Brexit & Hertfordshire:

Understanding the risks and potential impacts

Hertfordshire
Local Enterprise Partnership
PERFECTLY PLACED FOR BUSINESS

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Following the EU referendum on 23 June 2016, the UK voted to leave the EU (with 52% voting in favour of leaving). The official withdrawal process began when Article 50 was triggered on 29 March 2017, giving the UK until 29 March 2019 to negotiate an exit deal.

The challenges of analysing Brexit

There are a number of significant challenges in terms of analyzing the prospective economic risk and impacts of Brexit.

Firstly – the exact nature of Brexit has not been clearly defined.

Secondly – it is possible to analyse what is lost, but not what is gained, as there is no clear structure, proposals or examples to inform ourselves.

Thirdly, international trade, the international economy and the UK economy are interrelated in such complex and dynamic ways. This tends to require models that can deal with this level of complexity. But sometimes, individual views, based on partial judgments are given equal media attention.

Fourthly – there is significant uncertainty in the economy – we are at a point of major change, and it is challenging to understand how things will pan out. Uncertainty on its own is a great influence on the economy.

Scoping out what may change

From analysis of existing literature and commentary about Brexit, it is fairly certain that the following nice issues are pertinent:

1. International Trade and customs
2. Foreign Direct Investment and vulnerability to foreign takeovers
3. Market restructuring
4. Industrial restructuring
5. Labour markets and immigration
6. UK fiscal position
7. EU funding, networks and assistance
8. Macro-economic factors
9. Household real incomes

Every possible Brexit scenario is likely to have negative impacts

HM Treasury's initial forecasts of Brexit impacts have not come to pass, but Whitehall's recent briefing remains very cautious – and identifies negative economic consequences in every possible Brexit scenario. Other leading economic institutions and university departments have published similar conclusions.

The latest, and most robust analysis places the 'remain' areas at greatest risk

This is because analysis has revealed that service and technology industries are significantly at risk from changes to international trade and customs regimes, and these are important in the Greater South East of England and large cities in the UK.

According to LSE analysis, two districts in Hertfordshire, Watford and East Hertfordshire are in the top 10 local areas at risk from Hard Brexit This is due to local industrial specialisations.

There is broad agreement on the direction of change post-Brexit

There is broad consensus amongst leading economic research institutes for a negative impact on GDP growth, Foreign Direct Investment and living standards.

Studies forecast a 1 to 3 per cent reduction in GVA in the event of a soft Brexit, and 3 to 8 per cent reduction in GVA in the event of a hard Brexit. Putting this in context, the 2009 recession led to a reduction in GVA of 4.1 per cent over the year in 2009.

All income classes of households are vulnerable

Analysis, such as that from the LSC Centre for Economic Performance suggests that household income across all economic and social classes will be affected.

Summary: potential Brexit risks for Hertfordshire

Both manufacturing and services industry exports are internationally traded

Pharmaceuticals have a significant value of imports and exports, and therefore international trade is a significant aspect of this industry, employing 2,100 in Hertfordshire.

Other sectors with a high value of exports relative to total GVA, and that are significant employers in Hertfordshire include Manufacture of other transport equipment (employing 2,100 in Hertfordshire, and a classification which includes Aerospace), Manufacture of machinery and equipment not elsewhere classified (2,800), Other professional, scientific and technical activities (5,500), and Office administrative, office support and other business support activities (8,500).

Between 50,000 and 75,000 jobs in Hertfordshire could be dependent upon international trade

By applying the proportion of GVA value dependent upon imports and exports by detailed sector and applying this to employment in each sector in Hertfordshire – we have a simple way of estimating how many jobs are 'at risk' from disruption to international trade and customs arrangements changing.

In this way, we can estimate that 50,000 to 75,000 jobs in Hertfordshire may be affected by changes to international trading relationships – or between 7.5 and 15.0 per cent of total jobs.

In Hertfordshire, financial services and aerospace are significant industries that have supply chains and benefit from market integration with the EU

Hertfordshire has a significant number of employees in Financial services (12,400) and Aerospace (2,000). In particular, Aerospace employment is concentrated in Stevenage (1,300 jobs).

The financial services industry is the most at risk if there is a withdrawal of EU migrant labour

The most exposed broad industrial group to EU migrant workers nationally is Financial and business services, where 4.1 per cent of employees were born outside of the UK in an EU country. Hertfordshire is particularly exposed to this industry, as it accounted for 30.1 per cent of employees in 2016 compared to 22.8 per cent nationally (GB). St Albans has a high share of total employment in financial and business services, at 36.7 per cent.

National insurance number registrations from EU nationals have decreased since 2016

Total National Insurance Number registrations from EU residents has declined from 10,400 in March 2018 to 7,469 in March 2016.

Increases in prices may affect certain income groups and neighbourhoods more significantly

Deprivation and vulnerability to price rises is not widespread or of a significant scale in Hertfordshire, but may seriously effect certain individuals, households and neighbourhoods.

1. Understanding Brexit

Introduction

Following the EU referendum on 23 June 2016, the UK voted to leave the EU (with 52% voting in favour of leaving). The official withdrawal process began when Article 50 was triggered on 29 March 2017, giving the UK until 29 March 2019 to negotiate an exit deal. The impact of the vote to leave the EU is likely to be one of the largest potential economic impacts on the UK economy, in both the short and long-run. However, the magnitude of these effects remains unknown as they depend on the eventual form of Brexit, and knowledge of the post-Brexit UK economic environment across a range of dimensions such as trade, migration, and regulation.

The challenge of analysing Brexit

There are four significant points to make about appraising the impacts and consequences of Brexit:

1. It is difficult to appraise the impacts of a policy which has not been sufficiently defined

It is very difficult to appraise the impacts of new international trade agreements, regulatory regimes, or other market conditions when there is no detailed basis to do this (including timescales). Even with the latest proposals from HM Government (up until 17 July 2018), two years on from the EU referendum, and with the deadline to leave the EU set in March 2019, the UK Government has only just begun to set out a position on its preferred future model for international trade and the market relationship with the EU area. The next steps would be to secure EU member state agreement, and put more detail into how the proposals would be implemented.

2. It is possible to appreciate the impacts of known institutions and market relationships that will be lost, but not possible to quantify unknown institutions and relationships

There is, a lot of fairly sound analysis of current trading patterns and deals, international relations and regulatory regimes – and the role of trade in the economy. It is also easier to quantify existing activity such as trade volumes and sales, or the contribution of a particular industry to the nation's economy. So far, it has been possible to estimate the impacts of a loss of market access and trade, but not possible to appraise the (unknown) institutions and trade arrangements in the future.

3. Reputable sources of economic analysis, that use dynamic economic models are more reliable than individual views

We have tended to use and quote analysis from reputable sources that have examined hard data, and have sophisticated dynamic models of the UK and international economy. We give much less credence to individual economists' views. This is because international trade, the international economy and the UK economy are interrelated in such complex and dynamic ways. This tends to require models that can deal with this level of complexity.

4. Uncertainty in itself is a factor in determining economic outcomes

The exact nature of Brexit is currently very uncertain. This uncertainty, on its own, is an economic risk. Business and consumer confidence does not tend to thrive on uncertainty. Traditionally, the role of government has been to reduce and reverse business uncertainty, rather than to instigate and prolongue it.

Economic shocks are difficult to predict

The challenge with Brexit, is that, like any other major economic shock such as a recession, the precise impacts are hard to gauge. **What we do know is that:**

- **Economic forecasts and predictions become more unreliable in the face of major economic shocks**
- **Confidence can decline very quickly**. This can have quite serious impacts. Any perception in the market that there will be big declines in employment, consumer spending and/or business investment may have multiple impacts. For example:
- **There is no gradual adjustment.** Changes in behaviour tend to be abrupt, sweeping and significant. There is no smooth transition period. Businesses, in particular, will make bold decisions and actions in response to the new market environment. For example, even if there was a good transition deal for EU trade over 2-3 years with a new trade settlement in year 4, businesses will plan for the trade settlement in year 4 – which is the stable, long-term position. They will tend not to plan in a transitional phase.
- **There is a lot of 'switching' in the marketplace**. Businesses and consumers will continue to spend in the economy, but there can be a remarkable level of 'switching' between goods and services to save money and maximise utility.

Business and consumer behaviour can change quickly

Probably the most significant reflection from past experience is that once there is some degree of certainty about the future market, economic, or regulatory situation, businesses act swiftly to plan, restructure and operate. Consumers can also react quite quickly in terms of adjusting or switching spending. There is unlikely to be a gradual shift. We could witness some significant announcements and events in terms of industry and business restructuring, job losses, offshoring, or new jobs growth. And businesses tend to act first – they will not give much warning about what is about to happen.

We know more about Brexit's potentially negative impacts than the positives

It is obviously easier to analyse what might be lost in terms of trading and other international relationships post-Brexit, but very difficult to envisage the replacement trading relationships. This is because leaving the EU and forging new trade agreements and other relationships is an unprecedented situation. Historic trading links, pre-EU, are no longer of much relevance. The UK economic is structurally different, international trade has grown significantly, there are many new market players internationally (such as China), and international trade agreements are political agreements that often require lengthy negotiations, not market mechanisms.

Brexit will produce winners and losers, but leave many relatively unaffected

Not everyone will lose from Brexit. Some sectors will remain unaffected, particularly industries where the UK enjoys technological and market leadership. Such sectors often prove most adaptable.

Other sectors might benefit from the low value of sterling. Some might get bought out by foreign interests, who then enhance the performance of the firm or assets.

The UK has an open, flexible and dynamic economy. However, this has often been helped by the flexibility of immigration to solve labour demand problems, in the face of mixed capabilities in terms of the resident workforce, and an under-performing education and skills policy and delivery. While other market flexibilities (such as overseas control, market liberalisation, relatively open capital flows and financial services) will remain, creating a more rigid labour immigration policy will constrain the UK's ability to adjust.

The rest of this Chapter reviews the main studies concerning the potential impacts of Brexit.

Scoping out the potential impacts of Brexit

There have been a number of papers which have explored the potential economic issues, dynamics and consequences of Brexit. It is worth briefly discussing these here, and the main observations that have been made.

Firstly though, it is worth understanding the main economic issues that are important from the point of view of local and regional economies, which Brexit may affect:

International Trade and customs

Brexit will affect international trade and customs agreements. Which will affect the ability of UK businesses to export to foreign markets, and for the UK to import Foreign goods and services.

The EU is a major source of imports and exports for the UK. In 2013, the UK comprised one-sixth of the total value of economic output of the European Union. 10% of EU exports go to the UK; and 50% of UK exports go to the EU.

UK companies are relatively upstream in global supply chains, compared to companies in other European countries. The importance of the UK in international supply chains is particularly concentrated in a small number of sectors.

In terms of structural change – 50% of UK exports could potentially have to adhere to a new tariff regime, as would the significant value of EU imports into the UK. The ramifications (in terms of scale of change and new price/market dynamics) for export competitiveness, supply chains and consumer prices are potentially huge.

As well as tariff barriers to importing and exporting, there are non-tariff barriers such as the harmonisation of laws and regulations for certain industries, activities, and roles of governments. A number of industries, in particular financial services require an EU licencing system to operate in any EU country, where having an HQ in the EU is mandatory.

Harmonisation of markets, and free trade agreements can facilitate supply chain activities and customs unions (the regime for checking goods transferred across borders) between countries.

Whilst there may be opportunities from new trade agreements, and import substitution there is the potential disruption to market demand and supply caused by leaving or altering existing trade and customs relationships with the EU, and with areas that the EU has agreed free trade relationships with – such as Japan.

The vast majority of reputable economic studies forecast reduced GDP growth due to disruption or change of international trade relationships with the UK.

Foreign Direct Investment and vulnerability to foreign takeovers

Half of all European headquarters of non-EU firms are in the UK, with the UK hosting more HQs than Germany, France, Switzerland and the Netherlands put together .

The UK is the largest recipient of FDI in the EU and a lot of this investment has been contingent upon access to the EU single market. Many large European corporates are heavily invested in the UK and the commercial logic for this investment could be affected by Brexit.

Much inward investment activity is for activities in the UK which service, or are integrated with, EU markets. Changes to access or relationships with the EU may affect the UK's role in terms of inward investment going forward. The London School of Economics' empirical analysis[1] analysed at bilateral FDI flows between 34 OECD countries (including the UK) over the last three decades. Controlling for many other factors, the baseline estimate is that EU membership has raised FDI by about 28%.

The potential changes to market access (to the EU), immigration and work permits, and exchange rates would be significant considerations in any future business plans, particularly for businesses operating internationally, whether controlled by UK interests or ultimately owned overseas. Changes to some business fundamentals post-brexit would require some fairly radical and bold changes to business structures and operations.

The decline in the value of Sterling also has implications for the nature of FDI. It potentially makes UK assets and firms relatively more attractive for acquisition, as the relative cost in a foreign currency (such as US dollars) declines.

Market restructuring

Businesses and markets tend to make bold and speedy changes to operating plans and structures once they have clarity over future economic or

[1] Swati Dhingra, Gianmarco Ottaviano, Thomas Sampson and John Van Reenen (2016), CEP Brexit Analysis No. 3, The impact of Brexit on foreign investment in the UK, Centre for Economic Performance, London School of Economics.

market conditions. This can have local consequences in terms of closures and relocations.

Industrial restructuring

Significant changes to trade relationships, ability to attract and retain immigrant labour, and to operate internationally may severely constrain industries such as financial services and automotive industries, which make significant contributions to the UK economy.

Labour market and immigration

There are two potential effects of labour supply on the UK - the risk of stricter immigration regimes making it harder to recruit foreign workers; and Brexit causing workers originating from the EU to withdraw their labour and relocate to another EU country. There is not much spare capacity in the UK labour market, amongst UK citizens resident here, and where there is spare capacity there are often problems of low skills, or other barriers to effective work such as health and disability.

If the UK adopts the Norwegian or Swiss models the UK would still need to sign up to the free movement of labour. Under the other models the government could choose to align EU immigration with the non-EU points system. Tier 1 (highly skilled, entrepreneurs) and Tier 2 (skilled, graduate) immigration quotas would need to be raised significantly if the flow of immigration in these categories is not to be seriously disrupted. Tier 3 (unskilled) quotas are currently closed.

There is a real risk that immigrant labour supply may be constrained for industries that cannot meet their workforce needs through the resident UK workforce – e.g. those requiring high skills, specialist, or lower skilled seasonal workers. This includes some public services, such as health, where there are insufficient numbers of trained UK residents.

UK fiscal position

In the short- to – medium – term, if mainstream economic opinion is right – the UK's rate economic growth will be constrained. Business activities and investment are likely to be curtailed. Employment is subject to the use of migrant labour, who contribute taxes to the UK Exchequer.

