



Impacts of Structural Change: Implications for policies supporting transition to a Green Economy

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Executive Summary

Purpose of the paper

The aim of this paper is to review the drivers, processes and consequences – both costs and benefits - of structural economic change. The review provides the context within which the proposals for the Resource Efficiency Flagship Initiative can be understood and a basis for inferring the likely economic impacts of the Initiative.

The review is prompted by the recognition that the Initiative has the potential for major restructuring of the economy (both between and within classically defined economic sectors). A number of commentators have suggested that the Initiative could become a driver of structural change and the process of ‘creative destruction’, reflected in significant change at a micro-economic scale and the achievement of economic growth and rising real incomes at the macro-economic scale.

The balance of transition costs and benefits

The review has identified structural economic change as a dynamic and turbulent process associated with very substantial changes of growth and contraction at the sectoral and business levels which yield small, but persistent, net economic benefits over the long-term. This process and the associated economic outcomes appear to be almost universal, being present in western developed economies (for example, in the USA and the UK), economies that have undergone major political reform (for example, Spain and the transition economies of Eastern Europe) and newly developing economies (for example, China).

The process is dependent on the continuous recycling and reallocation of resources from declining to expanding economic activities yielding improvements in factor productivity and real rises in factor returns. The process is, however, not automatic or instantaneous. There are factor and product market rigidities and restrictions that can impede the process (and which are the focus of conventional economic policy). There are, therefore, opportunity costs associated with the under or unemployment of factors as a result of the adjustment processes and the transition to new economic models and activities.

The most significant costs are associated with structural unemployment. This can generate significant adverse consequences for social welfare, especially where spatially concentrated over many decades. Substantial policy responses have been formed as a result.

Risks to the transition process

The review has identified two areas of risk associated with the processes of structural change which have the potential to limit or (if well managed) catalyse the resource efficiency Flagship:

The existence of technological lock-in – where the interaction of technological and socio/political factors serve to inhibit the processes of structural change even where there are economic benefits of so doing.

The importance of institutional investment – where capital investment decisions are critical in shaping the nature and pace of structural change and the role of institutional investors becomes central to the process.

Implications of the review for the Flagship Initiative

1. **The capacity to generate structural change and economic growth:** The flagship, depending on the adjustment policies and associated scale of investment, has the potential to facilitate a new Kondratieff wave of ‘creative destruction’ resulting in the continuation of dynamic economic changes at a micro-economic scale, increased factor productivity and long-term economic growth and rising real incomes at the macro-economic scale;
2. **The synergy with more conventional economic policies:** The adjustment policies are likely to coincide with the broader economic model in terms of supporting the recycling of

factor resources, broader adaptation, and the avoidance of market restrictions and rigidities;

3. **The need to address the major barriers and opportunities:** The significance of technological change as an integral part of the transition process has to be recognised in terms of identifying and addressing major technological lock-in (especially that which would seek to perpetuate the use of fossil fuels) and by seeking to engage and frame the investment choices of the institutional investment community;
4. **The need to manage the risk of structural unemployment:** Structural change results in structural unemployment. The resource efficiency initiative is unlikely to be any different. Early recognition of the risks and development of a range of (innovative) responses to restructuring in key sectors and regions may alleviate the worst outcomes.

1 Introduction

1.1 Resource efficiency and the transformation process to a 'Green' economy

The transformation of the present EU and global economy to one which can be sustained over the long-term, given the physical limits to the use of natural resources, represents a major challenge to businesses. Such a transformation requires an absolute decoupling of economic growth from the demand for natural resources. This, in turn, requires a step change in the levels of resource efficiency achieved by the economy – and major changes in the resource productivity of individual businesses¹.

Failure to meet the challenge will result in an unhealthy mix of escalating environmental problems and significantly increasing economic costs as resource scarcity is eventually reflected in rising energy and material costs, as well as increasing levels of uncertainty and unrest over the security of supplies of energy, water and raw materials.

The required transformation is very significant – and will require time for the signals (through regulation and prices) to be sent to achieve corresponding changes in behaviour by producers and consumers. The impact of the transformation will vary for different industries, regions and businesses. There will be businesses that will gain competitive advantage from the process and others that will lose it. Such a process of adjustment, with winners and losers, is a constant economic process through time in response to all major and minor technological, financial, social and political changes.

These challenges are recognised in the Europe 2020 Strategy². The proposed resource efficiency Flagship Initiative seeks to promote the necessary shift to the required resource efficient, low carbon, economy and to decouple economic growth from resource use.

1.2 This paper provides a broader perspective on the process of economic change as a context for evaluating investment in resource efficiency

The rewards of a resource efficient economy in terms of environmental sustainability and wellbeing, reduced economic risks from future environmental problems and less future uncertainty are very substantial (some might say life-saving). There are concerns, however, that the economic and social costs of the necessary transformation may be so high that they inhibit and delay change, and lead to a prolonged period of adjustment which paradoxically leads to even greater costs over the long-term.

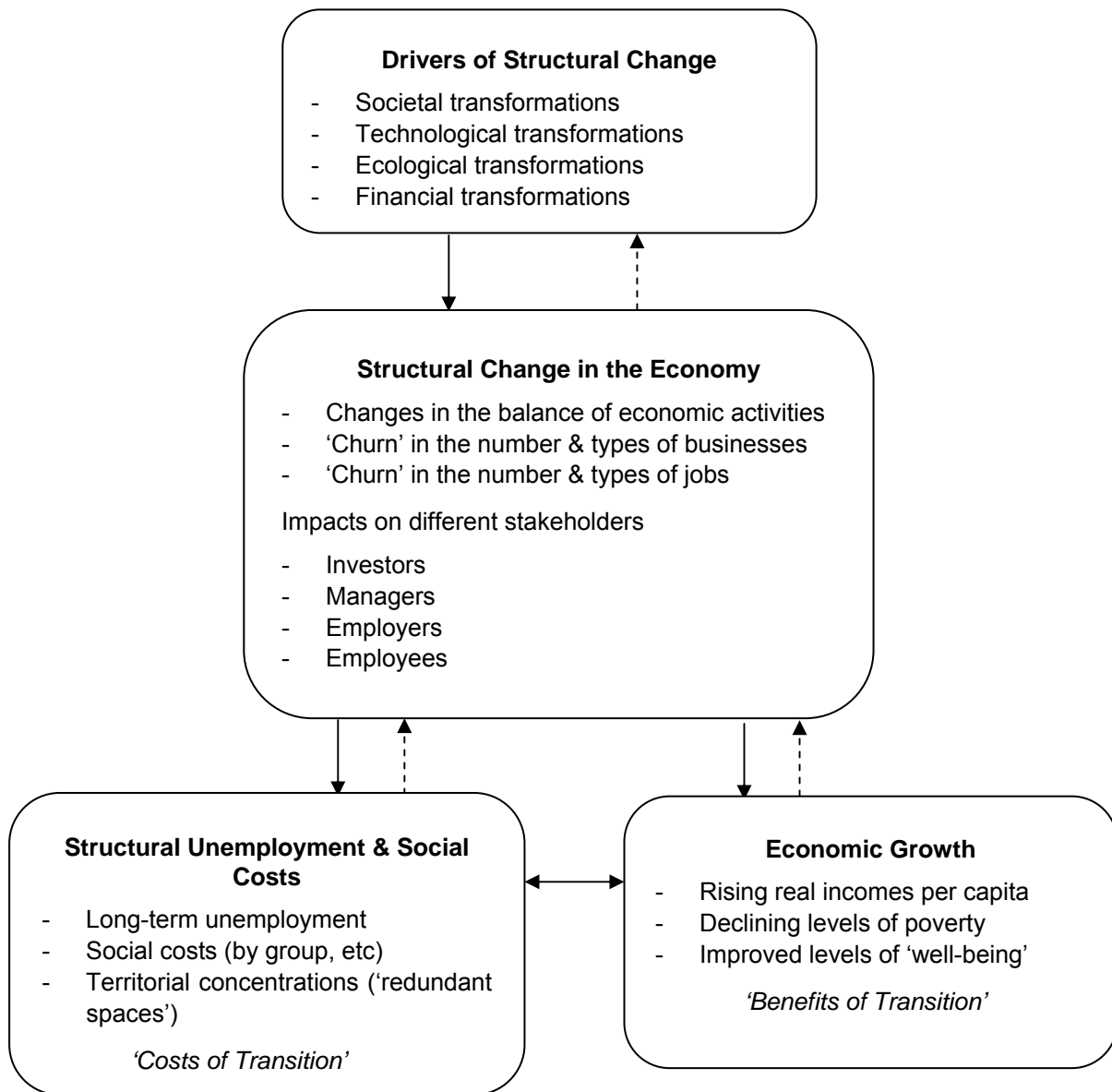
This paper examines the process of economic growth and its interaction with structural change at a macro-economic and a micro-economic scale; to provide a context in which to understand the possible implications of a policy induced acceleration towards a more resource efficient economy, with its implied technological and societal changes.

The paper builds on the general, simplified, framework in Figure 1.1 below. It seeks to explain and evidence the relationships between the drivers of change (technological, financial, social, ecological, etc.) and economic and social outcomes; and the nature of the changes that have taken place, including the identification of winners and losers associated with the processes of change.

