

MAKING AT HOME, OWNING ABROAD

A STRATEGIC OUTLOOK FOR THE
UK'S MID-SIZED MANUFACTURERS
FINBARR LIVESEY AND JULIAN THOMPSON
APRIL 2013

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About this report

About the RSA

The RSA (Royal Society for the encouragement of Arts, Manufactures and Commerce) is an enlightenment organisation committed to finding innovative practical solutions to today's social challenges. Through its ideas, research and 27,000-strong Fellowship it seeks to understand and enhance human capability so we can close the gap between today's reality and people's hopes for a better world.

The RSA has encouraged and championed ingenious thinking and invention in manufacturing since its foundation in the 18th Century. This has been accomplished through lectures, publications, practical demonstrations and innovation challenge prizes, called "Premiums".

About Lloyds Banking Group

Lloyds Banking Group is dedicated to helping Britain prosper. To do this, it aims to be the best bank for customers – and is re-shaping its business so that, by working together, the Group can focus all its future decisions around its customers. This includes focusing largely in the UK and on those customers and clients who have a strong link with the UK.

The Group is making considerable investment into expanding products and capabilities for our customers – including support for mid-sized businesses. As a result, Lloyds are very pleased to be supporting research in this area.

The Group has made a specific one-year commitment to the UK manufacturing sector. Launched in September 2012, Lloyds pledged an additional £1bn of lending to the sector. In addition, in conjunction with the University of Warwick Manufacturing Group, Lloyds has trained 100 Relationship Managers – and is in the process of training more – so they have an even better understanding of the manufacturing sector.



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Acknowledgements

This project was designed and conducted by the RSA’s Action and Research Centre (ARC). The authors wish to thank the project advisory group, listed in the appendices, whose comments and input greatly enhanced the report. Our thanks also go to Lloyds Banking Group, for their sponsorship of the research. Any errors or omissions in this report are ours alone.

Foreword

By David Oldfield

Managing Director, SME & Mid Markets,
Lloyds Banking Group

Lloyds Bank is committed to the manufacturing sector. We have been supporting manufacturers for over two centuries. In fact, one of our first business customers was a manufacturing company called Salts Healthcare, which is one of the oldest family businesses in the UK and, some 200 years later, continues to bank with us.

Continued investment in the business has helped Salts Healthcare to grow significantly. The company now has distributors in over 20 countries across the globe and continues to expand its sales presence across Europe, North America and Australasia.

Of course, targeting international markets is not unique and it is already high on the agenda for many manufacturers seeking growth opportunities. An interesting hypothesis in this independent research by the RSA is the prediction that ownership of manufacturing assets abroad could become the new method of creating and maintaining access to foreign markets.

However, this research articulates one possible route for the global economy – many other scenarios are equally valid. What this research certainly does is spark a timely and much needed debate on the future of the sector and mid-sized businesses, which we fully support. And, whatever the growth path UK manufacturers decide is right for their business, we are here to support their ambitions.

Across Britain, it is estimated that there are over 2,500 mid-sized manufacturers which, due to their relative agility, close customer relationships and sharp product focus, are best-placed to lead the UK economy's response to future market changes.

Our business is to ensure that manufacturers can access the growth capital to invest in new production methods, technologies, plant and machinery, make acquisitions, and safeguard their position in a competitive global market.

Manufacturers have their own unique banking needs and, at Lloyds Bank, we provide a broad range of product solutions and expertise from standard term loans and overdraft facilities to asset based lending and trade finance to debt capital markets and risk management solutions. We have further underlined our support to manufacturers' growing funding requirements through our £1bn Manufacturing Commitment which we launched last year.

Our Commitment, which incorporates the Funding for Lending Scheme, has already provided £700m of finance to manufacturing businesses in the first six months since the Commitment was launched. However we do recognise that we have further to go.

We also make sure our teams have the right skills and expertise to fully appreciate the long term investment needs and dynamics of the sector and act as trusted advisers to manufacturers across the country. That's why our relationship directors and managers undergo an extensive training programme with the University of Warwick, which is accredited by the Warwick Manufacturing Group and was developed in association with Engineers Employers Federation (EEF) and the Manufacturing Technologies Association (MTA).

From the beginning, our bank supported manufacturers. It is my pledge to continue that legacy today. Lloyds Bank has an unwavering commitment to support manufacturers through the economic cycle and ensure they have the models and capital structures for growth. We welcome the discussion that this independent research brings, but will also take the opportunity to encourage mid-sized manufacturers to invest in their businesses to prepare for the challenges and opportunities that lie ahead.

Executive summary

The economic context for UK manufacturers is changing rapidly. Over the coming decade making products globally will become unattractive for many sectors, as new production technologies and rising costs and regulations fundamentally change the economics of production. This will mean more will be made at home and exporting will be replaced with owning or controlling factories in target markets abroad.

This report looks at mid-sized manufacturing companies in the UK, which have not received significant attention to date, outlines their changing context and its implications, and finally provides a set of recommendations to support growth based on mid-sized manufacturing companies. Mid-sized businesses (MSBs), those larger than the traditional small and medium enterprise (SME) but smaller than multinational corporations (MNCs), will have a key role to play as these changes occur. These companies are of the correct scale to take advantage of the changes, retaining the agility of smaller companies combined with the scale required to invest in new production technologies.

Even now there are signs of change, with leading companies such as General Electric and Apple restarting production in the United States and recently production of the Raspberry Pi returning to the UK. These are the early signs of a change in the organisation of manufacturing, away from global value chains and towards more localised, smaller scale distributed manufacturing. While it is very difficult to predict how these changes will unfold, it is clear that global production will no longer be the default approach for large scale production and that regionalisation and potentially localisation will occur in many sectors.

The coming changes in context will mean switching from focusing on increasing exports to having ownership or control of productive assets in each of the markets a company wishes to serve. Over time this would lead to increases in domestic production and a general reduction in trade. Ownership for companies may be the only access point to overseas markets in the long run. Only products with high value-density will remain economical to produce at a distance from their point of use.

In the short-term (the next five years) the challenges that mid-sized manufacturing companies face are accessing skilled employees and growth capital, while managing a balancing act between their predominantly domestic structure and their need to increase their exports to international markets. Longer term (10 to 15 years) these companies will face two additional challenges: how to invest to develop new production methods that allow for economical production at lower scale and closer to the customer; and making a transition from exporting to owning or controlling assets internationally across the markets that they serve.

The UK government has a key role to play in assisting mid-sized companies both now and in the future and this agenda could provide a coherent narrative for support in the short to medium term. Immediate actions should be focused on reducing uncertainty in policy for mid-sized

manufacturers, supporting the generation of an identity for these firms and continuing to help improve the skilled workforce available. In the longer term the government will need to have a clear position on the levels of inward investment in production it wishes to have and how it will support UK mid-sized firms to invest in their target markets in order to expand their asset base overseas.

Localisation of production would lead to an increase in domestic production and a general fall in global trade. This could reduce the UK's trade deficit by a third. Based on 2011 trade figures this would amount to an expansion of approximately £30bn in domestic production paralleled by a similar change in the trade deficit.

Whilst not directly driven by a desire to address sustainability issues, these changes may also significantly reduce emissions. Products would travel shorter distances both in production and in delivery to customers. New production processes, such as additive manufacturing, significantly reduce the materials needed for production, leading to a reduction in waste and the ability to produce in lower volumes. The design of products, by choice or by regulation, will take on board the circular economy concept increasing the levels of reuse and recycling. If well managed, both for companies and for countries, adaptation to this new context could both provide growth and address the imperatives of climate change – so called green growth.

The trends outlined in this report at the very least imply the regionalisation of production, with the span of supply chains constrained to continental Europe. Without action the opportunity that the trends present, to have that production within the UK rather than in Germany or France, could be lost and long term declines in manufacturing employment and manufacturing's share of GDP could continue. With a strong vision and purposeful intervention, the decline in manufacturing employment could be arrested and some increase in manufacturing employment, of the order of 100,000 to 200,000, could occur over the coming decade. This detaching of manufacturing growth from employment growth may be the most difficult issue to manage over the longer term, but must be acknowledged and addressed.

An agenda for mid-sized manufacturing companies

Recommendations for mid-sized manufacturing companies

- Increase exports in the short-term to increase market access, turnover and international experience.
- Investment in new production technologies at the appropriate time to adapt to localisation pressures.
- Ownership or control of productive assets overseas in the medium-term to maintain market access.
- Strengthening of management capability.
- Work to improve the retention of highly-skilled employees.

Recommendations for government

- Continuation of actions to reduce uncertainty for manufacturing companies, such as changes to taxation and patent laws, to give companies confidence in the stability of the policy landscape.
- Support for mid-sized companies to access the Catapults,¹ specifically the High Value Manufacturing Catapult, at reasonable cost.
- Adaptation of the Small Business Research Initiative (SBRI) to target mid-sized manufacturing companies.
- Helping to fix the skills shortage problem, through work on the image of manufacturing and the ongoing Foresight project on the Future of Manufacturing.
- Include localised production in future analysis around the production and supply of energy.
- Clarity on inward investment rules based on a strategy for development of more localised production in the long term.
- Support for mid-sized companies moving to invest in production abroad to replace export footprints.

