certain goods may cascade through to other parts of the economy, thereby affecting consumption choices and firms' output and employment decisions over time. These general equilibrium effects can be estimated through CGE modelling.

CGE models can capture a detailed range of commodities, sectors and production factors supplied in the economy and the social accounting matrix published by national statistical authorities typically forms the core dataset of a CGE model. These models comprise a system of simultaneous equations that numerically simulates the interactions of different economic agents. In essence, a CGE model captures the economic behaviours of all agents in the economy through a system of equations. Figure A.1 below provides such an illustration of the economic interactions between different agents. Determining the general equilibrium in the economy requires solving the system of equations to obtain a set of prices and an allocation of commodities and production factors that support the equilibrium. When the economy is in equilibrium, the economy must satisfy the following conditions:

- All markets in the economy must clear i.e. the demand and supply of all commodities and production factors are balanced
- Income in the economy must balance i.e. all economic agents must exhaust their budgets

Following a shock to the economy which alters the initial set of prices, economic agents adjust to these price changes by reallocating consumption and production decisions until equilibrium in the economy is restored again. The CGE model compares the differences between the baseline and shock scenarios and allows one to evaluate the impact of the shock on the economy.

Figure A.1 – Economic interactions captured in a CGE model

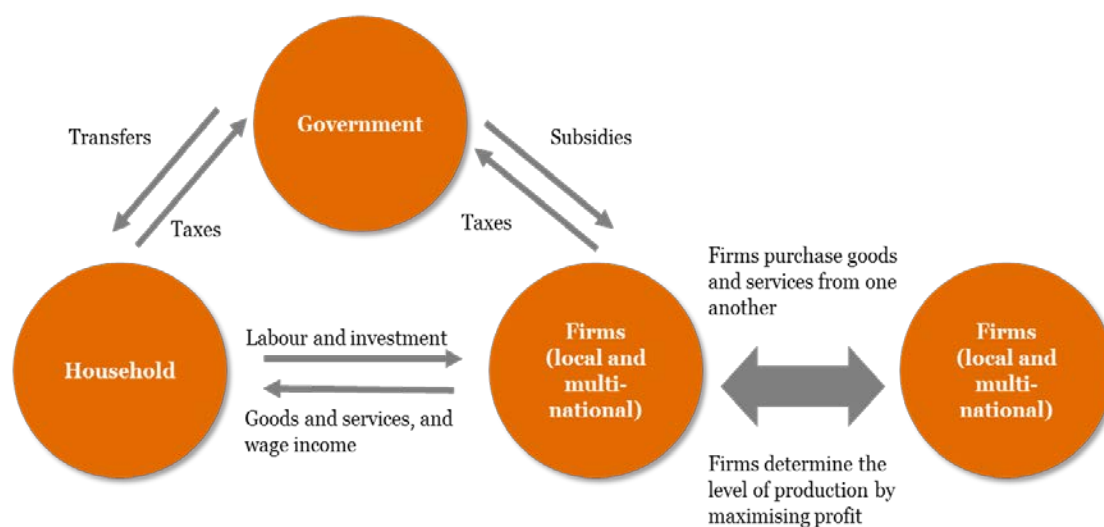


Figure A.1 shows the economic interactions between households, firms and the government captured in the CGE model. Each of these institutions is interlinked through either labour market or capital market flows, intermediate product demand, taxes or government transfers.

CGE modelling is built on the Walrasian General Equilibrium Structure which was developed and refined by inter alia, Arrow and Debreu (1954), Debreu (1959), and Arrow and Hahn (1971)<sup>55</sup>. International policymakers such the International Monetary Fund (IMF), World Bank, Organisation of Economic Cooperation and Development (OECD) and several national governments (including the UK and Singapore) use similar models to quantify the impact of policy changes. CGE models are typically used to analyse the impact of trade and fiscal policies, and in past ten years, have been used to estimate the economic effects of policy measures to reduce greenhouse gas emissions. The OECD GREEN model built by Burniaux, Nicoletti and Martins (1992)<sup>56</sup> is one example of a CGE model developed for environmental studies.

The CGE model we use is based on the Global Trade Analysis Project (GTAP) database maintained by the University of Purdue. The latest release, GTAP9, models production and trade in goods and services between 140 regions<sup>57</sup> of the world, each of which sub-divided into 57 industry sectors. The regions are further aggregated together into the seven regions we laid out in Figure 3.2. Given the focus of this study, we also grouped the industry sectors into (i) agriculture, mining and manufacturing; (ii) utilities and construction, (iii) wholesale, retail and transport; (iv) financial services, (v) services to businesses, and (vi) all other services.

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<sup>55</sup> Sources include: “*Existence of an equilibrium for a competitive economy*”, *Econometrica* 22 (3): 265–290, Arrow and Debreu (1954), “*Theory of Value: An Axiomatic Analysis of Economic Equilibrium*”, New York: Wiley. Reprint. New Haven: Yale University Press, Debreu (1959), “*General Competitive Analysis*”, Holden-Day, San Francisco, Arrow and Hahn (1971)

<sup>56</sup> “*GREEN: A Global Model for Quantifying the Costs of Policies to Curb CO2 Emissions*”, OECD Economic Studies, 19 (Winter), Burniaux, Nicoletti and Martins (1992)

<sup>57</sup> Most of which are individual countries, but smaller economies may be grouped together. For example, 18 countries and territories in the Caribbean are grouped into a single region in the database.

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