¹ For a well developed argument of the need and scale of the challenge of resource decoupling see Jackson, T (2009), Prosperity without Growth – Economics for a Finite Planet. London: Earthscan; and the references therein

² Europe 2020: A European Strategy for Smart, Sustainable and Inclusive Growth: COM(2010) 2020

Figure 1.1 Outline of the Underlying Processes



Notes: Linkages show dominant relationships, with some element of reverse relationship. Relationships and outcomes are defined with reference to specific periods of time and place.

In the simplest of terms, the paper seeks to provide greater understanding of the on-going balance between the economic and social benefits and costs of structural economic change, to frame discussion on policy development in the current context of contemporary structural change and the transition to a green economy.

For example, the possibility of giving undue weight to potential losers results from the often very public examples of enterprise closures:

'The short-term negative consequences of structural change, i.e. those enacted through the downsizing (or closure) of enterprises, are relatively identifiable, publicly visible and often strongly concentrated in particular sectors. The positive effects of structural change, both in terms of new companies and the expansion in existing companies, are generally less visible, much less publicised and more evenly spread throughout the economy'³.

³ European Foundation for the Improvement of Living and Working Conditions (2006) Restructuring and employment in the EU: Concepts, measurement and evidence; Pg. 5

This paper attempts to identify and understand the balance of both the negative ('transition costs') and positive ('transition benefits') outcomes of structural economic change. Analysis is undertaken through review and illustration of the processes and impacts of structural economic change at a number of levels of the economy, including both national and regional economies, sector and company level, and at the level of the labour market.

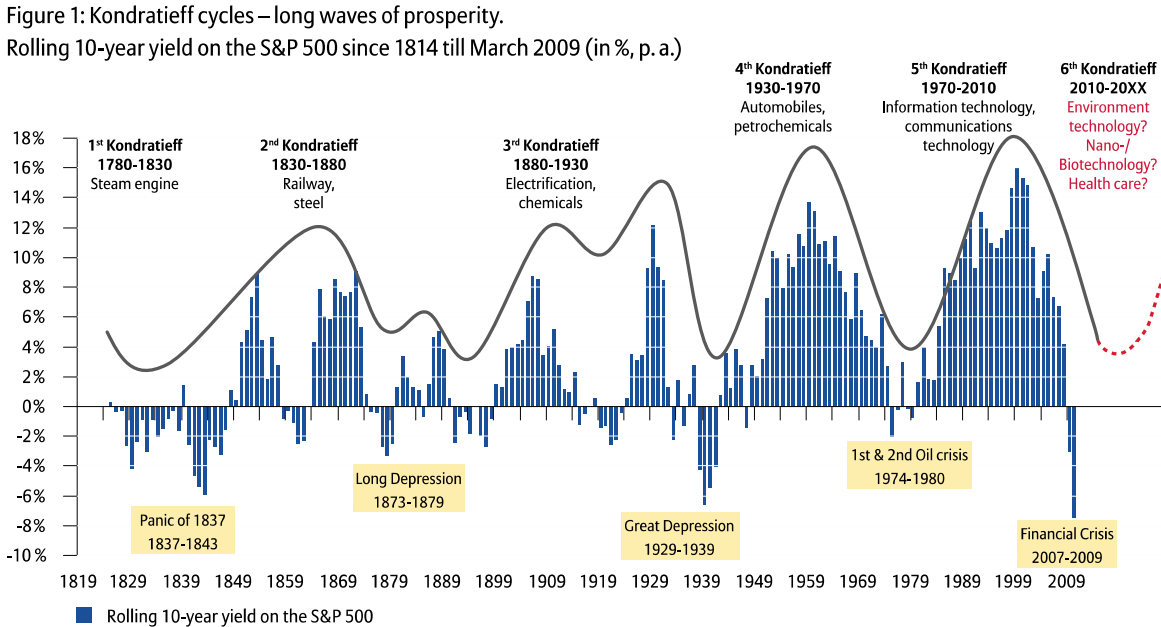
1.3 Structural economic change and economic growth

The history of capitalist economic development tells us that there is an intimate and complex relationship between the processes of economic growth and changes in economic structure (Silva and Teixeira, 2008). The relationship is not straightforward in the sense that one can say that economic growth causes structural change or that structural change causes economic growth. This is because structural change is the outcome of processes that reflect the ability of a firm, industry, region or national economy to respond to new competitive pressures and new opportunities (Dietrich, 2009).

Thus, a failure to respond to a constantly changing competitive environment can result in economic decline, unemployment and economic inequality (OECD, 2002). This implies the scale of structural change would correlate (with various lags in time) with changes in competitiveness and changes in income (at the micro or macro scales). There is a constant process of economic restructuring underway as technological and social change, combined with competitive and comparative advantage, constantly reworks the sectoral and locational dynamics of economic activity in a globalised economy (Dicken, 2010).

One such illustration of this process of structural change at the level of the world economy is Kondratieff waves (Freeman and Louçã, 2001). The long wave theory of Kondratieff relates technological change to global economic cycles and levels of global prosperity, where structural change is a driver of increased returns (see Figure 1.2 below).

Figure 1.2 Structural change – the example of Kondratieff cycles



Source: Datastream; Illustration: Allianz Global Investors Capital Market Analysis

Source: Allianz Global Investors, 2010

Additionally, these long-wave cycles have been shown to have a geography – as well as a history - with individual national economies subject to their own historical pathways of structural change as global drivers have combined with national economic and social characteristics. Thus, for example, different countries have been identified as the geographical heart in different Kondratieff waves led, in the First Kondratieff, by the UK's Industrial Revolution.

Indeed, for most of the 20th Century, the process of industrialisation (and manufacturing) has continued to be the dominant driver of structural change and economic growth on a global scale. This process has been described statistically through the three sector classification of national economies: comprising the primary sector (which includes agriculture and mining); the secondary sector (industry and manufacturing); and the tertiary sector (services) (see Table 1.1).

Table 1.1 Three Sector Structural Change in Selected Economies (% of Gross Value Added)

Selected economies	1980			2008		
	Agriculture	Industry	Services	Agriculture	Industry	Services
Poland*	8.2	39.4	52.0	3.7	32.0	64.2
Spain	6.3	37.0	55.7	2.6	28.4	69.0
UK	2.0	40.7	57.2	0.9	23.6	75.2
Germany	2.4	41.1	59.9	0.9	29.8	69.3
US	2.9	33.3	63.7	1.3**	21.8**	76.9**

*Note: The three sectors do not add up to 100%, due to minor errors in original data; *Polish data are for 1992 not 1980; **Data is from 2007, no data is available for 2008; ***Data from World Bank*

Source: OECD Factbook, 2010⁴

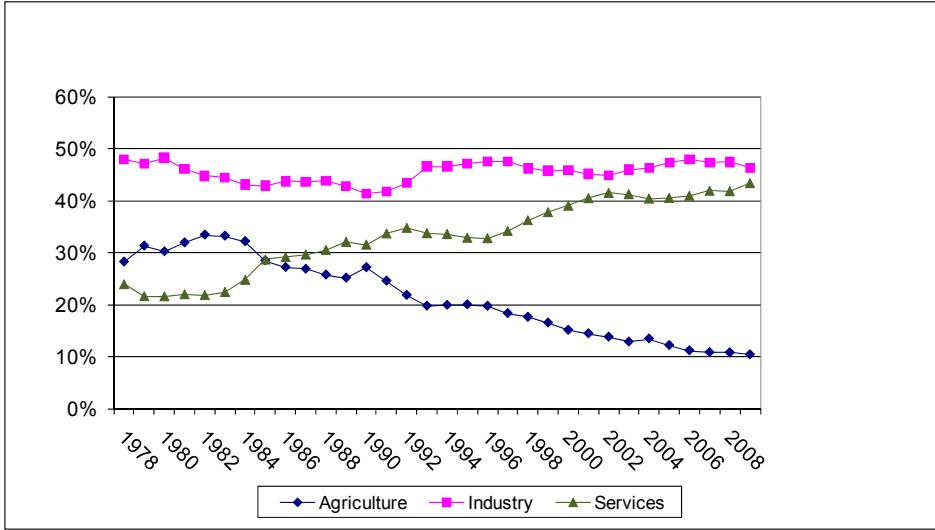
Table 1.1 exemplifies how major structural change has taken place over the past thirty years across a range of countries, with structural shifts in the economy from agriculture to industry to services (Aiginger, 2001, Quah, 1999). Over the same periods, the aggregate size of these economies has increased substantially, with annual average growth rates in GDP of between 1.5% and 2.5%.

Of course, the three sector model is not a theory of economic development as much as a description of the economic history of what is now the OECD. For example, development theorists have noted that newly industrialising countries are making such a transition both quicker and, even, to the point that some argue that certain structural shifts are being 'missed out'.

For example, looking at China (Figure 1.3), whilst the long-term trend has seen the 'usual' decline in the share of agriculture in GDP and an increase of the size of the service sector, industry has retained its majority share position in the economy. If China were to, eventually, follow the historical economic pathway of other OECD countries (and notwithstanding its recent very high rates of economic growth – see Figure 2.1, Section 2) this would suggest a substantial restructuring of the industrial economy, including the further expansion of a full range of service industries.

⁴ http://www.oecd-ilibrary.org/economics/oecd-factbook-2010_factbook-2010-en

Figure 1.3 Sectoral shares in the China economy (% of GDP), 1978 - 2008



Source: World Bank

Notwithstanding the different potential pathways of national economies, for our purposes the three sector model does capture in simple terms how national economies experience long run change in their dynamics and characteristics, whilst at the same time experiencing real increases in national income.

