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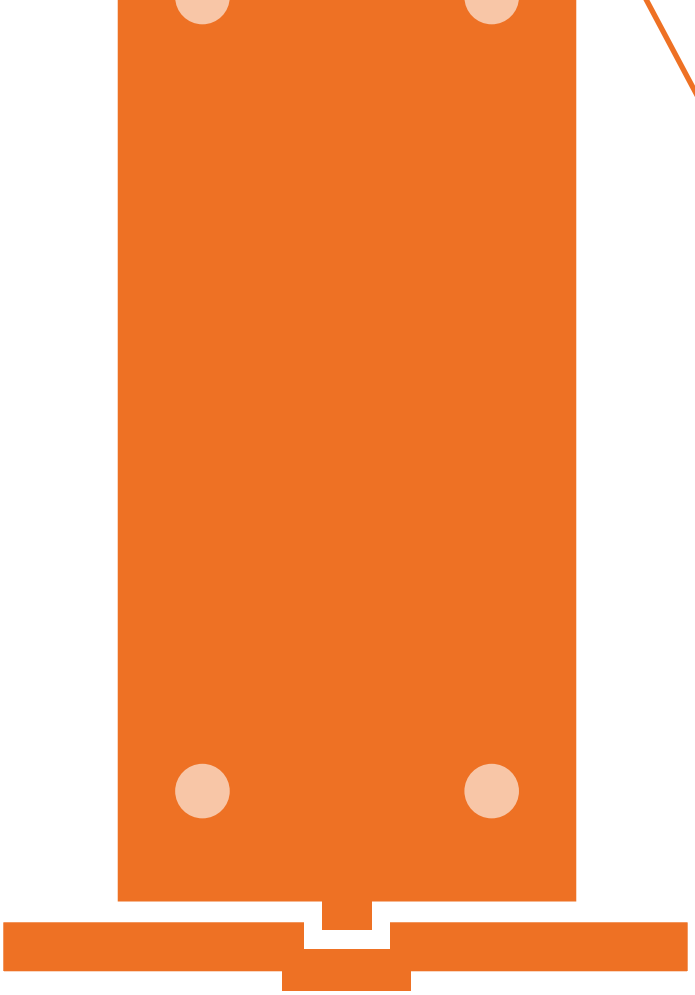

STRONG FOUNDATION INDUSTRIES

HOW IMPROVING CONDITIONS FOR CORE MATERIAL PRODUCERS COULD BOOST UK MANUFACTURING

Mathew Lawrence
and Alfie Stirling

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Institute for Public Policy Research

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SUMMARY

The foundation industries – manufacturers of core materials that supply other manufacturing and construction firms – have had a tough post-crisis period. Despite pockets of stronger than average investment, productivity and pay compared to the economy as a whole, these industries have experienced a deeper contraction, and been in recessionary territory for longer, than both the rest of manufacturing and the economy as a whole.

Although partly the result of increased competition from emerging markets, globalisation isn't the whole story: the foundation industries in the UK are smaller, and have contracted faster, than has been the case in other developed countries facing the same challenges. This reflects a broader weakness of the UK's economy: our manufacturing diversity has been lost over the last 40 years, and we remain an anomaly among advanced economies in having so few industries with comparative advantage. This is a key reason for our large and longstanding trade deficit.

Our analysis suggests that EU competitors support their industries in ways that the UK does not, which warrants investigation. Evidence on public and private research and development (R&D), productivity and investment performance shows that the UK performs relatively poorly, and that there is a role for government and industry in terms of helping firms to improve. With transitional support, the UK's foundation industry firms have the potential to supply advanced manufacturing firms, such as those in aerospace, automobiles and pharmaceuticals, to a much greater extent than they do currently. Building on our areas of existing comparative advantage would be a low-risk way to diversify our production capacity; this is, therefore, where the government should focus its efforts.

The government's response should have two phases. First, it should ease the pressure on those industries in acute distress by ensuring that UK firms are not unfairly disadvantaged by tax, energy costs or subsidised imports. Second, it should look to strengthen the institutional support available to the foundation industries, in line with other EU countries, in order to help them adjust their production to better integrate into domestic supply chains. This could include providing firms with more patient forms of finance, improved collaboration and innovation systems, and more life-cycle-costing forms of public procurement for the goods the foundation industries produce.

Key findings

UK foundation industries have performed poorly relative to other developed economies. The UK has one of the smallest foundation industry sectors relative to GDP in the OECD. Since 2000 its share of GDP has shrunk by 43 per cent, compared to an average decline across the OECD of 21 per cent.

Foundation industries contribute to regional growth. Most firms within the foundation industries are located outside the south east. Productivity and pay in the chemicals and basic metals sectors are generally higher than for both the rest of manufacturing and the non-financial sector as a whole.

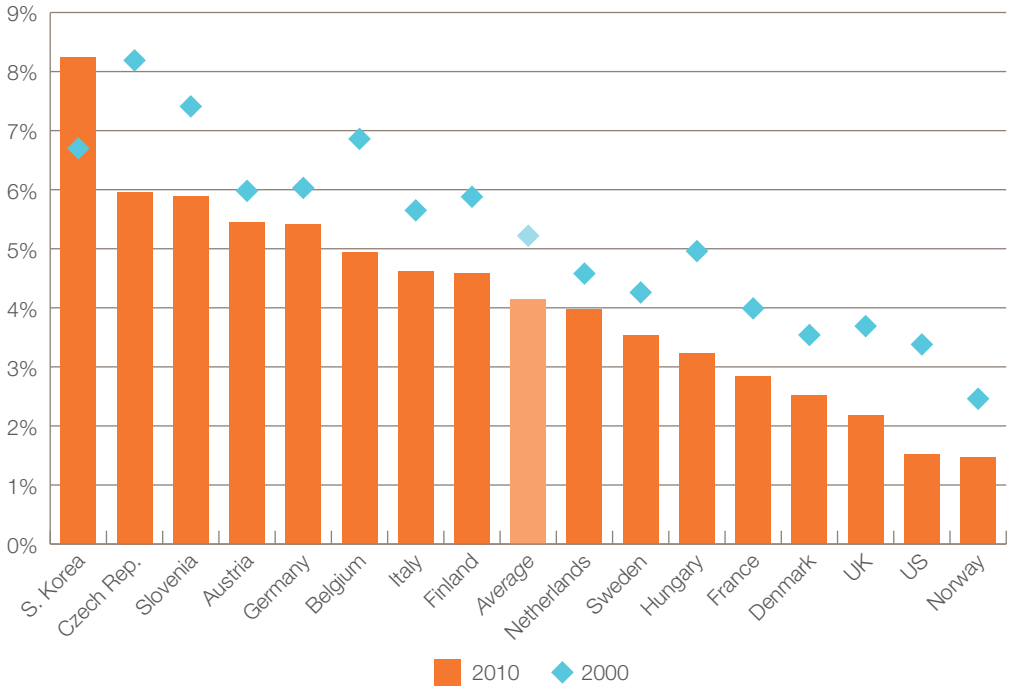
There is demand for foundation industry goods from key strategic sectors. A large proportion of domestic demand for basic metals and fabricated metals comes from UK strategic industry with revealed comparative advantage, including motor vehicle manufacture and aerospace.

International suppliers are increasingly meeting this demand. Domestic firms in chemicals, fabricated metals and basic metals manufacturing have come under increasing competitive pressure as global production has increased. At the end of the 1990s imports constituted 40 per cent of domestic consumption of basic metals, but that figure is now 90 per cent. Import penetration has also risen for chemicals and fabricated metals.

European co-ordinated market institutions offer greater support to their foundation industries. Co-ordinated market economies have institutional characteristics that supply more patient capital, stronger vocational training and industry-specific learning, and dense inter-firm networks that foster an innovative 'industrial commons'. Together these institutional features help form competitive advantages in differentiated, niche modes of production over the UK's liberal market model.

There are significant benefits to better embedding foundation industries in domestic supply chains. We estimate that one percentage point of demand for domestic output from fabricated metals, basic metals and chemicals is worth an additional £2.3 billion in gross output and around 19,000 jobs in affected industries and further down the supply chain, with UK firms well placed to capitalise.

Figure A.1
Between 2000 and 2010 manufacturing as a proportion of the total economy fell faster in the UK than in most comparable countries
Foundation industry output (GVA) as a proportion of total economy (GVA), OECD countries, 2000 and 2010 (%)



Source: IPPR analysis using OECD 2015a, ONS 2015b and ONS 2015c.
Note: All OECD countries included for which data was available. No OECD data was available for UK manufacturing output at the second digit; UK data was sourced from the ONS.

Key recommendations

Although recent years have been turbulent, certain parts of the foundation industries – particularly those that supply existing strategic industrial clusters – have the capacity to better integrate themselves into these supply chains. This would help them become more resilient and help diversify British manufacturing as a whole. To give firms a chance to do this, and provide time for institutional reform to embed itself, a series of immediate steps should be taken to ensure a fair playing field on trade and energy costs. At the same time, government – both national and local – should take a series of steps to overcome barriers facing the foundation industries.

Boost clusters

BIS should **create a 'cluster leadership team'** responsible for promoting brands of clusters, and improving connectivity within clusters. **Foundation industries should be eligible for support from a renewed and expanded advanced manufacturing supply chain initiative**, with applications from advanced manufacturers that integrate foundation industry firms considered favourably above equivalent bids that do not. Similarly, **foundation industries should be better integrated into the Catapult network**. Existing centres should encourage bids for co-ordinated research activities where applied science, foundation industries and advanced manufacturing firms can align their interest and conduct joint projects.

Improve access to more patient forms of finance

To help provide more patient finance targeted explicitly at nurturing stronger manufacturing clusters, **we propose restarting and repurposing the underspent regional growth fund (RGF)**. Government should use powers for emergency funding, or delay the expiry of any existing underspend, so that new or surplus budgets can be targeted **specifically** at supporting innovation and clustering in the **supply chains of strategic industry**, such as aerospace, automobiles and pharmaceuticals.

Introduce more strategic model of public procurement

Stronger standards guidance for public procurement would help support a market for high-quality British foundation industry goods without falling foul of EU state aid rules. We recommend the **use of more stringent standard regimes – including product quality and social and environmental impacts – in public procurement guidelines**. More strategic procurement would better account for the cost of a product over a life cycle, and help the UK transition towards a low-carbon economy by reducing our reliance on high-carbon foundation industry imports.

Spread ownership

Government should **introduce an employee right to buy whereby employees are given the opportunity to take ownership of firms that are planning to close or are being sold off**.

1. INTRODUCTION

UK manufacturing as a whole is in stagnation. The sector has generally grown more slowly than the economy as a whole since the 1970s, meaning that it has shrunk significantly as a percentage of GDP – from around 30 per cent in 1970 to 9 per cent in 2014.

This trend is repeated across developed economies. Rising domestic wages, coupled with increased competition from emerging-market producers, have disadvantaged labour-intensive industries in advanced economies, tilting the scales towards other sectors such as services that tend to be less vulnerable to being undercut by cheaper labour costs abroad. Such has been the degree of competition from emerging markets that, even with productivity rising more quickly in the UK manufacturing sector compared with the economy as a whole, the sector has been unable to resist decline. This has hit both domestic market share – as UK firms and consumers have looked to source goods more cheaply from outside the country – and our export volumes.

The aftermath of the 2008 financial crisis has proven particularly challenging for the UK's foundation industries (manufacturers of core materials that supply other manufacturing and construction firms). IPPR analysis of ONS statistics shows that while GDP dropped by 4 per cent in real terms between 2008 and 2009, gross value added (GVA) from foundation industry sectors shrunk by almost a quarter (ONS 2015a).[1] The average number of foundation industry jobs fell by 22 per cent between 2008 and 2010, compared with a fall of 10 per cent for manufacturing as a whole and 2 per cent across the economy (ibid).

The UK's recovery from recession has been sluggish. GDP only returned to its pre-recession level in 2013, and it took until 2015 to return to its 2008 peak on a per capita basis. But even in comparison to lacklustre performance across the board, the foundation industries have struggled: in 2014, output across the sub-sector was still 20 per cent below 2008 levels (ibid).

This report seeks to better understand the factors that have contributed to, and accelerated, the decline in the foundation industries in the UK since 2008, in order to decide what, if any, action should be taken by government. In the chapters that follow, we present new analysis of recent developments in these industries, looking at output, employment, productivity, pay, geographical distribution, supply chains and trade. We then move into an analysis of the institutional and policy ecosystem that sits around the foundation industries, drawing comparisons with the rest of the UK manufacturing sector and with differing political economies abroad. In our final section we make policy recommendations.

1 Foundation industries defined at the fourth-digit SIC code.

A note on definition and methodology

The 'foundation industries' are comprised of firms that fulfil the following three criteria (PWC 2014):

- they are manufacturing industry firms (SIC code C, first digit)
- intermediate consumption (that is, goods bought by other firms, rather than households) of their products is higher than the UK average
- over 75 per cent of this consumption comes from the manufacturing or construction sectors.