On average, migrants have contributed 34% more in fiscal terms to the UK than they have taken out, or £22.1 billion in total in 2011 terms[2]. It is not unreasonable to assume that, given the current lack of spare capacity in UK citizens resident here, that employment will decline due to EU citizens withdrawing their labour – either because their immigration status does not allow them to work, or that they choose to work elsewhere in the EU.

Therefore, with constrained economic growth and declining employment - the fiscal situation likely to deteriorate.

EU funding, networks and assistance

Over the current 2014-20 cycle, English regions will gain €2,665m in European funding before match funding.

The UK receives more funding from the European Research Council than any other country and 50% more than Germany, allowing UK universities to fund more than 10% of project-based research from EU contributions[3]. Ten of the top twenty universities in the FP7 programme are in the UK, including the top three[4]. UK researchers benefit from the pan-European collaboration encouraged by programmes like Horizon 2020. The automotive, aerospace, pharmaceuticals, and chemicals sectors are among the beneficiaries.

In early 2014 restrictions were placed on Swiss researchers accessing European Research Council grants following a dispute with the EU over free movement of persons. While the UK would most likely access science funding outside the EU, the Swiss experience shows this cannot be taken for granted. The UK is also likely to have less influence over research priorities following Brexit.

There are consultations underway to inform the development of the UK Shared Prosperity Fund – that will replace EU structural funds. However, there are no proposals on how membership of EU research funding programmes and projects will continue, or how they could be replaced.

Greater government intervention in the economy is unlikely, because any trade agreement (with any nation) will try to minimise non-tariff barriers to trade, such as public ownership and grant aid. For example, the proposed harmonisation with EU free trade and customs regulations will likely mean that the UK will have to continue to abide by EU State Aid law.

Macro-economic factors

So far, the UK's fiscal credibility has not been affected in international markets, the main impact of Brexit has been to depress sterling exchange rates.

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[2] Dustmann and Frattini, The Fiscal Effects of Immigration to the UK', UCL Centre for Research and Analysis of Migration, November 2013.

[3] HM Government, Review of the Balance of Competences between the UK and the EU: Research and Development.

[4] Sixth FP7 Monitoring Report, August 2013.

However, any shock or disruption to the economy could, in theory, cause a number of macroeconomic factors to shift in terms of market behaviour, or government responses to economic instability, such as:

- Further exchange rate fluctuations
- Assessments of credit ratings of sovereign UK debt
- Assessments of credit ratings of UK domiciled public corporations (i.e. traded on international stock markets)
- UK interest rates
- Monetary stimulus

Uncertainty

Uncertainty about market structures and economic environment tends to lead business/industry to withhold investment and delay recruitment. It can also constrain household spending and investment, including housing market transactions. This could potentially be mitigated by the UK government having a credible and clear strategy and actions for Brexit and management of the economy.

Household real incomes

The general consensus is that disruption to trade agreements and flows would lead to an increase in the prices of consumer goods and necessities such as food. An increase in the prices of basic goods impacts low income households hard, as it means that their 'real income' – their household budget – does not afford as many items. In effect, real incomes decline. An increase in the prices of basic goods means that there is less income left over for other purchases. Not only does this affect impact upon household real incomes, but upon health and deprivation, and, consumer spending in the wider economy.

This is the type of effect we witnessed in the most recent recession in 2009, with the switching of expenditure to cheaper items, and the rise in popularity of discount retailers and online shopping – to reduce household costs in the face of declining real incomes.

Review of Brexit impact studies

Introduction

Prior to, and since the 2016 EU Referendum, there have been numerous economic analyses of the potential implications and impacts of Brexit.

In this report, there is a focus on analysis from reputable sources that have examined hard data, and have sophisticated dynamic models of the UK and international economy. Much less credence to individual economists' views. This is because international trade, the international economy and the UK economy are interrelated in such complex and dynamic ways. This tends to require models that can deal with this level of complexity.

There are a number of papers which support very positive economic outcomes from Brexit (Economists for Brexit) – however, these are lacking sophisticated analysis and dynamic modelling – and having been criticised for ignoring empirical analysis of trade data[5]. This paper focuses on reports and analysis which have used data and modelling robustly.

This section summarises the main findings from studies, with more details provided in **Appendix A**.

Studies prior to the eu referendum

HM Treasury long-term analysis

Before the EU Referendum, HM Treasury published the report "The Long-Term Economic Impact of EU Membership and The Alternatives" This report focused on a period of 15 years following the referendum, by which point the nature of the UK's future relationship with the EU would be clear and the economy would have adjusted to the new economic reality.

The analysis in the long-term document sets out a range for each alternative, with a central estimate that gross domestic product (GDP) would be £4,300 lower in 2015 terms for each household after 15 years and every year thereafter.

HM Treasury analysis of immediate economic impact

In May 2016, HM Treasury published an additional report: its analysis of the immediate economic impact of leaving the EU. The central conclusion of the analysis is that the effect of this profound shock would be to push the UK into recession and lead to a sharp rise in unemployment. After two years, GDP would be around 3.6 per cent lower in the shock scenario compared with a vote to remain. In this scenario, the analysis shows that the fall in the value of the pound would be around 12 per cent, and unemployment would increase by around 500,000, with all regions. It was further forecast that the unemployment rate would rise by 1.6 percentage points, and that there would be an additional £24 billion of Public Sector Net Borrowing.

Of course, the immediate economic impact as predicted by HM Treasury has not come to pass. The UK's economic performance has remained positive, although muted over the past two years.

Studies since the eu referendum result

All studies are in agreement that disruption to international trade will have negative consequences, with differences over the degree of impact on economic growth rates.

LSE Centre for Economic Performance

Living standards: the LSE's Centre for Economic performance projects reduced GDP growth as a result of Brexit – estimating a loss of 6.3 per cent to 9.5 per cent of GDP in total (between £4,200 and £6,400 per household).

Foreign Direct Investment: LSE estimate is that EU membership has raised FDI by about 28 per cent. The LSE use existing macroeconomic estimates of how FDI affects growth combined with a very conservative estimate of the impact of Brexit – predicting a 22 per cent fall in FDI over the next decade which would cause a 3.4 per cent decline in real income – about £2,200 of GDP per household. The LSE's estimates of the impact of Brexit on the UK's car industry[6] imply that UK production would fall by 181,000 cars (12 per cent) and prices would rise by 2.5 per cent. Even if the UK manages a comprehensive trade deal and keeps tariffs at zero, production would fall by 36,000 cars.

Brexit and the impact of immigration on the UK. Evidence in this Report shows that the areas of the UK with large increases in EU immigration did not suffer greater falls in the jobs and pay of UK-born workers. The big falls in wages after 2008 are due to the global financial crisis and a weak economic recovery, not to immigration.

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[5] See Thomas Sampson, Swati Dhingra, Gianmarco Ottaviano and John Van Reenen (2016), LSE CEP Brexit Paper 06.

[6] Swati Dhingra, Gianmarco Ottaviano, Thomas Sampson and John Van Reenen (2016), CEP BREXIT ANALYSIS No. 3, The impact of Brexit on foreign investment in the UK, Centre for Economic Performance, London School of Economics.

There is also little effect of EU immigration on inequality through reducing the pay and jobs of less skilled UK workers. Changes in wages and joblessness for less educated UK born workers show little correlation with changes in EU immigration.

Evidence shows that EU immigrants pay more in taxes than they take out in welfare and the use of public services. They therefore help reduce the budget deficit. Immigrants do not have a negative effect on local services such as crime, education, health, or social housing

How the costs of Brexit would be distributed across income groups. The LSE calculates that after Brexit, prices would go up most in transport (a price hike of between 4 per cent and 7.5 per cent), alcohol (4 per cent to 7 per cent), food (3 per cent to 5 per cent) and clothing (2 per cent to 4 per cent). These product groups rely a lot on imports. By contrast, prices for services would rise the least. The analysis further concludes that the living standard of every income group would be lower after Brexit due to these higher prices. Those on middle incomes would suffer slightly more in proportionate terms than the richest and poorest households.

Looking solely at the 'static' short-run impact of trade, the income (not GDP) of the average UK household would drop by 1.8 per cent (£754) per year in our most 'optimistic' scenario where the UK joins countries like Norway in the European Economic Area. Income would fall by 4 per cent per year (£1,637) if the UK were to trade under World Trade Organization rules (in our more realistic 'pessimistic' scenario). If the longer-run dynamic effects of Brexit on productivity are taken into account, the average household would lose between 6.1 per cent and 13.5 per cent of their real incomes per year (£2,519 to £5,573).

For the poorest tenth of households (the bottom decile), real income losses would be 1.7 per cent to 3.6 per cent in the short run and 5.7 per cent to 12.5 per cent in the long run. For the richest households, the short-run losses would be 1.8 per cent to 3.9 per cent and the long-run losses 6 per cent to 13.4 per cent. These are only very slightly smaller than the losses suffered by the middle classes.

Cambridge Econometrics analysis prepared for the Greater London Authority

Cambridge Econometrics undertook an analysis of the likely implications of a variety of Brexit Scenarios in January 2018, focusing on the UK and London.

Five scenarios were developed to model five possible outcomes for the UK and London of the UK leaving the European Union Customs Union and Single Market.

Scenario 1: reflects a status quo situation where the UK remain in the Single Market and Customs Union (the baseline)

Scenario 2: the UK is part of the EEA, but not the Customs Union

Scenario 3: the UK is part of the Customs Unions, but not the EEA

Scenario 4: (the closest scenario to the government's current position) has a two year status quo transition period for two years, with no EEA membership, no customs union membership and EU/UK trade under WTO rules

Scenario 5: is a more extreme outcome of Scenario 4 with no transition period.

The modelling results show to the year 2030 that Brexit will have a negative impact on the UK economy across all key indicators, in particular, investment. Unders Scenario 2, the UK is expected to experience a loss of 1.0 per cent (£18.6bn) in GVA by 2030, 6.7 per cent (20.2bn) in investment and 0.5 per cent (176,000 people) in employment (compared to what may have happened if the UK remained in the Single Market and Customs Union).

Under Scenario 4, this loss would be 2.7 per cent (£49.1bn) in GVA, 13.8 per cent (£41.6bn) in investment and 1.4 per cent (468,000 people). Under Scenario 5, this loss would be 3.0 per cent (£54.5bn) in GVA, 15.4 per cent (£46.7bn) in investment and 1.5 per cent (482,000 people). The fall in the value of investment is greater than that of overall GVA, as the expected fall in imports is greater than the fall in exports, so the improvement in the trade balance helps recover some of the loss in investment.

CITY REDI analysis of Brexit risks for 54 industries

A recent report (December 2017)[7] for the University of Birmingham's City REDI[8] undertook an assessment of Brexit Risks for 54 Industries. This study employs the most recent data (for 2014) in the 2016-release of WIOD, the World Input-Output Database (www.wiod.org) which links global trade flows between 54 industries in 44 countries to the

[7] Bart Los, Wen Chen, Philip McCann and Raquel Ortega Argilés (2017) An Assessment of Brexit Risks for 54 Industries: Most Services Industries are also Exposed, Birmingham City REDI.

[8] City REDI was established by the University of Birmingham with over £4 million of investment to support regional economic growth policy and practice through engaged and relevant research. It's core objective is to help accelerate economic growth in the West Midlands city-region.

internal industrial structure of the economies, plus domestic and international transactions regarding purchases of consumer goods and capital goods.

The study is interesting, in that it reveals that a number of service sector industries are very exposed to Brexit. This analysis finds that 2.5 million UK jobs are exposed to Brexit. This represents about 8.2 per cent of total employment. 500,000 of these jobs are in adminstrative and support services. In wholesale trade, this number amounts to almost 275,000 workers, and in legal and accounting services another 172,000 jobs are at risk

For as many as 15 out of 54 industries, more than 20 per cent (up to 36 per cent) of value added is at risk. For some of these industries, such as the fisheries, chemicals manufacturing and motor vehicles manufacturing, these findings are as expected.

Local impacts of Brexit. Contrary to previous studies, the LSE concludes that areas in the South of England, and urban areas, are predicted to be harder hit by Brexit under both soft and hard Brexit scenarios. This pattern is explained by the fact that those areas are specialised in sectors that are internationally traded and embedded in cross EU-supply chains - are predicted to be badly hit by Brexit. The areas that were most likely to vote remain are those that are predicted to be most negatively impacted by Brexit. **Figure 1** summarises the estimated local impacts for each local authority district within Hertfordshire. **It shows that Watford and East Hertfordshire are in the top 10 of worst hit localities in a Hard Brexit scenario.**

Cross-Whitehall briefing on Brexit

The EU Exit Analysis: Cross Whitehall Briefing is the official work of cross-departmental economists, and it has been put together in a different way to the pre-referendum Treasury forecasts. It is claimed that the work was done to give a "broad directional" picture on the "best available evidence".

The main conclusions are:

- Even with a Free Trade Agreement "market access would be hampered almost to the same extent as the World Trade Organisation scenario". It stresses the limitations "of the current equivalency regimes".
- These factors among others mean that "London's status as a financial centre could be severely eroded".
- The PM's "Florence model" out of the customs union could lead to "high" customs barriers and some "low" tariffs.
- Only the "Customs Partnership" option, described as "blue skies" by David Davis, would maintain zero customs barriers.
- A "no deal" outcome, even one mitigated ahead of time, would lead to "high" customs barriers, "high" trade barriers away from borders and "high" tariffs with the EU.

Overall, the UK is predicted to suffer a 1.5 per cent drop in GDP while remaining in the EU's single market via the European Economic Area (EEA), a 5 per cent drop if it agrees a free trade deal, and an 8 per cent drop if Britain leaves the EU without a deal and reverts to trading on World Trade Organisation terms.

Regional impacts have been estimated. The impacts will hit sectors most exposed to European trade, and in turn regions such as the North East, West Midlands and Northern Ireland which have the highest concentrations of such trade.

North East England will suffer a 16 per cent hit to GDP in the event of a 'no-deal' Brexit according to the Government's own analysis. It is the only region of England with a surplus in goods trade with the EU, and also has the highest per capita EU funding of any English region. The East of England is projected to have a 8.0 per cent loss of GDP with hard Brexit.