1.4 The structure of the paper

The paper is structured to provide a general review of the nature of economic change and the impacts on economies, industries and businesses. It provides evidence on the economic and social impacts associated with the changes using a range of case studies detailing:

- Structural economic change at the national level (with reference to the experience of China, Poland, Spain and the US);
- Structural change at the sectoral (and business) level; and,
- Structural change at the regional level.

In addition, the paper includes reference to two case studies examining the economic implications of a move towards greater resource efficiency.

The case studies are presented in full in a supporting bound document to this paper.

2 Drivers of structural change and economic growth

2.1 Introduction

The following section outlines the variety of drivers of structural change at play – both historically and in today’s global economy. How these drivers impact on economies, regions and social groups, especially when in combination, is, always, a historically and geographically specific empirical question. In the following, a range of illustrations are put forward of historically significant processes of structural change, their influence on the macro-economy and the impacts that have resulted.

2.2 Drivers of structural change

If the market economy is conceived as a highly dynamic system that is constantly undergoing processes of restructuring driven by techno-economic, social and institutional change (Perez, 1983), then it is possible to identify a number of different drivers that – in aggregate – bring about ‘systemic’ change, and that results in a significant change in the structure of an economy above and beyond the normal ‘churn’ of business expansion and contraction as a result of competitive pressures.

The distinction between various drivers of structural change can be blurred, and their exact nature varies over time and space, but the ability of their combination to bring about systemic change is the basis on which theorists and commentators have talked of periods of structural change - whether from the technologically inspired viewpoint of Kondratieff (Freeman and Louçã, 2001), the Marxist-driven concept of regimes of accumulation (Gordon, 1980) or regulation theory (Aglietta, 1976), or the recent developments of ‘socio-technical transitions’ and associated ‘regimes’ and ‘niches’ (Smith and Stirling, 2008). The collapse of the Soviet system stands, for example, as one of the most recent historical examples of what the literature calls ‘systemic transformation’ whereby the political, economic and social systems of a set of economies have been totally, and literally, transformed.

We briefly review and illustrate these drivers of transformative change.

2.3 Technological transformations

There is a constant and underlying process of transformation that relates to technological change. Companies seek to protect and expand the intellectual property that gives them an advantage in the market place. Key parameters (e.g. investment in research and development, number of PhDs, number of patents, etc.), are seen as a measure of the innovative capacity of national economies and individual companies. In the last century, it was the developed economies that dominated the process of technological change, particularly within multinational corporations with, for example, the fourth Kondratieff of automotives and petrochemicals (or what has been called the ‘Fordist regime of accumulation’; Aglietta, 1976) led globally by the USA. Moreover, as the process of sectoral rebalancing from agriculture to industry to services has seemingly started to reach its limits in the world’s first mover economies, so technology has continued to play a critical role in the development of the economy (see Evidence Box 1 below). The rise of the Asian Tigers in the 1980s has, however, brought with it new centres of innovation and, today, the emerging economies of China and India are also rapidly developing a capacity for indigenous innovation (for example, renewable energy in China and ICT in India).

The centrality of innovation and technological change to processes of economic growth explains why concerns about intellectual property rights figure so highly in the activities of the World Trade Organisation. In the contemporary context, controlling the technologies that will enable the transition to a green economy may turn out to be at the heart of the next wave of global prosperity (see previous Figure 1.2). As Stern (2009: 89) has noted in the context of climate change and the transition to a low carbon economy:

‘There will be winners and losers, and the impacts of transition will need to be managed. However, transition to a Greenhouse Gas-constrained world will create opportunities for companies that anticipate new markets.’

Evidence 1: Technological change and the USA 'productivity miracle'

De Ferranti et al. (2001) argue that it is the dynamic process of productivity growth arising from innovation and adoption of new technologies that propels development. This, as much as any reallocation of resources among industries, is the key component of long term success in the USA's economic structural transition. From the late 1950s onwards, the American model accelerated economic growth through the rapid development of science as technology rather than from putting more people to work, with productivity growth averaging 2.8 per cent for the period 1959-73.

During the 1970s this expansion in productivity slowed as the US encountered growing competition, stagflation, and decreasing private investment. By 1990, however, the emergence of a knowledge economy supported by information technology once again offered the promise of accelerated productivity growth in the United States. Jorgenson et al. (2007: 35) note that while initially optimistic views of the potential of the 'computer age' were not supported by productivity statistics, with nonfarm business (NFB) productivity growth for the five years from 1991 to 1996 averaging only 1.0 per cent, US productivity growth improved sharply after the mid-1990s, averaging 2.7 per cent between 1995 and 2000, and over 3.0 per cent between 2000 and 2005.

Significantly, a report by McKinsey Global Institute in 2001 noted that this productivity 'miracle' was not isolated to one sector of the US economy but, rather, spread broadly across a number of key industries in both manufacturing and services: retail; wholesale; securities; telecoms; semi-conductors; and computer manufacturing. Productivity acceleration within these sectors can be traced to managerial and technological innovations that improved basic operations or facilitated the redesign of core products and services, with new and emerging information technologies one of the key tools utilised by management in this processes.

Sources: De Ferranti, D., Perry, G. & Lederman, D. (2001) From Natural Resources to the Knowledge Economy: Trade and Job quality. World Bank Publications, Washington DC; Jorgenson, D., Mun, S. & Stiroh, K. (2007) A Retrospective Look at the U.S. Productivity Growth Resurgence. Federal Reserve Bank of New York Staff Reports, no. 277; McKinsey Global Institute (2001) US Productivity Growth 1995-2000: Understanding the Contribution of Information Technology Relative to Other Factors. McKinsey, Washington DC.

2.4 Societal transformations

In the recent past there have been major societal transformations that have radically changed the economic structure of particular groups of national economies, with wider implications for the global economy. In the Post-War period the Soviet Union and its satellite states in Eastern Europe pursued a particular model of economic development, orchestrated by central planning, that focused on the development of heavy industry (Nove, 1987). For a while, this model returned economic growth, and furnished the Warsaw Pact with an impressive military industrial capacity; but it failed to improve living standards and was found incapable of promoting innovation and technological change. By the 1980s the Soviet model had failed and the fall of the Berlin Wall in 1989 and the collapse of the Soviet Union in 1991 brought an end to the centrally planned economy. The Soviet model, however, left an indelible structural legacy on the states of Central Europe and the newly independent states of the former Soviet Union, including over-developed and uncompetitive industrial economies and under-developed service sectors.

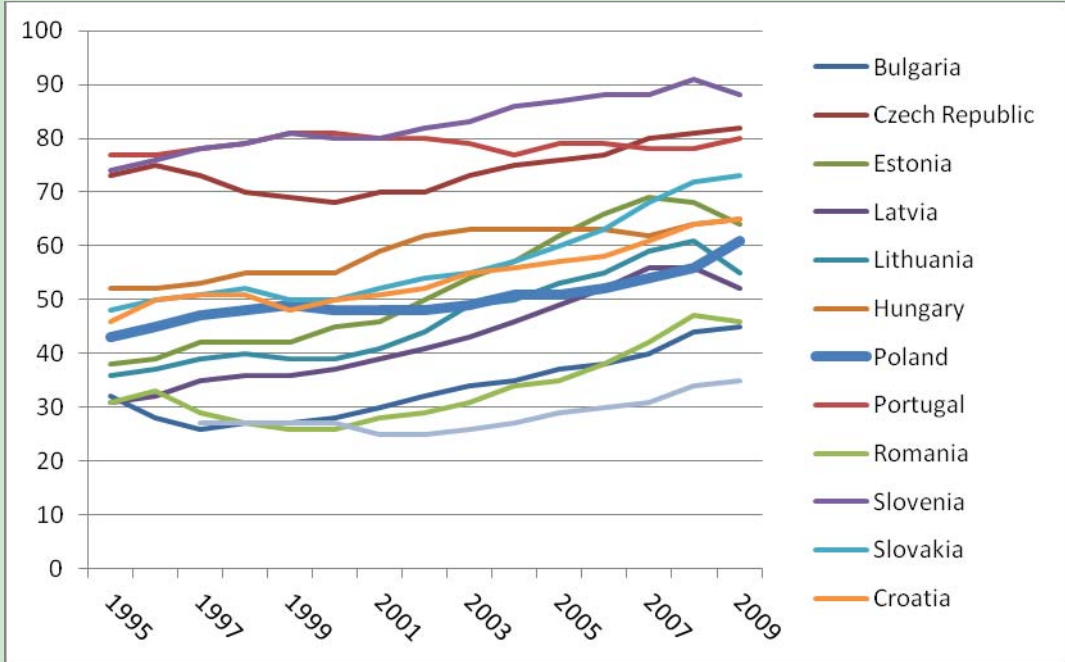
During the 1990s these economies experienced 'transitional recession' as the processes of economic transition resulted in the collapse of the old industrial economy and the slow emergence of new manufacturing and service economies (Gros and Steinherr, 1995). Subsequently, these economies have experienced economic growth and modernisation as integration into the global economy has continued apace, with a number of the states of Central Europe benefitting from early accession into the European Union and a newly defined role for themselves in the wider European economy (Dunford and Smith, 2000; see Evidence Box 2).

Evidence 2: Structural change and Central Eastern Europe

During the 1990s, a set of nations of Central Eastern Europe (CEE) were jointly grouped as ‘transition economies’ based upon their shared experiences of structural economic change. The shock of the ‘end of socialism’, amid the collapse of the Soviet model, saw savage across the board declines in GDP and the rise of substantial unemployment as the everyday processes and characteristics of these economies were fundamentally restructured.