Recommendations for supporting organisations

- Lenders should understand the changing investment needs of manufacturing companies and be prepared to support international acquisitions.
- Media representation of manufacturing should reflect the reality of the changing nature of manufacturing and the potential localisation that will occur.
- Development of open innovation prize challenges to spur the development of new production technologies and infrastructure at a local and regional level.
- Universities and professional bodies associated with engineering and manufacturing should support the development of degrees aligned with the medium to long term context of regionalisation and localisation.

1. Catapults, originally termed Technology Innovation Centres, sit between the research base and industry providing shared facilities and a focus for translating new technologies from universities into companies. For more detail see <http://catapult.innovateuk.org>.

Introduction

The UK economy needs to find a path to sustained growth. Since the recession of 2008/2009 gross domestic product (GDP) has either contracted or grown at very low levels, leading to an economy that is flat lining.² Beyond headline GDP numbers, there is a belief that there needs to be a rebalancing away from financial services and towards manufacturing in order to improve exports and provide a strong foundation in the long term³ for the economy.⁴

How is this growth to be achieved? Over the past two years mid-sized companies have attracted a significant amount of attention having been, in some eyes, “... overlooked and neglected by government, financiers and the media.”⁵ The recent Heseltine Review also commented on this pattern: “Without equal focus on the needs and competitiveness of our large and mid-sized businesses, the government does a disservice to the very SMEs it wishes to support.”⁶

This change of focus has not been confined to the UK. The United States is also focusing more on those companies that have reached a size that reduces the likelihood they will receive government support but that are small enough that reaching into global markets and managing multi-national assets remains a challenge.

Why has there been a rise in interest in these mid-sized firms? These companies have managed to grow through the recession, adding employment while large companies have been shedding jobs, as well as not outsourcing at the same levels as larger firms. All of these attributes make mid-sized companies attractive to government, as a potential source of job stability and growth in regional economies.

At the same time, the context for global manufacturing is changing and is likely to go through an inflection point in the coming 10 to 15 years. The movement of production to Asia based on cost advantages may have run its course for many industries, and the arrival of new production technologies will make it possible to make lower volumes closer to the consumer.

Taken together these changes present an opportunity and a challenge for countries like the UK. The opportunity is to reduce the trade deficit, to rebalance the economy and to be competitive in foreign markets. The challenge is to focus on the companies that are likely to drive these changes: the agile mid-sized companies which are large enough to invest

2. House of Commons Library. (2013).

3. For simplicity in this report short term is within three years, medium term is three to 10 years, and long term is 10 to 15 years from the present.

4. Cable. (2011).

5. CBI. (2011).

6. Heseltine. (2012).

in new technology and to have the ambition to grow internationally through investing in productive assets overseas.

Structure of the report

This report is based on a review of the available evidence on the role and importance of mid-sized manufacturing firms combined with a discussion of how the organisation of production may respond to global trends and the emergence of new production technologies. Starting with a discussion of the nature of mid-sized manufacturing companies, it then describes the changing context for these mid-sized companies, outlines potential implications and discusses what companies, government and other supporting agencies can do to take advantage of the opportunities that these changes imply.

It is hoped that the report will start a broad conversation on how UK mid-sized manufacturing companies can provide an impetus to growth as we move from the short to the medium term. Predicting when specific changes are likely to occur is fraught with difficulty, but we believe that there are sufficient early signals to see the shape of the road ahead and to begin to address the challenges that are coming for UK manufacturers.

Understanding mid-sized companies

- Mid-sized companies – i.e. those with a turnover between £25m and £500m and with between 100 and 2000 employees – are under-reported and undervalued.
- There are approximately 2,500 mid-sized manufacturing firms in the UK.
- Economic uncertainty is constraining their investment activity along with a lack of access to growth capital and skilled people.
- However, mid-sized manufacturing companies, due to their agility and their closeness to their customer base, will be key to future growth and rebalancing in UK manufacturing.

As production and manufacturing moves from being global to more local, which types of companies will be able to respond? Small and medium sized companies will in some sense have to ride the wave and hope that they can respond to the changes appropriately. Large multinational companies may take longer to adapt but they should have the resources to manage any negative consequences of taking longer to move to new models of production.

Companies that are between small and medium companies and large multinational companies, commonly referred to as mid-sized, will be key to whether the UK economy can adapt and take advantage of the opportunity presented by the difficulties in producing via global value chains. However, there is no commonly accepted definition for mid-sized businesses. A number of terms have been used to describe companies that are no longer small but have not yet become multinational, including ‘mid-sized’ and ‘mid-cap’. Unfortunately across the relatively small number of existing reports and analysis the definitions and boundaries for these terms constantly change.⁷

For the purposes of this report the term mid-sized will be used, as mid-cap implies a financial measure as being the only characteristic that matters. A working definition of mid-sized would include companies with between £25m and £500m in annual turnover, and between 100 and 2,000 employees. This can be split further into mid-sized companies operating domestically and those operating internationally, both of whom are predominantly supplied domestically but the international group have a growing export orientation with a minimum of 10 percent of revenue currently coming from overseas. This definition applies to just

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7. See appendix one for further details on defining mid-sized companies.

A lack of stability is a problem for companies of all sizes, but it appears to be a particular concern at present for mid-sized companies

under 2,500 manufacturing companies in the UK of which just under 1,000 also meet the threshold of having 10 percent of their revenue from outside of the UK.⁸

Key issues facing mid-sized companies

Across the many recent reports on mid-sized companies in the UK and the US in particular, a number of issues arise repeatedly. Taken together these represent a snapshot of the issues that mid-sized companies are currently facing and can be used as a starting point for discussing how industry and government can respond in the short-term.

Uncertainty a continuing problem

A lack of stability is a problem for companies of all sizes, but it appears to be a particular concern at present for mid-sized companies. The effect of uncertainty is in some ways amplified for those mid-sized companies that have been in family ownership for a long time and have a conservative attitude to risk. This has led to a lack of effort to grow businesses with many companies aiming to consolidate, pay down debt and increase cash balances. The CBI's *Future Champions* poll reported that "... 37 percent of firms were holding more cash than they were five years ago, rather than investing it in the expansion of the business. The principal reason is an uncertainty about where the economy is heading in the short to medium term."⁹

A similar situation is reported for US companies, with companies reporting that the uncertain economic outlook is their main obstacle to growth. Half of the 528 executives in mid-sized companies recently surveyed by Deloitte indicate that uncertainty is a barrier to company growth.¹⁰

Access to, and retention of skilled people a constant issue

Companies need skilled employees to prosper and grow. It is concerning that in almost every report looking at mid-sized companies the issue of skills is raised and is seen as a real concern. For UK mid-sized companies it appears that their top challenges strongly revolve around people issues, as they report their main areas of concern include finding and retaining skilled employees as well as attracting top management talent.¹¹

Mid-size company executives in the United States report that talent management is the foremost strategic challenge for the middle market, with the top six internal challenges cited as game changers being workforce related.¹² These include sustaining morale, attracting a new generation of employees and succession planning. It is an unfortunate fact for companies, but not for the highly-skilled, that employees with high levels of skills and experience will be in short supply even when unemployment is high.¹³

8. Based on a search of the FAME database for companies in the UK who meet the turnover and employee criteria outlined.

9. CBI. (2011).

10. Deloitte. (2012).

11. GE Capital. (2012).

12. Forbes. (2012).

13. Deloitte. (2012).

One of the reasons that mid-sized businesses struggle to attract the best talent is that they do not have a clear identity and “The relatively low profile of MSBs means that they are rarely at the forefront of new job hunters’ minds when they leave higher education.”¹⁴ The recent spate of reports focusing on mid-sized businesses aside, there has been very little focus on these companies in academic work, government policy, or in the media.

Access to growth capital rather than general financing key

It appears that mid-sized businesses in the UK are cash rich and have actually increased their cash reserves through the recent recession. Access to finance generally is not an issue, although it is taking longer most companies seeking financing are succeeding in accessing finance. “There is no evidence of significant numbers of mid-cap businesses being discouraged from seeking finance.”¹⁵

However, growth capital, primarily equity investment, is seen as a problem; “42 percent of mid-cap businesses require finance to invest in plant or machinery, and one quarter would need [finance] for acquisitions and property (increasing significantly from 20 percent in 2009 to 33 percent this year among larger mid-cap businesses with turnover of £100m–£500m).”¹⁶

The issue of whether there is a financing gap has been raised many times, for example in the *Rowlands Review* which suggested that the gap for growth finance was between £2m and £10m.¹⁷ This is a long standing discussion with roots back to the MacMillan Committee of 1931 and so it appears that there will always be a concern that there is a gap of some kind as the scale of investment required by companies through their lives increases.¹⁸

Managing the local/global tension is very difficult

Companies in this size bracket in some sense look in two directions at once. They are large enough to be exporting and generating revenue from overseas markets. However their supplier base is predominantly domestic, with 70 percent being within the UK. Close to half of mid-sized companies do not outsource and this, combined with their supplier base, reflects a deep embedding in the national economy.