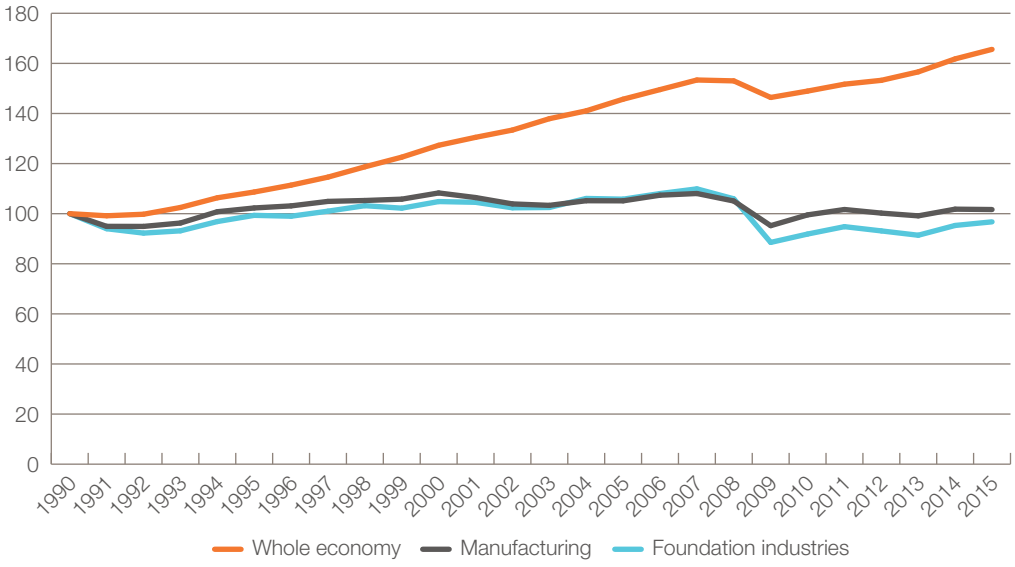
For our analysis, we apply this definition to industry sectors at the second-, third- and fourth-digit standard industrial classification (SIC) code level (see appendix, tables B.1, B.2 and B.3 respectively). Because data availability varies, we are sometimes forced to use a lower level of sectoral detail (that is, a lower 'digit') for our analysis. Where this is the case, we state the level of detail used.

2.
UK FOUNDATION INDUSTRIES' RECENT PERFORMANCE

2.1 Introduction

The foundation industries now produce 10 per cent less output, in real terms, than they did in 1990. Figure 2.1 shows how the foundation industries have fared relative to the wider manufacturing sector, and the UK economy as a whole, over the last 25 years.

Figure 2.1
The foundation industries have consistently underperformed against the rest of the UK manufacturing sector and the wider economy
Output for the UK economy as a whole (real GDP), the manufacturing sector and the foundation industries (real GVA, 1990=100)



Source: IPPR calculations based on ONS 2015b
Note: Foundation industries defined at the second-digit SIC code.

The structural pressures of globalisation have been felt acutely by foundation industry firms. The manufacture of goods from early-stage processing in wood, metal, minerals and chemicals tends to be less dependent on the high-skilled workforce and infrastructure that give developed countries a competitive advantage. This makes it easier for those processes to be delivered in developing countries at a lower cost.

The foundation industries have been buffeted by domestic recessions and currency fluctuations, which have accelerated the effects of globalisation. Typically, recessions act as junctures where business strategies are reviewed and reconfigured in response to longstanding issues; this often results in international relocation, the switching of suppliers, or simply reduced production. This is why the manufacturing sector contracted more quickly in the early

1990s than the rest of the economy. The strengthening of sterling relative to the currencies of key trading partners during the early 2000s hit competiveness further, as British exports became more expensive. This contributed to minimal manufacturing growth, despite growth across the economy as a whole.

2.2 Output, employment and regional distribution of activity

The foundation industries constitute a relatively small share of the UK economy: around £22 billion in gross value added (GVA, 2014 prices) terms, equivalent to 1.3 per cent of GDP (IPPR calculations using ONS 2015c and 2015d). The £6 billion fall in output seen since 2008 is predominantly the result of large output falls in the chemicals and non-metallic minerals sectors, although other sectors have also shrunk.

Employment within the sectors also fell between 2008 and 2013, from an average of well over half a million in 2008 to a little over 400,000 in 2013. Fabricated metals remains by far the largest foundation industry sector, with GVA of £10.8 billion and over 200,000 employees in 2013 (ibid).

Table 2.1
Output (GVA 2014 prices) levels (£ million) and percentage change by foundation industry sub-sectors in the UK, 2008, 2009 and 2014

	2008	2009	2014	Real change 2008–2014	Real change 2009–2014
Wood and wood products	£3,045m	£2,211m	£2,144m	-30%	-3%
Basic chemicals	£5,227m	£4,731m	£2,831m	-46%	-40%
Other non-metallic minerals	£4,002m	£3,083m	£2,912m	-27%	-6%
Basic metals	£4,536m	£2,166m	£3,054m	-33%	+41%
Fabricated metal products	£11,824m	£9,540m	£12,015m	+2%	+26%
Foundation industries	£28,633m	£21,731m	£22,956m	-20%	+6%

Source: IPPR analysis using ONS 2014a, 2015a and 2015d.
Note: Foundation industries defined at the fourth-digit SIC code.

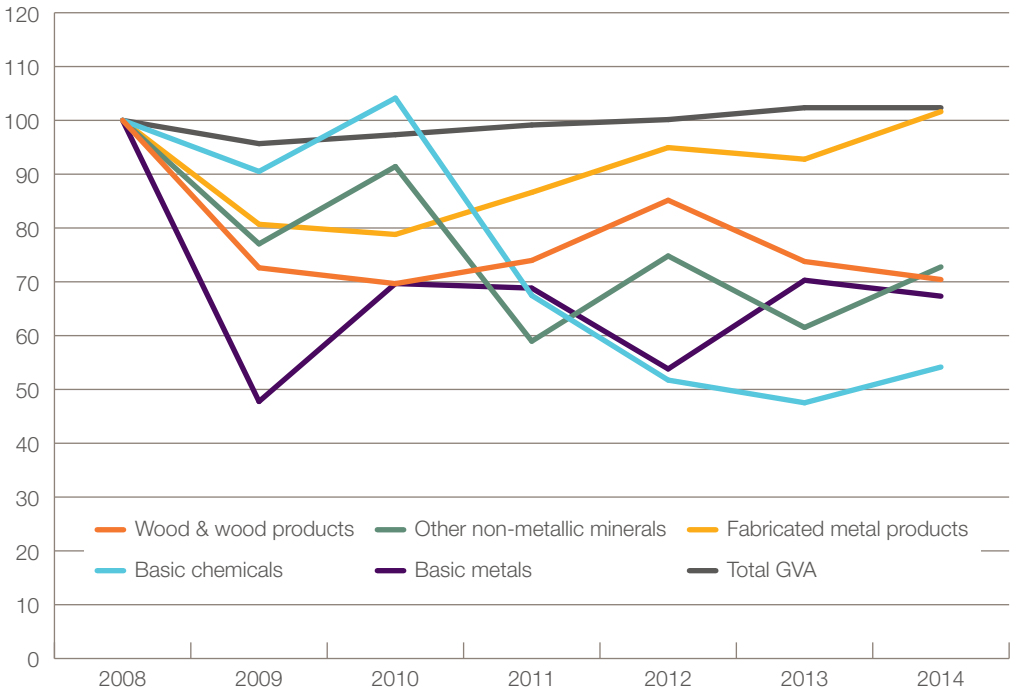
Table 2.2
Employment (thousands) levels and percentage change

	2008	2009	2014	Change 2008–2014	Change 2009–2014
Wood and wood products	74,000	57,000	71,000	-4%	25%
Basic chemicals	44,000	–	32,000	-27%	–
Other non-metallic minerals	65,000	72,000	55,000	-15%	-24%
Basic metals	69,000	30,000	24,000	-65%	-20%
Fabricated metal products	269,000	266,000	242,000	-10%	-9%
Foundation industries	521,000	425,000	424,000	-19%	0%

Source: IPPR analysis using ONS 2014a, 2015a and 2015d.
Notes: There is no available data for average employment in basic chemicals at the fourth digit in 2009. Foundation industries defined at the fourth-digit SIC code.

The foundation industry sub-sectors have had contrasting experiences post-2008. After contracting by almost 20 per cent during the recession, the largest sub-sector – fabricated metals – has grown more rapidly than the economy as a whole since 2010. It was the only foundation industry to have recovered 2008 levels of output by 2014. Basic metals and wood were the only other two industries to have experienced growth since 2009, but their respective trajectories remain bumpy and uncertain. One of the causes for these varying experiences is likely to be the strength of the key customer firms of respective foundation industries as well as the extent of competition from abroad; this is something we return to in the following sections.

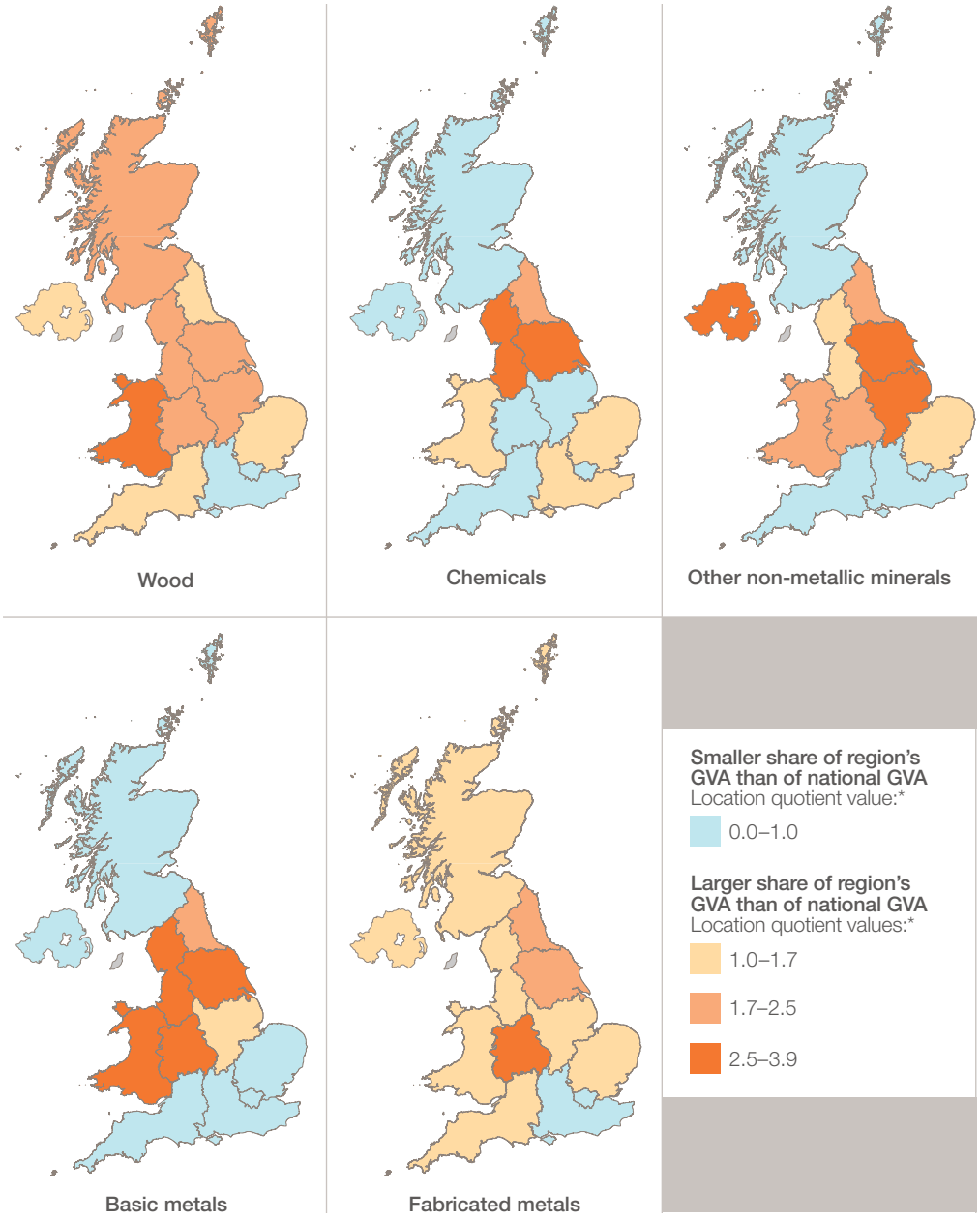
Figure 2.2
Fabricated metals is the best-performing foundation industry sub-sectors
Change in real GVA for the five foundation industry sub-sectors, and change in total real GVA (2008=100)



Source: IPPR analysis using ONS 2014a, 2015a and 2015d
Note: Foundation industries defined at the fourth-digit SIC code.
Foundation industry firms also account for a disproportionate share of output in the regions outside London and the South East. Output in the North West, West Midlands, and Yorkshire and Humber regions made up over half (52 per cent) of the UK's foundation industry GVA in 2013, despite those regions only accounting for a quarter of UK output overall (27 per cent). Figure 2.4 shows that, in 2013, only 4 per cent of foundation industry activities were based in London, despite the region accounting for over a quarter (26 per cent) of UK GVA (IPPR calculations using ONS 2015e).

Disaggregating the foundation industries further reveals that basic metal manufacturing is particularly concentrated in Yorkshire and the Humber, the North West and the West Midlands: over two-thirds (68.8 per cent) of all value added for the sub-sector comes from just these three regions (ibid). The North West is also home to a concentration of basic chemicals production, accounting for almost a third (31.9 per cent) of the sub-sector's GVA (ibid).

Figure 2.3
The UK's foundation industries are strongly concentrated in particular regions
GVA-based location quotients of foundation industries, by region, 2013*



Source: IPPR analysis using ONS 2015e
*Notes: Location quotients have been estimated using GVA. They represent the ratio of an industry's share of regional GVA relative to that industry's share of UK wide GVA. A value of less than 1.0 indicates that an industry makes up a smaller share of GVA in a given region compared with its share of total UK GVA. A value of greater than 1.0 means that an industry takes up a larger share of regional GVA compared with the economy as a whole. Intervals for colour gradation above 1 are equal to one standard deviation from the mean value of location quotients for all foundation industries and regions.
Foundation industries defined at the second-digit SIC code.

Figure 2.4
Over two-thirds of all value added for the basic metals sub-sector is concentrated in three regions: Yorkshire and the Humber, the North West and the West Midlands
Output for the foundation industries (2008 and 2013) and the non-financial economy (2013), by regions of the UK (GVA, current prices)*

Source: IPPR analysis using ONS 2015e
Notes: *2014 prices estimated using respective industry level deflator series at the second-digit SIC code. Foundation industries defined at the second-digit SIC code.