FIGURE 1: LSE CEP ANALYSIS OF LOCAL IMPACTS: POTENTIAL GVA LOSS IN EACH HERTFORDSHIRE DISTRICT

Ranking by severity of GVA contraction under hard Brexit	Local Authority	Soft Brexit	Hard Brexit
4	Watford	-1.5	-3.1
6	East Hertfordshire	-1.5	-2.8
14	Three Rivers	-1.4	-2.8
18	St Albans	-1.3	-2.7
21	Hertsmere	-1.4	-2.7
58	Broxbourne	-1.3	-2.5
60	Welwyn Hatfield	-1.3	-2.5
63	Dacorum	-1.3	-2.5
98	Stevenage	-1.3	-2.4

Source: Swati Dhingra, Stephen Machin and Henry G. Overman (2017) The Local Economic Effects of Brexit, LSE CEP Brexit Paper 10.

Framework for analysing potential Brexit impacts

This report analyses the potential risks from Brexit to Hertfordshire using available economic data and evidence. The focus here is the risks that can be quantified for Hertfordshire.

There are three strands to this analysis

1. Industries at risk due to trade and customs arrangements
2. Industries at risk due to dependence on EU labour
3. Local incomes at risk due to price rises

These are explored in more detail as follows.

Industries at risk due to trade and customs arrangements

A number of approaches have been taken, outlined as follows.

Trade risk

The first is to analyse which industries have a higher than average GVA contribution from imports and exports, per worker, and therefore have a greater propensity to generate GVA from international trade.

Using Input-Output tables for the UK economy (Office for National Statistics), we get a value for imports in terms of GVA contribution to goods and services can be determined, and we can also determine the GVA value of export goods.

For each industry, the percentage of total GVA from imports and exports can be determined. This percentage rate is then applied to total employment in Hertfordshire in order to understand jobs potentially at risk.

A detailed analysis is included in **Appendix B.** In the **Chapter 2**, an analysis and narrative is provided.

Supply chain risk

The second is to analyse industries where their embeddedness within international supply chains, particularly within the EU, are well known.

Many of the UK companies who trade internationally are relatively upstream in global supply chains, compared to companies in other European countries. The importance of the UK in international supply chains is particularly concentrated in a small number of sectors. In 2009 the UK exported almost $54bn of business and financial services into the supply chains of other countries, with companies in other EU countries accounting for a large proportion[9]. In the same year the UK exported over $30bn of mining and chemical products and over $20bn in the transport, telecom, and wholesale and retail sectors into international supply chains.

Those industries with the greatest supply chain risk due to trade and customs disruption with the EU include:

- Chemicals
- Pharmaceuticals
- Aerospace
- Automotive
- Financial services

In the next sections, Hertfordshire's exposure to these industries is assessed.

Industries at risk due to dependence on EU labour

The latest official data on the nationality of those in work in the UK from January to March 2018 are that:

- There were 28.73 million UK nationals working in the UK, 417,000 more than for a year earlier.
- There were 2.29 million EU nationals working in the UK, 28,000 fewer than for a year earlier.
- There were 1.25 million non-EU nationals working in the UK, 20,000 more than for a year earlier.

The employment rate (the proportion of people aged from 16 to 64 years who were in work) was 81.9% for EU nationals, higher than that for UK nationals (75.6%) and higher than that for non-EU nationals (63.0%).

Certain industries employ a greater share of EU nationals in their workforce, as evidenced in **Figure 2**. It shows that Financial and business services are the most dependent on EU workers, representing

[9] OECD-WTO Trade in Value Added database

4.1 per cent of all employees, followed by Transport and Communications (3.1 per cent) and Wholesale and retail (3.1 per cent).

FIGURE 2: SHARE OF UK EMPLOYEES IN EACH INDUSTRIAL CATEGORY THAT ARE EU MIGRANT WORKERS AND NON-EU MIGRANT WORKERS IN 2016

	EU workers as % total	Non EU migrants as % of total
Agriculture, forestry and fishing	-	-
Energy and water	2.2%	2.9%
Manufacturing	2.4%	2.9%
Construction	1.9%	1.9%
Wholesale and retail trade	3.1%	4.3%
Transport and communication	3.1%	5.0%
Financial and business services	4.1%	4.7%
Public admin, education and health	2.4%	3.7%
Other services	2.6%	4.1%
Total	2.9%	3.9%

Source: Employment by Industry and Nationality for EU and non-EU workers, April 2016 to March 2017, Office for National Statistics, 2016.

Local areas at risk due to low incomes

A number of reputable university departments and institutions forecast a GVA and household income loss from Brexit (under all scenarios).

An increase in retail prices, particular for goods such as food and energy, are also forecast as a result of Brexit.

This paints a picture of increasing pressure on household incomes in terms of income loss and price rises for essential goods and services.

This means that low income households are vulnerable to Brexit, and in the following Chapter we try to quantify this vulnerability.

2. Estimating potential Brexit risks for Hertfordshire

Industries at risk due to trade and customs arrangements

Industrial sectors that are more dependent upon imports

Figure 3 lists the industrial sectors where the value of imports as a percentage of GVA value (for the UK) is above 20 per cent. The manufacture of basic pharmaceutical products and pharmaceutical preparations industry's exports are significant by value nationally. This industry is also a significant employer in Hertfordshire, with 2,100 employees.

Wholesale trade is also reliant on imports – making up 82.3 per cent of the value of GVA.

Industrial sectors that are more dependent upon exports

Figure 4 examines export value as a percentage value of GVA for industrial sectors, and lists those sectors where this value exceeds 20 per cent. Top of this list is insurance, reinsurance and pension funding, where nationally, export values are 55.3 per cent of the value of GVA. This sector employs 2,300 in Hertfordshire. Again, the manufacture of basic pharmaceutical products and pharmaceutical preparations industry's exports are 41.1 per cent of its value of GVA, with the value of exports per employee at £727,072 in 2015.

Other sectors with a high value of exports relative to total GVA, and that are significant employers in Hertfordshire include Manufacture of other transport equipment (employing 2,100 in Hertfordshire, and a classification which includes Aerospace), Manufacture of machinery and equipment not elsewhere classified (2,800), Other professional, scientific and technical activities (5,500), and Office administrative, office support and other business support activities (8,500).

When we look at the list of industry categories where exporting makes up a significant value of outputs, or the basic price of exports per employee is very high – it is important to note that nationally, this includes service industries as well as manufacturing activities.

Between 50,000 and 75,000 jobs in Hertfordshire could be dependent upon international trade

Figure 5 takes the value of exports as a share of the value of GVA, and then applies this ratio to total employment in each sector. We then sum the total jobs 'at risk' for each geographical area. These values are best viewed as the potential numbers of jobs linked to international trade. It is not possible to estimate direct changes to jobs – either losses or gains – from changes to trading arrangements. This is because firms and industries will vary considerably on how they adapt to changes, and the exposure of individual firms to EU market relationships is not fully known.

In this way, we can estimate that 50,000 to 75,000 jobs in Hertfordshire may be affected by changes to international trading relationships – or between 7.5 and 15.0 per cent of total jobs.

In Hertfordshire, financial services and aerospace are significant industries that have supply chains and benefit from market integration with the EU

Figure 6 provides data on the presence of Chemicals, Pharmaceuticals, Aerospace, Automotive and Financial services industries in Hertfordshire.

Hertfordshire has a significant number of employees in Financial services (12,400) and Aerospace (2,000). In particular, Aerospace employment is concentrated in Stevenage.

FIGURE 3: INDUSTRIES DEPENDENT ON IMPORTS

2-digit industrial classification	Total employment, 2016		Share of total employment, 2016		import as % of supply, 2016	export as % of demand, 2015	exports per employee, 2015	Employment quotient, 2016
	Hertfordshire	Great Britain	Hertfordshire	GB				
46 : Wholesale trade, except of motor vehicles and motorcycles	29,500	1,158,000	4.9%	4.0%	82.3%	100.0%	212	1.2
26 : Manufacture of computer, electronic and optical products	2,500	112,000	0.4%	0.4%	49.0%	25.8%	225,671	1.1
28 : Manufacture of machinery and equipment n.e.c.	2,800	162,500	0.5%	0.6%	44.2%	42.8%	153,240	0.8
27 : Manufacture of electrical equipment	1,800	73,500	0.3%	0.3%	43.7%	25.1%	117,943	1.2
21 : Manufacture of basic pharmaceutical products and pharmaceutical preparations	2,100	35,500	0.4%	0.1%	42.0%	41.2%	727,072	2.9
30 : Manufacture of other transport equipment	2,100	136,000	0.4%	0.5%	42.0%	48.6%	210,473	0.8
24 : Manufacture of basic metals	400	68,500	0.1%	0.2%	41.5%	40.8%	263,200	0.3
29 : Manufacture of motor vehicles, trailers and semi-trailers	600	161,500	0.1%	0.6%	41.4%	27.0%	221,658	0.2
90 : Creative, arts and entertainment activities	1,000	87,000	0.2%	0.3%	32.6%	32.8%	67,583	0.6
16 : Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	800	75,500	0.1%	0.3%	32.2%	3.3%	6,144	0.5
32 : Other manufacturing	2,300	70,500	0.4%	0.2%	30.4%	25.5%	174,968	1.5
22 : Manufacture of rubber and plastic products	1,900	148,000	0.3%	0.5%	30.2%	20.8%	47,748	0.6
20 : Manufacture of chemicals and chemical products	1,600	88,000	0.3%	0.3%	28.9%	30.8%	294,721	0.9
74 : Other professional, scientific and technical activities	5,500	214,500	0.9%	0.7%	26.1%	41.1%	70,872	1.2
55 : Accommodation	4,800	463,000	0.8%	1.6%	25.2%	18.2%	17,995	0.5
31 : Manufacture of furniture	700	85,500	0.1%	0.3%	24.8%	5.0%	14,156	0.4
82 : Office administrative, office support and other business support activities	8,500	505,000	1.4%	1.7%	24.5%	40.8%	53,074	0.8
17 : Manufacture of paper and paper products	400	52,000	0.1%	0.2%	23.9%	8.3%	43,037	0.4

FIGURE 4: INDUSTRIES DEPENDENT ON EXPORTING, AND WITH A HIGH VALUE OF EXPORTS PER EMPLOYEE

2-digit industrial classification	Total employment, 2016		Share of total employment, 2016		import as % of supply, 2016	export as % of demand, 2015	exports per employee, 2015	Employment quotient, 2016
	Hertfordshire	GB	Hertfordshire	GB				
65 : Insurance, reinsurance and pension funding, except compulsory social security	2,300	103,000	0.4%	0.4%	7.7%	55.3%	225,628	1.1
30 : Manufacture of other transport equipment	2,100	136,000	0.4%	0.5%	42.0%	48.6%	210,473	0.8
28 : Manufacture of machinery and equipment n.e.c.	2,800	162,500	0.5%	0.6%	44.2%	42.8%	153,240	0.8
21 : Manufacture of basic pharmaceutical products and pharmaceutical preparations	2,100	35,500	0.4%	0.1%	42.0%	41.2%	727,072	2.9
74 : Other professional, scientific and technical activities	5,500	214,500	0.9%	0.7%	26.1%	41.1%	70,872	1.2
24 : Manufacture of basic metals	400	68,500	0.1%	0.2%	41.5%	40.8%	263,200	0.3
82 : Office administrative, office support and other business support activities	8,500	505,000	1.4%	1.7%	24.5%	40.8%	53,074	0.8
90 : Creative, arts and entertainment activities	1,000	87,000	0.2%	0.3%	32.6%	32.8%	67,583	0.6
20 : Manufacture of chemicals and chemical products	1,600	88,000	0.3%	0.3%	28.9%	30.8%	294,721	0.9
29 : Manufacture of motor vehicles, trailers and semi-trailers	600	161,500	0.1%	0.6%	41.4%	27.0%	221,658	0.2
26 : Manufacture of computer, electronic and optical products	2,500	112,000	0.4%	0.4%	49.0%	25.8%	225,671	1.1
32 : Other manufacturing	2,300	70,500	0.4%	0.2%	30.4%	25.5%	174,968	1.5
27 : Manufacture of electrical equipment	1,800	73,500	0.3%	0.3%	43.7%	25.1%	117,943	1.2
22 : Manufacture of rubber and plastic products	1,900	148,000	0.3%	0.5%	30.2%	20.8%	47,748	0.6

FIGURE 5: ESTIMATING THE NUMBER OF EMPLOYEES AT RISK FROM DISRUPTION TO INTERNATIONAL TRADE ARRANGEMENTS

Area	Imports as % of supply (GVA)		Exports as % of demand (GVA)	
	Employees at risk	At risk as % of total employment	Employees at risk	At risk as % of total employment
Hertfordshire	53,700	8.9%	73,700	12.2%
Broxbourne	5,100	13.3%	6,200	16.1%
Dacorum	7,500	11.0%	10,300	15.2%
East Hertfordshire	5,400	8.6%	7,300	11.6%
Hertsmere	5,900	11.1%	8,100	15.2%
North Hertfordshire	5,600	10.6%	7,100	13.6%
St Albans	4,900	6.8%	7,600	10.5%
Stevenage	3,700	8.2%	4,400	9.9%
Three Rivers	3,200	7.8%	4,900	12.0%
Watford	6,600	7.1%	9,700	10.5%
Welwyn Hatfield	6,100	7.6%	8,400	10.5%
Buckinghamshire Thames Valley	29,200	12.5%	38,400	16.4%
Cheshire and Warrington	42,200	8.6%	54,600	11.2%
Greater Cambridge and Greater Peterborough	77,200	10.0%	91,500	11.9%
Thames Valley Berkshire	55,000	10.7%	79,000	15.3%
Great Britain	2,613,000	8.9%	3,299,300	11.3%

Source: Business Register and Employment Survey (2016), Input-Output Supply Use Tables (2010-2015), Office for National Statistics. This is calculated by applying the ration of that the basic value of imports and exports as a % share of GVA to employment in each industry.

FIGURE 6: INDUSTRIES WITH SUPPLY CHAIN RISKS - EMPLOYEES IN CHEMICALS, PHARMACEUTICALS, AUTOMOTIVE, FINANCIAL SERVICES

Industry	Automotive related	Aerospace	Chemicals	Finance and insurance	Pharmaceuticals
Hertfordshire	900	2,000	1,700	12,400	2,200
Broxbourne	0	0	0	600	0
Dacorum	100	0	100	1,000	0
East Hertfordshire	200	200	200	1,200	1,300
Hertsmere	0	0	0	2,200	700
North Hertfordshire	100	200	600	1,400	100
St Albans	100	0	100	1,500	0
Stevenage	100	1,300	0	900	0
Three Rivers	0	0	0	1,600	0
Watford	0	100	300	1,600	0
Welwyn Hatfield	200	200	300	600	200

Source: Business Register and Employment Survey (2016), Office for National Statistics.

Industries at risk due to dependence on EU labour

Office for National Statistics estimates for the percentage of EU workers in each broad industrial sector are a useful basis on which to compared Hertfordshire's exposure to such risks.