However, mid-sized companies recognise the need to be global. “Executives at mid-sized companies – even those focused on the domestic market – realise that globalisation is the path to long-term growth. In almost every overseas market, more companies are taking steps to sell their products.”¹⁹ It is the management of this tension between the local and the global that is difficult for mid-sized companies, but it may also be a key strength in the longer term.

Companies in this size bracket in some senses look in two directions at once

14. CBI. (2011).

15. BIS. (2010).

16. BIS. (2010).

17. Rowlands. (2009).

18. For a discussion on this issue see Gill, Minshall et al. (2007).

19. Deloitte. (2012).

Advantages of mid-sized companies

It should also be noted that there are particular advantages to being a mid-sized company and these should not be ignored. These companies are small enough to be agile, close to their customers and have a narrower focus with a smaller product range. These advantages allow proactive MSBs to react to their changing market place faster than either the very large or the very small companies with whom they compete. This is a discussion we will return to, as it is these advantages which may mean mid-sized companies are best adapted to the coming changes in the global economy.

The changing context for mid-sized manufacturers

- Large scale global trends combined with new production technologies will make global manufacturing uneconomic and unattractive for many sectors.
- These trends include rising oil costs, increased regulation of emissions, demands for mass customisation and changing patterns of demand.
- Additive manufacturing, synthetic biology, new materials and data analytics will be enablers of these changes allowing for lower scale production closer to the point of consumption.
- Early signals of these changes are the recent reshoring of production for some companies, including General Electric, Apple and the makers of the Raspberry Pi.

These companies will be the bellwethers for the changes occurring in the next five to 20 years

Key global trends affecting manufacturing

The technological, economic and social context for mid-sized manufacturers is changing rapidly. Being large enough to operate in a more global fashion but too small to be able to absorb some of the impacts of changing demand or technology, these companies will be the bellwethers for the changes occurring in the next five to 20 years. Drawing on a number of recent studies,²⁰ this section provides an overview of key global trends that will impact mid-sized manufacturers, discusses the emerging production technologies, and finally asks what the interaction of these technologies and trends implies for manufacturing. It cannot be comprehensive, but it highlights the complexity that mid-sized firms face when trying to plan for the future.

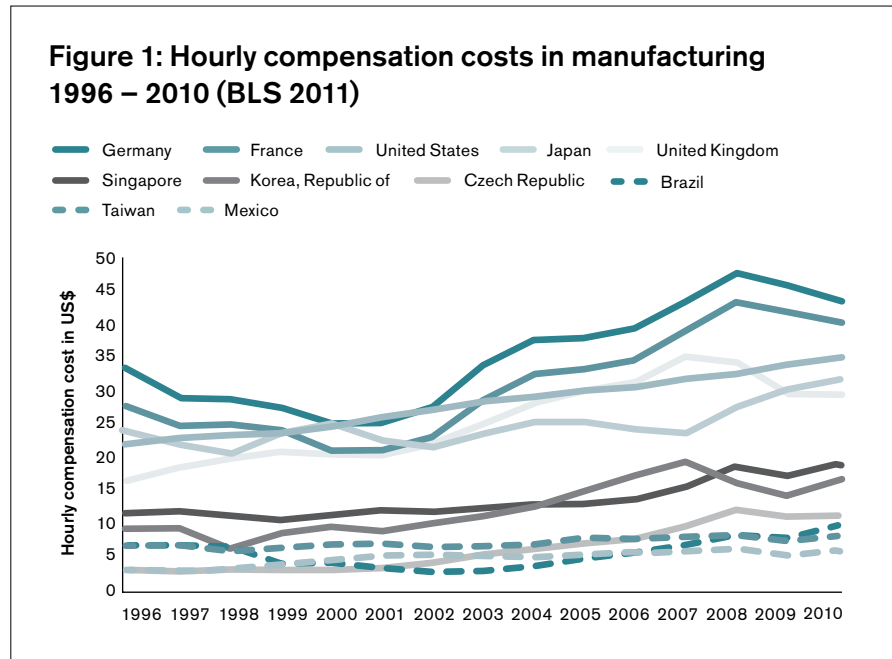
Comparative labour costs

Over the past 15 years the costs of hiring a manufacturing employee has changed significantly, although the countries that were the most expensive in 1996 remain the most expensive in 2010 (see figure 1).

20. Foresight. (2012); Shipp, Gupta et al. (2012); World Economic Forum. (2013).

However, these trends do not take into account productivity changes, automation and robotics trends, the importance of labour costs to total cost, and variations in wage rates within countries.

The latest report from the Boston Consulting Group on global manufacturing and the competitive position of the United States has investigated the comparison between the US and China over the past 10 years and projected out to 2015. “By around 2015, the total labor-cost savings of manufacturing many goods in China will only be about 10 to 15 percent when actual labor content is factored in ... many companies will find that making products in China that are destined for the US will bring only marginal cost savings ...”²¹



Oil and transportation

The optimism of the pre-crisis period, where the world was thought to be ‘flat’ – deeply connected both physically and digitally with distance not being an issue – and globalisation brought us ever closer, has been replaced by doubt. This has called into question the inevitability of global value chains as the only option for organising manufacturing, but has not yet provided a clear picture of the options for companies when trying to decide on their geographic footprint. Much of this hangs on the price of oil and subsequently the price and availability of transportation modes that meet the needs of producers.

There is significant uncertainty over how oil availability and prices will change in the coming decade and beyond as predictions are notoriously difficult. The interplay between available reserves, new exploration and in particular new technology is complex, and the growth of demand will be unclear as alternatives, particularly for transportation, are sought.

However, recent work by the International Monetary Fund (IMF) has attempted to develop a better model for the world oil market, based on bringing together the ‘geological view’, that physical constraints will

21. Sirkin, Zinser et al. (2012).

More realistic forecasts appear to indicate a world where oil price will become a stronger factor in location decisions

determine the future of oil output and price, and the ‘technology view’, that higher oil prices will have an effect on oil production through the search for technology solutions. According to this model, which is much better than previous models at predicting oil price from a sample, “... our prediction of small further increases in world oil production comes at the expense of a near doubling, permanently, of real oil prices over the coming decade. This is uncharted territory for the world economy, which has never experienced such prices for more than a few months.”²²

In terms of the availability of oil, there is strong evidence that the peak of conventional oil production will occur before 2030 under practically all scenarios.²³ Many forecasts that have a later date for the peak of oil production rest on assumptions that are very optimistic and in some cases are implausible. Planning for the medium-term that assumes a business as usual case for oil is at risk of missing a significant shift in the world economy.

These more realistic forecasts appear to indicate a world where oil price will become a stronger factor in location decisions and in the medium to long term there is a serious issue of availability to maintain global value chains. This needs to be balanced against the value-density of products, as products with significant value per ton will remain amenable to more global patterns of production and sourcing. “For products such as semiconductors, electronics, and office machinery, with value densities exceeding \$70,000 per – as much as 10 times as high as for automobiles and machinery – landed costs are not affected as much by rising transportation costs.”²⁴

It should also be noted that energy independence, especially for the United States, has been high on the political agenda, with the push to access shale oil and use fracking techniques to recover both oil and gas.²⁵ The introduction of these techniques may make the US the largest oil producer for a brief period and may significantly reduce imports of oil to the US, again supporting the move to more localised production for the US.

Commodity prices

Through the 20th century commodity prices were either flat or falling, bar the oil crisis of the 1970s. However, since 2000 all of that stability has disappeared as the IMF’s all commodity index (figure 2) shows.

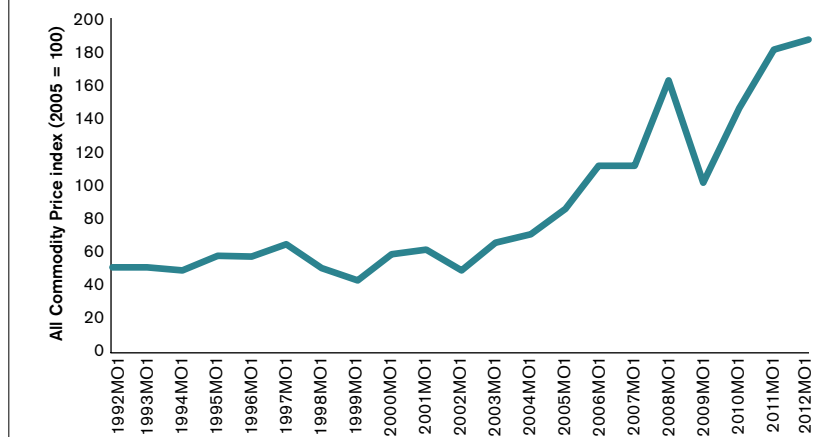
22. Benes, Chauvet et al. (2012).