2.3 Productivity, pay and investment

Figure 2.5 shows the level of productivity[2] across the foundation industries both for the two years after the financial crisis and for the most recent two-year period available.[3] It shows that, with the exception of wood, the foundation industries reported higher productivity than the non-financial sector as a whole for the period 2013–2014. Basic chemicals and basic metals also had higher productivity than manufacturing as a whole, notwithstanding that output per employee in the chemicals sector fell sharply across the period. These two industries also have especially high pay, with median hourly earnings at £15.28 and £15.85 (respectively) in 2015; and compared with a median of £11.80 in the economy as a whole and £12.88 in manufacturing (ASHE 2015).

With the exception of chemicals, however, productivity growth was stronger for the rest of the foundation industries compared with non-financials firms as a whole. Levels of productivity in the basic metals almost doubled (with a growth rate of 93 per cent), while productivity in fabricated metals increased by over a quarter (26 per cent) (ONS 2015c). This compares with productivity growth of 7 per cent

2 Measured in terms of output (GVA) per employee. The vast majority (92 per cent) of manufacturing jobs are full-time (ONS 2015g), which means that productivity can be estimated on a reasonably accurate basis in the form of annual output (GVA) per average number of employees.

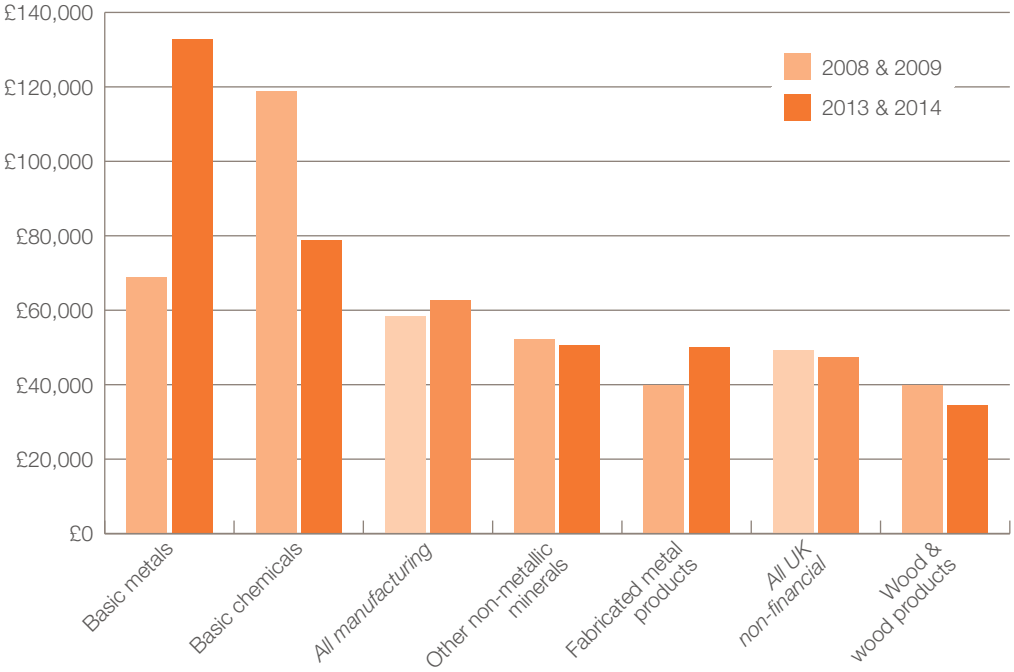
3 To improve the reliability of our findings, we have increased the sample size by rolling together two years of data from the Annual Business Survey for each respective data point. This notwithstanding, it should be noted that there remains a high degree of volatility in output and employment data at the third-digit SIC.

across the whole manufacturing sector, and near-zero growth for the non-financial sector as a whole over the same period.

Productivity can rise for a variety of reasons, some positive, others less so.[4] It can be indicative of structurally improved capacity per worker, such as through system or technological change. But measured productivity also rises if firms are shedding jobs more quickly than the speed at which their sales are falling – and this is not what we would characterise as being a 'good' productivity gain. We can look at the employment data to determine whether the productivity gains made by the foundation industries post-2008 were of the 'good' kind.

All of the foundation industries shed workers between 2008 and 2014, and in the case of non-metallic minerals, it is likely that any apparent productivity gains seen in the data are a function of employment falling at a faster rate than output. However for basic metals and fabricated metals the story is a little more mixed. In these sectors, while employment did fall between 2008 and 2014, GVA actually rose between 2009 and 2014 (see tables 2.1 and 2.2).

Figure 2.5
Basic metals and fabricated metals have both seen an increase in productivity
Output (GVA 2014 prices) per worker by foundation industry sub-sector, 2008–2009 compared with 2013–2014



Source: IPPR analysis using ONS 2014a, 2015a and 2015d
Note: Foundation industries defined at the fourth-digit SIC code.

Case study: Energy efficiency and CO_2 reduction strategies, Tata Steel

Tata Steel is one of Europe's largest steel producers. Through a combination of investment and workforce engagement and education, they have sought to make their energy use safer and more efficient, including by taking steps to improve their processes and environmental performance concerning energy, waste, water and CO_2 emissions. They are also leading partners in ULCOS (the Ultra-Low Carbon dioxide [CO_2] Steelmaking

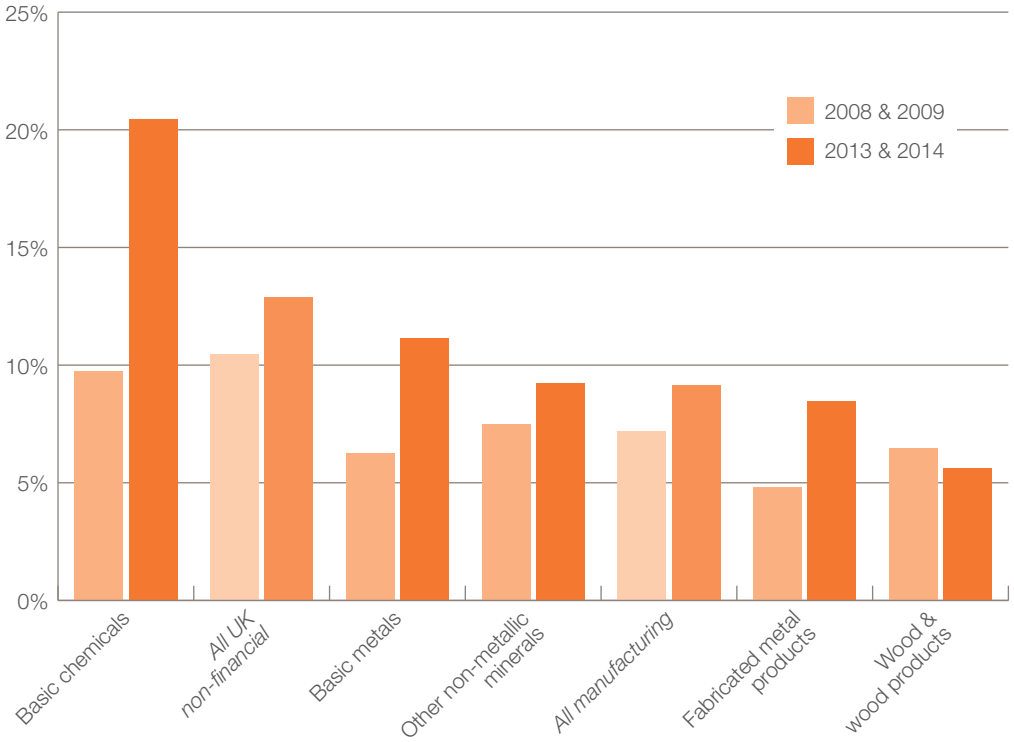
4 This is particularly true for productivity measured in terms of output per hour.

programme), a consortium of 48 European companies and organisations across 15 European countries conducting co-operative research and development to significantly reduce CO_2 emissions from steel production.

Within the UK, the company has made a number of investments to improve energy efficiency and reduce CO_2 emissions. For example, at Port Talbot, Tata Steel have invested £60 million in a basic oxygen steelmaking (BOS) plant that generates electricity by recovering and making use of process heat from the BOS gas cooling system. This investment helps generate 10MW of electricity (equivalent to electricity for 20,000 homes), and is significant step towards creating a self-sufficient energy supply at Port Talbot, reducing the need for electricity and natural gas imports. It is also estimated that the recovery process will reduce CO_2 emissions by 240,000 tonnes a year.

At Scunthorpe, a £45 million investment in the Raventhorpe Solar Farm has created 38MW of installed capacity, which is connected directly to the Tata Steel Scunthorpe plant. The solar farm is expected to produce an estimated 39,400 megawatt hours per year, equivalent to 7 per cent of the site's total energy, and will reduce CO_2 emissions by 20 kilotonnes per year when fully operational. These examples suggest that energy efficient investment can both reduce costs in the long run, while contributing towards environmental and climate change targets.

Figure 2.6
Increases in net investment have coincided with improved productivity in the basic metals and fabricated metals sub-sectors, but not in chemicals
Net capital expenditure as a proportion of average output by foundation industry sub-sector



Source: IPPR analysis using ONS 2014a, 2015a and ONS 2015d
Note: Foundation industries defined at the fourth-digit SIC code.

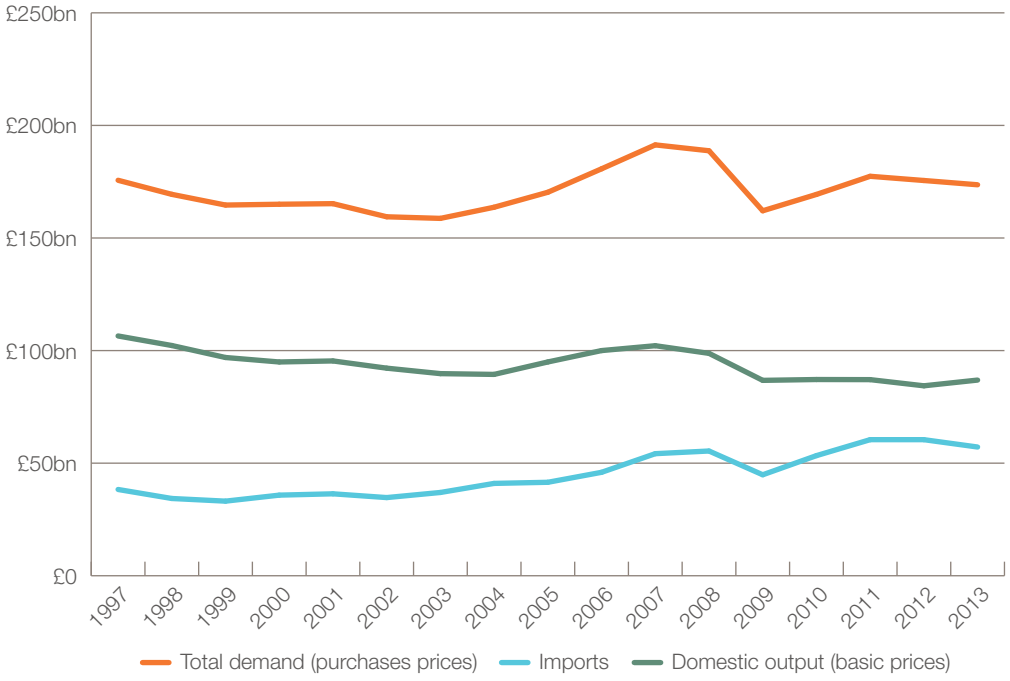
We have only a small amount of historical data for investment by detailed foundation industry sub-sector, which means that any conclusions about patterns of investment and productivity are tentative at best. However, the data suggests that investment in the basic chemicals and basic metals sectors has been stronger than the average for

manufacturing as a whole. It has also risen significantly in both these sectors, as well as in fabricated metals, between 2008–2009, and 2013–2014.[5] In both basic metals and fabricated metals, the two sectors where output has increased fastest since 2009, an increase in net investment has happened alongside an improvement in productivity.[6]

2.4 Supply, demand and balance of trade

As is the case for all firms, the fortunes of the UK's foundation industries are determined by demand for their products (both domestically and abroad), and the extent to which domestic firms can compete with international competitors for market share. Although demand for UK foundation industry products (including both domestic demand and exports) has remained relatively constant since the late 1990s (notwithstanding the economic cycle), the problem for the UK's producers is that an increasing share of this demand is being met through imports rather than domestic production. This would suggest that falling output from domestic industry is better explained by lost market share to foreign firms, as opposed to falling aggregate demand (at home and from abroad) for their product types.

Figure 2.7
An increasing share of demand for UK foundation industry products is being met through imports rather than domestic production
Domestic production, total demand and imports of foundation industry goods, 1997–2013 (2014 prices)*



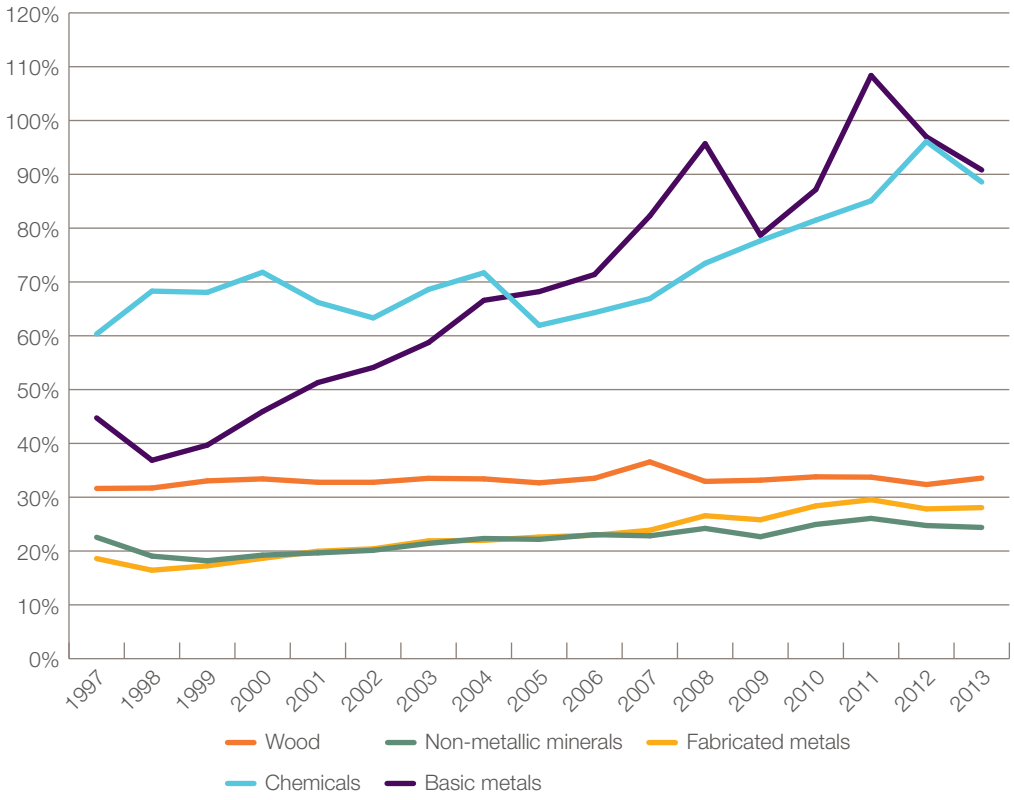
Source: IPPR calculations using ONS 2015d and 2015h
Notes: *Domestic consumption plus exports.
Foundation industries defined at the second- and third-digit SIC code groupings used by the ONS (2015h).