The financial services industry is the most at risk if there is a withdrawal of eu migrant labour

As can be seen in **Figure 7**, the most exposed broad industrial group (for the UK as a whole) to EU migrant workers nationally is Financial and business services, where 4.1 per cent of employees were born outside of the UK in an EU country. Hertfordshire is particularly exposed to this industry, as it accounted for 30.1 per cent of employees in 2016 compared to 22.8 per cent nationally (GB). St Albans has a high share of total employment in financial and business services, at 36.7 per cent.

3.1 per cent of workers in the wholesale and retail trade industrial category are from the EU – and this is again, another industry that accounts for a greater share of employees in Hertfordshire (17.7 per cent) than nationally (15.3 per cent). 24.8 per cent of employees in Welwyn Hatfield worked in this industrial group.

The next highest share of workers in the UK that were born in the EU is in Transport and communication (3.1 per cent). Hertfordshire has a similar share of employees (9.1 per cent) in this industry group compared to nationally (9.1 per cent). 15.1 per cent of employees worked in this industry group in Dacorum.

National insurance number registrations from EU nationals have decreased since 2016

Figure 8 details National Insurance Number registrations in Hertfordshire and the UK. As can be seen, total registrations from EU residents has declined from 10,400 in March 2018 to 7,469 in March 2016. National Insurance Number registrations from the rest of the world were fairly similar over this period – from 2,628 in March 2016 to 2,648 in March 2018.

In 2016, EU National Insurance Number registrations were equivalent to 1.0 per cent of the workforce in Hertfordshire compared to 1.1 per cent for the UK.

FIGURE 7: EMPLOYMENT IN BROAD INDUSTRIAL GROUPS IN HERTFORDSHIRE

Area	Manufacturing	Construction	Wholesale and retail trade	Transport and communication	Financial and business services	Public admin, education and health	Other services
% of workers who are EU Migrants in the UK	2.4%	1.9%	3.1%	3.1%	4.1%	2.4%	2.6%
							Total employment 2016
Hertfordshire	35,000	38,000	107,000	55,000	182,000	118,500	29,000
Broxbourne	2,750	3,500	9,125	2,525	11,250	5,750	1,375
Dacorum	4,500	3,250	13,750	10,250	14,900	13,500	3,250
East Hertfordshire	4,500	4,250	9,625	4,375	17,025	14,250	3,000
Hertsmere	2,500	5,500	9,875	5,750	12,275	10,000	3,250
North Hertfordshire	7,000	3,750	9,875	3,625	11,875	10,150	2,375
St Albans	1,750	3,750	11,000	6,250	26,450	12,900	3,750
Stevenage	5,500	1,500	6,900	3,375	8,750	13,500	2,375
Three Rivers	950	5,500	4,750	5,000	12,375	6,950	2,000
Watford	2,125	2,375	12,375	5,750	51,575	11,125	3,000
Welwyn Hatfield	3,750	4,250	20,000	7,500	15,800	20,000	4,750
England	2,049,500	1,144,500	3,906,000	2,405,000	5,980,000	6,568,000	1,160,000
Great Britain	2,368,000	1,346,500	4,449,500	2,649,000	6,636,000	7,726,000	1,338,500
							Share of total employment (excluding agriculture), 2016
Hertfordshire	5.8%	6.3%	17.7%	9.1%	30.1%	19.6%	4.8%
Broxbourne	7.1%	9.1%	23.7%	6.5%	29.2%	14.9%	3.6%
Dacorum	6.6%	4.8%	20.3%	15.1%	22.0%	19.9%	4.8%
East Hertfordshire	7.2%	6.8%	15.4%	7.0%	27.3%	22.8%	4.8%
Hertsmere	4.7%	10.3%	18.5%	10.8%	23.0%	18.7%	6.1%
North Hertfordshire	13.3%	7.1%	18.8%	6.9%	22.6%	19.3%	4.5%
St Albans	2.4%	5.2%	15.3%	8.7%	36.7%	17.9%	5.2%
Stevenage	12.4%	3.4%	15.6%	7.6%	19.7%	30.4%	5.4%
Three Rivers	2.4%	13.7%	11.8%	12.5%	30.8%	17.3%	5.0%
Watford	2.3%	2.6%	13.4%	6.2%	55.7%	12.0%	3.2%
Welwyn Hatfield	4.6%	5.3%	24.8%	9.3%	19.6%	24.8%	5.9%
England	8.1%	4.5%	15.4%	9.5%	23.6%	25.9%	4.6%
Great Britain	8.1%	4.6%	15.3%	9.1%	22.8%	26.6%	4.6%

Source: Business Register and Employment Survey, : Employment by Industry and Nationality for EU and non-EU workers, April 2016 to March 2017, Office for National Statistics, 2016.

FIGURE 8: NATIONAL INSURANCE NUMBER REGISTRATIONS

	March 2016			March 2018		
	Total	EU	Rest of World (ex-EU)	Total	EU	Rest of World (ex-EU)
Hertfordshire	13,068	10,440	2,628	10,117	7,469	2,648
Broxbourne	943	838	105	774	646	128
Dacorum	1,319	1,081	238	1,082	852	230
East Hertfordshire	1,265	1,088	177	1,056	918	138
Hertsmere	1,480	1,259	221	992	810	182
North Hertfordshire	624	457	167	471	332	139
St Albans	1,150	884	266	909	646	263
Stevenage	925	722	203	743	480	263
Three Rivers	600	453	147	445	336	109
Watford	2,313	1,845	468	1,825	1,239	586
Welwyn Hatfield	2,449	1,813	636	1,820	1,210	610
UK	823,366	627,220	196,146	667,059	474,397	192,662

Source: Department for Work and Pensions.

Local areas at risk due to low incomes

With Brexit, there is a potential threat of price inflation for imported goods, due to a depreciation of sterling and new trade arrangements (possibly with tariffs) or for domestically produced goods if labour costs increase. This is likely to affect household real incomes and welfare.

Low income groups amongst Hertfordshire Residents, and deprived neighbourhoods may be vulnerable.

As **Figure 9** details, No Hertfordshire districts were in the top 100 of deprived districts in England in 2015. The highest score of multiple deprivation is in Stevenage, placed 157th out of 326 local authority districts. For the separate measure of income deprivation – Stevenage ranked 118th in 2015, as presented in **Figure 10.**

Figure 11 presents information on neighbourhoods – the geographical unit of Lower Super Output Areas (LSOAs). It shows that 9 of Hertfordshire's LSOAs are amongst the top 20% deprived in England.

In sum – deprivation and vulnerability to price rises is not widespread or of a significant scale in Hertfordshire, but may seriously effect certain individuals, households and neighbourhoods.

FIGURE 9: INDEX OF MULTIPLE DEPRIVATION, 2015

Local Authority District name (2013)	IMD - Average rank	IMD - Rank of average rank (out of 326)	IMD - Rank of average score (out of 326)	IMD - Proportion of LSOAs in most deprived 10% nationally	IMD - Rank of proportion of LSOAs in most deprived 10% nationally (out of 326)	IMD - Rank of extent (out of 326)	IMD - Rank of local concentration (out of 326)
Broxbourne	14793.04	171	177	0	200	183	187
Dacorum	10266.72	260	261	0	200	252	247
North Hertfordshire	9675.86	271	269	0	200	237	244
Watford	13583.69	194	197	0	200	226	224
St Albans	5827.85	319	320	0	200	302	307
Welwyn Hatfield	11246.44	235	244	0	200	263	259
East Hertfordshire	6247.35	315	314	0	200	300	312
Stevenage	16405.04	137	157	0	200	219	217
Hertsmere	10943.21	247	243	0.0161	179	254	241
Three Rivers	7909.91	300	296	0.0189	176	243	253

Source: 2015 Index of Multiple Deprivation, Ministry of Housing, Communities & Local Government.

FIGURE 10: INCOME DEPRIVATION, 2015

Local Authority District name (2013)	Income - Average rank	Income - Rank of average rank (out of 326)	Income - Rank of average score (out of 326)	Income - Rank of Proportion of LSOAs in most deprived 10% nationally (out of 326)	Income - Rank of scale (out of 326)
Broxbourne	16133.95	141	145	211	193
Dacorum	12268.69	224	220	211	167
Hertsmere	12873.79	216	214	186	230
North Hertfordshire	11655.33	235	232	211	199
Three Rivers	10061.67	272	264	211	287
Watford	13898.58	189	202	211	241
St Albans	8253.09	296	296	211	245
Welwyn Hatfield	12952.5	214	216	211	213
East Hertfordshire	8121.92	297	297	211	250
Stevenage	18922.14	83	118	211	191

Source: 2015 Index of Multiple Deprivation, Ministry of Housing, Communities & Local Government.

FIGURE 11: DEPRIVATION IN LOWER SUPER OUTPUT AREAS IN HERTFORDSHIRE – THOSE IN THE MOST DEPRIVED 20% OF LOWER SUPER OUTPUT AREAS

LSOA name (2011)	Local Authority District name (2013)	Index of Multiple Deprivation (IMD) Rank (where 1 is most deprived)	Index of Multiple Deprivation (IMD) Decile (where 1 is most deprived 10% of LSOAs)
Hertsmere 006C	Hertsmere	3,049	1
Three Rivers 012D	Three Rivers	3,268	1
Stevenage 008D	Stevenage	4,216	2
Broxbourne 013C	Broxbourne	4,399	2
Watford 009B	Watford	5,005	2
Stevenage 009A	Stevenage	5,265	2
North Hertfordshire 009C	North Hertfordshire	5,822	2
Dacorum 008D	Dacorum	6,009	2
Broxbourne 013D	Broxbourne	6,292	2

Source: 2015 Index of Multiple Deprivation, Ministry of Housing, Communities & Local Government.

Appendix A: Brexit impact studies

Original HM Treasury analysis pre-referendum

Introduction

Prior to the EU Referendum, HM Treasury published two reports exploring the economic impacts. What is surprising is the severity of the impacts and the short term economic downturn if the UK decided to leave the EU, single market and customs union – and that these scenarios have yet to come to pass. This has somewhat damaged the credibility of economic modelling for Brexit impacts.

HM Treasury analysis: the long-term economic impact of EU membership and the alternatives

Before the EU Referendum, HM Treasury published the report "The Long-Term Economic Impact of EU Membership and The Alternatives" This report focused on a period of 15 years following the referendum, by which point the nature of the UK's future relationship with the EU would be clear and the economy would have adjusted to the new economic reality. That document concluded that the UK would be permanently poorer if it left the EU and adopted any of these alternative relationships.

The analysis in the long-term document sets out a range for each alternative, with a central estimate that gross domestic product (GDP) would be £4,300 lower in 2015 terms for each household after 15 years and every year thereafter. However, the impact of the transition effect would be considerably larger if the UK did not seek participation in the Single Market, as would be the case if it fell back on World Trade Organization (WTO) membership.

HM Treasury analysis: the immediate economic impact of leaving the EU

In May 2016, HM Treasury published an additional report: its analysis of the immediate economic impact of leaving the EU. The analysis in this HM Treasury document quantifies the impact of that adjustment over the immediate period of two years following a vote to leave.

Such a vote would trigger a redefinition not only of the UK's economic relationship with the EU and the rest of the world, but also of much of the UK's domestic economic policy, regulatory and legislative framework. A vote to leave would cause an immediate and profound economic shock creating instability and uncertainty which would be compounded by the complex and interdependent negotiations that would follow.

The central conclusion of the analysis is that the effect of this profound shock would be to push the UK into recession and lead to a sharp rise in unemployment.

In the shock scenario, a vote to leave would result in a recession, a spike in inflation and a rise in unemployment. The analysis shows that the economy would fall into recession with four quarters of negative growth. After two years, GDP would be around 3.6 per cent lower in the shock scenario compared with a vote to remain. In this scenario, the analysis shows that the fall in the value of the pound would be around 12 per cent, and unemployment would increase by around 500,000, with all regions

experiencing a rise in the number of people out of work. The exchange-rate-driven increase in the price of imports would lead to a material increase in prices, with the CPI inflation rate higher by 2.3 percentage points after a year.

In the severe shock scenario, the analysis shows that after two years the level of GDP would be 6 per cent lower, the number of people unemployed would rise by around 800,000, sterling would depreciate by 15 per cent and CPI inflation would increase by 2.7 percentage points after a year.

These scenarios do not allow for so-called 'tipping points', such as the crystallisation of financial stability risks. Nor do they incorporate the risk of a 'sudden stop' in financial inflows, reflecting concerns about the size of the current account deficit.

FIGURE A1: HM TREASURY ANALYSIS OF ECONOMIC IMPACTS OF BREXIT, 2016

Immediate impact of a vote to leave the EU on the UK (% difference from base level unless specified otherwise)

	Shock scenario[a]	Severe shock scenario[a]
GDP	-3.6%	-6.0%
CPI inflation rate (percentage points)	+2.3	+2.7
Unemployment rate (percentage points)	+1.6	+2.4
Unemployment (level)	+520,000	+820,000
Average real wages	-2.8%	-4.0%
House prices	-10%	-18%
Sterling exchange rate index	-12%	-15%
Public sector net borrowing (£ billion)[b]	+£24 billion	+£39 billion

[a] Peak impact over two years. Unemployment level rounded to the nearest 10,000. [b] Fiscal year 2017-18.

EU Exit Analysis: Cross Whitehall Briefing

The EU Exit Analysis: Cross Whitehall Briefing is the official work of cross-departmental economists, and it has been put together in a different way to the pre-referendum Treasury forecasts. It is claimed that the work was done to give a "broad directional" picture on the "best available evidence".

The main conclusions are:

- Even with a Free Trade Agreement "market access would be hampered almost to the same extent as the World Trade Organisation scenario". It stresses the limitations "of the current equivalency regimes".
- These factors among others mean that "London's status as a financial centre could be severely eroded".
- The PM's "Florence model" out of the customs union could lead to "high" customs barriers and some "low" tariffs.
- Only the "Customs Partnership" option, described as "blue skies" by David Davis, would maintain zero customs barriers.
- A "no deal" outcome, even one mitigated ahead of time, would lead to "high" customs barriers, "high" trade barriers away from borders and "high" tariffs with the EU.

The importance of non-tariff barriers

Non-tariff barriers. Such barriers of regulation, employment, standards etc are the "most material factor" – i.e. the most damaging to the economy.

When converted to an equivalent tariff, these numbers are very significant in certain sectors - retail, defence, agriculture, food and drink, motor vehicles and chemicals.

Under Whitehall's analysis, non-tariff barriers into European trade hugely outweighs the total impact of signing free trade deals with the US, Australia, New Zealand, the whole of the Trans Pacific Partnership, ASEAN, the Gulf Co-operation Council, China and India.