23. Sorrell, Miller et al. (2010).

24. McKinsey Global Institute. (2012).

25. Bullis, K. (2012).

Figure 2: IMF all commodity index for January 1992 – 2012²⁶



Since the turn of the century this aggregate measure of commodity prices has been rising, only interrupted by the financial crisis of 2008. Other commodity indices, such as the McKinsey Commodity Price Index, show a similar pattern. Based on their analysis McKinsey claims that volatility is now greater as commodities are moving together rather than rising and falling in price independently of one another.²⁷ In addition, there is no sense that commodity prices will fall in the coming 10 to 20 years, as demand from emerging economies rises and other pressures such as climate change constrain the options available to companies and to countries.

Pressures of sustainability

Unfortunately, in the face of increasing evidence and agreement on the challenges of climate change and the need for sustainable solutions, current developments and policies have not made the global energy system sustainable now or in the long-term.²⁸ The World Bank goes further: “Despite the global community’s best intentions to keep global warming below a two degrees centigrade increase above pre-industrial climate, higher levels of warming are increasingly likely”.²⁹ Their recent report outlines the impacts of a four degree rise compared to pre-industrial levels and argues that while the impacts will not be felt uniformly across the globe, such an increase in temperature would have a significantly negative impact on the poorest regions and have knock-on effects through the global economy.

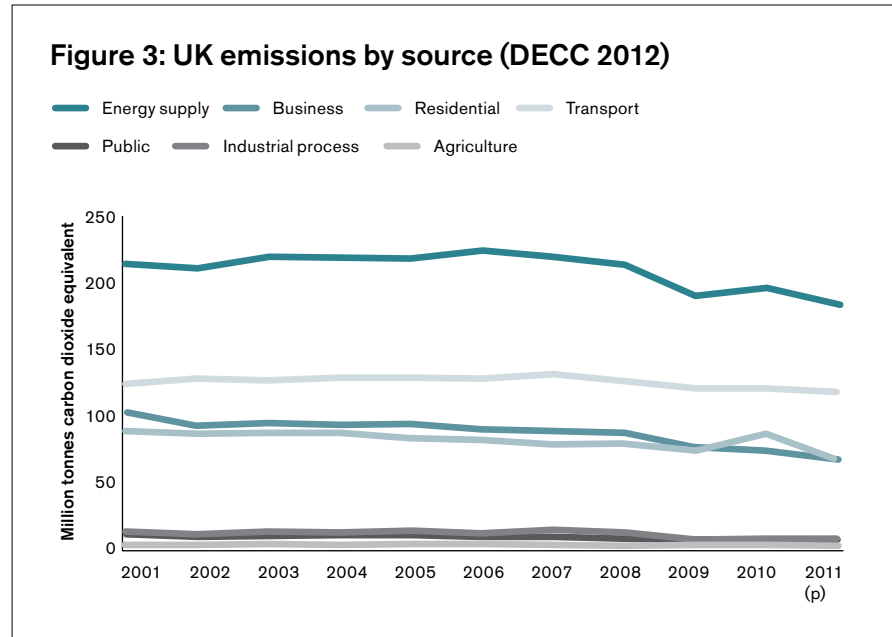
The timing of the introduction of regulations to limit emissions, either during production or in the transportation of goods, is uncertain but it appears more likely that stronger national and international standards will be introduced in the medium term. Business and transportation are key sources of emissions leading to climate change – in the UK business accounted for 15 percent of emissions, while transport accounted for 26 percent (figure 3).

26. Data for the IMF commodity indices is online at www.imf.org/external/np/res/commod/index.aspx.

27. Dobbs, Oppenheim et al. (2011).

28. IEA. (2012).

29. World Bank. (2012).

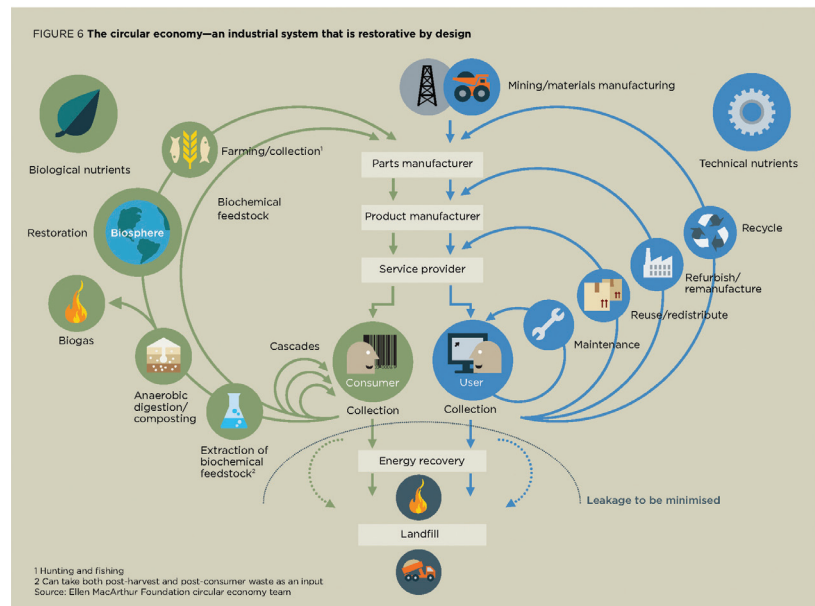


Reductions from industry, or any increased industrial base, will potentially target energy usage first, as energy supply is the largest source of emissions, and then look to reducing emissions from transportation of goods. These changes would imply production being close to the customer and carried out in low volume. This would then reduce unnecessary stock and some waste.

At the same time that production location is in question, the organisation of production in terms of materials use has come under scrutiny. A key concept that has come to prominence is that of the circular economy (figure 4). This is defined as follows by the Ellen MacArthur Foundation (2012): “A circular economy is an industrial system that is restorative or regenerative by intention and design” where waste is designed out as much as possible, reusing durable components and using renewable energy sources in production.³⁰

30. Ellen MacArthur Foundation. (2012).

Figure 4: Towards the circular economy: economic and business rationale for an accelerated transition, Ellen MacArthur Foundation (2012)



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A move towards linking inputs and outputs, reusing as much material in the system as possible, would preference more localised production

A move towards linking inputs and outputs, reusing as much material in the system as possible, would preference more localised production as it will attempt to minimise the required energy input and the amount of transport required to deliver a product to a customer. This raises the question of how local production could become, with industrial clusters located strategically, regionally and nationally to balance the needs of circularity with the constraints of distance.

Changing and fragmenting patterns of demand

Demand patterns are changing quickly as consumers demand customisation at varying levels and new markets open up in developing economies with different tastes and preferences to those of existing markets. While mass customisation has not delivered all of the benefits to companies or consumers that were hoped for, it has become a dominant model for satisfying varying consumer needs. Examples range from Levi jeans measuring customers in store and then producing the jeans to those measurements, to Dell producing a bespoke computer once it has been ordered and paid for by the customer.³¹

The emergence of a global middle or consuming class is more likely as emerging economies continue to grow. This will lead to significant shifts in the pattern of demand; "... consumption by developing economies could rise from \$12tr annually in 2010 to \$30tr in 2025 ... some 1.8bn individuals are likely to enter the global consuming class, and 60 percent of households in the world with incomes of at least \$20,000 a year likely to be in developing economies."³²

31. *The Economist*. (2009).

32. McKinsey Global Institute. (2012).

Manufacturers will be faced with the challenge of product customisation for local needs

These forces imply that companies will be managing their global footprint based on their ability to meet the needs of varied consumers matching the demand profile rather than purely on cost arbitrage. With an increase in the number of markets being served, manufacturers will be faced with the challenge of product customisation for local needs or in more extreme versions handling distinctly different products in different markets. Again, managing this kind of proliferation is a pressure to be closer to the market, fragmenting what was once a homogenised, global approach to making and serving customers.

The emergence of new production technologies

Key for manufacturing firms are the changes that are occurring in production technologies which, when considered alongside economic changes, could imply a radically different industrial organisation for a variety of sectors in the medium to long term. Ongoing changes in production technologies generally aim to reduce waste, allow for complexity in production, and reduce the energy used in making, responding to the demands of sustainability and of customer variety discussed above.