5 As with productivity, and to improve the reliability of our findings, we have increased the sample size by rolling together two years of data from the Annual Business Survey for each respective data point. This notwithstanding, it should be noted that there remains a high degree of volatility in output and employment data at the fourth-digit SIC.

6 Given that we have only five data points (one each for the five basic industries), any visually apparent correlation will not be statistically significant.

Figures 2.8, 2.9 and 2.10 disaggregate 'import penetration'[7] and the value of imports and exports over time by foundation industry sub-sector. It shows that some foundation industry sub-sectors – chemicals and basic metals in particular – have become much more open to international trade since the late 1990s while others – such as wood and non-metallic minerals – have remained relatively closed. It is significant that our largest foundation industry sector, fabricated metals, has seen imports rise sharply over the period, while exports have remained broadly flat, suggesting a loss of competitive advantage (IPPR calculations using ONS 2014a).

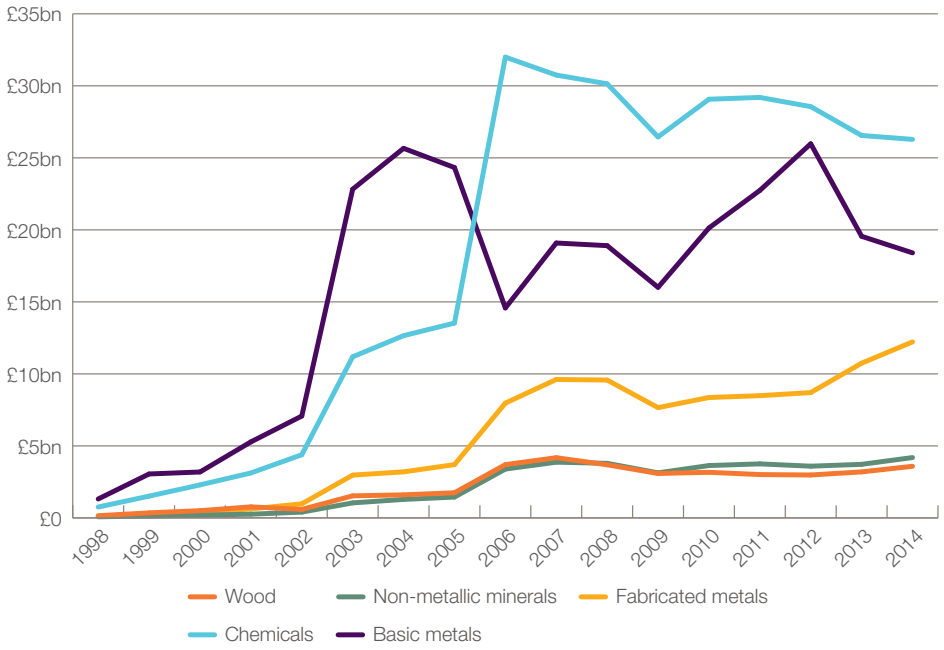
Figure 2.8
Chemicals and basic metals have become much more exposed to international trade since the late1990s
Volume of imports as a proportion of domestic demand by foundation industry, 1997–2013



Source: IPPR calculations using ONS 2015h
Note: Foundation industries defined at the second- and third-digit SIC code groupings used by the ONS (2015h).

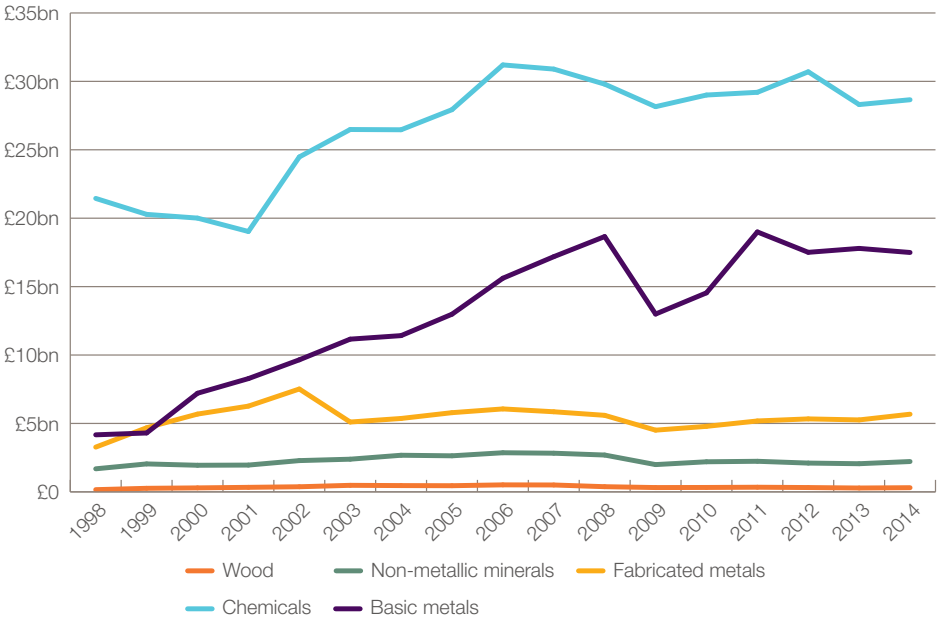
7 We use the same method as the ONS to estimate import penetration, calculated by dividing imports by domestic demand – defined in this case as the sum of domestic output, plus imports and minus exports. Theoretically, this means that imports can exceed 100 per cent of domestic demand if significant volumes of imported goods go on to be exported.

Figure 2.9
Fabricated metals, the UK's largest foundation industry sector, has seen imports rise sharply, along with chemicals and basic metals
Imports of foundation industry goods (2011 prices), 1998–2014



Source: ONS 2015i
Note: Foundation industries defined at the second-digit SIC code.

Figure 2.10
Exports in fabricated metals have remained broadly flat, suggesting a loss of competitive advantage
Exports of foundation industry goods (2011 prices), 1998–2014



Source: ONS 2015i
Note: Foundation industries defined at the second-digit SIC code.

Case study: steel production

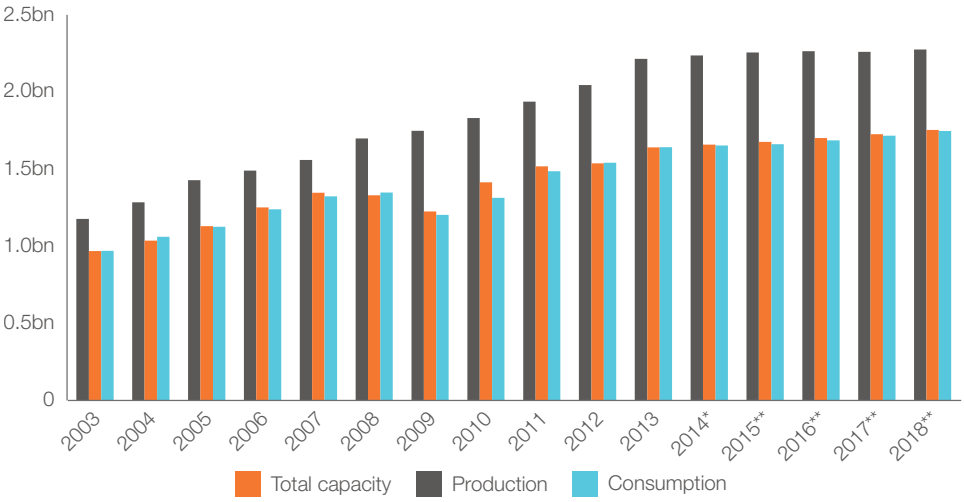
The global steel industry is in poor health. Weak demand has caused the global steel price, and therefore steel producers' profits, to plummet. Global demand grew by a mere 0.8 per cent in 2014 (Australian Government 2015a) compared to 6 per cent in 2013 (Australian Government 2015b), and in 2015 it is estimated to have actually declined by 1.7 per cent (Australian Government 2015a). Looking ahead, global demand is forecast to rise by about 30 per cent between 2014 and 2030 (OECD 2015b), which compares to almost 100 per cent growth between 2000 and 2014 (IPPR calculations using OECD 2015c).

Despite this, investment in steel facilities has remained strong, which means oversupply is likely to be a feature of the steel market even in the event that demand picks up. Nominal capacity for steel production increased by around 3 per cent a year between 2012 and 2014, and significant further investment in new capacity is already in the pipeline. Global capacity is expected to reach 2.4 million tonnes per year by 2017 (OECD 2015a), while demand is expected to grow only moderately, to 1.8 million tonnes per year by 2020 (Ernst and Young 2015).

Figure 2.11

Global demand for steel is expected to grow far slower than anticipated global capacity

Global production, consumption and capacity in the steel industry (tonnes), 2003–2018



Source: adapted from Ernst and Young 2015
Note: *estimate; **forecast.

Research by the OECD found that investment in new steel facilities is disproportionately concentrated in regions that are currently significant net importers of steel, such as north Africa and south east Asia (OECD 2015a). The deluge of investment demonstrates the current importance of geopolitics and the desire for self-sufficiency in strategic industry, defying as it does prevailing market conditions. This is indicative of a broader problem of the dumping of steel products in European markets at below the cost of production. Both the EU and the US have recently found evidence of the dumping of steel products from China and Taiwan, with ongoing investigations into broader patterns of the dumping of steel (EUROFER 2015, Anderson 2016).

Excess capacity in steel is likely to weigh on global prices for the foreseeable future. This has presented a very real and immediate threat to the survival of the UK steel industry, with high-profile facility closures already at Redcar and Scunthorpe in 2015. But a slowing Chinese economy also represents a risk to other areas of manufacturing that may be exposed to changing international market and trade dynamics in the future. For example, we estimate that a one percentage point loss in demand for domestic production of basic metals, chemicals and fabricated metals – perhaps coming as a result of reduced demand for exports or increased competition from imports – could (without mitigation) cost the UK around £2.3 billion in gross output and result in the loss of 19,000 jobs (full-time equivalent) among effected industries and their suppliers

(IPPR analysis using ONS 2015a, 2015d, 2015h, 2014b and 2014c).[8] These industries have lost significantly more than one percentage point in demand through import competition alone since 2008. Estimated positive effects from an increase in demand would be equal and opposite.

Faced with global excess capacity, governments in developed economies have a range of options. One course of action is to allow their domestic steel industries to bear the full costs of adjustment, possibly leading to facility closures and job losses. This option also risks conceding future market share and growth in the event that demand picks up further down the line. At the other end of the spectrum, government can give temporary or sustained respite to domestic industry through duties, anti-dumping measures, subsidies, or even nationalisation. In the event of a prolonged slump – or permanent decline – in demand, this level of interventionism risks propping up an uncompetitive industry at significant cost. Between these two extremes, there are a variety of intermediate responses, such as allowing overall domestic capacity to fall, but providing targeted support to those areas of industry that are most strategic or else able to become so by moving up the value chain.

Despite rising global capacity in steel production, Germany's steel industry is in good shape relative to other European countries. Germany remains the largest steel producer in the EU (the seventh largest in the world), producing about 30 per cent of Europe's steel, worth €17.2 billion. Despite the challenges of global oversupply, German steel production expanded by around 2 per cent in 2015 (Deutsche Bank 2015a).

Steel forms the backbone of the German economy, and its strategic use in other industries is directly linked to the industry's resilience. Innovations in steel and iron production occur in response to industrial developments in car manufacturing, construction and mechanical engineering among others. The automotive and engineering sectors in Germany are predicted to see production growth of 2 per cent over the year and therefore continue to drive the demand for German steel.

The UK's foundation industry firms supply a wide range of domestic customers, from aircraft machinery manufacturers to the education sector (see table 2.3). However, demand for goods from wood, chemicals and non-metallic minerals is dominated by construction. This helps to explain the faster than average decline of foundation industries as a whole after 2008 (even compared with the rest of manufacturing), as construction output remained below 2008 levels until 2015 (figure 2.12).

In contrast, significant proportions of domestic demand for basic and fabricated metal outputs currently come from high-growth, strategically important sectors. Excluding demand for products from within the sector itself, 19 per cent of consumption in basic metals comes directly from the manufacturing of motor vehicles, while 27 per cent of UK consumption of fabricated metals comes from manufacturing in motor vehicles and aerospace. Further demand for basic and fabricated metals from high-growth industries also comes indirectly via the intermediate consumption of goods from the manufacturing of machines and machine parts. This will have contributed to the higher growth that we have seen in these sub-sectors since 2009 than the rest of the foundation industries (see section 2.2), particularly in fabricated metals where growth in GVA has also been stronger than both the rest of manufacturing and the UK non-financial sector as a whole.

Along with fuels, chemicals and petrochemicals firms produce the main material inputs for the pharmaceutical industry. Although pharmaceuticals remains an important export industry for the UK, its prolonged contraction since 2008 (see figure 2.12) is likely to be a key reason for the decline in the foundation chemicals industry over the same period.