The single market is by its design meant to eliminate non-tariff barriers. Leaving the single market as a policy aim is also a policy to introduce non-tariff barriers into Britain's trade. These are the most important barriers for a service-based economy.

Estimate of regional impacts of various Brexit scenarios

Overall, the UK is predicted to suffer a 1.5 per cent drop in GDP while remaining in the EU's single market via the European Economic Area (EEA), a 5 per cent drop if it agrees a free trade deal, and an 8 per cent drop if Britain leaves the EU without a deal and reverts to trading on World Trade Organisation terms.

Regional impacts (**Figure A2**) have been estimated. The impacts will hit sectors most exposed to European trade, and in turn regions such as the North East, West Midlands and Northern Ireland which have the highest concentrations of such trade.

North East England will suffer a 16 per cent hit to GDP in the event of a 'no-deal' Brexit according to the Government's own analysis. It is the only region of England with a surplus in goods trade with the EU, and also has the highest per capita EU funding of any English region.

In the analysis, the West Midlands is forecast to be the region hit second-worst by a no-deal Brexit, with an estimated 13 per cent hit to GDP in such a scenario.

FIGURE A2: ESTIMATED GDP LOSS UNDER EACH BREXIT SCENARIO, EU EXIT ANALYSIS: CROSS WHITEHALL BRIEFING

	% FALL IN GDP UNDER EACH BREXIT SCENARIO		
REGION	EEA MEMBERSHIP	FREE TRADE AGREEMENT	WTO TERMS
North East	3.5	11.0	16.0
North West	2.5	8.0	12.0
Yorkshire & Humberside	1.5	4.5	7.0
West Midlands	2.5	8.0	13.0
East Midlands	1.5	5.0	8.0
East of England	1.5	5.0	8.0
London	<1.0	5.0	8.0
South East	1.5	5.0	7.0
South West	1.0	2.0	5.0
Scotland	2.5	6.0	9.0
Wales	1.5	5.0	9.0
Northern Ireland	2.5	8.0	12.0
UK	1.5	5.0	8.0

Source: EU Exit Analysis: Cross Whitehall Briefing

Preparing for Brexit: analysis prepared by Cambridge Econometrics for Greater London Authority

Cambridge Econometrics undertook an analysis of the likely implications of a variety of Brexit Scenarios in January 2018, focusing on the UK and London. It was noted that London has greatly benefited from the prevailing economic environment and a large international labour force, the consequences could be especially challenging.

Five scenarios were developed to model five possible outcomes for the UK and London of the UK leaving the European Union Customs Union and Single Market.

Scenario 1: reflects a status quo situation where the UK remain in the Single Market and Customs Union (the baseline)

Scenario 2: the UK is part of the EEA, but not the Customs Union

Scenario 3: the UK is part of the Customs Unions, but not the EEA

Scenario 4: (the closest scenario to the government's current position) has a two year status quo transition period for two years, with no EEA membership, no customs union membership and EU/UK trade under WTO rules

Scenario 5: is a more extreme outcome of Scenario 4 with no transition period

Assumptions were made for each scenario, focusing on the effects Brexit could have on trade, investment and migration/the labour market. The assumptions are based on a mix of: directly borrowing inputs from existing studies; making adjustments made on short-term evidence from the data; using existing information on government targets and guidelines; and making more judgemental assessments using additional literature.

The trade assumptions for each scenario, disaggregated by the type of trade costs (tariffs and non-tariff barriers), the flow of trade (imports and exports), the group of trading partners (EU and non-EU), and by sector were based on the assumptions used in the Dhingra et al (2016a[10]) study.

Recent changes in investment (a 1.5 per cent fall in the average year-on-year growth in total business investment over the last five quarters) from the ONS Business investment in the UK dataset were used in order to quantify the potential short-term change in investment due to uncertainty. The longer-term investment assumptions were made relative to the baseline trajectory in the form of a slowdown in investment growth. Taking into consideration that growth in total investment in the baseline (Scenario 1) is 1.9 per cent pa over 2021-30, it was assumed that growth in total investment would fall to 1 per cent pa over 2021-2030 in Scenarios 4 and 5, and assumed that the slowdown would be smaller in Scenarios 2 (1.5 per cent pa) and 3 (1.3 per cent pa).

The harder Brexit scenarios assumed that the government's tens of thousands migration target would be achieved, and the softer Brexit scenarios built up to this from Scenario 1, in which migration is based on the GLA 2016-based projections. Lastly, the assumptions for the impact on skills level and so productivity of the UK labour force from a change in migration patterns were based on the CEP study by Dearden, Reed and Van Reenen (2005), which estimated that the elasticity of productivity with respect to the proportion of trained (skilled) workers is 0.6.

The scenario results were driven by CE's macro-sectoral model, E3ME. E3ME is a global model that includes coverage of all of Europe's Member States and candidate countries, the world's largest economies and all other economies in groups. It has a detailed sectoral disaggregation, and the model has been used to develop many scenarios in order to model trade and other policy effects across the European Union and globally.

As expected, the more severe the type of Brexit (going from Scenario 2 to Scenario 5), the greater the negative impact will be on London and the UK. The results show that Brexit will not only reduce the size of the UK economy (compared to what may have happened if the UK remained in the Single Market and Customs Union), but also put it on a slower long-term growth trajectory (i.e. the economy is still growing, but at a slower rate than if the UK remained in the Single Market and Customs Union). So the cumulative change in GVA over time will keep increasing in the long-term.

Model results for Brexit scenarios

UK impacts

The modelling results show to the year 2030 that Brexit will have a negative impact on the UK economy across all key indicators, in particular,

[10] Dhingra S., Ottaviano G., Sampson T. and J. Van Reenen (2016b), The impact of Brexit on foreign investment in the UK. Centre for Economic Performance Brexit Analysis, No. 3. See http://cep.lse.ac.uk/pubs/download/brexit03.pdf

investment (see **Figure A3** below). The UK is expected to experience a loss of 1.0 per cent (£18.6bn) in GVA by 2030, 6.7 per cent (20.2bn) in investment and 0.5 per cent (176,000 people) in employment under Scenario 2 (compared to what may have happened if the UK remained in the Single Market and Customs Union).

This loss would be 2.7 per cent (£49.1bn) in GVA, 13.8 per cent (£41.6bn) in investment and 1.4 per cent (468,000 people) under Scenario 4 and 3.0 per cent (£54.5bn) in GVA, 15.4 per cent (£46.7bn) in investment and 1.5 per cent (482,000 people) in employment under Scenario 5. The fall in the value of investment is greater than that of overall GVA, as the expected fall in imports is greater than the fall in exports, so the improvement in the trade balance helps recover some of the loss in investment.

Impacts on London

London is expected to experience a loss of 0.8 per cent (£4.1bn) in GVA by 2030 and 0.6 per cent (30,500 people) in employment under Scenario 2 (compared to what may have happened if the UK remained in the Single Market and Customs Union), a loss of 1.9 per cent (£9.6bn) in GVA and 1.6 per cent (83,800 people) in employment under Scenario 4 and a loss of 2.1 per cent (£10.8bn) in GVA and 1.6 per cent (87,000 people) in employment under Scenario 5 (see table below).

London is not expected to be affected as much as the UK, in terms of GVA and productivity. This reflects that London has a higher concentration of higher-value sectors, which are more resilient, and are able to recover from economic shocks more quickly. Population (and so employment) impacts in London are noticeably stronger than in the UK. London has a larger proportion of non-UK workers, so border restrictions and a reduction in EU migration are expected to impact London the most.

Sector impacts

Financial & professional services, Science and Technology, Creative and Construction, which make up a high proportion of economic activity in the UK, particularly in London, are among the sectors hit the hardest by Brexit. Construction and Hospitality, which tend to require less skilled labour and employ a larger proportion of EU migrants than other key sectors, are expected to see larger impacts on employment in London than in the UK.

FIGURE A3: MODELLED IMPACTS OF BREXIT SCENARIOS ON THE UK ECONOMY TO 2030 – PERCENTAGE DECREASE IN GVA FOR EACH SCENARIO

	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Exports to rest of the world	-0.4	-0.6	-2.3	-2.3
Imports from rest of the world	-1.5	-2.3	-4.4	-4.6
Population	-0.7	-1.4	-2.2	-2.2
GVA	-1.0	-1.6	-2.7	-3.0
Investment	-6.7	-9.9	-13.8	-15.4
Employment	-0.5	-0.9	-1.4	-1.5
Productivity	-0.5	-0.7	-1.3	-1.5

Source: Cambridge Econometrics (2018) Preparing for Brexit, Greater London Authority, p8.

CITY REDI analysis of Brexit risks for 54 industries

Recent report finds significant brexit risks for service industries

A recent report (December 2017)[11] for the University of Birmingham's City REDI[12] undertook an assessment of Brexit Risks for 54 Industries. This study employs the most recent data (for 2014) in the 2016-release of WIOD, the World Input-Output Database (www.wiod.org) which links global trade flows between 54 industries in 44 countries to the internal industrial structure of the economies, plus domestic and international transactions regarding purchases of consumer goods and capital goods.

2.5 million uk jobs exposed to brexit, with 0.5 million jobs in adminstrative and support services

The figure reports the numbers of jobs exposed to Brexit in the 20 industries for which these numbers are largest. In administrative and support services activities, almost 0.5 million jobs are at risk. In wholesale trade, this number amounts to almost 275,000 workers, and in legal and accounting services another 172,000 jobs are at risk. In the UK economy as a whole, slightly more than 2.5 million jobs are exposed to the trade effects of Brexit.

This represents about 8.2 per cent of total employment. This is somewhat lower than the share of UK GDP at risk (8.5 per cent), which reveals that the workers in the jobs at risk are on average slightly more productive than the average British worker.

For as many as 15 out of 54 industries, more than 20 per cent (up to 36 per cent) of value added is at risk. For some of these industries, such as the fisheries, chemicals manufacturing and motor vehicles manufacturing, these findings are as expected.

Professional, scientific and technical activities are at risk

Professional, scientific and technical activities, activities auxiliary to financial services and wholesale trade are not only exported directly to EU countries, but also sell intensively to UK manufacturing firms exporting to the EU. Many of these services are far more exposed than financial services, the focus of much media debate.

Among the industries that are most exposed, a few have above-average labour productivity levels, such as pharmaceuticals manufacturing and mining and quarrying. There is no clear link between productivity and value added at risk shares, since other high-productivity industries like insurance services and real estate services are among the industries with (very) low exposure levels.

In aggregate, about 8.5 per cent of UK GDP –in 2014 almost £140 billion per annum -is at risk due to Brexit. The contributions of industries to this figure do not only depend on their exposure levels, but also on their relative size in terms of value added. Administrative and support services (including renting and leasing services) contribute most, followed by wholesale trade and legal and accounting services. Again, supply chain effects play a major role.

The study's review of academic research and literature suggests that the UK's ability to domestically substitute for EU imports is likely to be rather limited. Switching to more imports from other non-EU parts of the world (e.g. China) is likely to be widespread. This observation is particularly true for the manufacturing sector.

[11] Bart Los, Wen Chen, Philip McCann and Raquel Ortega Argilés (2017) An Assessment of Brexit Risks for 54 Industries: Most Services Industries are also Exposed, Birmingham City REDI.

[12] City REDI was established by the University of Birmingham with over £4 million of investment to support regional economic growth policy and practice through engaged and relevant research. It's core objective is to help accelerate economic growth in the West Midlands city-region.

FIGURE A4: TOP 20 INDUSTRIES IN TERMS OF NUMBERS OF JOBS AT RISK FROM BREXIT

Primary industries in light blue, manufacturing industries in dark blue.

Source: Bart Los, Wen Chen, Philip McCann and Raquel Ortega Argilés (2017) An Assessment of Brexit Risks for 54 Industries: Most Services Industries are also Exposed, Birmingham City REDI.

FIGURE A5: ESTIMATES OF GVA IMPACTS OF BREXIT SCENARIOS USING WORLD INPUT-OUTPUT DATABASE (WIOD)

Table 1: Sector Specific Impacts (% change in GVA)

ID	WIOD Industry	*Soft Brexit (%)*	*Hard Brexit (%)*
1	Agriculture, Hunting, Forestry and Fishing	3.3	4.2
2	Mining and Quarrying	-7.3	-12.5
3	Food, Beverages and Tobacco	1.4	2.8
4	Textiles and Textile Products; Leather, Leather and Footwear	-6.8	-5.2
5	Wood and Products of Wood and Cork	9.9	15.9
6	Pulp, Paper, Paper , Printing and Publishing	3.5	6.3
7	Coke, Refined Petroleum and Nuclear Fuel	-0.5	-0.8
8	Chemicals and Chemical Products	-8.9	-15.1
9	Rubber and Plastics	-0.4	-0.7
10	Other Non-Metallic Mineral	0.2	0.2
11	Basic Metals and Fabricated Metal	0.5	5.1
12	Machinery, nec	-0.1	-0.2
13	Electrical and Optical Equipment	-9.5	-6.3
14	Transport Equipment	-0.5	-0.9
15	Manufacturing, nec; Recycling	0.9	2.5
16	Electricity, Gas and Water Supply	-1.1	-2.1
17	Construction	-1.4	-2.6
18	Retail Sale of Fuel; Wholesale Trade, Commission Trade, including Motor Vehicles & Motorcycles	-0.8	-1.6
19	Retail Trade, Except of Motor Vehicles & Motorcycles; Repair of Household Goods	-1.2	-2.3
20	Hotels and Restaurants	0.0	-0.2
21	Inland Transport	-0.6	-1.2
22	Water Transport	4.7	9.1
23	Air Transport	5.2	10.4
24	Other Supporting and Auxiliary Transport Activities; Activities of Travel Agencies	-1.3	-2.5
25	Post and Telecommunications	-1.8	-3.9
26	Financial Intermediation	-2.8	-6.2
27	Real Estate Activities	-1.4	-2.6
28	Renting of M&Eq and Other Business Activities	-1.7	-4.0
29	Education	-1.2	-2.2
30	Health and Social Work	-1.3	-2.4
31	Public Admin, Defence, Soc. Security & other Public Svc	-1.1	-2.3

Source: Dhingra, S., G. Ottaviano, T. Sampson and J. Van Reenen (2016) 'The Consequences of Brexit for UK Trade and Living Standards', CEP BREXIT Paper No. 02.

London School of Economics centre for economic performance Brexit papers

The London School of Economics researched and wrote a series of Brexit papers examining various aspects and likely impacts.