Since the initial shock of transition, the transition economies have experienced sustained economic growth and a rise in living standards. Poland, for example, has seen GDP per capita increase from 43% of EU-27 to 61% in just over a decade (see Figure E1) and was one of the few countries of Europe to avoid the recent global recession.

Figure E1: GDP per capita in Purchasing Power Standards (PPS) (EU-27 = 100)



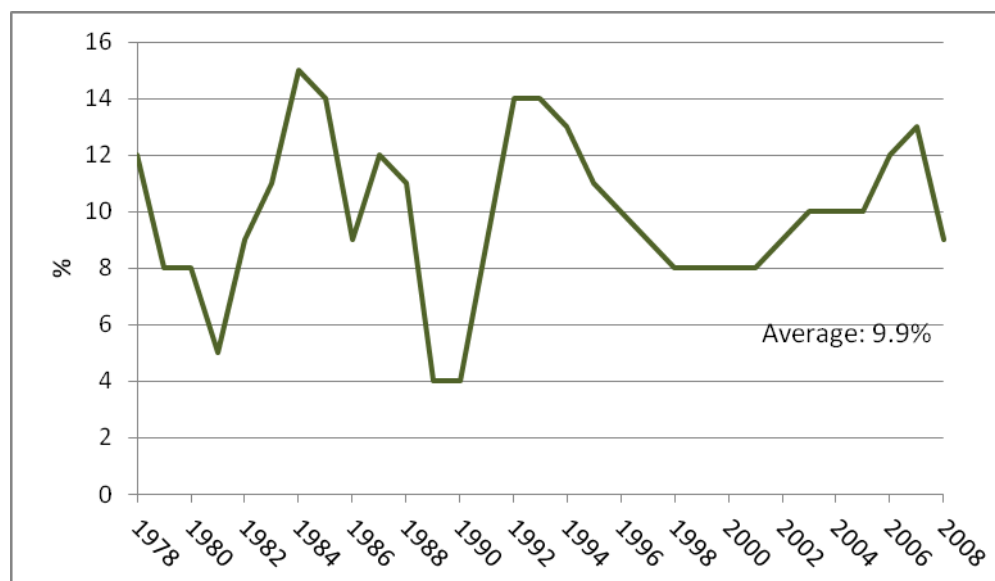
Source: OECD

More recently, the emergence of the so-called BRICS (Brazil, Russia, India, China) (Goldman Sachs Global Economics Group, 2007) or the ‘southern engines of growth’ or CIBS (China, India, Brazil and South Africa) (Santos-Pailino and Wan, 2010) provide other examples of how societal transformation is driving rapid structural change and economic growth.

Undoubtedly, it is China that is leading the way in global growth and its economic success is synonymous with the process of globalisation whereby it has benefited as once national production networks have been stretched across the globe to maximise the benefits of low labour cost locations in an era of falling transportation costs. As with the newly industrialised countries in Asia, rising living standards in the emerging economies has subsequently made them important markets in their own right, thus generating indigenous demand and changing the dynamics of the global economy (Naughton, 2007). Following the adoption of economic reform policies in 1978, China has achieved an average annual growth in GDP (in real terms) of more than 9%, trebling it its GDP volume over the period 1978 – 2008 (see Figure 2.1 below). Furthermore, recent reports suggest such that China’s most recent growth may be such that it has overtaken Japan to become the second largest economy in the world⁵.

⁵ <http://www.telegraph.co.uk/finance/economics/6890189/Chinese-economy-overtakes-Japan.html>

Figure 2.4 China's Real GDP Growth, 1978 - 2008



Source: World Bank

As the case study demonstrates (see separate Case Study paper), over the last 30 years China has introduced major social and economic reform that has led to a transformation of its economy and delivered impressive rates of economic growth. The process is, nevertheless, still far from complete in both economic and social terms.

2.5 Political transformations

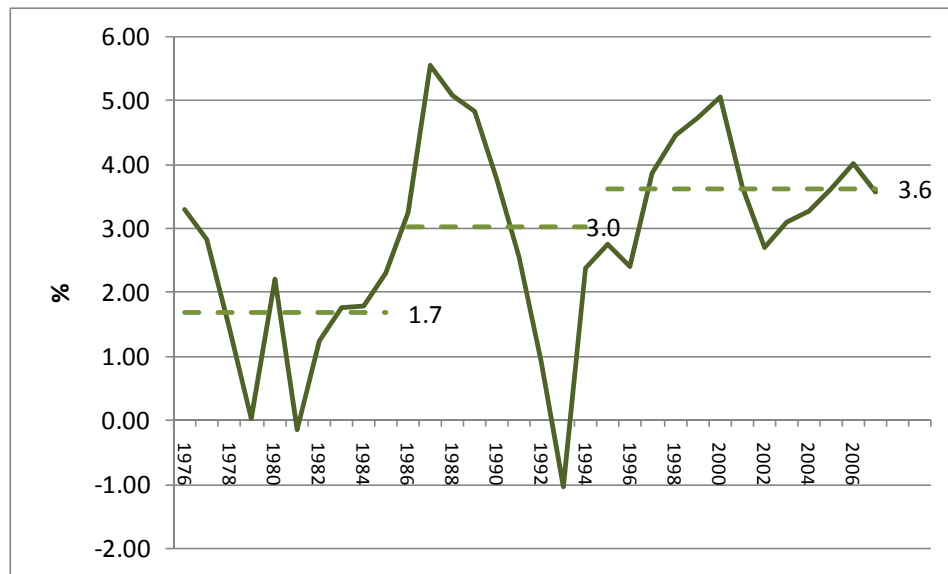
Examples where political projects have brought about a change in the structure of national economies include the process of economic integration and the creation of regional trade blocks and the related impact on the structure of national economies and their trade relations. Economic theory relating to integration tells us that it results in both 'trade creation', as new trading opportunities are created between member states in the union; and 'trade diversion', as trade is diverted away from non-member state towards member states (see Pomfret, 1986 for a review of the theory). At the same time, economic integration provides national producers with access to larger markets, but also increased competition, but overall market integration results in a higher rate of economic growth for all member states (Badinger, 2005). Thus, the political creation of the European Union and its single market has promoted structural change with new competitive advantages within a wider European market (Young, 2010). Furthermore, the benefits of the Single Market have extended through the process of enlargement, which increases the size of the internal market and drives new rounds of competition.

According to the European Commission (2007, 3), the Union has witnessed an increase in welfare of € 518 per head in 2006 compared to the situation without the single market (corresponding to a 2.15% increase of GDP over the period 1992-2006). Badinger (2005) estimates that the per capita GDP of the EU would be approximately one-fifth (26.1%) lower if no economic integration had taken place since the 1950s. Nevertheless, processes of competition and restructuring as a result of political decisions related to trade arrangements will produce winners and losers (including sectors, regions and social groups) in the context of an overall growth in real per capita incomes.

For example, the positive economic impact of EU integration has been argued for in the case of Spain, and as part of its longer run process of political economic modernisation following the ending of the Franco dictatorship. Over the last three decades, the Spanish economy has experienced several rounds of intense restructuring - which can be related to specific drivers such as the energy crisis (see Figure 2.2 below) - but whose impact has been mediated by the longer run on-going process of the internationalisation, opening up and integration of the Spanish economy. Overall, this has delivered a long run convergence of Spanish GDP per capita to above 86% of the EU15. Nevertheless, a cost of this

modernisation has been a persistently high unemployment rate for over a decade (see separate Case Study paper).

Figure 2.5 Spanish GDP growth rate (constant prices 2000)



Source: Eurostat

Similarly, the economies of Central Europe have faced the dual challenge of responding to the collapse of their Soviet-style planned economies and their introduction into the competitive market of the European Union. Nevertheless, the adoption of EU legislation and the creation of ‘fully-functioning’ market economies has meant that they have developed far more sustainable and resilient economies than those post-socialist states that remain outside the EU.

2.6 Financial transformations

The global economy is currently experiencing the aftermath of a financial crisis second only to the Great Depression of the 1930s. The current crisis was triggered by events in the USA financial system, but quickly translated into a global crisis. Unlike previous recessions that had primarily impacted on the industrial and manufacturing sectors that suffered a sudden fall in demand, the recent crisis resulted in a shortage of credit and finance and challenged the profitability of major financial institutions across the world. The collapse of major companies in banking and finance has meant that those economies, regions and cities dominated by the service sector felt the initial impact of job losses. However, the impact of crisis was felt right across the global economy as it significantly reduced demand for goods and services and eroded government finances (OECD, 2009).

With concerted financial support from governments across the world, the financial services sector has been saved from collapse, in the interests of maintaining levels of economic activity. However, there are major continuing impacts on the industrial and manufacturing sectors and regions of the developed economies as credit remains constrained; and as austerity budgets are introduced to balance the financial costs of avoiding the collapse in the financial sector. In contrast, emerging markets, such as Brazil, China and India continue to experience high growth rates, increasingly driven by growing domestic demand. The global financial crisis has accelerated the global shift in economic activity away from the Atlantic basin (US and EU) in favour of Asia.

Other instances of financial crisis exist. In the 1990s, the Asian financial crisis significantly depressed global demand and exposed failings in the ‘Asian Miracle,’ but the region was quick to recover. Similarly, in the case of Russia, the 1998 financial crisis was later seen as a positive turning point. The Russian Financial Crisis caused a sudden and significant reduction in the value of the rouble that made imported goods prohibitively expensive. As a result, much of the domestic manufacturing capacity that had been closed came back into

production to substitute imports and to satisfy domestic demand. The net result was a rebound in the share of manufacturing in economic output, which also benefitted those regions specialising in light industry and food production.