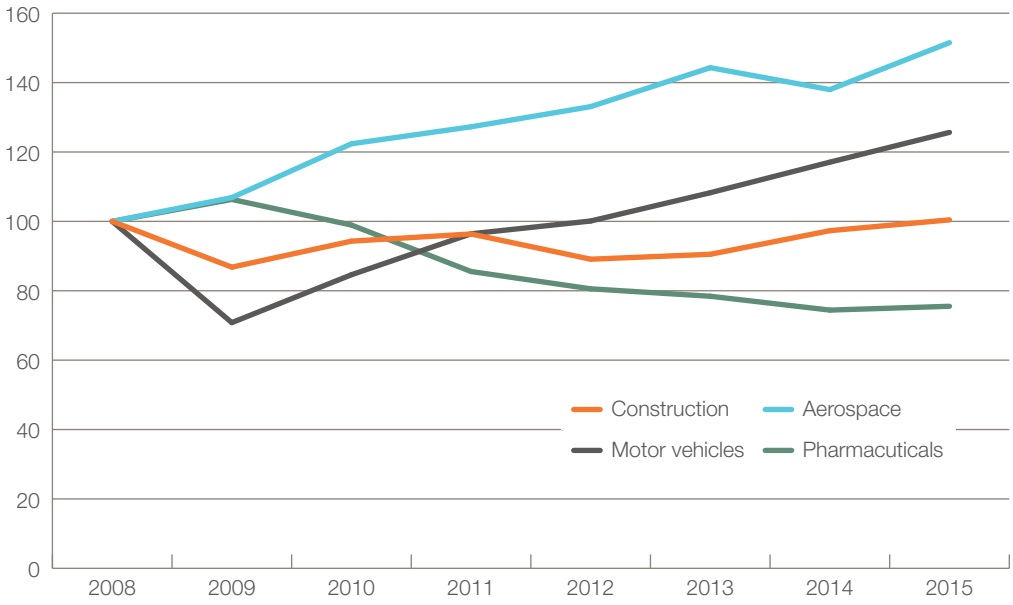
8 As with all multipliers, these estimates will be subject to a margin for error. These estimates do not take account of the fact that companies may be able to pivot into new markets, or that some people will find work elsewhere. They also do not take account of the fact that some proportion of lost jobs and output will come from suppliers outside of the UK. Due to the availability of data, foundation industries are defined here at the second- and third-digit SIC code groupings used by the ONS (2015h) 'supply and use tables'. Therefore estimates of the effects for foundation industries measured at the fourth digit will be smaller.

Table 2.3
The five largest drivers of intermediate demand for foundation industry products (2012)

Wood		Chemicals		Non-metallic minerals	
Construction	45.8%	Petrochemicals	39.5%	Construction	59.1%
Wood	25.7%	Rubber and plastic	15.9%	Cement and plaster	6.2%
Furniture	7.2%	Motor vehicles	6.2%	Glass and clay	3.5%
Motor vehicles	2.5%	Gases and fertilisers	4.0%	Motor vehicles	2.9%
Education	1.9%	Other chemicals	3.2%	Other wholesale trade	2.8%
Basic metals		**Fabricated metals**			
Fabricated metals	22.1%	Construction	19.3%		
Motor vehicles	16.2%	Motor vehicles	12.4%		
Basic metals and casting	15.3%	Fabricated metals	11.4%		
Machinery	10.7%	Aero-spacecraft	11.3%		
Basic iron and steel	10.0%	Machinery	11.2%		

Source: IPPR calculations using ONS 2015h
Note: Foundation industries defined at the second- and third-digit SIC codes (see appendix for full explanation).

Figure 2.12
The prolonged contraction in pharmaceuticals since 2008 is likely a key reason for the decline in the foundation chemicals industry over the same period
Output in key customer industries for foundation industry firms (real GVA, 2008 = 100)

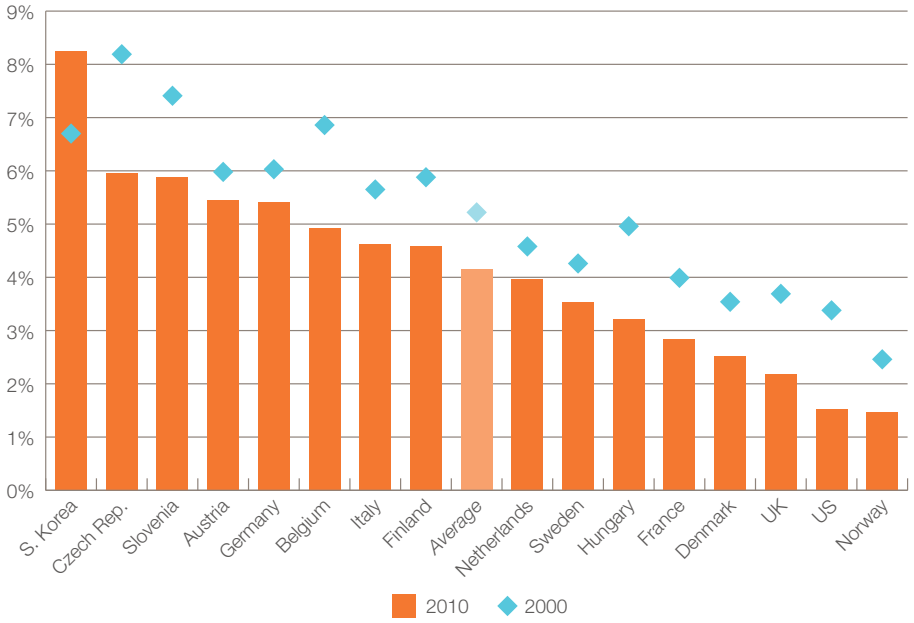


Source: IPPR calculations based on ONS 2015a
Note: Industries defined at the second-digit SIC code.

2.5 The international context

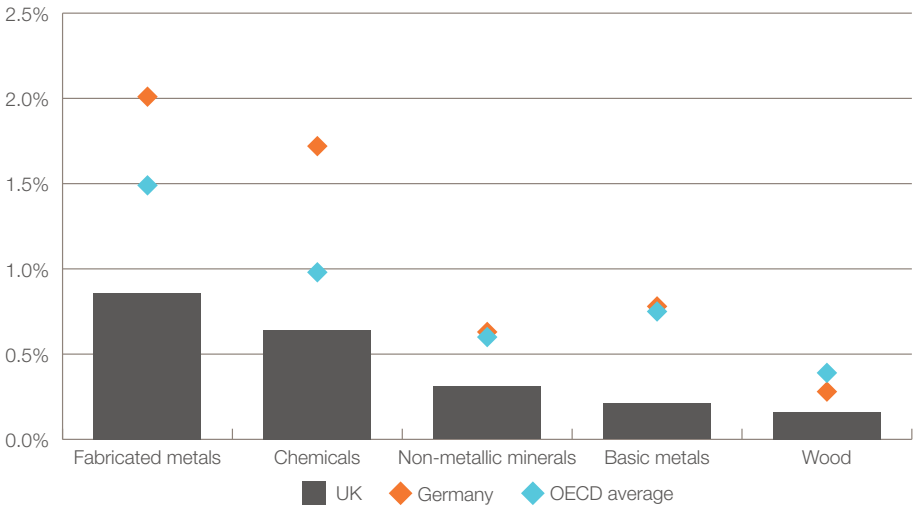
Although manufacturing output has generally declined in developed countries across the globe, foundation industry manufacturing in the UK has fared particularly badly by international standards. Across the 16 OECD countries for which data is available, only the US and Norway have a smaller foundation industry sector as a proportion of the economy (Figure 2.13). The UK has experienced a faster decline in the size of its foundation industries compared with other developed nations. Comparing 2000 with 2010, foundation industry GVA as a proportion of the economy fell by almost half, compared with an average decline across the countries for which data is available of 21 per cent.

Figure 2.13
In the OECD only the US and Norway have a smaller foundation industry sector as a proportion of the economy than the UK
Foundation industry output (GVA) as a proportion of total economy (GVA), OECD countries, 2000 and 2010 (%)



Source: IPPR analysis using OECD 2015a, ONS 2015b and ONS 2015c
Notes: *All OECD countries included for which data was available. No OECD data was available for UK manufacturing output at the second digit. UK data sourced from the ONS.
Foundation industries defined at the second-digit SIC code.

Figure 2.14
The fabricated metals, basic metals and chemical sectors are all much smaller in the UK than in Germany
Foundation industry output by sub-sector as a proportion of GDP in the UK, Germany, and OECD average, 2010 (GVA current prices, %)*



Source: IPPR analysis using OECD 2015, ONS 2015b and ONS 2015c
Notes: *All OECD countries included for which data was available. No OECD data was available for UK manufacturing output at the second digit. UK data sourced from the ONS.
Foundation industries defined at the second-digit SIC code.

It is likely that this is, at least in part, the result of two periods of 'Dutch disease', whereby the dominance of one economic sector has pushed up the value of the pound and reduced the international competitiveness of other sectors. In the 1980s, the culprit was North Sea oil; in the 1990s and 2000s it was the finance sector (Dolphin 2014). Foundation industry GVA in the UK shrank throughout this period at a more rapid pace than in comparable countries, which is at least partly attributable to the strong pound.

In addition, it is striking that investment per employee in UK foundation industries was significantly lower than other European foundation industries between 2011 and 2013, as table 2.4 illustrates, while R&D intensity (that is, business expenditure on research and development as a percentage of GVA) is lower among UK foundation industries than among their equivalents in France and Germany over that period (Eurostat 2016). UK productivity, meanwhile, lags behind most other major European foundation industry countries (BIS 2012). In the next chapter we look at some of the institutional features that have helped sustain higher investment levels.

Table 2.4
Investment per employee (€), by foundation industry sector, in selected European countries, 2011–2013

	Manufacture of wood, and of products of wood and cork*	Manufacture of chemicals and chemical products	Manufacture of other non-metallic mineral products	Manufacture of basic metals	Manufacture of fabricated metal products†
Belgium	€11,900	€40,800	€26,800	€63,000	€10,700
Denmark	€4,800	€13,200	€6,400	€5,000	€5,100
Germany	€5,100	€14,800	€7,900	€10,800	€5,600
Spain	€3,100	€10,600	€7,900	€10,600	€3,500
France	€8,700	€30,900	€19,900	€26,000	€5,900
Italy	€4,000	€13,900	€9,100	€14,300	€5,400
Austria	€9,400	€24,500	€10,500	€14,100	€8,100
UK	€3,800	-	€5,000	€7,500	€4,000

Source: authors' analysis of Eurostat 2016
***Note: excludes the manufacture of furniture, articles of straw and plaiting materials.**
†Note: Excludes the manufacture of machinery and equipment.

2.6 Conclusion

Performance in the foundation industries remains lacklustre since the financial crisis, with all industries yet to recover 2008 levels of GVA and employment. Beneath this, trends in investment, productivity, supply chains and import penetration vary by sub-sector.

Fabricated metals and basic metals grew faster between 2009 and 2013 than the economy as a whole. There are also pockets of high investment, particularly within chemicals and basic metals. Levels of productivity are higher in fabricated metals, chemicals and basic metals compared to both other foundation industries and the economy as a whole.

Our analysis of recent trends in the foundation industries' supply chains suggests that the decline in non-metallic minerals and wood can be at least partly attributed to reduced demand for their products from the construction sector since the recession.

Demand for chemicals, basic metals and fabricated metals has proven more resilient, though more volatile, reflecting greater exposure to international markets. Much of domestic demand for these sectors' outputs is driven, either directly or indirectly, by firms in strategic, high-growth sectors such as manufacturing of aerospace, automobiles and pharmaceuticals.

Reduced output from foundation firms in chemicals, basic metals and fabricated metals looks to have been driven largely by significantly increased competition from abroad. Although these pressures will have been common to foundation industry firms in all advanced economies, the UK's industries have experienced a more dramatic decline than most. We turn next to the factors that might help to explain this.

Table 2.5
UK foundation industries: key facts

	Fabricated metals	Basic metals	Non-metallic minerals	Chemicals	Wood
Size of industry (2014 GVA, 2014 prices)	£12,015m	£3,054m	£2,912m	£2,831m	£2,144m
Employment (2014)	242,000	24,000	55,000	32,000	71,000
Percentage change in real GVA, 2009–2014	+2%	-33%	-27%	-46%	-30%
Distribution of sector GVA within UK (top 3 regions, location quotients)	West Midlands (3.1)	Yorkshire & Humber (3.4)	Northern Ireland (3.9)	North West (3.2)	Wales (3.3)
	Yorkshire & Humber (2.2)	Wales (3.2)	East Midlands (2.8)	Yorkshire & Humber (2.6)	Scotland (2.2)
	North East (1.8)	North West (2.9)	Yorkshire & Humber (2.7)	North East (2.5)	Yorkshire & Humber (2.1)
Percentage change in productivity, 2008/9–2013/14	+26%	+93%	-3%	-34%	-14%
Change in investment 2008/9–2013/14 (investment as a proportion of GDP)	+4 percentage points	+5 percentage points	+2 percentage points	+11 percentage points	-1 percentage point
Three largest customer industries (2013)	Construction	Fabricated metals	Construction	Pharmaceuticals	Construction
	Motor vehicles	Motor vehicles	Cement and plaster	Rubber and plastic	Furniture
	Aerospace	Machinery	Glass and clay	Motor vehicles	Motor vehicles
Import penetration	34%	89%	24%	91%	28%

Source: ONS 2015a, 2015d, 2015e, 2015h and 2014a.

3.
EXPLAINING UK FOUNDATION INDUSTRIES' UNDERPERFORMANCE

We know that globalisation means that emerging markets now account for a much greater share of global production of foundation industry goods, and at a lower cost than developed countries can offer. But this doesn't explain why the UK's foundation industries have fared badly relative to otherwise comparable advanced economies. In this chapter we therefore consider the possible explanations for the UK's underperformance relative to other European countries whose foundation industries have performed better in recent years, while facing many of the same external pressures.