Currently 3D printing, or additive manufacturing, is the most discussed and possibly the most over-hyped of new production technologies. Various techniques, some laser based, build components in layers, reducing waste and providing the ability to produce complex pieces in one process. While the technique initially was used in rapid prototyping, it is now being used to make products in the field, for example in making complex turbine parts. The advantages of additive manufacturing include reduced time from design to build, almost complete flexibility in design, significant material savings and no need for tooling.³³

The move to additive manufacturing requires an increase in the number and type of materials that can be worked with in this manner. Current approaches work with polymers and metals (for example, stainless steel and titanium), but there is a need for further work to broaden this range to expand the applications of additive manufacturing. At the same time, new materials are becoming available more generally, impacting on the weight and structural characteristics of products and opening up new opportunities in electronics and energy (for example using metamaterials and organic light emitting diodes (OLEDs)).³⁴

Additive manufacturing may be a general purpose technology (GPT) which has a ripple effect through the economy, as it enables new models of working across a broad range of sectors. However, it is uncertain how the various associated technologies are likely to develop. Even with this caveat, the ability to produce without tooling, with design freedom and on an as-needs basis will create new markets and new modes of working for companies globally. For companies and countries with a lead in additive techniques there may be significant market opportunities as the technologies become more widely accepted.³⁵ By 2030, additive manufacturing processes may be directly competitive with traditional manufacturing approaches.³⁶

33. Petrovic, Haro Gonzalez et al. (2011).

34. Foresight. (2012).

35. Sissons and Thompson. (2012).

36. Shipp, Gupta et al. (2012).

Additive manufacturing may be a general purpose technology (GPT) which has a ripple effect through the economy

The coming together of biology and engineering is producing new technologies and new ways to think about production. Synthetic biology is “... the design and engineering of biologically based parts, novel devices and systems as well as the redesign of existing, natural biological systems.”³⁷ By controlling biological processes in a modular and repeatable fashion existing industrial processes can be significantly improved and new applications across healthcare, energy and pharmaceuticals can be developed.

Finally, the increase in the use of information technology (IT) in manufacturing has enabled the emergence of truly global value chains, and the importance of IT in manufacturing will increase over the coming 10 to 20 years. As well as improved enterprise resource planning software, the use of radio frequency identification (RFID) tags and improved communication speed and quality have raised efficiency in many sectors. In a similar fashion, the emergence of deep connectivity and the potential to link assets via the internet (the so-called ‘internet of things’) will potentially enable a distributed, localised version of manufacturing that encompasses the needs and wants of consumers without incurring significant costs in management and operation.

Bringing technology and trends together

Any one of these trends changing rapidly over time would be an issue for a company to manage but potentially could be managed within existing structures and without significant disruption. However, with many different trends coming together, and some at a very high rate of change, there is a concern that traditional modes of management will not suffice. Specifically, current models of supply chain management came into being during a period of relative stability and this leaves companies without the experience and the ability to adapt sufficiently quickly to these changes.³⁸ Some of these trends are already affecting the decisions of companies and have started significant discussion on the actual rather than perceived benefits of offshoring, especially for US companies. A small number of companies have already moved production out of Asia and others are considering their options for future production facilities.

The highest profile cases in the past year of the decision to manufacture in the US as opposed to China are those of General Electric (GE) and Apple. GE’s production facility in Louisville Kentucky Appliance Park had at its peak six large factory buildings employing 23,000 people, compared to just under 2,000 in 2011.³⁹ Since the beginning of 2012, however, two new assembly lines have opened and a third is planned as the company is reported to be investing \$800m into the site. According to Jeff Immelt, the CEO of GE, “... around 2008, we came to the conclusion that outsourcing was quickly becoming mostly outdated as a business model ...”⁴⁰

One of the most recent announcements on expanding production for high-technology goods in the US has come from Apple. At the beginning of December 2012 they announced that they would invest \$100m

37. TSB. (2012).

38. Christopher and Holweg. (2011).

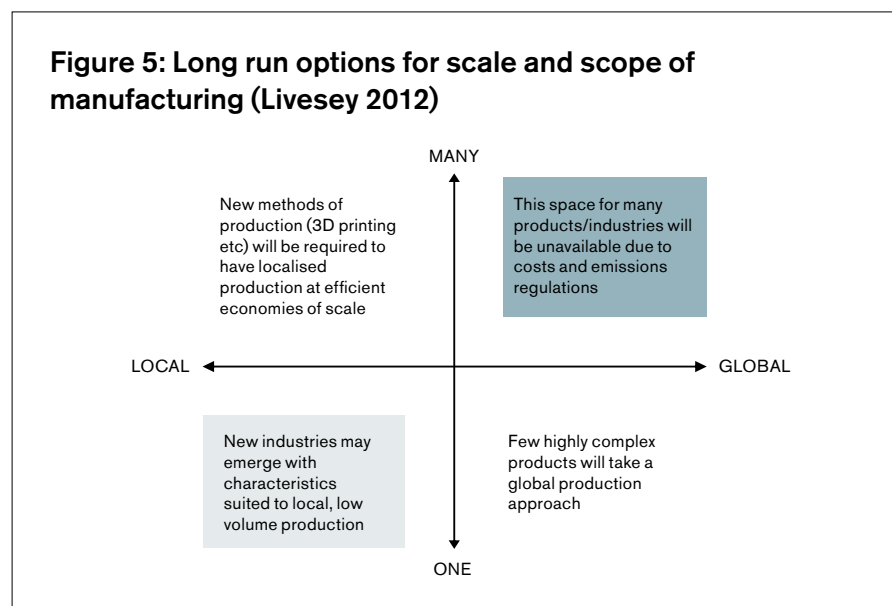
39. Fishman. (2012).

40. Immelt. (2012).

to make some of its Mac computers in the United States.⁴¹ Interestingly, Lenovo has also decided to locate production of its Think range in North Carolina, according to the company, in order to achieve faster turnaround times to North American customers. There are a rising number of examples where companies have decided to produce within the UK rather than overseas.⁴² These include plastics companies, paint manufacturers and electronics producers. The most recent example is that of the largest distributor of the Raspberry Pi, element14, bringing all of its production from Asia to Wales.⁴³

There are a rising number of examples where companies have decided to produce within the UK rather than overseas

While this is a significant change for individual companies, taken at the national level it represents a potential massive shift in economic power. According to analysis by the Boston Consulting Group, if 10 to 30 percent of the goods that the US now imports from China in seven industries moved back to the US it would add “... \$20 billion to \$55 billion in output annually to the domestic economy.”⁴⁴



The combination of new technologies and global trends leads to a pressure for regionalisation if not localisation of production in the medium to long term. The general trend will be to have production in the region where the products will be used rather than making a product on one side of the world and selling it on the other side of the world. This implies many companies will not be, in the long run, exporting in high volume. Instead they will be producing in the country of use or very close to it, depending on how economies of scale can be achieved at lower volumes, what Peter Marsh of the *Financial Times* has referred to as ‘industrial democracy’.⁴⁵ Companies could also be producing subassemblies at distance and carrying out assembly and customisation locally. How concentrated production will become depends on the product type and how strongly the trends impact each component in its manufacture and distribution.

41. Rampell and Wingfield. (2012).

42. APMG. (2013).

43. *The Manufacturer*. (2013).

44. Sirkin, Zinser et al. (2012).

45. Marsh. (2012).

The combination of new technologies and global trends leads to a pressure for regionalisation if not localisation of production in the medium to long term

Figure 5 summarises these changes, describing the interaction of how distributed and how far from the end user production is (the x-axis) and the volume of production (the y-axis). This highlights that few products in the long run will be made at high volume in a true global production network. The significant long run implication of this is that the debate will not be about trade balances, offshoring or reshoring, rather it will be about investment and ownership access in different markets. Reshoring and onshoring will have no meaning in the extreme version of this future, as all production is within the national boundary. This also implies a steep decline in world trade and exporting being replaced by foreign ownership for many companies' strategies.

Implications of the changing context

- The localisation of production will decrease trade and increase domestic production.
- In the medium term this could reduce the UK's trade deficit by a third.
- In terms of 2011 trade this would be an increase of £30 billion in domestic production.
- However labour intensity in manufacturing will continue to decline and so the impact on employment will be moderate.
- Adaptation to these changes could have significant sustainability benefits, especially if constructed around the concept of the circular economy.

Many kinds of manufacturing have reached a tipping point in terms of whether they should be located overseas or in the country where the goods will be consumed

The changes outlined above would have a very significant impact on the structure and performance of the UK economy. Depending on the actions of companies, government and other supporting agencies, there will be fewer imports of goods into the UK as well as a change in the export intensity of a number of sectors. How these changes will play out is impossible to precisely predict, but a general sense of the potential impact can be developed. This section provides an estimate of how the blending of new production technologies and global trends might impact the scale of manufacturing in the UK and consequently the balance of trade, and provides a short comment on associated employment changes.

Reducing the balance of trade

As noted above, higher transportation costs, emissions regulations, and the emergence of new production technologies will bias production to be more regional, if not local. This in general, would suppress the level of trade, leading to lower levels of imports and exports in general.

Even without any of these changes many kinds of manufacturing have reached a tipping point in terms of whether they should be located overseas or in the country where the goods will be consumed.⁴⁶ According to the recent Boston Consulting Group (BCG) analysis there are seven industries which are close to a tipping point based on logistics costs as a share of product costs and labour costs as a share of total product costs. These seven are: transportation goods, computers and electronics, fabricated metals, machinery, plastics and rubber, appliances and electrical equipment, and furniture. While the specific calculations will be different, taking this list as a starting point allows us to select elements of the

46. McKinsey Global Institute. (2012), Sirkin, Zinser et al. (2012).

UK manufacturing base that are likely to also be moving towards a tipping point.