2.7 Ecological transformations

Since the Rio Earth Summit in 1992, the environmental consequences of economic growth have gained increasing prominence. The sudden and dramatic increase in energy prices (reflecting conflict in the Middle-East) in the 1970s provides an idea of the potential transformative impact of ecological concern if reflected in the price of natural resources (see, for example, Figure 2.2 above and the impact on Spain's growth rates). The sharp increase in energy prices triggered global recession and forced many developed industrial economies to focus on improving energy efficiency and to reduce the energy intensity of their industry (Smil, 2010). This had the effect of driving heavy industry offshore to use low labour costs to offset higher production costs causing both sectoral and regional industrial decline. Industries like steel production and shipbuilding moved to the newly industrialising economies in Asia, such as South Korea, whilst the developed economies looked to renewed growth through development of the 'post-industrial' service sector (Dicken 2010).

Arguably, in the instance of such heavy industry, the ecological driver has merely added further weight to the range of structural factors driving passage by the OECD economies through the 'three sector model' (see Table 1.1) and towards service-dominated economies. Between 1995-2004, for example, whilst total employment for the EU25 increased by 0.96%, employment in primary and secondary industries declined – by 1.45% in agriculture, by 5.66% in mining and quarrying, and by 0.85% in manufacturing, with decline occurring both for the EU15 and the NMS10 (Penderer et al., 2009).

Most recently, concerns about anthropogenic climate change and energy security are driving an agenda to reduce the carbon and energy intensity of production (Bradshaw, 2010). The resultant transition to a low carbon economy will generate a new round of economic restructuring that will be played out in different ways across particular economic sectors, national economies and cities and regions (Rubin, 2009). For example, in a recent review of the distribution of the new industrial technologies of the low carbon economy in England, a major finding was of a geography which challenged the long run regional North-South divide of the UK economy (see Evidence Box 3).

Evidence 3: Offshore Wind and the English Regions

Leading research institutes serving the rapidly growing UK offshore wind industry are widely dispersed across the UK with assets across the North West, North East, Yorkshire & Humber, East Midlands, the South West and Scotland. Momentum is building in industrially focused research with the two global leaders in offshore wind turbine manufacture having established a UK presence – Siemens Wind Power has located one of its five global core competence centres at Keele University Science & Business Park (North West) and Vestas Wind Systems is now partnered with the Advanced Composites Centre for Innovation and Science (ACCIS) at Bristol University (South West). In the North East, NaREC provides large-scale blade testing facilities and is developing world-class drive train testing facilities, whilst TWI recently established a Renewable Energy Manufacturing Technology Centre (REMTEC). Both centres are collaborating with Clipper Windpower, another potentially important future offshore turbine manufacturer that aims to build the world's largest 10MW turbine.

Most English regions contain leading technology and component suppliers or else have service capabilities relating to the planning, construction and maintenance of offshore wind farms. Compared to Denmark and Germany, however, there is a lack of scale and concentration of suppliers, and supply chains are only slowly developing.

Source: GHK/Technopolis/CURDS (2010) Expertise and Excellence in New Industry New Jobs Technologies

2.8 Summary: Drivers as the basis of structural economic change

In summary, as the global economy and the national economies within it become more inter-linked and integrated, an expanding array of processes – financial, political, ecological, social, technological, etc. - can be identified as both contextualising and driving the nature and character of national economies and economic change. Whilst such processes have always existed, their combination, intensity and reach continues to grow with myriad consequences (both benefits and costs) for economic actors – sectors, enterprises, labour, regional economies, etc. – and depending on the time and place.

Whilst these drivers are on-going, there exist understandings of particularly systemic periods of structural change which have jointly influenced at key moments in time the growth rates and economic paths of substantial groups of national economies (such as the transition economies of Central Eastern Europe in the 1990s or the rise of the Newly Industrialising Countries (NICs)). Nevertheless, what should be recognised also is the constant process of structural change, re-shaping and churn experienced by the ‘everyday process’ of the economy and how this can, over time, drive substantial change in the nature of the economy – such as the move to service-dominated or post-industrial economies or the rise and move to global power of multinational enterprises.

The next section moves to a greater description of those ‘everyday processes’ of the economy and the difficulties they pose in both tracking economic change and identifying the balance of costs and benefits inherent in such change.

3 The processes of structural economic change

3.1 Structural change and the ‘everyday processes of churn’

The previous section has described and illustrated the large scale processes or ‘drivers’ that, in unison, are shaping the development of national economies and economic pathways in contemporary times. These drivers act by providing the competitive environment and framework within which economic agents undertake economic decision-making. It is these innumerable decisions, in aggregate, which define the characteristics of the economy – the type and balance of sectors, the dynamism of organisational change, the changing nature of the firm base, the skill requirements of human capital and the nature of their delivery, and so on.

In order to understand the (changing) characteristics of the economy and the processes which lie beneath them, economists and social scientists use a common set of concepts (investment, sector, enterprise, employment, etc.) but are constantly challenged by new varieties (for example, social enterprise, clusters, jobsharing, etc.) and which often become clear only with hindsight. Moreover, in many instances it is these new varieties which are the vanguard indicators of more significant processes of structural economic change; identifying their significance and their short term and long run impact is a highly challenging task.

Structural economic change is the cumulative outcome of changes in production processes (supply) and consumer choice (demand). In simple terms, individual products are understood to go through a product lifecycle that eventually renders them obsolete and redundant. Thus, producers constantly have to develop new products and they also have to pay constant attention to the competitiveness of their products and adapt their production strategies – such as seeking out a lower cost locations (Vernon, 1979) and which, in the 1990s, saw the growth of a set of Newly Industrialising Countries (NICs) as the ‘global flipside’ process of the industrial restructuring of Europe’s manufacturing heartlands.

Thus, the change in the scale and type of competitive pressures as a result of the different drivers gives rise to the birth, expansion, contraction and death of businesses as well as their development into new forms (multinationals, joint ventures, franchises, etc.). This is a continuous process in a market economy, and in a healthy dynamic economy one can expect to see evidence of investment in new sectors of economic activity promoting new firm formation and job creation as other more mature sectors of economic activity decline.

At the scale of a national economy, the result is a constant ‘churn’ in the number and types of businesses and ‘churn’ in the number and types of jobs. Cumulatively, and over time, this will see also the rise of new sectors and associated occupations (think of web design and webmasters) and the decline of others. All of this is well understood in the context of developed industrial economies and there are bodies of theory and well-proven policy prescriptions that support the innovation process and new business formation to ensure an efficient and dynamic process of economic renewal. Such processes are less understood in the context of emerging markets and developing economies.

Analytical evidence to support the link between economic restructuring and these underlying processes is hard to come by as economic analysis of the drivers of economic growth tend to hold economic structure constant. There is evidence, however, to suggest that retarding the processes of economic restructuring can actually damage the competitiveness and growth prospects of economies (OECD, 2002). The OECD (2009, 43) observes:

‘Policies to revitalise the economic structure of OECD economies cannot just be about the fostering of new industries. They will also need to enable (and sometimes encourage) the decline and restructuring of dying industries and enable the reallocation of resources from old industries to new industries.’

In this section, we seek to illustrate the ‘everyday’ and ‘ongoing’ processes of ‘churn’ in the economy and how many are at one and the same time processes of structural change which will, in aggregate, incorporate new characteristics for an economy including, ultimately, any understanding of the economic benefits and costs of structural change.

As the opening quote from the OECD in Section 1 highlighted, often it is the immediate costs of 'churn' such as firm closure or redundancies which are most visible; with the longer run benefits of new firm formation and job creation elsewhere, or enhanced productivity, much harder to see. In the section below we begin with an investigation of a fundamental process of 'churn' – the entry and exit of firms in the economy – to make more visible the benefits as well as costs of structural economic change, and as the basis for a broader review of the impacts on the characteristics of an economy (such as its sectoral balance, employment structure, company activity and sub-national economic geography).

3.2 Churn in the economy – firm entry and exit

In the following section, we review a variety of recent evidence on firm entry and exit into national economies, and its relationship to productivity trends, industrial structure and employment trends. We begin with Evidence Box 4 which outlines the full extent of everyday churn in the world's leading economy, and its relationship to enhanced productivity.

Evidence 4: Turmoil and Growth: Young Businesses, Economic Churning and Productivity Gains

Davis et al (2008)⁶ argue that in any dynamic capitalist economy some firms thrive and grow while others decline and sometimes fail, and that sorting successful business ventures from unsuccessful ones is a necessary part of the market economy.

Their research on the USA economy highlights that churning of businesses and jobs is a constant feature of the USA private sector - millions of jobs are created as a result of growth in existing businesses and the creation of new businesses yet, at the same time, millions of jobs are destroyed in the economy each year as businesses contract or close.

Key conclusions of their research include:

- In the USA, between 1977 and 2005, more than one-third of job creation was due to the entry of new establishments – a similar proportion of job destruction was from the collapse of existing firms;
- The contribution of initial establishments extends beyond initial entry - surviving new businesses have high employment growth rates in early years. Young businesses also have higher exit rates than older businesses contributing to job destruction;
- The extent of churn is calculated through the excess job reallocation rate; the amount of job creation and destruction over and above the minimal amount required to accommodate the net employment change. This confirms that younger firms play a disproportionate role in the churning processes of the USA economy. The excess reallocation rate declines as firms mature;
- The data show that, conditional on survival, young establishments have higher productivity levels and higher productivity gains than more mature establishments. In effect, the churning process replaces lower productivity businesses with new, more productive ones. In particular, young survivors initially are 3% more productive than mature incumbents, but their productivity advantage over incumbents increases during the subsequent five years to 5%.