We begin by examining two key issues raised by the industry as obstacles to success: the relatively high cost of industrial energy in the UK, and the design of business rates here compared to Europe. We then look at the benefits for the foundation industries of a co-ordinated market approach to industrial policy, with a particular focus on collaborative innovation systems, supply chain integration and more patient forms of finance.

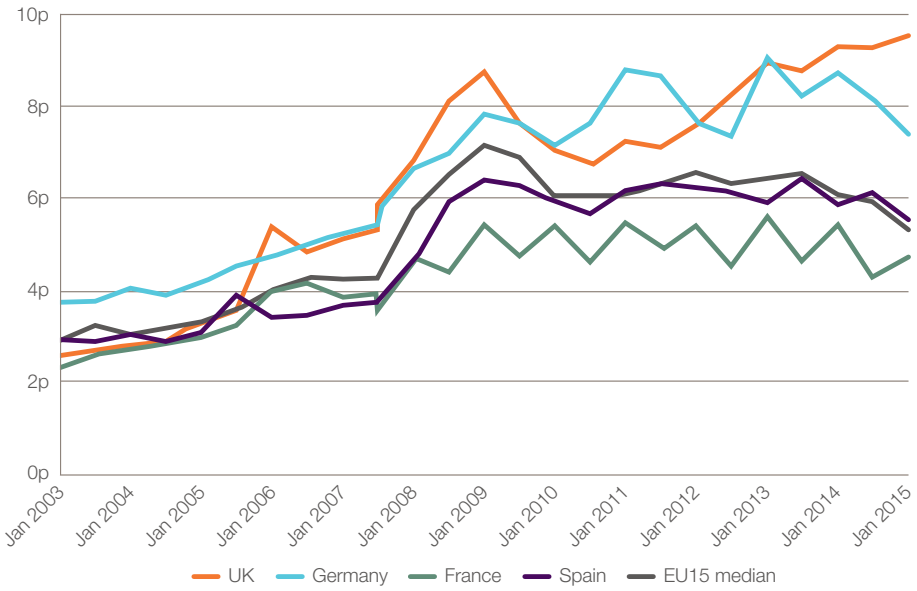
3.1 Energy costs

Industrial electricity prices in the UK are significantly higher than the EU15 median (see figure 3.1). High energy costs are particularly problematic for foundation industry firms as they tend to be energy intensive. For example, it is estimated that energy makes up between 6 and 8 per cent of the cost of steel production, which is roughly double the average for the manufacturing sector as a whole (Committee on Climate Change 2014). Given how vulnerable the foundation industries are to being undercut by cheaper producers abroad, this represents a significant threat to the competitiveness of UK firms.

The most recent Department of Energy and Climate Change 'Quarterly Energy Prices' analysis (figure 3.2) breaks down industrial energy prices for the EU15. An estimated one-third of the price of industrial energy in the UK reflected low-carbon policy costs (see figure 3.2). The UK government has, however, recently moved to reduce the energy costs associated with low-carbon policies. In particular, in December 2015 the government introduced the energy intensive industries compensation scheme which will provide compensation to energy-intensive firms for all government policy designed to support the low-carbon transition and renewable investment up until 2019/20. This is expected to reduce energy costs for these industries by £410 million over the next five years, in part by transferring the cost of exemption on to household energy bills and other less energy-intensive businesses.

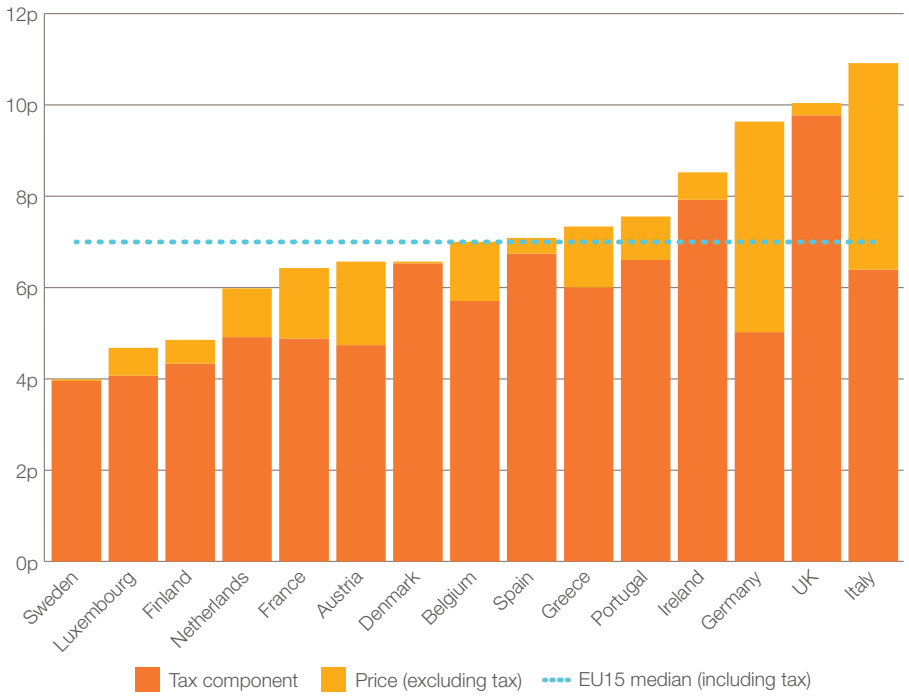
In total, the announced compensation and exemptions measures are expected to reduce the impact of the renewables obligation (RO) and feed-in-tariff (FiT) by 85 per cent of the policies' costs to eligible businesses (this is the maximum allowed under EU state aid rules). Figure 3.3 illustrates the expected effect of these mitigation measures by 2020 in terms of significantly reducing the burden of environmental taxes and renewables and greenhouse gas policies that face energy-intensive firms (BIS 2016).

Figure 3.1
Industrial electricity prices in the UK are significantly higher than the EU15 median
Comparison of European electricity prices for energy-intensive consumers in selected EU countries and EU15 median, January 2003–January 2015



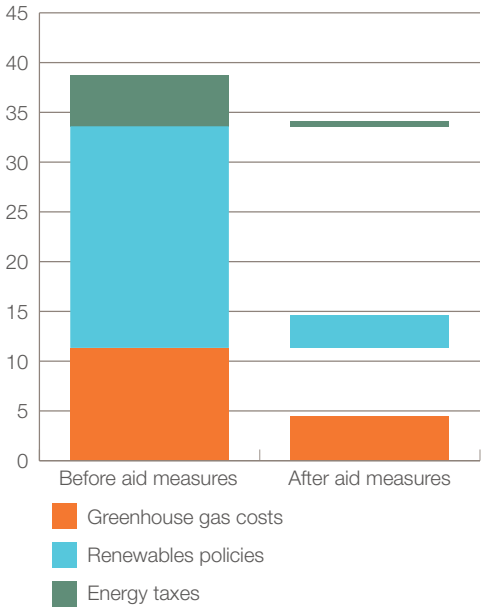
Source: adapted from BIS 2015a: 12

Figure 3.2
The UK government has very limited capacity to offset the high cost of industrial energy with tax reductions
Industrial energy prices in selected EU countries, December 2015



Source: adapted from DECC 2015: table 5.2.11
Note: Prices are for medium consumers in the EU15 for January–June 2015. Medium consumers are defined as having an annual consumption of 2,000–19,999MWh per annum.

Figure 3.3
Eligible businesses in the UK could recover 85 per cent of the cost of environmental levies
Illustrative example of the effects of UK aid measures in 2020 (£/MWh, real 2012 prices)



Source: adapted from DECC 2014b: figure 2

Finally, it is worth noting that investment in renewable forms of energy will ultimately lower wholesale prices, meaning any reduction in investment in renewables as a result of cuts to environmental levies could prove counterproductive. The UK's high electricity prices are partially a reflection of the cost of generating the electricity; some of the cheapest electricity in Europe is in countries with high amounts of existing hydro-power (such as Norway and Sweden) or existing nuclear power (such as France) or both (such as Finland) (European Commission 2015a).

In conclusion, energy prices certainly do look to be higher in the UK than in comparable countries, but recent policy decisions will significantly reduce the impact of the UK's low-carbon policies on the energy prices facing the foundation industries. Government activity should therefore focus on reforming the UK's wholesale energy market and energy distribution network to ensure that the cost of energy falls over the long term.

3.2 Business rates

Business rate design in the UK differs from that in Europe in one crucial respect: standard policy across Europe is to offer a 'rates holiday' for new investments, while in the UK plant and machinery are treated as fixed assets and included in the assessment of a site's rental value, shaping the business rates valuation process. To the extent that this means investment in new plant and machinery increases the rentable value of the facility, it acts as a potential disincentive to invest for manufacturers. Moreover it has created an anomaly that means the UK's foundation industries face business rates between five and seven times higher than those paid by their European competitors (BIS 2015b).

Our analysis suggests that investment across the foundation industries has been strong in recent years, with average investment between 2013 and 2014 in basic chemicals and basic metals higher than manufacturing as a whole, while the increase in investment as a proportion of GVA in fabricated, basic metals and chemicals all rose faster between 2008/2009 and 2013/14 than the economy as a whole. This suggests

that the relatively high level of business rates is having a limited disincentive effect, though of course we cannot know the counterfactual. Looking at the tax system more broadly, the direction of travel appears to be towards reduced costs of investment: reforms to the tax rate and capital allowances are thought to have reduced the cost of investment in equipment by 3 per cent between 2010 and 2015, for example (Maffini 2015). And taxes on company earnings are among the lowest of any developed economy, meaning that the ultimate returns on investment are taxed relatively lightly (HM Treasury 2015a). As Mariana Mazzucato has argued, businesses typically invest because they think they're going to make money; while taxes play a role in shaping investment, they are not normally the critical factor in that decision (Mazzucato 2014).

Overall, then, while the design of business rates potentially acts as a disincentive to investment in manufacturing, the UK's tax regime taken as a whole does not place the sector at a particular disadvantage.

3.3 Institutional context

The institutional context in which the foundation industries operate in the UK has a key impact on their ability to compete. The UK is a liberal market economy, in which firms co-ordinate between themselves and their financiers, employees, suppliers and customers via market mechanisms.

An alternative model is the more co-ordinated market approaches of Germany, Belgium and the Scandinavian countries among others, all of which have significant foundation industry sectors. These countries have far greater non-market co-ordination between and within firms than the UK in areas such as industrial relations, vocational training and skills, corporate governance and financing. In practice this leads to stronger regional banking systems, widespread adoption of a stakeholder model of corporate governance, and industry-level bargaining over wages and conditions (Hall and Soskice 2001).

Manufacturing industries in co-ordinated market economies are supported by institutions that encourage more patient forms of capital, stronger vocational training and industry-specific learning, and dense inter-firm networks that share information and technical expertise conducive to fostering an innovative 'industrial commons'. A complex web of complementary R&D institutions promotes strategic interaction between firms. Together these institutional features typically help form competitive advantages in differentiated, niche modes of production. Below we consider a few of the features of co-ordinated market economies.

Collaborative R&D

The *Zentrales Innovationsprogramm Mittelstand* (Central Innovation Programme Mittelstand) in Germany is an example of a nationwide institute that funds collaborative industry-oriented research, with the goal of supporting innovation and competitiveness for SMEs. It funds individual companies to pursue R&D, and collaborative R&D projects between SMEs, with the expectation that they will develop and share innovative products, processes or technical services. Firms producing basic metals, non-ferrous metals and chemicals have all received tailored support through the programme in recent years through this institute, focused on new product development (Federal Ministry of Economy and Energy 2015).

Other co-ordinated market economies in Europe have also supported foundation industry innovation through direct public investment, through either regional or national governments. For example, in October 2013 France launched the Institute for Research and Technology for Materials, Metal Industry and Processes; in April 2014, the regional Wallonia government in Belgium announced a €41.5 million 'Reverse Metallurgy' project focused on developing 'smart steel'; and Sweden has committed €22 million between 2013 and 2016 for research and development in its steel and mining sectors (European Commission 2015b).

Among developed economies the UK ranks in the middle in terms of the percentage of manufacturing businesses' expenditure on R&D that is financed by the government, at around 9 per cent. The UK has made significant amounts of funding available to manufacturing for investment in recent years via the Regional Growth Fund (RGF) and the Advanced Manufacturing Supply Chain Initiative (AMSCI), some of which has reached foundation industries. Around £110 million of committed grant funding from the RGF was classified as 'chemicals' and 'materials, pharmaceuticals and chemicals'; around £40 million of committed funding via the AMSCI was classified as 'chemicals' and 'materials and engineering'.[9] The cancellation of AMSCI and RGF therefore represents a potential risk to investment and future productivity in the sector. Funding is still made available via the Innovate UK and catapult centres that benefits projects in the foundation industries, although it is difficult to quantify the precisely how much. Despite this, data from Eurostat shows that R&D intensity and investment rates were lower among UK foundation industries than those in France and Germany between 2011 and 2013. This suggests that there is a greater strategic role for industry and government to play in further supporting UK manufacturing R&D, investment and innovation.

Patient finance

Co-ordinated market economies involve high levels of long-term co-ordination and often non-public information sharing between firms and banks, while the banks themselves are often owned or part-owned by the public sector, and geared to providing long-term finance to particular sectors. By contrast, bank–firm interactions in liberal market economies such as the UK tend to be restricted to the provision of capital, and in practice firms tend to be more reliant on their own profits to fund their investment.

These structural characteristics mean finance is typically more short-termist in liberal market economies than in co-ordinated market economies, with investment and R&D – crucial to producing innovation in manufacturing – generally lower than is desirable (Kay 2012). For example, the ratio of capital investment to manufacturing output in the UK is low relative to its competitors, and has been for decades (Hughes 2014).