Foreign Direct Investment: Swati Dhingra, Gianmarco Ottaviano, Thomas Sampson and John Van Reenen (2016), CEP BREXIT ANALYSIS No. 3, The impact of Brexit on foreign investment in the UK, Centre for Economic Performance, London School of Economics.

Living Standards: Swati Dhingra, Gianmarco Ottaviano, Thomas Sampson and John Van Reenen March 2016, The consequences of Brexit for UK trade and living standards, Paper No' CEPBREXIT02.

Foreign direct investment

The London School of Economics's empirical analysis looks at bilateral FDI flows between 34 OECD countries (including the UK) over the last three decades. Controlling for many other factors, the baseline estimate is that EU membership has raised FDI by about 28 per cent .

The UK has many advantages that would be unaffected by Brexit such as language, light regulation and deep capital markets

The LSE use existing macroeconomic estimates of how FDI affects growth combined with a very conservative estimate of the impact of Brexit – a 22 per cent fall in FDI over the next decade. LSE calculate that a Brexit-induced fall in FDI could cause a 3.4 per cent decline in real income – about £2,200 of GDP per household.

The LSE's estimates of the impact of Brexit on the UK's car industry[13] imply that UK production would fall by 181,000 cars (12 per cent) and prices would rise by 2.5 per cent. Even if the UK manages a comprehensive trade deal and keeps tariffs at zero, production would fall by 36,000 cars.

The consequences of Brexit for UK trade and living standards

The European Union (EU) is the UK's largest trade partner. Around a half of the UK's trade is with the EU. EU membership reduces trade costs between the UK and the EU. This makes goods and services cheaper for UK consumers and allows UK businesses to export more.

Leaving the EU ('Brexit') would lower trade between the UK and the EU because of higher tariff and non-tariff barriers to trade. In addition, the UK would benefit less from future market integration within the EU. The main economic benefit of leaving the EU would be a lower net contribution to the EU budget.

In an 'optimistic' scenario, the UK (like Norway) obtains full access to the EU single market – estimate this results in a 1.3 per cent fall in average UK incomes (or £850 per household). In a 'pessimistic' scenario with larger increases in trade costs, Brexit lowers income by 2.6 per cent (£1,700 per household).

All EU countries lose income after Brexit. The overall GDP fall in the UK is £26 billion to £55 billion, about twice as big as the £12 billion to £28 billion income loss in the rest of the EU combined. Non-EU countries experience some smaller income gains.

If the UK unilaterally removed *all* its tariffs on imports from the rest of the world after Brexit, UK incomes fall by 1 per cent in the optimistic case and 2.3 per cent in the pessimistic case.

In the long run, reduced trade lowers productivity. Factoring in these effects substantially increases the costs of Brexit to a loss of 6.3 per cent to 9.5 per cent of GDP (about £4,200 to £6,400 per household).

Being outside the EU means that the UK would not automatically benefit from future EU trade deals with other countries. This would mean missing out on the current US and Japanese deals, which are forecast to improve real incomes by 0.6 per cent.

After Brexit, would the UK obtain better trade deals with non-EU countries? It would not have to compromise so much with other EU states, but the UK would lose bargaining power as its economy

[13] Swati Dhingra, Gianmarco Ottaviano, Thomas Sampson and John Van Reenen (2016), CEP BREXIT ANALYSIS No. 3, The impact of Brexit on foreign investment in the UK, Centre for Economic Performance, London School of Economics.

makes up only 18 per cent of the EU's 'single market'.

It is unclear whether there are substantial regulatory benefits from Brexit. The UK already has one of the OECD's least regulated product and labour markets. 'Big ticket' savings are supposedly from abolition of the Renewable Energy Strategy and the Working Time Directive – both of which receive considerable domestic political support in the UK.

Brexit and the Impact of Immigration on the UK

Between 1995 and 2015, the number of immigrants from other European Union (EU) countries living in the UK tripled from 0.9 million to 3.3 million. In 2015, EU net immigration to the UK was 172,000, only just below the figure of 191,000 for non-EU immigrants.

The big increase in EU immigration occurred after the 'A8' East European countries joined in 2004. In 2015 29 per cent of EU immigrants were Polish.

EU immigrants are more educated, younger, more likely to be in work and less likely to claim benefits than the UK-born. About 44 per cent have some form of higher education compared with only 23 per cent of the UK-born. About a third of EU immigrants live in London, compared with only 11 per cent of the UK-born.

Many people are concerned that immigration reduces the pay and job chances of the UK born due to more competition for jobs. But immigrants consume goods and services and this increased demand helps to create more employment opportunities. Immigrants also might have skills that complement UK-born workers. So empirical evidence is needed to settle the issue of whether the economic impact of immigration is negative or positive for the UK-born.

New evidence in this Report shows that the areas of the UK with large increases in EU immigration did *not* suffer greater falls in the jobs and pay of UK-born workers. The big falls in wages after 2008 are due to the global financial crisis and a weak economic recovery, not to immigration.

There is also little effect of EU immigration on inequality through reducing the pay and jobs of less skilled UK workers. Changes in wages and joblessness for less educated UK born workers show little correlation with changes in EU immigration.

EU immigrants pay more in taxes than they take out in welfare and the use of public services. They therefore help reduce the budget deficit. Immigrants do not have a negative effect on local services such as crime, education, health, or social housing

European countries with access to the Single Market must allow free movement of EU citizens whether in the EU (like the UK) or outside it (like Norway and Switzerland).

The refugee crisis has nothing to do with EU membership. Refugees admitted to Germany have no right to live in the UK. The UK is not in the Schengen passport-free travel agreement so there are border checks on migrants.

Who Bears the Pain? How the costs of Brexit would be distributed across income groups

All serious economic analysis finds that Brexit would have a negative impact on UK GDP per capita. But a popular view is that membership of the European Union (EU) only benefits elites and has not helped those in the middle or at the bottom of the income distribution.

Our research uses data on household expenditure by different income groups and household types combined with estimates of changes in the prices of goods and services after Brexit to look at who would win and who would lose.

- Find that prices would go up most in transport (a price hike of between 4 per cent and 7.5 per cent), alcohol (4 per cent to 7 per cent), food (3 per cent to 5 per cent) and clothing (2 per cent to 4 per cent). These product groups rely a lot on imports.
- By contrast, prices for services would rise the least.
- The living standard of every income group would be lower after Brexit due to these higher prices. Those on middle incomes would suffer slightly more in proportionate terms than the richest and poorest households.

Looking solely at the 'static' short-run impact of trade, the income (not GDP) of the average UK household would drop by 1.8 per cent (£754) per year in our most 'optimistic' scenario where the UK joins countries like Norway in the European Economic Area.

Income would fall by 4 per cent per year (£1,637) if the UK were to trade under World Trade Organization rules (in our more realistic 'pessimistic' scenario). If we take account of the longer-run dynamic effects of Brexit on productivity, the average household would lose between 6.1 per cent and 13.5 per cent of their real incomes per year (£2,519 to £5,573).

For the poorest tenth of households (the bottom decile), real income losses would be 1.7 per cent to 3.6 per cent in the short run and 5.7 per cent to 12.5

per cent in the long run. For the richest households, the short-run losses would be 1.8 per cent to 3.9 per cent and the long-run losses 6 per cent to 13.4 per cent. These are only very slightly smaller than the losses suffered by the middle classes.

Looking at specific households such as pensioners, families with children and single people, we find that the pain would also be widely shared. For example, even in the short run, pensioners would lose between 2 per cent and 4 per cent of their income.

Including the effects of reduced immigration or changing patterns of industry demand after Brexit makes no material difference to this analysis of inequality.

The Local Economic Effects of Brexit

This paper studies the local impacts of the increases in trade barriers associated with Brexit. Predictions of the local impact of Brexit are presented under two different scenarios, soft and hard Brexit.

Average effects are predicted to be negative under both scenarios, and more negative under hard Brexit. The spatial variation in shocks across areas is somewhat higher under hard Brexit because some local areas are particularly specialised in sectors that are predicted to be badly hit by hard Brexit.

Areas in the South of England, and urban areas, are predicted to be harder hit by Brexit under both scenarios. Again, this pattern is explained by the fact that those areas are specialised in sectors that are predicted to be badly hit by Brexit.

Finally, the areas that were most likely to vote remain are those that are predicted to be most negatively impacted by Brexit.

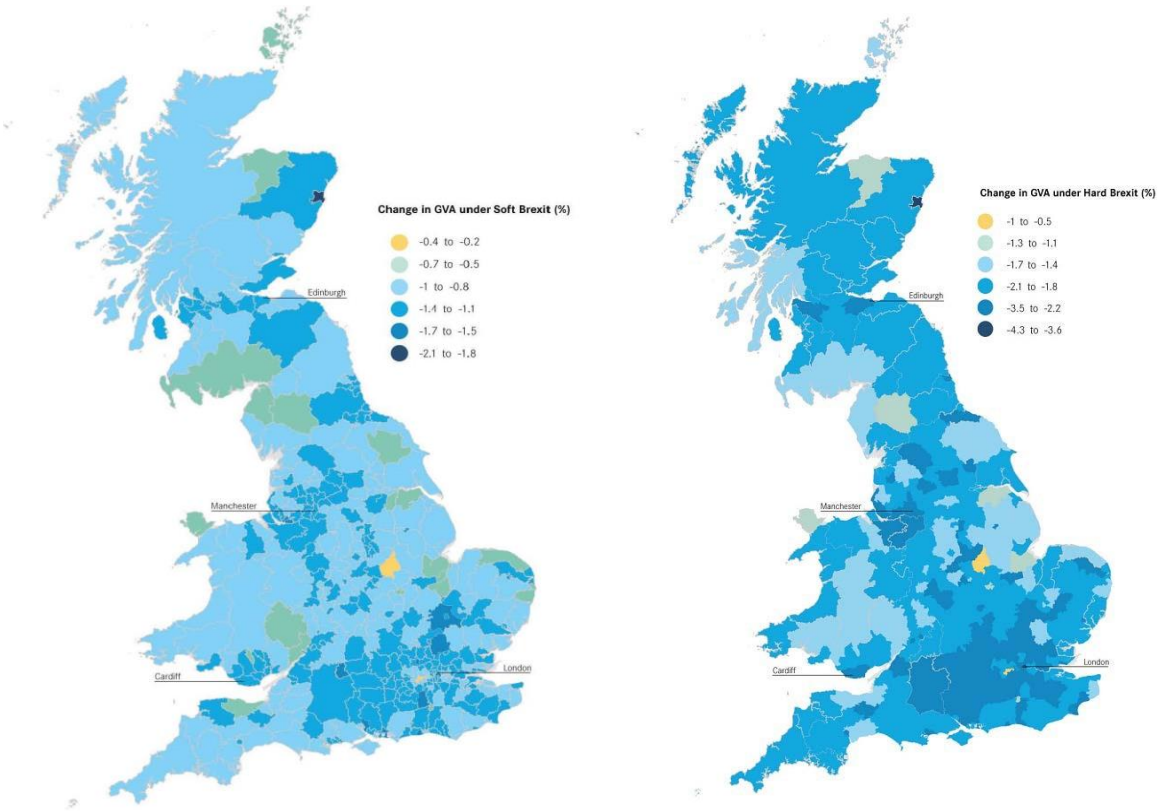
The ten least negatively affected regions show somewhat more geographical variation, although it is striking that the South of England is now somewhat under-represented. Hounslow and Crawley do relatively well because their proximity to Heathrow and Gatwick means a high share of employment in the Air Transport Industry, which sees only small loses even under hard Brexit.

FIGURE A6: REPRODUCTION OF TABLE 3: MOST AND LEAST AFFECTED LOCAL AUTHORITIES (% CHANGE IN GROSS VALUE ADDED)

Top 10-	Soft Brexit %	Hard Brexit %	Bottom 10	Soft Brexit %	Hard Brexit %
City of London	-1.9	-4.3	Eden	-0.7	-1.3
Aberdeen City	-2.1	-3.7	Moray	-0.7	-1.3
Tower Hamlets	-1.7	-3.6	North Lincolnshire	-0.8	-1.3
Watford	-1.5	-3.1	Corby	-0.8	-1.3
Mole Valley	-1.5	-3.0	Anglesey	-0.6	-1.2
East Hertfordshire	-1.5	-2.8	South Holland	-0.6	-1.1
Reading	-1.4	-2.8	Crawley	-0.7	-1.1
Reigate and Banstead	-1.4	-2.8	Isles of Scilly	-0.5	-1.1
Worthing	-1.5	-2.8	Melton	-0.4	-0.8
Islington	-1.3	-2.8	Hounslow	-0.2	-0.5

Source: Swati Dhingra, Stephen Machin and Henry G. Overman (2017) The Local Economic Effects of Brexit, LSE CEP Brexit Paper 10.

FIGURE A7: COPY OF FIGURE 2: MAPS OF PERCENTAGE DECREASES IN LOCAL AUTHORITY GVA



Source: Swati Dhingra, Stephen Machin and Henry G. Overman (2017) The Local Economic Effects of Brexit, LSE CEP Brexit Paper 10.