In conclusion, the reallocation of jobs, workers and capital to their best use is a major force behind productivity gains over time in the USA economy. In other words, churn in the economy has a favourable impact on productivity and well-being such that churn (or turmoil) in the economy is actually a strength.

3.2.1 Enterprise entry and exit in Spain

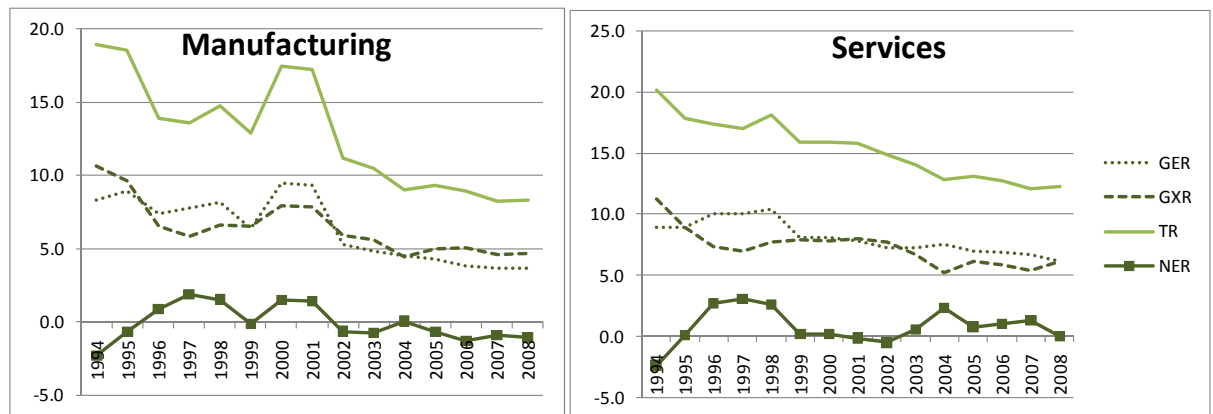
The case study of Spain re-iterates the message of the level of 'churn' which takes place constantly within the firm base of the economy. In Spain's case, the dynamic of firm birth and death has combined with globalisation processes within the economy – with, for example,

⁶ Davis, S., Haltiwanger, J., and Jarmin, R. (2008) on "Turmoil and Growth: Young Businesses, Economic Churning and Productivity Gains" Ewing Marian Kauffman Foundation; <http://sites.kauffman.org/pdf/TurmoilandGrowth060208.pdf>

the expansion of foreign direct investment flows (FDI) – and such that the nature of the national economy’s industrial structure has shifted to include a growing firm segment of Spanish multinationals.

Figure 3.1 outlines how the transition of the Spanish economy from a manufacturing to a services-dominated economy has been accompanied by a high turnover of businesses (both firm births and firm deaths). As this process of transformation has slowed there has been a clear downward tendency in both entry and exit rates. Nevertheless, the churn in business stock is clear: in any one year between 5% and 10% of the business stock exits to be replaced with new businesses; with the net effect close to zero (slightly negative for manufacturing and slightly positive for services).

Figure 3.6 Entry and Exit of Spanish firms in the national economy over time



GER: Gross Entry Rates; GXR: Gross Exit Rates; TR: Turnover Rates; NER: Net Entry Rates

Source: DIRCE; National Statistics Institute (INE)

Since 2002, whilst the manufacturing sector has seen a substantial reduction in firm creation and destruction, this has been accompanied by a process of industrial concentration. Whilst the number of manufacturing enterprises within the Spanish economy is the same in 1994 as it was in 2008, the proportion of firms with more than 20 employees within manufacturing has grown from 12.6% in 1994 to 15.2% in 2008. In contrast, the service sector has seen an increase in the number of enterprises from 0.6m in 1994 to 1.0m in 2008.

The process of business churn and reorganisation, allied with the increased openness of the Spanish economy, has led to a rise in the number of Spanish multinational firms. A number are former public or private monopolies (for example, Telefonica, Repsol-YPF), banks (for example, Santander, BBVA) or family firms (for example, Inditex, Puig, NH Hotels). The internationalisation of most companies in Spain has been gradual⁷ (through commercial or production subsidiaries, alliances or, lately, mergers and acquisitions) and usually starting in culturally close markets (Western Europe and Latin America) before diversifying geographically as well as economically.

3.3 Churn in the economy – job creation and destruction and (un)employment

Churn in the economy, as demonstrated through business demography statistics, can also be indicated by labour market statistics.

3.3.1 Firm entry and exit and employment creation and destruction in the UK and USA

Unemployment is, of course, related to job creation and destruction in an economy.

In the UK, between 1998 and 2008, private sector employment increased by just under one fifth (18.9%) from 16.3 million to 19.4 million jobs in the UK. However, this increase of 3.1 million net jobs hides the true scale of job creation and destruction in the UK economy. The

⁷ See Puig, N., Alvaro, A., and Castro, R. (2008) European challenges and opportunities: the role of Europe in the internationalisation of Spanish firms. In H.G. Schröter (ed.) "The European Enterprise", Springer-Verlag, Berlin.

gross effects behind this net change in employment have been calculated, and compared with data from the US⁸.

Job creation and destruction rates are defined as follows:

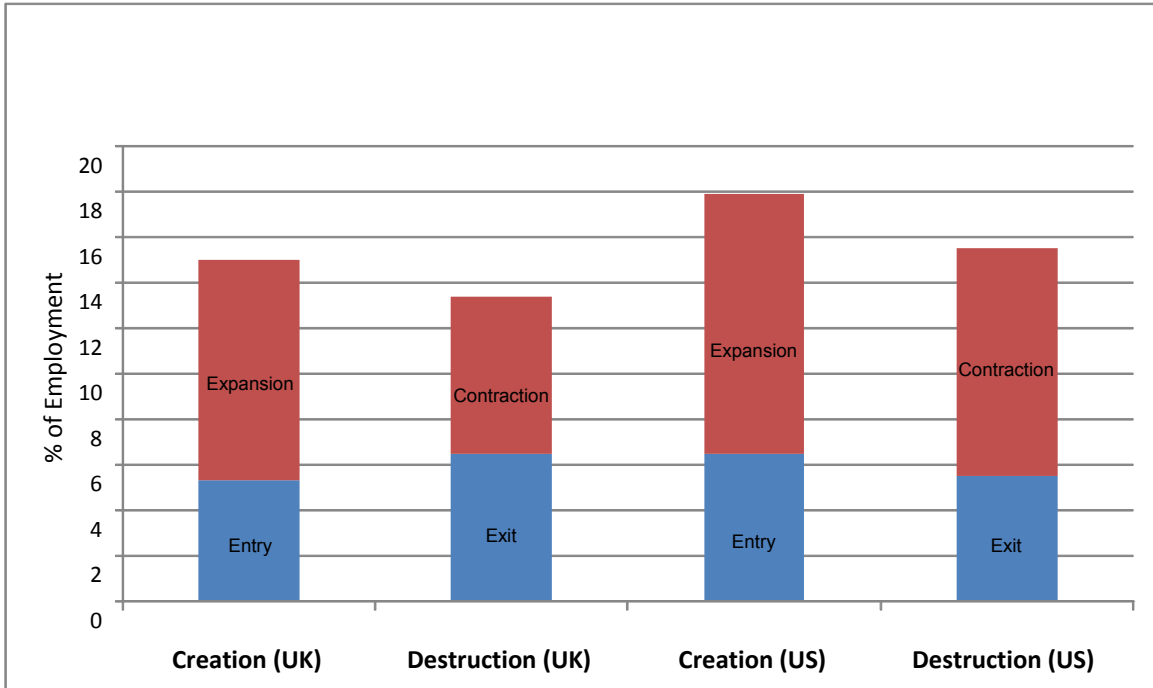
- *Job Creation:* Gross job creation at time t equals employment gains summed over all businesses that expand or start up between t-1 and t;
- *Job Destruction:* Gross job destruction at time t equals employment losses summed over all businesses that contract or close between t-1 and t.

Figure 3.2 shows that, over the decade 1998 to 2008, the net employment change in the UK of an additional 3.1 million jobs hid a much larger magnitude of gross job flows. On average, 13.4% of private sector jobs were destroyed over a 12-month interval during the 1998-2008 period, whilst job creation was slightly higher at 15%. This resulted in a small average net annual increase in private sector employment over the 10 years of 1.6%.

In comparison with data for the US⁹ (based on the average annual figures for job creation and destruction for the longer 30 year period, 1975-2005), the UK trends are remarkably similar. In the US, the job destruction rate is just under 15% per year and job creation is just under 18% per year; in other words, the level of job creation is slightly higher and the net effect is also slightly more positive.

A key point to note is that this headline metric of ‘churn’ looks much the same in the UK as it does in the US (although care is required in drawing a direct parallel as the comparison is based on different time periods).

Figure 3.7 Average Annual Private Sector Job Creation and Destruction in the UK (98-08 and US (75-05) as % of Total Private Sector Employment



Source: ONS Business Structure Database and Davis et al (2008)

The UK data is still subject to analysis but suggests that churn, as in the US (see Evidence Box 4 above), is a significant driver, if not the sole explanation, for improvements in productivity.