Assuming that imports and exports will both be reduced, based on trade figures for 2011 we can calculate what the potential impact would be on the trade balance and whether this would imply more or less manufacturing occurring in the UK. Table 1 shows the potential impact a range of changes in imports and exports across these seven areas would imply for the UK's trade balance. This is based on the actual levels of trade for the UK in 2011 and the figure in each cell of the table is positive for a reduction in the trade deficit, negative if the trade deficit is increasing.⁴⁷

This model is based on industries which are likely to be at a tipping point within five years and does not take into full account potential changes in production technologies and how these may reduce the efficient scale of production. If the reasoning for a reduction in trade generally holds, it is likely that these estimates are conservative and over a 10 year period a stronger change will occur. Also this holds all other sectors constant, which may not be the case as other products' cost structures change, again implying this estimate is likely to be conservative.

Table 1: Change to UK's trade balance based on specific reductions in imports and exports for seven specific activities

£ million	Percentage reduction in exports				
	40%	30%	20%	10%	None
Percentage reduction in imports					
40%	13,870	23,639	33,409	43,178	52,948
30%	633	10,402	20,172	29,941	39,711
20%	-12,604	-2,835	6,935	16,704	26,474
10%	-25,841	-16,702	-6,302	3,467	13,237
None	-39,078	-29,309	-19,539	-9,770	0

The analysis carried out by BCG assumes "... that 10 to 30 percent of goods in the tipping-point industries that the US now imports from China could be reshored this decade."⁴⁸ Assuming a 30 percent reduction in imports for these seven activities in the UK and a 20 percent reduction in exports, based on 2011 trade data the UK's trade deficit would have been £20bn smaller.

What about employment?

At the same time, these changes will have an impact on employment in manufacturing. However, an increase in manufacturing output, mainly due to a contraction in imports and the replacement of that output with

47. ONS. (2012).

48. Sirkin, Zinser et al. (2012).

Actions to adapt to these changing conditions may stabilise employment in manufacturing

domestic production, may not lead to the creation of significant numbers of new jobs. This is due in part to increasing levels of automation in production as technology takes over tasks that previously would have required some human input.⁴⁹ The accepted narrative that technology progress led to resources being deployed elsewhere in the economy ignored the real possibility of technological unemployment. “There is no economic law that says that everyone, or even most people, automatically benefit from technological progress.”⁵⁰

There may be some positive impact on employment, from the direct and the indirect employment associated with new manufacturing companies. In 2009 the manufacturing sector “... generated some £140bn in gross value added, representing just over 11 percent of the UK economy. It also employed some 2.6m people, representing over 8 percent of total UK employment.”⁵¹ Taking the estimate of a £20bn increase in domestic production as a starting point, a rough estimate for the employment impact could be as many as 300,000 new jobs, if current levels of labour intensity were to be maintained. However the actual total is more likely to be between 100,000–200,000 jobs, as new production technologies lower the labour content of this new domestic production.

The important point is that actions to adapt to these changing conditions may stabilise employment in manufacturing, whereas inaction may lead to the production occurring within continental Europe and further declines in UK employment and GDP.

Intended and unintended environmental benefits

Approximately 90 percent of world trade is shipped and international shipping is currently responsible for just under 3 percent of global emissions (roughly 1000m tons CO₂ equivalent).⁵² As discussed above, a key change under the pressures of rising oil prices, tighter regulation of emissions and the possibility of producing locally, would be a general reduction in world trade. Taking the 30 percent estimate of import reduction above and assuming that this would be a general level of trade reduction, this would imply a drop of 1 percent in terms of current global emissions. This should also be considered against the scenarios developed by the International Maritime Organisation which show a very broad range of possibilities with a range of CO₂ emissions increases of between 220 percent and 310 percent between 2007 and 2050.⁵³

Demand for transport is one of the key variables linked to growth in CO₂ emissions but as the IMC note “Increased recycling, more regional trade and a more service-oriented economy could contribute to the decoupling of economic growth from seaborne trade.” This is the core point – the combination of trends outlined above effectively break the link between growth and trade, and if that is the case there is the potential for a significant and in some ways unintended environmental benefit.

49. Krugman. (2012).

50. Brynjolfsson and McAfee. (2012).

51. BIS. (2010).

52. International Chamber of Shipping. (2009).

53. International Maritime Organisation. (2009).

At the same time, new production processes such as additive manufacturing are intentionally designed to reduce the amount of materials required in production, by minimising waste. This combined with a trend towards design for re-use and renewal means that fewer products may need to be made, with lower levels of materials use and hence a much reduced carbon footprint for many products. These are the intended benefits from new production processes and approaches to making and further strengthen the possibility for emissions reductions and reduction of pressures on scarce resources.

Supporting mid-sized manufacturing to grow and prosper

- In the short-term companies, government and supporting organisations need to work together to improve the capability of MSBs and to increase their export potential.
- However in the medium-term there will be a shift towards either outsourcing or ownership of production assets both at home and overseas for lower value-density products.
- Large multinationals may need to restructure themselves as collections of MSBs take advantage of the new economic context.

This report has discussed mid-sized manufacturing companies and provided a picture of how the companies in the middle view themselves and the challenges they face. It has also outlined the changing context in which these companies operate and this provides a starting point to discuss what mid-sized companies, government and supporting organisations can do to ensure they prosper and have a positive impact on the future growth of the economy.

An agenda for companies

All companies have faced a difficult period through the recent recession and it remains to be seen whether the UK, the Eurozone and the world economy generally can find a path back to growth in the near term. For mid-sized UK manufacturers there will be specific short-term issues which they will have to address which can be highly individual and context specific, but will include:

- Expansion of exports to increase market access and turnover, and to gain international experience.
- Strengthening of management capability.
- Work to improve the retention of highly-skilled employees.

However, mid-sized manufacturers have advantages that align them to the changing context. These are characteristics that these companies should preserve if possible as a key advantage over larger companies. They include maintaining their agility and willingness to adapt their strategies quickly and retaining a clear customer focus.

It remains to be seen whether the UK, the Eurozone and the world economy generally can find a path back to growth

Mid-sized businesses appear to have the most natural fit with a world which preferences localisation of production

In the medium-term these companies will have to adapt to the strongly changing context, and this will include:

- Investing in new production technologies at the appropriate time to adapt to localisation pressures.
- Owning or controlling productive assets overseas to maintain market access and adapt to economic conditions.

The potential pressures of localisation and customisation should work in favour of mid-sized companies, depending on whether they can link their customer orientation to the demand for personalisation, as well as taking advantage of their already predominately domestic structure, with low levels of outsourcing and a strong domestic supplier network.

In the medium to long term though these companies will have to make difficult decisions on investment and location. Specifically, mid-sized companies will be faced with the choice of investing in new production technologies that allow for lower scale production and will be trying to understand when exporting will remain feasible compared to owning productive assets in their target markets.

It should be noted that companies at both ends of the size spectrum will have to adapt and change in this kind of future. Small companies may need to orient themselves to mid-sized businesses in order to be in a strong supply chain. Large multinationals may need to consider themselves to be collections of mid-sized businesses in order to take advantage of the new context. However, mid-sized businesses appear to have the most natural fit with a world which preferences localisation of production.

An agenda for government

While companies must be the primary movers in responding to the challenges and opportunities that the changing economic context provides, government also has a role in supporting companies attempting to grow and expand their reach. Specifically government can in the short term:

- Continue to reduce uncertainty for manufacturing companies, building on changes to taxation and patent laws, to give companies confidence in the stability of the policy landscape.
- Help to fix the skills shortage problem, through work on the image of manufacturing and the forthcoming results of the Foresight project on the Future of Manufacturing, as well as programmes such as the Queen Elizabeth Prize for Engineering.
- Ensure support for mid-sized companies to access the Catapults,⁵⁴ specifically the High Value Manufacturing Catapult, at reasonable cost and to make use of the Technology Strategy Board.
- Adapt the Small Business Research Initiative (SBRI)⁵⁵ to specifically target mid-sized manufacturing companies.

54. Catapults, originally termed Technology Innovation Centres, sit between the research base and industry providing shared facilities and a focus for translating new technologies from universities into companies. Further details on the Catapults can be found online at <http://catapult.innovateuk.org/>.

55. Full details of the SBRI programme is online at www.innovateuk.org/deliveringinnovation/smallbusinessresearchinitiative.ashx.

In the short to medium term, government can also:

- Include localised production in future analysis around the production and supply of energy.
- Provide clarity on inward investment rules based on strategy for development of more localised production in the long term delivered through UKTI.
- Support mid-sized companies moving to invest in production abroad to replace export footprints.

In outlining an agenda for government in relation to mid-sized companies it is important to discuss whether the target should be more firms at this scale or whether the government should aim to have companies grow through the mid-sized bracket to become true multinationals. The impact of having more mid-sized manufacturers compared to converting some of them into multinational corporations is unclear.

Manufacturing at any scale may not be a major job creator due to automation and productivity increases, but it is still imperative for government to understand these changes as allowing the productive assets in the country to move into foreign ownership may have a negative long term impact on the level of tax paid to the Exchequer.

An agenda for supporting organisations

It is not just government and companies who come together to make markets work and economies grow. The credit crisis and subsequent recession highlight the critical role that finance plays in making economies operate and the embedded nature of both companies and markets is important to acknowledge.