Germany's financial system also incorporates a range of public and quasi-public financial institutions that have specific remits for long-term investments in the manufacturing sector. The *Industrielkreditbank* (IKB) is an example of a quasi-public bank that specialises in direct, long-term loans to small manufacturing firms, while the state-owned *Kreditanstalt für Wiederaufbau Bankengruppe* (KfW – Reconstruction Loan Corporation) is a lending institution specifically mandated to provide funding for larger industrial and developmental projects. Both have a long-term investment horizon to support high-quality production strategies and incremental product innovation, which help foundation industry firms move up the value chain. The network of regionally specific, publicly mandated savings banks in Germany also provide an effective route for investment. For example, €24 billion was lent to the metals industry in 2015, with savings banks the dominant lending institutions, while savings banks in total were the second-largest lender to the chemicals sector, which received loans worth €9 billion (Deutsche Bank 2015b).

Interestingly, the KfW has also been used as a strategic tool for reorganising declining sectors, including the steel and shipbuilding industries in the 1970s and 1980s. Given the issues of global overcapacity in the steel sector in particular, and the potential need to reorganise the sector, such an institute is likely to prove useful to the foundation industries in Germany in the future if capacity has to be reduced or reoriented towards new product supply (Hancke and Coulter 2013).

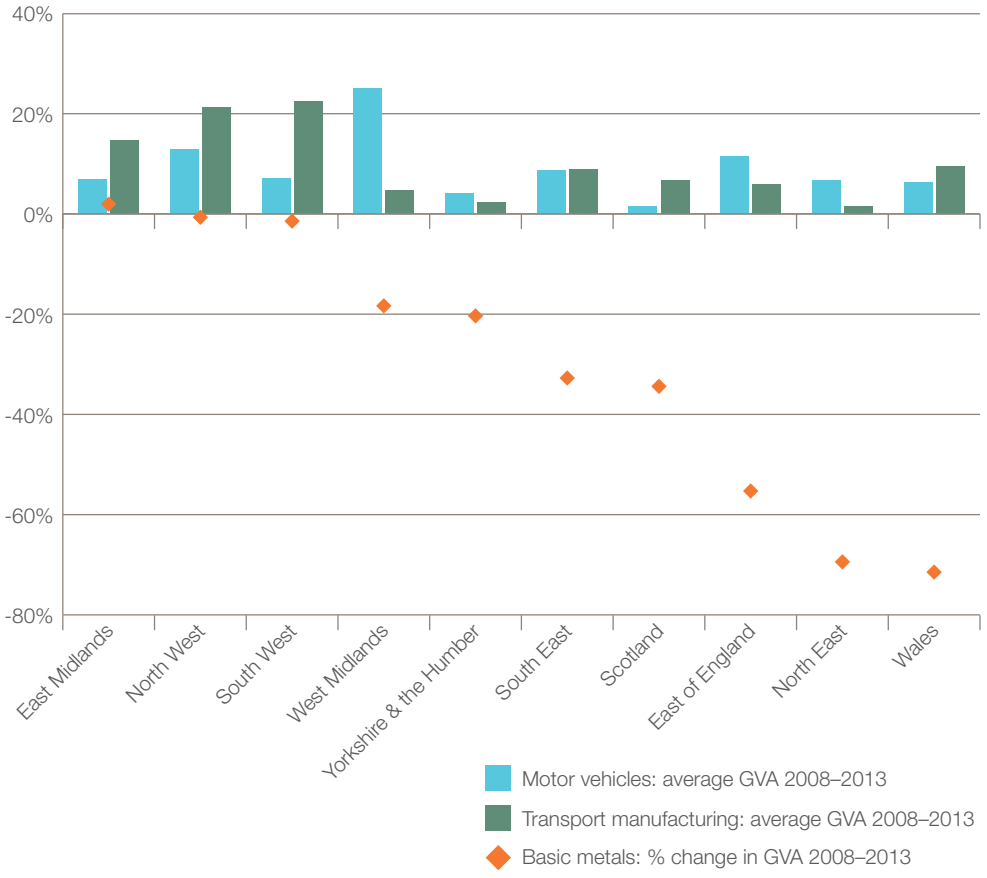
9 Data provided by BIS to IPPR, March 2016.

Taken together, the evidence suggests that more co-ordinated capital structures provide important advantages in financing manufacturing over the long run, providing more patient forms of capital that are conducive to long-term investment in innovation and R&D. By contrast, the UK's liberal market economy is arguably less effective at supporting the longer-term innovation investment in manufacturing that is crucial to creating sustainable competitive advantages in the production of foundation industry goods.

Supply chain integration

The UK has a small number of industries in which it enjoys a comparative advantage: aerospace manufacturing, pharmaceuticals, oil and gas, and automobile manufacturing. As shown in chapter 2, the chemicals, basic metals and fabricated metals sectors currently supply to these successful sectors, and (in the case of basic and fabricated metals) this looks to have supported their own growth in the aftermath of the financial crisis. In particular, there is some tentative evidence that GVA growth in basic metals, a foundation industry that supplies to the transport manufacturing and motor vehicle manufacturing sectors, has been most resilient in those regions of the UK where its customer industries have grown strongly, although the fact that the relationship is quite weak suggests that basic metals manufacturers are not well embedded in local supply chains (see figure 3.4).

Figure 3.4
GVA growth in basic metals has been most resilient in those regions of the UK where its customer industries are largest
Change (%) in basic metals output by region against average regional output in automobile and transport manufacturing as a proportion (%) of their countrywide output



Source: IPPR analysis using ONS 2015e
Note: Foundation industries defined at the second-digit SIC code.

More broadly, the UK is rare in being an advanced economy that produces a relatively narrow range of goods. This means that firms tend to be less embedded in domestic supply chains, and that their activities are less firmly anchored in the UK in the event of an adverse change to business conditions. This contrasts with the more diverse range of production activity seen in Germany or France, and is a key cause of the UK's relatively poor manufacturing performance (Dolphin 2014).

Co-ordinated market economies tend to have stronger local supply chains, supported by more interventionist policy designed to nurture technical expertise, backed by national and regional government with sectoral expertise in supporting specific manufacturing clusters (ibid). For example, at the federal level in Germany the 'go-cluster' programme explicitly seeks to strengthen clusters, helping to raise the international visibility of exporting clusters, funding collaborative research to ensure national innovation clusters transition into international clusters of excellence, and funding management training to improve co-ordination across supply chains.[10]

Regional government also has tailored policy programmes to support clusters, including in key foundation industries such as metals. For example, the regional government in Kaiserslautern provides a networking role to bring together the local metals and vehicle clusters,[11] while the Brandenburg government has adopted a 'metal cluster' industrial strategy, to co-ordinate local crosscutting supply chains around materials, production and automation engineering, and clean technologies, with the goal of improving interdisciplinary co-operation across clusters.[12] In the state of North Rhine-Westphalia, the 2014 *Fortschritt NRW* industrial strategy for the region focused on a number of key sectors, including developing existing clusters in metallurgy and manufacturing through support for technology transfers and supply chain integration.

These initiatives have helped maintain strong foundation industry clusters in Germany. Almost half of German steel production (44 per cent) takes place in one state: North Rhine-Westphalia, Europe's largest steel-producing region. The region's steel and metal sector employs 263,300 people across 2,289 firms that generate revenue of €65.6 billion (European Commission 2014a). Related industries, such as car manufacturing, cluster in the same region, as do many of the country's research institutions. These close links between industry, universities and non-academic research centres have meant that the state has developed a reputation as a centre of innovation (European Commission 2015b).

The links between industrial sectors within Germany mean that 60 per cent of the components the automotive industry in Germany buys are sourced from within the country, compared with an equivalent figure of 40 per cent in the UK (HMG 2015). The clustering of complementary activities, and strong local supply chains, have helped Germany's foundation industries weather the post-crisis period.

3.4 Conclusions

Globalisation has put severe pressure on the UK's foundation industries. However, other European countries have faced similar external pressures and have not seen their foundation industries decline to the same degree as they have in the UK.

Our analysis suggests that a combination of factors facing the various sub-sectors has contributed to their current state. Given the internationally exposed nature of the sector, the high cost of energy relative to European rivals – for firms that are particularly energy intensive – is an important factor that reduces the cost competitiveness of UK foundation industries. The higher-than-average industrial

10 See http://www.clusterplattform.de/CLUSTER/Navigation/EN/NationalLevel/go-cluster/go-cluster.html
11 See https://www3.kaiserslautern.de/wfk-kl/pages/wfk/netzwerkaktivitaeten/netzwerk-metall.php
12 See http://www.metall-brandenburg.de/en/Master-Plan

energy prices have been in part due to costs associated with low-carbon policies. Recent policies designed to compensate energy-intensive firms for the indirect costs of environmental policies are therefore welcome. Ultimately, however, more fundamental changes to our energy sector will be needed, as the high cost of energy in the UK is linked to the design of its wholesale energy market. The nature of such changes is beyond the scope of this report.

The design of business rates in the UK both disincentivises investment in plant and machinery, and raises the cost of business rates significantly above that faced by other European foundation industry firms, suggesting room for action. However, the tax regime as a whole taxes earnings – the proceeds of investment – relatively lightly. We are therefore sceptical that the tax system places the UK's foundation industries at a particular disadvantage compared to other developed economies.

More broadly, we have found that the institutional support for the UK's foundation industries differs from more co-ordinated market economies in Europe. While it cannot be robustly concluded that such differences have contributed decisively to the relative underperformance of UK foundation industries in recent years, the UK's relatively poor performance on indicators such as public and private R&D, productivity and investment compared to key European competitors indicates a role for government and industry going forward. It suggests that a more supportive institutional ecology that offers greater availability of patient finance, better innovation systems and supply-chain support would improve the resilience of the sector in future.

4. RECOMMENDATIONS

4.1 The criteria for policy action

The foundation industries have had a tough post-crisis period. Despite recording stronger than average productivity, investment and pay performance in this period compared to the economy as a whole, the immediate future is likely to remain challenging. Critically though, our analysis suggests that a large proportion of domestic demand for basic and fabricated metal goods currently comes from high-growth, strategically important sectors. The evidence therefore suggests there is scope to include the foundation industries – in particular the basic chemicals, basic metals and fabricated metals sub-sectors – in a strategy for industrial diversification, building out from the UK's strategic, high-growth sectors.

Not all sub-sectors of the foundation industries are good candidates for a concerted policy response from government. But for those firms that have the greatest potential to develop or increase a comparative advantage, or to add to comparative advantage in other industries through greater supply chain integration, there is a case for proportionate government support.

Any public intervention must have the long-term aim of achieving at least one of two objectives for candidate foundation industries and firms (in practice these may often prove mutually reinforcing or even dependent):

- integrate activity as far as possible into the domestic supply chains of the UK's existing strategic industry with revealed comparative advantage
- move up the value chain into more niche, speciality production that has export potential.

Candidate industries and firms for intervention must demonstrate that they meet criteria in support of the above objectives, which could include: geographic proximity to high-growth industrial consumers (current or prospective) of their products; or fixed assets with the potential to be repurposed for new lines of production. In this chapter we set out recommendations to improve the institutional ecosystem for foundation-industry firms best placed to meet these specifications.

We focus on two types of government intervention.

1. Special interim measures for those firms and industries that meet the above criteria but are currently experiencing significant distress, as is the case in the UK steel industry. Within this we recommend government action to:
   - tackle illegal 'dumping'
   - reduce energy costs
   - review business rates.
2. Medium- to longer-term institutional reform to assist those firms that meet the above specifications but require support to move up the value chain and better integrate into existing high-growth industry supply chains. Within this we consider possible government action to:
   - boost clusters through supply chain integration and improving co-ordination in innovation
   - reform finance, building on the precedent of regional development funds
   - improve public procurement processes

– incentivise employee ownership.

The special interim measures alone will not secure a sustainable future for struggling sectors, nor are they likely to avert ongoing restructuring. However, by stabilising the foundation industries in the short-term, they will provide a window of opportunity to embed longer-term institutional reform.

4.2 Securing the sector's immediate future: short-term measures to stabilise the sector

Ensuring a level playing field in trade

Our analysis suggests that producers are currently dumping steel products in European markets. **We recommend that the government support the introduction of appropriate EU trade policy instruments to counter these practices.** In the short term, if the ongoing European Commission investigation into alleged Chinese and Russian dumping of basic metal products concludes that dumping is occurring, the UK government should support the imposition of EU tariffs on dumped steel. Similarly, if evidence is found of systematic dumping of other products of the foundation industries into Europe, the UK should work proactively with the European Commission and its European partners to investigate, and if necessary introduce trade instruments on the relevant goods. Any action should be evidence led, and taken collectively.

This would be consistent with the British government's recent interventions at the EU level: Britain has already voted twice in favour of anti-dumping measures – in July and November 2015 – on imports of particular steel products, alongside the other major foundation industry nations in the EU.

Ensuring energy price competiveness

The price of industrial energy in the UK is significantly above the European average. The UK government has taken steps to reduce the cost of climate change policies for its energy-intensive industries, most recently with the announcement of a compensation package in December 2015. **We recommend that the government assists all eligible firms to apply for the energy intensive industries compensation scheme.** In particular, BIS should prioritise ensuring firms meet the 31 March 2016 deadline, including offering guidance on the procedure, to allow them to claim compensation backdated to the date of the EU state aid approval on 14 December 2015. Nevertheless, measures to address the costs associated with low-carbon policies are themselves a necessary but not necessarily sufficient step to ensure that UK companies do not face a significant disadvantage in terms of energy costs. A number of other steps must still be taken in order to secure low-carbon, price competitive energy for the UK.

Network charges are high, and vary across regions. The Competition and Markets Authority (CMA) is currently investigating the organisation of the electric network, including examining **whether it would be feasible and desirable to introduce a single national network rate to prevent significant geographical imbalances in pricing.** One option would be for Ofgem to swiftly implement any recommendation from the CMA regarding ensuring a single national rate for network charges.

Regardless of what Ofgem concludes regarding network charges, it should introduce greater transparency into the network-charging regime, for example by requiring network providers to give 12 months' notice of network price changes to large-scale energy users, a notice period in line with other network practices in Europe. Ofgem should also consider the potential feasibility and cost of introducing reduced network charges or exemptions for particularly high-energy users.