⁸ Anyadike-Danes, Bonner and Hart (2011), Job Creation and Destruction in the UK:1998-2008 (BIS, forthcoming)
⁹ Davis et al., (2008), op cit.

In terms of the modes of job creation and destruction the patterns in the UK and the US are similar. For job creation, approximately a third of new jobs are created through firm entry, and the remainder through business expansion. With respect to job destruction it is broadly 50:50 between exit and contraction in the UK whereas in the US it is contraction which is the dominant mechanism of job destruction (see Figure 3.2 above).

In summary, it can be concluded that for the UK the job creation and destruction rates reveal that over a quarter (27.9%) of all jobs in the private sector were either destroyed or created over an average 12 month period – a remarkable level of turbulence in the UK economy.

Expressing this in the actual number of jobs emphasises the point more clearly:

- On average each year there were 1.0m jobs created through firm entry and 1.8 million created through the expansion of existing firms; and,
- By contrast, exiting firms destroyed on average 1.3 million jobs each year while the contraction of firms accounted for a further 1.2 million job destructions.

In total, therefore, around 5.3 million jobs in the UK economy were either created or destroyed each year over the period 1998 to 2008.

3.3.2 Frictional unemployment

One outcome of job creation and destruction processes is frictional unemployment. Frictional unemployment arises when an individual is temporarily unemployed while looking for, or waiting to start, a new job; in other words, it takes time for employers and workers to find an appropriate match. It is widely accepted that there will always be some level of unemployment, even in healthy economies, in order for the labour market to function and this gives rise to the concept of ‘the natural rate of unemployment’ in any economy and at which the labour market is viewed as in equilibrium.

During 2008-09, for example, Eurostat data suggests that around 46% of individuals in the EU were re-employed within six months of being made unemployed, although this figure had increased after averaging approximately 35% between 2000 and 2005. Furthermore, OECD data suggests that the average duration of unemployment was approximately 12 months in the EU in 2008 and 2009, having fallen from an average of around 16 months between 2001 and 2006. These durations are, however, significantly longer than those in the US, which are estimated to have remained between three and six months from 2001 to 2009.

Evidence Box 5 provides an example of this process at a sub-national scale.

Evidence Box 5: Semiconductors, labour market churn and resettlement in North East England

In May, 1997, German company Siemens opened a semiconductor plant employing 1,200 people in North Tyneside - the UK's largest ever inward investment project (of £1.13 billion). This followed the earlier 1989 semiconductor investment of £400 million by Fujitsu, cementing ‘a new industrial future for North East England’ - an old industrial region which had yet to recover from decades of industrial restructuring.

A year later, in 1998, Siemens announced the closure of its new plant in the face of tumultuous conditions within the global semiconductor market. In the same month, Fujitsu followed suit with the loss of 555 jobs, dealing a substantial body blow to the region's ‘new industrial future’ and raising serious questions around a regional economic policy based upon foreign direct investment.

Yet, within 15 months of both plants closures, 87% of 511 respondents from the joint workforces made redundant reported that they were re-employed (Dawley, 2007). Furthermore, by 2001, the ex-Siemens and Fujitsu workforce comprised the vast majority of the new 320 strong workforce who had returned to the ex-Siemens plant but which was now owned by American semiconductor company Atmel.

Atmel pledged to create 1,500 jobs over the coming three years. In reality, over the next few years, Atmel and the plant were to undergo substantial restructuring as the company moved into Smart Card Technology with both job losses and job growth to, eventually, 595 staff in 2008 when, once again, the plant was closed.

Yet again, however, redundant workers achieved high levels of re-employment. Up to six months after redundancy, 76% of (105) respondents claimed to be employed or self-employed, with 20% unemployed and 3% withdrawn from the labour market. On average, respondents were unemployed for 3.95 weeks, although 42% experienced no unemployment (Dawley, 2008).

Concerning re-employment, workers were distributed widely across the manufacturing base of the North East, with 17% gaining employment outside the region. Around 60% of respondents reported that skill requirements and salaries in their new jobs were equivalent or higher than in those they had left from Atmel, and 72% suggested they had higher levels of job satisfaction.

References: Dawley, S. (2007) Making labour-market geographies: volatile 'flagship' inward investment and peripheral regions, *Environment and Planning A* 2007, volume 39, pages 1403 – 1419; Dawley, S. (2008) Advanced manufacturing skills tracking survey – a report investigating the post-closure resettlement patterns of the former Atmel Workforce, Report to the Tyne and Wear LSC and Atmel Response Group, December, Newcastle, UK

In summary, a percentage of unemployment - related to job creation and destruction processes - reflects a constant a process of churn in the labour markets of healthy economies, the re-employment of large numbers of individuals, and the process of sectoral employment reallocation as part of the long-run process of structural change.

3.4 Structural change, business strategy and company restructuring

The level of firm entry and exit in the economy illustrated in the previous section highlights how the processes of structural change are also, clearly, evident at a company level. In order to remain competitive, companies must evolve and adapt to the environment in which they operate. At certain periods of time (for example, the rise of new Kondratieff waves), structural drivers may revolutionise that environment – and expected producer behaviour – across whole sections of the economy, markets and, indeed, concepts of the consumer (see Evidence Box 6). This may require quite radical responses and shifts in strategy by individual companies.

Evidence Box 6: Structural change and business strategies – 'Prosumption'

It is argued that the spread of highly interactive web technologies is revolutionising the relationship between the producer and consumer (Lent and Lockwood, 2010) – and companies ignore this at their peril. 'Prosumption' refers to the breaking down of the barriers between production and consumption, so that consumers can be directly and personally involved in the production of the goods they are purchasing. Examples of prosumption are:

- *Market research intensification:* Expansion of the market research relationship with consumers (e.g. on-line forums, interactive review, social network based surveys, etc.);
- *Personal specification:* a further development of the ability of the consumer to customise the product to their exact specification or 'build to order'; through, for example, on-line specification of computers for delivery or fine tuning of TV packages;
- *Collaborative specification:* the inclusion of consumers in the collaborative design of products such as the 'Wiki' approach and 'open source' software more generally, or Threadless.com which will produce customer designed T-shirts if other customers vote for them;
- *Consumer into producer:* a further extension of the open source approach whereby consumers become producers – most noticeably in the creation of mobile phone 'apps'; and,
- *Open innovation:* the encapsulation of R&D, innovation and technological development as an interactive and iterative system based on accessing information and knowledge from the full array of agents in the innovation system including substantially from outside of the company.

Source: Lent, A. And Lockwood, M. (2010) *Creative destruction: placing innovation at the heart of progressive economics*, IPPR, London, December

3.4.1 The influence of recession on business strategies

The proposition of ‘creative destruction’ first coined by Schumpeter – and arguably exemplified in prosumption - has perhaps its sternest test when examining the effects of economic recession:

“The fundamental impulse that keeps the capital engine in motion comes from the new consumers’ goods, the new methods of production and transportation, the new markets ... [The process] incessantly revolutionizes from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact of capitalism.” (Joseph Schumpeter).

The effect of recession could either be to set back the process, through a reduced level of demand, or to accelerate the process as competition becomes stronger in the face of reduced demand. Recent research in the UK¹⁰ has reviewed the current evidence on the effects of recession.

The study identifies from the literature three business strategies for responding to recession:

- *Retrenchment strategies* – cutting operating costs and divestment of non-core assets. These appear to be the most common approaches adopted by businesses to deal with recession conditions, especially in the short-term. Analysts report divestment of businesses, closure of establishments, reductions in employment, and expenditure cuts on a wide range of activities including R&D, marketing and employee training.
- *Investment strategies* – expenditure on innovation and market diversification. Recession is regarded as an opportunity to implement strategic change that would otherwise not have occurred. Many of today’s household names launched successful businesses during recessions. The evidence on businesses adopting investment strategies to manage through recession, however, is patchy. Such strategies are risky and many firms are likely to be too preoccupied with short-term survival to think about innovation and growth, or lack the resources to implement such strategies effectively.
- *‘Ambidextrous’ strategies* – combining retrenchment and investment. It is likely that most firms adapt under recession conditions through judicious cost/asset-cutting behaviour and through investment in product innovation and market development. Choosing the appropriate investments to make and costs to cut takes on additional importance during recession when market selection pressures are at their most severe.

The study concludes that although there is evidence of all three strategies it is not clear which strategies tend to predominate, and little or no analytical evidence of the effectiveness of different strategies in particular cases. In essence, it argues that the current literature has major gaps and weaknesses on business strategies during recession and their impact.

3.4.2 Company restructuring

As companies evolve and adapt their business strategies in the face of structural drivers such as those outlined above, this often entails restructuring their activities and workforce:

*‘Restructuring is understood as the deliberate adaptation of an economic unit(s) to changes in its environment, implying or expected to imply a downsizing strategy, namely, a reduction in the number of jobs...restructuring is necessary, and even positive, for businesses in order to remain competitive. Nonetheless, it often entails a number of negative socio-economic effects’.*¹¹

Seven key types of company level restructuring can be identified¹²:

¹⁰ Business strategies during difficult economic conditions: Department of Business Innovation and Skills (BIS), Kitching J, et al, Small Business Research Centre, Kingston University; Dixon S, School of Management, Bath University, 2009

¹¹ Corall, A. Isusi, I. and Stack, J. (2006) Support measures for business creation following restructuring; pg. 1

¹² <http://www.emcc.eurowfound.eu.int/erm/>

- *Relocation* – activities remain in a company, but relocate to another location within the same country;
- *Outsourcing* – activities are subcontracted to another company within the same country;
- *Offshoring* – activities are relocated or subcontracted to another country;
- *Bankruptcy/ closure* – a company or industrial site is closed;
- *Merger/ acquisition* – two companies merge or a company is purchased by another, leading to rationalisation and potentially job losses;
- *Internal restructuring* – where a company undertakes a job cutting plan unrelated to relocation, etc; and,
- *Expansion* – where a company expands its operations, hiring new workers.