FIGURE A8: REPRODUCTION OF TABLE A1: IMPACT OF BREXIT FOR LOCAL AUTHORITIES (% CHANGE GROSS VALUE ADDED)

Ranking by severity of GVA contraction under hard Brexit	Local Authority	Soft Brexit	Hard Brexit
1	City of London	-1.9	-4.3
2	Aberdeen City	-2.1	-3.7
3	Tower Hamlets	-1.7	-3.6
4	Watford	-1.5	-3.1
5	Mole Valley	-1.5	-3.0
6	East Hertfordshire	-1.5	-2.8
7	Reading	-1.4	-2.8
8	Reigate and Banstead	-1.4	-2.8
9	Worthing	-1.5	-2.8
10	Islington	-1.3	-2.8
11	Swindon	-1.5	-2.8
12	Halton	-1.5	-2.8
13	Craven	-1.4	-2.8
14	Three Rivers	-1.4	-2.8
15	Slough	-1.4	-2.8
16	Brentwood	-1.3	-2.8
17	Wokingham	-1.4	-2.8
18	St Albans	-1.3	-2.7
19	Bracknell Forest	-1.3	-2.7
20	Edinburgh, City of	-1.4	-2.7
21	Hertsmere	-1.4	-2.7
22	Westminster	-1.3	-2.7
23	Salford	-1.4	-2.7
24	Eastleigh	-1.6	-2.7
25	South Cambridgeshire	-1.5	-2.7
26	Bournemouth	-1.3	-2.7
27	Camden	-1.3	-2.7
28	Trafford	-1.3	-2.6
29	Stockton-on-Tees	-1.4	-2.6
30	Bristol, City of	-1.3	-2.6
31	Rushmoor	-1.4	-2.6
32	Harrow	-1.3	-2.6
33	Tunbridge Wells	-1.2	-2.6
34	Elmbridge	-1.3	-2.6
35	Surrey Heath	-1.3	-2.6
36	Leeds	-1.3	-2.6
37	Ipswich	-1.3	-2.6
38	Kingston upon Thames	-1.3	-2.6
39	Hackney	-1.3	-2.6
40	Nottingham	-1.3	-2.6
41	Basingstoke and Deane	-1.4	-2.6
42	Northampton	-1.3	-2.6
43	Bromley	-1.3	-2.6
44	Hart	-1.4	-2.6
45	Epsom and Ewell	-1.2	-2.6
46	Chiltern	-1.3	-2.5
47	Vale of White Horse	-1.4	-2.5
48	Milton Keynes	-1.3	-2.5
49	Southwark	-1.2	-2.5
50	Windsor and Maidenhead	-1.3	-2.5
51	Cheshire West and Chester	-1.3	-2.5

Ranking by severity of GVA contraction under hard Brexit	Local Authority	Soft Brexit	Hard Brexit
52	Lambeth	-1.2	-2.5
53	Runnymede	-1.2	-2.5
54	Brighton and Hove	-1.3	-2.5
55	Glasgow City	-1.3	-2.5
56	South Oxfordshire	-1.3	-2.5
57	Woking	-1.3	-2.5
58	Broxbourne	-1.3	-2.5
59	Cardiff	-1.3	-2.5
60	Welwyn Hatfield	-1.3	-2.5
61	Guildford	-1.3	-2.5
62	Havant	-1.5	-2.5
63	Dacorum	-1.3	-2.5
64	Croydon	-1.2	-2.5
65	Merton	-1.2	-2.5
66	Cheshire East	-1.3	-2.5
67	Warrington	-1.3	-2.5
68	Redbridge	-1.2	-2.5
69	Manchester	-1.2	-2.5
70	Barnet	-1.2	-2.5
71	Peterborough	-1.2	-2.5
72	Cambridge	-1.3	-2.5
73	South Gloucestershire	-1.3	-2.5
74	North Tyneside	-1.3	-2.5
75	Blaby	-1.3	-2.5
76	Dartford	-1.3	-2.5
77	Gloucester	-1.4	-2.5
78	Poole	-1.4	-2.4
79	Chelmsford	-1.3	-2.4
80	Wandsworth	-1.2	-2.4
81	Waverley	-1.2	-2.4
82	Broxtowe	-1.3	-2.4
83	Exeter	-1.2	-2.4
84	Harlow	-1.4	-2.4
85	Winchester	-1.3	-2.4
86	Stockport	-1.3	-2.4
87	Inverclyde	-1.3	-2.4
88	Cheltenham	-1.2	-2.4
89	Southend-on-Sea	-1.3	-2.4
90	Darlington	-1.2	-2.4
91	Fareham	-1.4	-2.4
92	Preston	-1.2	-2.4
93	Liverpool	-1.2	-2.4
94	East Hampshire	-1.3	-2.4
95	Richmond upon Thames	-1.1	-2.4
96	Bury	-1.3	-2.4
97	St Edmundsbury	-1.3	-2.4
98	Stevenage	-1.3	-2.4
99	Calderdale	-1.3	-2.4
100	Hammersmith and Fulham	-1.1	-2.4
101	Middlesbrough	-1.2	-2.4
102	West Lothian	-1.3	-2.4
103	Mid Sussex	-1.2	-2.3
104	Lewisham	-1.2	-2.3

Ranking by severity of GVA contraction under hard Brexit	Local Authority	Soft Brexit	Hard Brexit
105	West Berkshire	-1.2	-2.3
106	Maidstone	-1.2	-2.3
107	Warwick	-1.2	-2.3
108	Bolsover	-1.2	-2.3
109	Sefton	-1.2	-2.3
110	Taunton Deane	-1.2	-2.3
111	Birmingham	-1.2	-2.3
112	Redcar and Cleveland	-1.3	-2.3
113	Coventry	-1.2	-2.3
114	Sevenoaks	-1.2	-2.3
115	Wycombe	-1.2	-2.3
116	Broadland	-1.2	-2.3
117	North West Leicestershire	-1.3	-2.3
118	Test Valley	-1.2	-2.3
119	Sutton	-1.1	-2.3
120	Havering	-1.2	-2.3
121	Waltham Forest	-1.2	-2.3
122	Epping Forest	-1.2	-2.3
123	Norwich	-1.2	-2.3
124	Thurrock	-1.2	-2.3
125	Shepway	-1.2	-2.3
126	Lincoln	-1.2	-2.3
127	Knowsley	-1.2	-2.3
128	Solihull	-1.1	-2.3
129	Tonbridge and Malling	-1.1	-2.3
130	North Hertfordshire	-1.3	-2.3
131	The Vale of Glamorgan	-1.3	-2.3
132	East Renfrewshire	-1.2	-2.3
133	Wiltshire	-1.2	-2.3
134	York	-1.1	-2.3
135	Renfrewshire	-1.3	-2.3
136	Rushcliffe	-1.1	-2.3
137	Harrogate	-1.1	-2.3
138	Aylesbury Vale	-1.2	-2.3
139	Swansea	-1.2	-2.3
140	Horsham	-1.2	-2.2
141	Rossendale	-1.4	-2.2
142	Wirral	-1.2	-2.2
143	South Bucks	-1.1	-2.2
144	Newham	-1.1	-2.2
145	Enfield	-1.2	-2.2
146	Bedford	-1.2	-2.2
147	Portsmouth	-1.2	-2.2
148	Haringey	-1.2	-2.2
149	Greenwich	-1.1	-2.2
150	West Dunbartonshire	-1.2	-2.2
151	Bolton	-1.2	-2.2
152	Newcastle upon Tyne	-1.1	-2.2
153	Chorley	-1.2	-2.2
154	Ashford	-1.2	-2.2
155	Tandridge	-1.1	-2.2
156	Spelthorne	-1.1	-2.2
157	Rugby	-1.2	-2.2

Ranking by severity of GVA contraction under hard Brexit	Local Authority	Soft Brexit	Hard Brexit
158	Aberdeenshire	-1.2	-2.2
159	Bath and North East Somerset	-1.1	-2.2
160	Castle Point	-1.2	-2.2
161	Medway	-1.2	-2.2
162	Thanet	-1.3	-2.2
163	Doncaster	-1.2	-2.2
164	Derby	-1.2	-2.2
165	Bromsgrove	-1.1	-2.2
166	Stafford	-1.3	-2.2
167	Lancaster	-1.1	-2.2
168	Gateshead	-1.2	-2.2
169	Great Yarmouth	-1.2	-2.2
170	Bexley	-1.1	-2.2
171	Rochdale	-1.3	-2.2
172	Canterbury	-1.1	-2.2
173	East Cambridgeshire	-1.3	-2.2
174	North Lanarkshire	-1.2	-2.2
175	Mansfield	-1.2	-2.2
176	Charnwood	-1.3	-2.1
177	Eastbourne	-1.1	-2.1
178	Newport	-1.2	-2.1
179	Dundee City	-1.2	-2.1
180	Bradford	-1.2	-2.1
181	Lewes	-1.2	-2.1
182	Sheffield	-1.2	-2.1
183	West Oxfordshire	-1.3	-2.1
184	Staffordshire Moorlands	-1.1	-2.1
185	Rother	-1.1	-2.1
186	Brent	-1.1	-2.1
187	Stirling	-1.1	-2.1
188	Harborough	-1.1	-2.1
189	South Tyneside	-1.2	-2.1
190	Plymouth	-1.1	-2.1
191	Blackburn with Darwen	-1.3	-2.1
192	Daventry	-1.1	-2.1
193	Leicester	-1.2	-2.1
194	East Dunbartonshire	-1.1	-2.1
195	Fife	-1.2	-2.1
196	Sunderland	-1.2	-2.1
197	Gravesham	-1.1	-2.1
198	Colchester	-1.1	-2.1
199	North Ayrshire	-1.2	-2.1
200	Tewkesbury	-1.2	-2.1
201	Torbay	-1.1	-2.1
202	Denbighshire	-1.3	-2.1
203	Barking and Dagenham	-1.1	-2.1
204	Hastings	-1.2	-2.1
205	Tamworth	-1.2	-2.1
206	North Devon	-1.2	-2.1
207	North East Lincolnshire	-1.1	-2.1
208	Fylde	-1.0	-2.1
209	St. Helens	-1.1	-2.1
210	Mendip	-1.1	-2.1

Ranking by severity of GVA contraction under hard Brexit	Local Authority	Soft Brexit	Hard Brexit
211	Midlothian	-1.1	-2.1
212	Cotswold	-1.1	-2.1
213	Stratford-on-Avon	-1.1	-2.1
214	Central Bedfordshire	-1.1	-2.1
215	Chesterfield	-1.2	-2.1
216	Bridgend	-1.2	-2.1
217	South Norfolk	-1.1	-2.1
218	Newcastle-under-Lyme	-1.2	-2.1
219	Rhondda, Cynon, Taff	-1.2	-2.1
220	East Ayrshire	-1.1	-2.1
221	Adur	-1.1	-2.1
222	South Lanarkshire	-1.1	-2.1
223	Ealing	-1.0	-2.0
224	Suffolk Coastal	-1.1	-2.0
225	Falkirk	-1.1	-2.0
226	Southampton	-1.0	-2.0
227	North Somerset	-1.1	-2.0
228	South Staffordshire	-1.2	-2.0
229	Lichfield	-1.1	-2.0
230	Oxford	-1.0	-2.0
231	Worcester	-1.1	-2.0
232	Basildon	-1.1	-2.0
233	Kirklees	-1.2	-2.0
234	Wigan	-1.1	-2.0
235	Nuneaton and Bedworth	-1.1	-2.0
236	Hartlepool	-1.2	-2.0

Source: Swati Dhingra, Stephen Machin and Henry G. Overman (2017) The Local Economic Effects of Brexit, LSE CEP Brexit Paper 10.

Appendix B: Additional Data to assess Hertfordshire's Brexit risks

FIGURE B1: ESTIMATING THE NUMBER OF EMPLOYEES AT RISK FROM DISRUPTION TO INTERNATIONAL TRADE ARRANGEMENTS

	Imports as % of supply (GVA)		Exports as % of demand (GVA)	
Area	Employees at risk	At risk as % of total employment	Employees at risk	At risk as % of total employment
Hertfordshire	53,700	8.9%	73,700	12.2%
Broxbourne	5,100	13.3%	6,200	16.1%
Dacorum	7,500	11.0%	10,300	15.2%
East Hertfordshire	5,400	8.6%	7,300	11.6%
Hertsmere	5,900	11.1%	8,100	15.2%
North Hertfordshire	5,600	10.6%	7,100	13.6%
St Albans	4,900	6.8%	7,600	10.5%
Stevenage	3,700	8.2%	4,400	9.9%
Three Rivers	3,200	7.8%	4,900	12.0%
Watford	6,600	7.1%	9,700	10.5%
Welwyn Hatfield	6,100	7.6%	8,400	10.5%
Buckinghamshire Thames Valley	29,200	12.5%	38,400	16.4%
Cheshire and Warrington	42,200	8.6%	54,600	11.2%
Greater Cambridge and Greater Peterborough	77,200	10.0%	91,500	11.9%
Thames Valley Berkshire	55,000	10.7%	79,000	15.3%
Great Britain	2,613,000	8.9%	3,299,300	11.3%

Source: Business Register and Employment Survey (2016), Input-Output Supply Use Tables (2010-2015), Office for National Statistics.

FIGURE B2: DETAILED INDUSTRY CLASSIFICATIONS WITH EXPORTS AND IMPORTS AS A PERCENTAGE SHARE OF GVA (UK)

2 Digit Industrial Classification	Hertford-shire	Great Britain	Share of total employees in Herts	Share of total employees in GB	import as % of supply (GVA)	export as % of demand (GVA)	exports per employee £	Hertfordshire Employment Quotient
01 : Crop and animal production, hunting and related service activities	200	189,500	0.0%	0.6%	22.0%	5.3%	10,521	0.0
02 : Forestry and logging	200	14,000	0.0%	0.0%	42.5%	7.3%	7,500	0.6
03 : Fishing and aquaculture	0	8,000	0.0%	0.0%	15.3%	29.0%	120,143	0.0
05 : Mining of coal and lignite	0	1,100	0.0%	0.0%	59.5%	3.0%	32,000	0.0
06 : Extraction of crude petroleum and natural gas & 07 : Mining of metal ores	0	15,000	0.0%	0.1%	44.8%	30.6%	868,645	0.0
08 : Other mining and quarrying	100	17,500	0.0%	0.1%	21.1%	11.3%	47,500	0.2
09 : Mining support service activities	0	21,000	0.0%	0.1%	5.9%	10.5%	20,826	0.0
10 : Manufacture of food products	1,600	367,500	0.3%	1.3%	20.5%	8.2%	31,385	0.2
11 : Manufacture of beverages	1,100	36,000	0.2%	0.1%	15.4%	10.3%	215,973	1.5
13 : Manufacture of textiles	200	50,000	0.0%	0.2%	22.4%	11.7%	58,255	0.2
14 : Manufacture of wearing apparel	200	28,000	0.0%	0.1%	35.0%	15.5%	332,982	0.4
15 : Manufacture of leather and related products	200	7,500	0.0%	0.0%	44.2%	18.9%	475,286	1.2
16 : Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	800	75,500	0.1%	0.3%	32.2%	3.3%	6,144	0.5
17 : Manufacture of paper and paper products	400	52,000	0.1%	0.2%	23.9%	8.3%	43,037	0.4
18 : Printing and reproduction of recorded media	2,300	103,000	0.4%	0.4%	0.2%	0.5%	488	1.1
19 : Manufacture of coke and refined petroleum products	0	8,000	0.0%	0.0%	24.8%	14.5%	1,328,000	0.0
20 : Manufacture of chemicals and chemical products	1,600	88,000	0.3%	0.3%	28.9%	30.8%	294,721	0.9
21 : Manufacture of basic pharmaceutical products and pharmaceutical preparations	2,100	35,500	0.4%	0.1%	42.0%	41.2%	727,072	2.9
22 : Manufacture of rubber and plastic products	1,900	148,000	0.3%	0.5%	30.2%	20.8%	47,748	0.6
23 : Manufacture of other non-metallic mineral products	400	73,500	0.1%	0.3%	17.7%	8.9%	30,483	0.3
24 : Manufacture of basic metals	400	68,500	0.1%	0.2%	41.5%	40.8%	263,200	0.3
25 : Manufacture of fabricated metal products, except machinery and equipment	6,500	300,000	1.1%	1.0%	17.6%	12.1%	21,601	1.0
26 : Manufacture of computer, electronic and optical products	2,500	112,000	0.4%	0.4%	49.0%	25.8%	225,671	1.1
27 : Manufacture of electrical equipment	1,800	73,500	0.3%	0.3%	43.7%	25.1%	117,943	1.2
28 : Manufacture of machinery and equipment n.e.c.	2,800	162,500	0.5%	0.6%	44.2%	42.8%	153,240	0.8
29 : Manufacture of motor vehicles, trailers and semi-trailers	600	161,500	0.1%	0.6%	41.4%	27.0%	221,658	0.2
30 : Manufacture of other transport equipment	2,100	136,000	0.4%	0.5%	42.0%	48.6%	210,473	0.8