As has been highlighted above even at this point in time there is a shortage of growth capital for mid-sized businesses. It remains to be seen whether the proposed Business Bank and the Business Finance Partnerships will solve this problem in the short term. However, in the longer term banks will have to understand the nature of investment for production, whether that is localised production in the UK or overseas ownership and production in target markets abroad, as well as the new business models that may arise due to these changes.

The media also have a role to play, as the narrative on manufacturing and industrial organisation is about to change quite significantly. The interpretation of manufacturing and how it operates, its portrayal in the media and subsequently how students view employment in manufacturing are all linked.

Other intermediate organisations have important roles to play. For example, organisations like the RSA, Technology Strategy Board and NESTA could develop prize challenges to spur the development of new production technologies to develop and encourage a regionalised or localised production infrastructure. This would be aligned with the work of the Catapults but would provide a separate channel to achieving the technical change needed to manage production at lower scale, closer to the customer.

Finally, the skills required to manage and make in this way will be different from those that are used today to manage globally distributed

production. Universities and professional bodies such as the Royal Academy of Engineering (RAE) have a key role to play in ensuring over the medium to long term that graduates have skills appropriate to their context rather than producing graduates based on a narrative that is passing its sell by date.

Conclusion

Mid-sized manufacturing companies will have a significant role to play in the future of UK manufacturing, rebalancing of the economy and overall growth. However, the road to their success is a difficult one, and it is unclear that the UK is ready to respond to the challenges and the opportunities that this changing context provides. It is imperative that both industry and government begin to discuss the medium term and how investment decisions now will affect the growth trajectory for both companies and the country.

While this report has sketched a potential future and an agenda for change, there are a number of questions which remain open and which require further discussion. These include:

- What distribution of sizes of companies is most effective for the national economy? Should we and can we encourage smaller companies to become medium-sized enterprises?
- How should rules on foreign ownership of assets in the UK be adjusted over time as the economic context preferences more localised production?
- Without the prospect of significant employment growth associated with increased domestic manufacturing how can political support be generated to underpin the changes that are necessary?
- If new production technologies enable economic low volume production close to the consumer, given the potential environmental benefits should it be afforded even greater funding priority for research and development from government?

Changes in the world economy, technological progress and large scale trends are hard to predict. This report should be taken as the starting point for an important discussion on the future of UK manufacturing and specifically the role of mid-sized companies in that future.

Appendix one

– what is a mid-sized company?

In many ways commentators and policy makers have been obsessed with the size of companies in the UK for a long time. At the lower end of the scale, the story has been told that entrepreneurs and small companies are the lifeblood of the economy. At the larger end of the scale, there has been an ongoing worry that there are not enough multinationals emerging from the UK.⁵⁶ The discussion based on size has focused on the extremes of the scale, missing the middle.

However, over the past two years the middle has started to get more attention. Separate reports from the CBI, Grant Thornton, and GE Capital amongst others and a series of pieces as part of the Growth Review from the current UK government have all commented on the state and the importance of mid-sized companies in the UK.⁵⁷ A similar trend has occurred in the US with Forbes, GE Capital and Deloitte all taking a stronger look at the middle market.⁵⁸

This section reviews the available evidence on mid-sized companies and where possible disaggregates the data for manufacturers. It should be noted that there are various terms attempting to describe the middle of the distribution of companies. While mid-cap is our jumping off point, mid-sized appears to be a more appropriate phrase as capitalisation is just one aspect of the potential definition for those companies placed between the largest and the smallest of firms.

Estimates of the number of mid-market companies varies significantly

Depending on the sources and assumptions made underneath a simple cut off in terms of turnover or employees, the number of mid-sized or mid-market companies in the UK varies between approximately 9,500 and 33,700 according to the latest reports (see table 2).

56. See for example Owen, G. (2004). *Where are the big gorillas? High technology entrepreneurship in the UK and the role of public policy*, CEP Discussion Paper, London School of Economics.

57. CBI. (2011); BIS. (2012); GE Capital. (2012); Grant Thornton. (2012).

58. GE Capital. (2011); Deloitte. (2012); Forbes. (2012).

Table 2: Comparison of reported number of mid-sized companies in the UK

Study	Number of mid-sized companies	Notes
NIESR	9,545	Threshold is £25m to £500m, sourced from the Inter-Departmental Business Register (IDBR).
GE Capital	21,500	Sourced from Eurostat and BvD Amadeus databases, no clear boundary stated "The definitions of middle market firms follow an intuitive yet objective methodology using inflection point analysis at local market level to pinpoint the section of the economy that could be described as mid-market."
Grant Thornton	33,700	Companies with between 50 and 499 employees.
CBI	No firm number reported, estimated as less than 1 percent of companies	All companies with a turnover between £10m and £500m.

The upper estimates in table 2 would claim too many companies if the lower bound of £25m in turnover is realistic, as the average turnover for UK companies with 50 to 99 employees is just under £11m.⁵⁹ The middle of the range of estimates does not provide a set threshold and without further detail it is difficult to assess whether the estimate is realistic or not. The lower estimates have the benefit of a clear definition and a strong source and so it would appear to be pragmatic to take this as the starting point for assessing the number mid-sized businesses in the UK.

Similarly estimates for manufacturing companies and employment varies

It is unsurprising that as the definition of these companies is varied, how important they are in the manufacturing sector is reported differently as well (see table 3).

59. CBI. (2011).

Table 3: Report indicators of the focus of MSBs in manufacturing

Study	Indicators of manufacturing focus for mid-sized businesses
NIESR	"Within the private sector, about one-fifth of UK MSB employment was in manufacturing, compared with just over one-tenth of the workforce of the entire UK economy in manufacturing."
GE Capital	"Manufacturing is 18.7 percent of mid-market private sector GDP"
Grant Thornton	"More than 840,000 workers are employed in the manufacturing sector by MSBs." (ONS estimates 2.5 million people are employed in UK manufacturing, so this would represent 34 percent of manufacturing employment).
CBI	Represent 30 percent of the UK's manufacturing employment base.

According to the NIESR data, the UK has the lowest share of MSB employment in manufacturing (19.4 percent compared to 39.9 percent for Germany) with a turnover per employee in mid-sized manufacturing comparable to Germany (€256 compared to €245) but lagging Finland (€282), France (€284) and Sweden (€305).

Export orientation

According to the CBI "... in 2009 55 percent of mid-sized businesses that exported derived less than 25 percent of their revenue from exporting ..."⁶⁰ Overall, the GE Capital data claims that only 17 percent of UK mid-market firms' revenues are generated outside of the EU and that 36 percent of these firms operate locally or nationally at best.⁶¹ A small scale survey of 35 mid-sized businesses completed as an input into the Growth Review by Middlesex University noted that "More than half (54 percent) of the MSBs were involved in export activity, with exports accounting for an average of 49 percent of sales in these firms."⁶²

In comparison, from the Deloitte survey 39 percent of US middle market companies earn revenue only domestically, while another 35 percent earn less than one quarter of their revenue from overseas.⁶³ According to KPMG "... 34 percent of mid-sized companies we surveyed in the USA derive the majority of their revenue from foreign markets."⁶⁴

Looking specifically at manufacturers, a survey of 301 UK mid-sized companies showed the breakdown of export intensity for production industries with 14 percent not exporting and 34 percent deriving more than 50 percent of their turnover from exports.⁶⁵ This is in line with the Aston University analysis of the Business Structural Database for the UK Growth Review which appears to say that just over 34 percent of manufacturing MSBs derive more than 50 percent of their turnover from exports.⁶⁶

60. *Ibid.*

61. GE Capital. (2012).

62. BIS. (2011).

63. Deloitte. (2012).

64. KPMG. (2012).

65. ICAEW. (2012).

66. Aston University. (2012).

Defining mid-sized companies depends on existing classifications

A working definition of mid-sized would include companies with between £25m and £500m in turnover, with between 100 and 2,000 employees. This can be split further into mid-sized companies operating domestically and those operating internationally, both of whom are predominantly supplied domestically but the international group have a growing export orientation with a minimum of 10 percent of revenue currently coming from overseas.

How many mid-sized manufacturers are there in the UK?

Table 4 shows a nested search for companies (using the FAME database)⁶⁷ within the UK who are manufacturers and have both employees between 100 and 2,000 and turnover between £25m and £500m. This returns 2,436 companies or 2.5 percent of manufacturing companies in the database.

Table 4: Manufacturing companies in the UK based on FAME database

Search step	Number of companies returned in search
All active companies in FAME database	2,684,033
Companies in England, Scotland, Northern Ireland and Wales	2,496,873
Companies with primary SIC code (UK SIC 2007) from 10 to 32	97,608
Number of employees between 100 and 2000	4,468
Turnover (latest available) between £25m and £500m	2,436

Using the turnover and employee criteria outlined above there are just under 2,500 mid-sized manufacturing companies currently operating in the UK.