More broadly, the organisation of the UK's energy market, including generation and distribution, contributes to higher than average energy costs downstream for British industry compared to our European competitors. Structural reform of the energy market therefore remains a priority not just for the foundation industries but for the British economy more generally if the UK is to establish an affordable, decarbonised and secure electricity supply (see Platt et al 2014 for a potential reform agenda).

Reforming business rates

Business rates are undergoing significant reform. In October 2015 the Treasury committed to abolish the uniform business rate, and to devolve business rate-setting to local authorities (HM Treasury 2015b). **We recommend that local authorities with a high concentration of foundation industries consider using their new powers to exempt plant and machinery from business rate valuations.** Such a move would have implications for local authorities' revenues, and should therefore be weighed up against potential downsides for each region. Nonetheless, exempting plant and machinery from business rate valuations would be a targeted mechanism for reducing a key business cost UK industry faces when it invests.

4.3 Longer-term measures to boost competitiveness

Boosting clusters

It is rare for industrial clusters to succeed without some form of government intervention (OECD 2007, EIU 2011, Mazzucato 2013). This suggests government policy – at both a national and local level – should play more of a role in strengthening clusters around the UK's manufacturing industries that have a revealed comparative advantage. This will involve supporting some foundation industries to either move up the value chain or else become better integrated into existing clusters, or both. Public policy should do this in a number of ways.

First, both national and local government should play a brokering role to encourage co-operation and interaction between firms, research institutes and industry bodies with the goal of increasing collaboration in sector networks. Before they were abolished, regional development agencies played such a co-ordinating role, bringing together local networks of firms to deepen regional supply chain integration. Local government, particularly new City Deal regions, are well placed to take up such a role. **We recommend that local governments use their devolved economic powers to play a stronger co-ordinating role to local manufacturing clusters**, for example by setting up network brokers or through providing grants to facilitate network promotion and collaboration between firms.

Second, **BIS should co-ordinate with local government and LEPs to create regional 'cluster leadership teams'**, as recommended in previous IPPR research (Dolphin 2014). These would be responsible for promoting the brand of a cluster and improving connectivity within the cluster, such as between foundation industries and the aerospace or automotive sectors. An overarching national cluster champion at BIS should help co-ordinate the efforts of the cluster leadership teams and make the case to government for tailored policies to support the growth of clusters. For example, the cluster champion could bring together sectoral groups representing firms that buy foundation industry goods – such as the Aerospace Growth Partnership, the Automotive Council, the Construction Leadership Council and the Construction Industry Council – with the foundation industries themselves, to help ensure the maximum proportion of British foundation industry products are used in these manufacturing sectors.

Third, to better integrate the foundation industries into existing high-value manufacturing chains, **firms within the foundation industries should be eligible for support from a renewed and expanded advanced manufacturing supply chain initiative, acting both on their own behalf and in partnership with advanced manufacturing firms**.

Advanced manufacturers that effectively integrate UK-based foundation industry firms into their applications should be considered favourably above equivalent bids that do not. This will help incentivise the integration of the foundation industries into the UK's manufacturing supply chain over time and provide positive spillover effects in terms of increased collaboration.

Fourth, **the foundation industries should be better integrated into the Catapult networks**. Integrating foundation industry firms into the networks would have a dual role: it would help boost innovation within the foundation industries and it would accelerate their integration into existing supply chains. To do this, **Catapult centres should encourage joint procurement bids and back co-ordinated research activities where applied science, foundation industries and other UK firms can align their interest and conduct joint projects together**. As with our recommendation on the advanced manufacturing supply chain initiative, relevant bids that can integrate UK foundation industries into their projects should be favoured over equivalent bids that do not. This is because supply chains generally develop most effectively when firms work with other firms up the supply chain to jointly deliver projects. Obvious potential Catapult partnerships include the Transport Systems, Advanced Manufacturing and Offshore Renewable Energy Catapults, along with firms working in these areas further up the supply chain that can integrate foundation industry firms into their projects with the relevant Catapult centres.

Finally, Innovate UK are planning to expand the Catapult network to 30 centres by 2030 (Hauser 2014); **a materials catapult which brings together applied science and industry to advance the manufacture of low-carbon, high-quality materials** would be a strong candidate for inclusion.

More tailored, patient finance for industry

We propose a number of reforms to repurpose the regional growth fund (RGF) to help provide more patient finance that is targeted explicitly and nurtures stronger manufacturing clusters. The RGF was set up in 2010 to provide grants and loans to projects and enterprises with the potential for significant economic growth and private jobs creation. Funds were granted either to 'projects' (a contracted business activity or a package of business and activities) or a 'programme', whereby a programme operator – such as a local authority or a 'local enterprise partnership' (LEP) – contracts projects of their own. In all cases, bidders for project funding have to set out how their application will meet the objectives of the fund (NAO 2014).

As of 2014, a total of £3.2 billion had been earmarked for six rounds of investment by the RGF, with individual awards ranging from between around £1 and £70 million (ibid). By the end of 2015, £2.7 billion of this had been invested (BIS 2015b). A sizeable portion of this (£1.1 billion) has gone to manufacturing projects, including £364 million for the automobile industry and £100 million to aerospace. This implies that an outstanding balance of around £500 million remains unspent, likely to be made up of unrecycled cash from withdrawn projects and programmes, and unspent money controlled by programme operators.

The 2015 spending review announced that there will be no further proposed rounds of the RGF. Much, if not all, of any outstanding balance is therefore likely to expire in 2016. According to BIS, however, 'Ministers reserve the option to use exceptional Regional Growth Fund (eRGF) funding to respond quickly to significant economic shocks and genuinely exceptional opportunities' (ibid). We recommend that the government either uses its powers for eRGF funding, or delays the expiry of any existing underspend, so that surplus budget can be repackaged into a seventh round of funding with a narrowly defined focus of supporting innovation and clustering in the supply chains around aerospace, automobiles and pharmaceuticals. This should have an emphasis on patient,

more long-termist forms of finance, to help provide foundation industry firms stability as they attempt to transition higher up the value chain.

The fund could use 'location quotients'[13] to define which LEPs and regions were eligible for strengthened clustering around respective target industries, and successful bids would need to demonstrate that they meet the specifications set out in section 4.1. Previous rounds of the RGF have also used productivity profiles in the allocation of funding, and this is something that they could return to in any renewed scheme, with an emphasis on funding to support incremental, sustained productivity improvements.

The newly created £400 million Northern Powerhouse Investment Fund – announced at the 2015 autumn statement as a joint venture between the British Business Bank and local enterprise partnerships in the North West, Yorkshire and the Humber, and the Tees Valley – could offer a further source of funding to support patient, long-term investment in foundation industry firms in the broader region.

More strategic public procurement

An effective public procurement strategy for the goods of the foundation industries should be part of a more strategic approach to the sector as a whole, targeted at supporting existing foundation industry clusters in the UK. Of course, more effective public procurement cannot on its own sustain the foundation industries in its current size. Nonetheless, more targeted public procurement of the goods of the foundation industry can provide an anchor for consistent demand for the products of manufacturing clusters in the future. Moreover, public procurement can be an effective tool for meeting national climate commitments by stressing the importance of sourcing low-carbon goods where possible.

Of course, value for money remains a key criteria in setting procurement practices. However, as Lord Heseltine found, 'the problem is that it is often equated with short term, lowest cost procurement which ignores the issue about the country's industrial base – the exploitation of R&D, the skills we need and the creation of jobs' (Heseltine 2012). It also does not necessarily reflect international best practice. Germany, for example, explicitly includes the goal of promoting innovation through public procurement and its government has stipulated that 'contracting authorities on the federal level assess life-cycle costs when purchasing any products for which energy-efficiency can be applied', which pertains to their domestic foundation industries. France and Belgium have also set out legal objectives regarding the social and environmental sustainability of public procurement (European Commission 2010).

We therefore recommend the use of more stringent standard regimes – including product quality and social and environmental impacts – in public procurement guidelines for foundation industry goods. The standard regime describes a framework for the organisational governance, supply chain management and environmental and social aspects that must be addressed in order to ensure the responsible sourcing of products. Stronger standards guidance for public procurement would help support high-quality British foundation industry goods without being in contravention of state aid rules, while promoting wider social, economic and environmental benefits.

It is also worth noting that a more strategic procurement approach matches the direction of travel by the UK government. For example, it recently introduced a new policy on steel procurement for major policies, seeking to improve the transparency and strategic nature of such procurements (CCS 2015). Such a note for other goods of the foundation industries used in major public projects – including a stronger

13 Location quotients are used to measure the share of jobs made up by an industry in a given area, relative to their share of jobs nationally.

standards regime for both these goods and for steel – would therefore be a continuation of recent policy. It is also in line with the most recent EU directive on public procurement (EU Directive 2014/24), which explicitly allowed for member states to take into account social and environmental costs in contracting, and advocated full life-cycle costing to ensure better value for money over the whole length of a contract. This suggests there is ample room for more strategic procurement by national and local government in the UK without contravening EU law.

Regarding the potential barrier of state aid rules more broadly, it is worth noting that in January 2016 the EU reiterated that state aid rules did not allow for the public support and restructuring of failing steelmakers. It did, however, allow government intervention to assist in research, development and innovation to make domestic producers more competitive in the long term (European Commission 2016). Moreover, there are a series of general block exemption regulations that provide for potential exemption from state aid rules. In particular, it allows for:

> *'Regional aid: One of the key objectives of the EU is to raise the quality of life of citizens in disadvantaged regions of the Union. Aid is allowed if it "enhances economic cohesion", particularly when it assists with the creation of new large scale industrial projects.'*
> House of Commons Library 2013

Given the importance of the foundation industries to regional economies, and the importance of industrial clusters to the resilience of the UK economy as a whole, these guidelines suggest there is potential for devolved national governments in particular to proactively explore whether they could activate the 'regional aid' exemption, for example in the form of public-private partnerships to help transition firms through the current turbulence or through targeted support to increase R&D within the foundation industries.

Support for employee ownership

Even with targeted support, many firms within the foundation industries are still likely to face a period of restructuring, including many that may potentially consider closing. **Given this, the government should introduce an employee right to buy – which the previous government's Nuttall review recommended – whereby employees would be given the opportunity to take ownership of firms that are planning to close or are being sold off.** Advice and guidance available to employee groups wishing to take ownership of a failing business should be made available, particularly regarding the risks of transferring losses and liabilities of a failing business onto its employees. Sufficient time to finance any possible transfer of ownership should also be provided. IPPR has also previously set out a series of financial reforms that could help finance the transition to employee ownership, such as allowing employee-owned firms to issue bonds to raise capital, which would be critical to ensuring their viability (see Lawrence and McNeil 2014 for further details).

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APPENDIX
FOUNDATION INDUSTRIES AS DEFINED BY SIC CODES

Table B.1
Foundation industries defined at the second-digit SIC code

	SIC description	SIC code
Wood	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	16
Basic chemicals	Manufacture of chemicals and chemical products	20
Other non-metallic minerals	Manufacture of other non-metallic mineral products	23
Basic metals	Manufacture of basic metals	24
Fabricated metals	Manufacture of fabricated metal products, except machinery and equipment	25

Source: Prosser 2009

Table B.2
Foundation industries defined at the third-digit SIC code

	SIC description	SIC code
Wood	Sawmilling and planing of wood	16.1
	Manufacture of products of wood, cork, straw and plaiting materials	16.2
Basic chemicals	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms	20.1
Other non-metallic minerals	Manufacture of glass and glass products	23.1
	Manufacture of refractory products	23.2
	Manufacture of clay building materials	23.3
	Manufacture of cement, lime and plaster	23.5
	Manufacture of articles of concrete, cement and plaster	23.6
Basic metals	Manufacture of basic iron and steel and of ferro-alloys	24.1
	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	24.2
	Manufacture of other products of first processing of steel	24.3
	Manufacture of basic precious and other non-ferrous metals	24.4
	Casting of metals	24.5
Fabricated metals	Manufacture of structural metal products	25.1
	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	25.5
	Treatment and coating of metals; machining	25.6
	Manufacture of other fabricated metal products	25.9

Source: Prosser 2009

Table B.3

Foundation industries defined at the fourth-digit SIC code

	SIC description	SIC code
Wood	Saw milling and planing of wood	16.10
	Manufacture of veneer sheets and wood-based panels	16.21
	Manufacture of other builders' carpentry and joinery	16.23
	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	16.29
Basic chemicals	Manufacture of industrial gases	20.11
	Manufacture of dyes and pigments	20.12
	Manufacture of other inorganic basic chemicals	20.13
	Manufacture of other organic basic chemicals	20.14
	Manufacture of plastics in primary forms	20.16
	Manufacture of synthetic rubber in primary forms	20.17
Other non-metallic minerals	Manufacture of flat glass	23.11
	Shaping and processing of flat glass	23.12
	Manufacture of hollow glass	23.13
	Manufacture of glass fibres	23.14
	Manufacture and processing of other glass, including technical glassware	23.19
	Manufacture of refractory products	23.20
	Manufacture of clay building materials	23.30
	Manufacture of cement	23.51
	Manufacture of lime and plaster	23.52
	Manufacture of articles of concrete, cement and plaster	23.60
Basic metals	Manufacture of basic iron and steel and of ferro-alloys	24.10
	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	24.20
	Cold drawing of bars	24.31
	Cold rolling of narrow strip	24.32
	Cold forming or folding	24.33
	Cold drawing of wire	24.34
	Precious metals production	24.41
	Aluminium production	24.42
	Lead, zinc and tin production	24.43
	Copper production	24.44
	Other non-ferrous metal production	24.45
	Casting of iron	24.51
	Casting of steel	24.52
	Casting of light metals	24.53
	Casting of other non-ferrous metals	24.54
Fabricated metals	Manufacture of metal structures and parts of structures	25.11
	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	25.50
	Treatment and coating of metals	25.61
	Machining	25.62
	Manufacture of steel drums and similar containers	25.91
	Manufacture of light metal packaging	25.92
	Manufacture of wire products, chain and springs	25.93
	Manufacture of fasteners and screw machine products	25.94
	Other fabricated metal products n.e.c. (not elsewhere classified)	25.99

Source: Prosser 2009