2 Digit Industrial Classification	Hertford-shire	Great Britain	Share of total employees in Herts	Share of total employees in GB	import as % of supply (GVA)	export as % of demand (GVA)	exports per employee £	Hertfordshire Employment Quotient
31 : Manufacture of furniture	700	85,500	0.1%	0.3%	24.8%	5.0%	14,156	0.4
32 : Other manufacturing	2,300	70,500	0.4%	0.2%	30.4%	25.5%	174,968	1.5
33 : Repair and installation of machinery and equipment	2,800	124,500	0.5%	0.4%	5.6%	6.3%	10,926	1.1
35 : Electricity, gas, steam and air conditioning supply	1,000	125,500	0.2%	0.4%	0.9%	0.2%	1,403	0.4
36 : Water collection, treatment and supply	1,300	36,000	0.2%	0.1%	0.2%	0.0%	90	1.7
37 : Sewerage	300	21,500	0.1%	0.1%	0.0%	0.0%	0	0.7
38 : Waste collection, treatment and disposal activities; materials recovery	2,000	130,500	0.3%	0.4%	14.1%	17.2%	31,634	0.7
39 : Remediation activities and other waste management services. This division includes the provision of remediation services, i.e. the cleanup of contaminated buildings and sites, soil, surface or ground water.	300	5,500	0.0%	0.0%	0.0%	0.0%	0	2.6
41 : Construction of buildings, 42 : Civil engineering, 43 : Specialised construction activities	37,500	1,346,000	6.2%	4.6%	0.5%	0.7%	1,528	1.3
45 : Wholesale and retail trade and repair of motor vehicles and motorcycles	14,000	525,000	2.3%	1.8%	0.4%	0.5%	373	1.3
46 : Wholesale trade, except of motor vehicles and motorcycles	29,500	1,158,000	4.9%	4.0%	82.3%	100.0%	212	1.2
47 : Retail trade, except of motor vehicles and motorcycles	63,500	2,766,500	10.5%	9.5%	0.0%	0.0%	0	1.1
49 : Land transport and transport via pipelines	9,500	583,000	1.6%	2.0%	4.1%	3.8%	4,715	0.8
50 : Water transport	0	13,000	0.0%	0.0%	16.8%	36.5%	449,697	0.1
51 : Air transport	100	76,000	0.0%	0.3%	35.1%	23.3%	107,507	0.1
52 : Warehousing and support activities for transportation	8,500	519,000	1.4%	1.8%	3.2%	10.9%	10,061	0.8
53 : Postal and courier activities	4,800	225,000	0.8%	0.8%	6.7%	8.6%	7,933	1.0
55 : Accommodation	4,800	463,000	0.8%	1.6%	25.2%	18.2%	17,995	0.5
56 : Food and beverage service activities	31,000	1,706,000	5.1%	5.8%	5.9%	5.7%	3,544	0.9
58 : Publishing activities	3,300	131,500	0.5%	0.4%	9.3%	14.8%	27,818	1.2
59 : Motion picture, video and television programme production, sound recording and music publishing activities; 60 : Programming and broadcasting activities	2,900	149,000	0.5%	0.5%	7.2%	12.2%	75,238	0.9
61 : Telecommunications	6,500	204,000	1.1%	0.7%	5.2%	8.7%	33,659	1.5
62 : Computer programming, consultancy and related activities	18,000	683,500	3.0%	2.3%	9.5%	25.6%	4,305	1.3
63 : Information service activities	1,900	64,500	0.3%	0.2%	8.0%	19.5%	366,215	1.4
64 : Financial service activities, except insurance and pension funding	4,000	496,000	0.7%	1.7%	4.2%	19.2%	29,715	0.4

2 Digit Industrial Classification	Hertford-shire	Great Britain	Share of total employees in Herts	Share of total employees in GB	import as % of supply (GVA)	export as % of demand (GVA)	exports per employee £	Hertfordshire Employment Quotient
65 : Insurance, reinsurance and pension funding, except compulsory social security	2,300	103,000	0.4%	0.4%	7.7%	55.3%	225,628	1.1
66 : Activities auxiliary to financial services and insurance activities	6,500	436,000	1.1%	1.5%	1.0%	0.5%	1,481	0.7
68 : Real estate activities	9,000	478,000	1.5%	1.6%	1.5%	0.5%	2,291	0.9
69 : Legal and accounting activities	21,500	634,000	3.6%	2.2%	2.3%	13.5%	11,732	1.6
70 : Activities of head offices; management consultancy activities	26,500	759,500	4.4%	2.6%	1.7%	15.1%	10,099	1.7
71 : Architectural and engineering activities; technical testing and analysis	8,000	545,500	1.3%	1.9%	3.6%	15.8%	14,914	0.7
72 : Scientific research and development	6,500	137,500	1.1%	0.5%	6.7%	13.4%	41,563	2.3
73 : Advertising and market research	3,300	169,500	0.5%	0.6%	6.1%	19.4%	36,555	0.9
74 : Other professional, scientific and technical activities	5,500	214,500	0.9%	0.7%	26.1%	41.1%	70,872	1.2
75 : Veterinary activities	1,000	55,500	0.2%	0.2%	0.0%	0.0%	0	0.9
77 : Rental and leasing activities	5,500	149,500	0.9%	0.5%	5.5%	2.4%	5,170	1.8
78 : Employment activities	46,500	966,000	7.7%	3.3%	7.5%	6.4%	3,282	2.3
79 : Travel agency, tour operator and other reservation service and related activities	1,100	99,000	0.2%	0.3%	0.9%	0.9%	1,606	0.5
80 : Security and investigation activities	2,500	201,000	0.4%	0.7%	0.0%	4.4%	1,611	0.6
81 : Services to buildings and landscape activities	23,500	687,500	3.9%	2.3%	0.0%	2.1%	561	1.7
82 : Office administrative, office support and other business support activities	8,500	505,000	1.4%	1.7%	24.5%	40.8%	53,074	0.8
84 : Public administration and defence; compulsory social security	15,000	1,259,500	2.5%	4.3%	0.0%	0.8%	899	0.6
85 : Education	49,500	2,601,000	8.2%	8.9%	0.5%	5.2%	2,596	0.9
86 : Human health activities	29,000	2,267,000	4.8%	7.7%	1.7%	0.3%	198	0.6
87 : Residential care activities; 88 : Social work activities without accommodation	24,500	1,598,500	4.0%	5.5%	0.0%	0.0%	9	0.7
90 : Creative, arts and entertainment activities	1,000	87,000	0.2%	0.3%	32.6%	32.8%	67,583	0.6
91 : Libraries, archives, museums and other cultural activities	900	106,000	0.1%	0.4%	8.8%	3.0%	3,358	0.4
92 : Gambling and betting activities	1,600	92,500	0.3%	0.3%	13.7%	0.7%	1,470	0.8
93 : Sports activities and amusement and recreation activities	11,000	453,500	1.8%	1.5%	6.0%	2.3%	762	1.2
94 : Activities of membership organisations	4,500	225,500	0.7%	0.8%	0.0%	0.0%	0	1.0
95 : Repair of computers and personal and household goods	4,000	61,000	0.7%	0.2%	12.6%	16.8%	22,692	3.2
96 : Other personal service activities	6,000	313,000	1.0%	1.1%	0.7%	1.0%	753	0.9
97 : Activities of households as employers of domestic personnel	0	0	0.0%	0.0%	0.5%	0.3%	#DIV/0!	#DIV/0!

2 Digit Industrial Classification	Hertford-shire	Great Britain	Share of total employees in Herts	Share of total employees in GB	import as % of supply (GVA)	export as % of demand (GVA)	exports per employee £	Hertfordshire Employment Quotient
TOTAL ALL SECTORS	605,500	29,267,500	100.0%	100.0%	13.8%	13.0%	17,995	1.0

Source: Business Register and Employment Survey, Input-Output Supply Use Tables, Office for National Statistics.

FIGURE B3: SECTORS POTENTIALLY AFFECTED BY SUPPLY CHAIN AND MARKET INTEGRATION WITH THE EU

Industry	Hertford-shire	Broxb-ourne	Dacorum	East Hertfordshire	Hertsmere	North Hertfordshire	St Albans	Stevenage	Three Rivers	Watford	Welwyn Hatfield
AUTOMOTIVE RELATED	900	0	100	200	0	100	100	100	0	0	200
2811 : Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	0	0	0	0	0	0	0	0	0	0	0
2815 : Manufacture of bearings, gears, gearing and driving elements	200	0	100	100	0	0	0	0	0	0	100
2910 : Manufacture of motor vehicles	100	0	0	100	0	0	0	0	0	0	0
2920 : Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	0	0	0	0	0	0	0	0	0	0	0
2931 : Manufacture of electrical and electronic equipment for motor vehicles	200	0	0	100	0	0	0	100	0	0	0
2932 : Manufacture of other parts and accessories for motor vehicles	200	0	0	0	0	100	0	0	0	0	0
3091 : Manufacture of motorcycles	0	0	0	0	0	0	0	0	0	0	0
3099 : Manufacture of other transport equipment n.e.c.	0	0	0	0	0	0	0	0	0	0	0
AEROSPACE	2,000	0	0	200	0	200	0	1,300	0	100	200
3030 : Manufacture of air and spacecraft and related machinery	2,000	0	0	200	0	200	0	1,300	0	100	200
CHEMICALS	1,700	0	100	200	0	600	100	0	0	300	300
1910 : Manufacture of coke oven products	0	0	0	0	0	0	0	0	0	0	0
1920 : Manufacture of refined petroleum products	0	0	0	0	0	0	0	0	0	0	0
2011 : Manufacture of industrial gases	0	0	0	0	0	0	0	0	0	0	0
2012 : Manufacture of dyes and pigments	0	0	0	0	0	0	0	0	0	0	0
2013 : Manufacture of other inorganic basic chemicals	400	0	0	0	0	400	0	0	0	0	0
2014 : Manufacture of other organic basic chemicals	0	0	0	0	0	0	0	0	0	0	0
2015 : Manufacture of fertilisers and nitrogen compounds	0	0	0	0	0	0	0	0	0	0	0
2016 : Manufacture of plastics in primary forms	0	0	0	0	0	0	0	0	0	0	0
2017 : Manufacture of synthetic rubber in primary forms	0	0	0	0	0	0	0	0	0	0	0
2020 : Manufacture of pesticides and other agrochemical products	0	0	0	0	0	0	0	0	0	0	0
2030 : Manufacture of paints, varnishes and similar coatings, printing ink and mastics	0	0	0	0	0	0	0	0	0	0	0

Industry	Hertford-shire	Broxb-ourne	Dacorum	East Hertfordshire	Hertsmere	North Hertfordshire	St Albans	Stevenage	Three Rivers	Watford	Welwyn Hatfield
2041 : Manufacture of soap and detergents, cleaning and polishing preparations	200	0	0	100	0	200	0	0	0	0	0
2042 : Manufacture of perfumes and toilet preparations	300	0	0	0	0	0	100	0	0	300	0
2051 : Manufacture of explosives	0	0	0	0	0	0	0	0	0	0	0
2052 : Manufacture of glues	0	0	0	0	0	0	0	0	0	0	0
2053 : Manufacture of essential oils	200	0	0	100	0	0	0	0	0	0	0
2059 : Manufacture of other chemical products n.e.c.	500	0	100	0	0	0	0	0	0	0	300
2060 : Manufacture of man-made fibres	0	0	0	0	0	0	0	0	0	0	0
FINANCE AND INSURANCE	12,400	600	1,000	1,200	2,200	1,400	1,500	900	1,600	1,600	600
6411 : Central banking	0	0	0	0	0	0	0	0	0	0	0
6419 : Other monetary intermediation	2,400	200	400	300	200	200	500	200	100	300	100
6420 : Activities of holding companies	0	0	0	0	0	0	0	0	0	0	0
6430 : Trusts, funds and similar financial entities	0	0	0	0	0	0	0	0	0	0	0
6491 : Financial leasing	300	0	0	0	100	0	0	0	200	0	0
6492 : Other credit granting	1,000	0	0	0	0	0	0	0	500	400	0
6499 : Other financial service activities, except insurance and pension funding, n.e.c.	100	0	0	0	0	0	0	0	0	0	0
6511 : Life insurance	1,500	0	0	0	700	800	0	0	0	0	0
6512 : Non-life insurance	700	0	0	400	100	0	0	100	0	0	0
6520 : Reinsurance	100	0	0	0	0	0	100	0	0	0	0
6530 : Pension funding	0	0	0	0	0	0	0	0	0	0	0
6611 : Administration of financial markets	0	0	0	0	0	0	0	0	0	0	0
6612 : Security and commodity contracts brokerage	200	0	0	0	0	0	0	100	0	0	0
6619 : Other activities auxiliary to financial services, except insurance and pension funding	2,800	100	400	200	400	200	400	100	500	600	200
6621 : Risk and damage evaluation	300	0	0	100	0	0	0	0	100	0	0
6622 : Activities of insurance agents and brokers	1,800	100	200	100	400	100	200	200	100	100	100
6629 : Other activities auxiliary to insurance and pension funding	1,300	100	0	0	200	100	300	200	0	100	100
6630 : Fund management activities	100	0	0	0	0	0	0	0	0	0	0
PHARMACEUTICALS	2,200	0	0	1,300	700	100	0	0	0	0	200
2110 : Manufacture of basic pharmaceutical products	800	0	0	0	700	0	0	0	0	0	0

Industry	Hertford-shire	Broxb-ourne	Dacorum	East Hertfordshire	Hertsmere	North Hertfordshire	St Albans	Stevenage	Three Rivers	Watford	Welwyn Hatfield
2120 : Manufacture of pharmaceutical preparations	1,400	0	0	1,300	0	100	0	0	0	0	100
Column Total	605,500	38,500	67,500	62,500	53,500	52,500	72,500	44,500	40,500	93,000	80,000