Taking the sample of companies in table 4, we can look at how domestically oriented the companies are in terms of turnover and their productivity level based on turnover per employee. For companies reporting any split between domestic and overseas revenue (1,815 companies in the sample) they have average UK turnover of £59m and an average overseas turnover of £34m, so on average these companies' domestic revenue is twice their overseas revenue.

Looking at the distribution of the percentage of revenue generated domestically (table 5) again highlights the predominance of domestic mid-sized manufacturers but there is a strong set of companies with strong overseas revenue.

67. The FAME database contains companies who are registered at Companies House and covers both active and inactive companies. Further detail available online at www.bvdinfo.com/Products/Company-Information/National/Fame.

This indicates that while there are 2,436 mid-sized manufacturing companies, based on turnover and employees, these can be split into those that are international, with at least 10 percent of turnover coming from overseas (973 companies), and those that are domestic mid-sized manufacturers (1,463 companies of which 382 are purely domestic, i.e. have no revenue from outside of the UK).

Table 5: Distribution of companies according to percentage of turnover which is domestic

Percentage of turnover generated domestically	Number of companies	Percentage of companies (those reporting turnover split, n=1815)	Percentage of all companies in sample (n=2436)
100%	382	21.0%	15.7%
90–99%	460	25.3%	18.9%
70–90%	278	15.3%	11.4%
30–70%	377	20.8%	15.5%
10–30%	219	12.1%	9.0%
0–10%	99	5.5%	4.1%
No split in turnover reported	621	-	25.5%

Appendix two

– modelling the impact on the balance of trade

The estimates for the impact of potential changes on the balance of trade are based on a static analysis using trade data for 2011 for the UK.⁶⁸ Based on the seven tipping point industries outlined in the recent BCG report on the future of American manufacturing⁶⁹ the model simply introduces a percentage reduction in the scale of both imports and exports for the given area. The changes in imports and exports are allowed to be of different scales, as existing production in the UK is likely to be qualitatively different to production which might be reshored.

Table 6 shows an example for a 30 percent reduction in imports and a 10 percent reduction in exports for the seven tipping point areas, implying a decrease in the UK's trade deficit of just under £30bn, roughly one-third of the trade deficit in 2011.

Table 6: Example of modelling possible impact on trade balance

Modelling trade balance imports for 2011			Import effect	Export effect			
<i>All figures in £ millions</i>			<i>0.7</i>	<i>0.9</i>			
Activity CPA (08)	Imports	Exports	Adjusted Imports	Adjusted Exports	2011 balance	Modified balance	Impact on trade balance
Plastic products	6670	4658	4669	4192	-2012	-477	1535
Fabricated metal products	8511	5274	5958	4747	-3237	-1211	2026
Computer, electronic & optical equipment	43057	24094	30140	21685	-18963	-8455	10508
Electrical equipment	14722	10030	10305	9027	-4692	-1278	3413
Motor vehicles	38715	29934	27101	26941	-8781	-160	8621
Other transport	16537	22851	11576	20566	6314	8990	2676
Furniture	4157	854	2910	769	-3303	-2141	1162
Totals	132369	97595	92658	87926	-34674	-4733	29941

68. ONS. (2012).

69. Sirkin, Zinser et al. (2012).

Appendix three

– existing support for the middle

Policy support for manufacturing companies, and companies generally, has traditionally been structured either neutrally or based on whether companies are of a certain size. As noted at the beginning of this report, companies at either end of the scale receive attention. However, those that are neither very small nor very large have not appeared explicitly in policy documents.

Explicit support for mid-sized businesses in the UK

Over the past decade there have been a number of efforts to develop a UK manufacturing strategy, ranging from the Government's Manufacturing Strategy⁷⁰ through to the Growth Review Framework for Advanced Manufacturing.⁷¹ All of these reports either discuss companies broadly or focus on small and medium enterprises making no distinctions within this category. This is again reflected in the most recent Parliamentary debate on industrial policy and manufacturing⁷² in which the issue of size came up in terms of small, niche manufacturing in contrast to large factories, and in terms of support for SMEs in line with financial support given to companies in Germany.

The recent Mid-Sized Businesses Growth Review⁷³ marks a turning point, as it explicitly attempts to understand the role and needs of mid-sized businesses in the UK, although it did not have an explicit element looking at mid-sized manufacturing firms. This element of the Growth Review commissioned a series of reports which provide a snapshot of current thinking on UK mid-sized businesses.

The key recommendations of that review include:⁷⁴

- Linking mid-sized businesses to business schools.
- Developing a national campaign to celebrate 'hidden champion' mid-sized businesses.
- Eight pathfinder projects to be established by Local Enterprise Partnerships (LEPs) to raise the profile of mid-sized businesses, strengthen business networks and encourage peer-to-peer support on issues such as exporting and succession planning.
- Working with large companies to strengthen their supply chains.
- Providing a register of qualified non-executive directors via the Institute of Directors (IoD).

70. DTI. (2002).

71. BIS. (2010).

72. Hansard HC Deb 22 November 2012, vol. 553, no. 73, columns 795–833.

73. BIS. (2012).

74. This summary is based on the website for the mid-sized review www.gov.uk/government/organisations/departments-for-business-innovation-skills/series/mid-sized-businesses.

- A tailored package of export support for mid-sized businesses via UKTI targeting an additional 500 mid-sized businesses per year.
- Setting up of the Business Finance Partnership to raise £1bn in non-bank finance available to mid-sized businesses.
- Increasing resource efficiency by increasing the number of mid-sized businesses taking advantage of programmes via WRAP and others.

As part of ongoing process of implementation, the latest update from December 2012 on progress for the growth review includes a section on the actions focused on mid-sized business.⁷⁵

75. HMT. (2012).

Figure 6: Progress on commitments towards MSBs from the Growth Review (HMT 2012)

The UK's mid-sized businesses (defined as £25–£500m turnover) account for a fifth of private sector employment and turnover, and have significant potential to grow.

	"The Government will..."	Progress	Notes
188	UKTI will receive £10m additional funding to provide a tailored package of export support to an additional 500 mid-sized businesses (MSBs) per year. UKTI and UK Export Finance will also work with businesses to promote existing trade finance support for mid-sized businesses.	Progress made	UKTI has expanded its network of International Trade Advisers dedicated to MSBs, with over 20 in place across UKTI's English regional network. It is on track to engage 500 new MSB clients this financial year. Lord Green and John Cridland, CBI Director-General, jointly led trade missions to Turkey and Russia dedicated to MSBs.
189	Develop commitments to support and strengthen supply chains.	Progress made	In October 2012, the Prime Minister announced leading UK companies will help tens of thousands of businesses secure increased levels of affordable supply chain finance.
190	Increase numbers of mid-sized businesses benefiting from resource efficiency schemes by up to 200.	Progress made	The Government is engaging with MSBs to improve resource efficiency in food and drink, supply chains and water using industries. The target of 200 MSBs was a 3 year ambition.
191	Establish a task force of UK business schools to report by October 2012 on options for improving access to appropriate courses and promoting links between mid-size businesses, business schools and students.	Complete	The Business Schools Task Force published their report in November 2012, recommending increased collaboration between business schools and MSBs. Regional events are now planned to promote and build momentum behind the recommendations.
192	The Government asked 8 Local Enterprise Partnerships (LEPs) to establish a dedicated local pathfinder project to raise the profile of mid-sized businesses, strengthen business networks and encourage peer-to-peer support.	Progress made	LEP core funding was announced in September 2012, helping to support MSB activity.
193	Working with business, launch a national campaign to showcase mid-sized business and publicise the full range of Government services available.	Complete	A number of national events have helped bring MSBs together to share their experience in 2012.

As figure 6 shows, this indicates that there are six commitments that the government is monitoring, with two complete (linking to business schools, national campaign) and the other four ongoing. The commitments on the non-executive directors register are not mentioned, although the directory is now online at the IoD website⁷⁶ even though it appears to be more of a general service rather than one targeted at MSBs.

The Business Finance Partnership is also not mentioned even though it, as well as the Business Bank, was a key element of the Autumn Statement.⁷⁷ The confusion between mid-sized and SME appears again in the Statement, as both of these initiatives appear in section 1.104 under the title “Improving access to finance for small and medium sized businesses”. There are now four funds established under the BFP, with plans for a fifth to be started.

⁷⁶. See <http://nxd.iod.com/> for further details.

⁷⁷. HMT. (2012).

Appendix four – advisory group

The following individuals very kindly provided their time to review a draft of this report and provided many insightful and helpful comments and additions. None of the opinions expressed in this report should be attributed to any of the Advisory Group and all errors and omissions remain the responsibility of the project team.

- Mike Cherry, policy chairman, Federation of Small Businesses
- Hayley Conboy, principal policy adviser – Competitive Markets Directorate, CBI
- Keith Hodgkinson, deputy director of innovation policy, BIS
- Paul McCaffrey, project manager, Foresight on Future of Manufacturing, GO-Science
- John Stevenson, MP, All Party Parliamentary Group on Manufacturing
- Martin Stevens, CEO, AI Technologies & Chair of LASER Group of SE Region Manufacturers

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