In many of the above instances, understanding both the costs and benefits not only for the restructured company but of the economic activities that often accrue from restructuring in new forms or places is extremely challenging. For example, company restructuring is traditionally associated with job losses, but can lead to new enterprise creation.

Management or employee buy-outs may involve restructured workers becoming owners of the affected business or business unit, or workers who lost their jobs could potentially start new businesses, potentially in a similar field to the original firm.

One of many examples is Otto GmbH & Co KG, a wholesale mail order company based in Hamburg, Germany, which underwent a restructuring process in 2004 in response to technological changes and shifts in consumer habits (e.g. a move to internet retailing)¹³. Some 500 job cuts were planned, and the company initiated a business creation project to reduce the negative impacts of this process. Following these job cuts, 32 new companies were established, consisting of shops, consultancy companies and service providers in IT, advertising, textiles, and tourism. A transition was experienced from a declining sector (wholesale mail order) to emerging forms of economic activity, and the shift from one large company to multiple smaller companies.

Company restructuring in the face of the pressures exerted by structural change frequently includes offshoring, where activities are relocated to new countries. Drivers of offshoring include lower labour costs in the new destination, access to higher level skills (e.g. in order to meet new technological challenges), proximity to growing markets, and proximity to key suppliers (both of which lower transport costs and potentially generate benefits through clustering effects, including knowledge transfer). Section 3.3 has highlighted elements of this process *within* Europe, whereby the NMS10 have seen growth in manufacturing sectors in decline across the EU15 (although in most cases the net outcome at EU25 level has been employment loss).

One example at company level is the Freudenberg Group based in Weinheim, Germany, that produces components and intermediate products for use within a range of sectors, including automotives and the mechanical engineering industries. A 2009 study of the Group¹⁴ reported that in 2007 it employed over 34,000 people worldwide, up from 28,000 in 2002. In 2007, some 17,000 people were employed in the EU. Between 2002 and 2007, the Group completed a number of restructuring exercises. In 2005, for instance, Freudenberg Nonwovens (producing non-woven materials for filters or other technical applications) restructured its German operations, with just under 500 jobs cut as production was relocated to China and Eastern Europe. Simultaneously, however, the company opened a new technology centre in Germany with the creation of 58 new jobs. The Freudenberg Group as a whole has invested significantly in Eastern Europe in order to lower costs, opening production facilities in Romania and Hungary.

¹³ Corall, A. Isusi, I. and Stack, J. (2006) Support measures for business creation following restructuring

¹⁴ European Foundation for the Improvement of Living and Working Conditions (2009) ERM case studies: Employment impact of relocation of multinational companies across the EU; Pg. 14-15

3.5 Industrial restructuring and structural change

Given the processes of churn outlined so far, and the range of structural drivers of the 'everyday' economy, this section moves to the meso-level scale of a number of individual industries to highlight the differential balance of the costs and benefits of structural change in action.

3.5.1 Textiles and apparel¹⁵

The textiles and apparel sector is a good example of a European industry subject to the pressures of substantial structural change. The global textiles and clothing industry is very large; in 2000, around \$1 trillion was spent globally on clothing, split roughly equally between Western Europe, North America and Asia. The industry has come to be dominated by developing countries, which collectively account for over half of all textiles exports and three quarters of all clothing exports¹⁶. Employment in textiles and clothing has expanded in a number of developing countries, most of which are located in Asia (particularly China, Pakistan and Bangladesh).

In 2009, the clothing and textiles industry in the EU27 employed 2m people across some 128,000 companies. Between 2008 and 2009 the number of people employed in the industry and the number of enterprises in the EU27 both dropped by 13%, continuing a long-term process of decline¹⁷. Elsewhere it has been estimated that 1 million jobs were lost in the textiles and clothing industry in the EU27 between 1995 and 2006, with employment dropping from 3.7 million to 2.7 million people.

A number of drivers of structural change have contributed to this position:

- Globalisation – the textiles and clothing supply chain has become increasingly global, in part driven by regulatory changes. Production is increasingly located in low-cost locations. In 2003 the average hourly wage in the clothing industry was \$0.23 in Pakistan and \$0.86 in China, compared to \$10.03 in Germany¹⁸. The price of clothing products is particularly important for consumers, driving down prices and making high cost production uncompetitive;
- Regulatory changes – between 1995 and 2005, quotas on international textiles trade were gradually phased out, giving WTO members unrestricted access to EU markets;
- The single market – the enlargement of the EU to 27 Member States and the development of a single market in textiles and clothing has made access to Western European markets easier for low-cost producers in Eastern Europe;
- Low-cost producers moving up the value chain – over time, low cost producers have sought to invest in higher value added activities in order to increase their income and also to respond to competitive pressures from areas where labour costs are even lower. In doing so they have begun to compete with EU countries in new areas. Whilst most R&D still takes place in the OECD area, such activities are increasingly being relocated to Asia – particularly China and India – where labour costs are lower yet skilled labour is still available.

As a result of these pressures, EU manufacturers have tended to focus on higher value products, niche production, and the application of services within the industry (e.g. around design, marketing etc).

The province of Łódź in Poland has historically been a centre of textiles and clothing manufacturing. During the Communist era the province accounted for 40 per cent of national

¹⁵ This section is based on European Monitoring Centre on Change (2008) Trends and drivers of change in the European textiles and clothing sector: Mapping report

¹⁶ University of Cambridge (2006) Well dressed? The present and future sustainability of the clothing and textiles sector in the United Kingdom; Pg 8

¹⁷ Euratex (2009) Activities of the year 2009

¹⁸ University of Cambridge (2006) Well dressed? The present and future sustainability of the clothing and textiles sector in the United Kingdom; Pg 10

cotton and silk products manufacturing, and 33 per cent of national wool fabrics manufacturing. The collapse of the Soviet Union exposed the province to international competition, leading to significant job losses and company closures. In response to the crisis, Łódź has diversified into new activities (attracting a range of electrical goods manufacturers) and also restructured its textiles and clothing industry. The focus of the latter has been on moving up the value chain, losing jobs in production, but gaining jobs in R&D.

A good example of this process is the company Farbolux Biliński, a textiles and clothing manufacturer based in Łódź that was founded in 1991¹⁹. The company has focussed on automation and high technology products. Between 2003 and 2007 the company doubled its turnover whilst simultaneously managing to maintain the same staffing levels. Investment in R&D over this time quadrupled, reflecting the investment in the latest technology.

3.5.2 Knowledge Intensive Business Services²⁰

The Knowledge Intensive Business Services (KIBS) sector has been one of the fastest growing service sectors within the EU since the 1980s. KIBS are primarily defined on the basis that knowledge is their main input and output. The sector typically includes: computing and related ICT activities, research and development, legal activities, accounting, marketing and advertising, recruitment, consultancy, and architecture. KIBS can be divided into:

- Traditional professional services (e.g. legal firms); and,
- New technology services (e.g. software design).

Core drivers of the KIBS sector have included:

- Technology - particularly ICT which have both created new markets in their own right, and altered the working practices of other sectors (increasing the division of labour);
- An increasing focus on core competences - firms are increasingly specialising on core competences and outsourcing or sub-contracting other activities. This process has acted as a key driver of the KIBS sector, since many activities – e.g. legal services – would once have been retained within a company. The shift within manufacturing towards an increasing emphasis on service activities (e.g. marketing and advertising) is an example of this process;
- Regulation - increasing regulation (e.g. the application of employment laws, environmental standards, etc.) has created new markets, since increasingly specialist knowledge is required.

The KIBS sector accounted for around 8 per cent of employment in the EU25 in 2003, with particularly high proportions in the EU15 (for example, around 12 per cent of total employment in the UK), and lower proportions in the NMS10 (for example, 2 per cent of total employment in Slovakia). Four EU15 countries (the UK, Germany, France and Italy) accounted for around three quarters of the KIBS sector's total economic output in 2003.

Having grown rapidly over the past few decades in response to new opportunities presented through restructuring, the KIBS sector is itself facing structural change pressures.

Competitive pressures have emerged, particularly from relatively low cost competitors in India and China. Outsourcing to locations outside of the EU has grown, particularly within functional and relatively low-skill activities, such as customer services, HR, and data processing. Due to a large English-speaking population, India has proven particularly successful in attracting investment from European KIBS companies²¹.

KIBS are often located in close proximity to key clients, meaning that as alternative economic growth centres have developed, KIBS activities are increasingly becoming global.

¹⁹ European Monitoring Centre on Change (2008) Textiles and clothing sector: Farbolux Biliński, Poland

²⁰ This section is based on European Monitoring Centre on Change (2006) Trends and drivers of change in the European knowledge-intensive business services sector: Mapping report

²¹ European Monitoring Centre on Change (2006) Outsourcing of ICT and related services in the EU

The growth of financial centres in Asia and the Middle East, for instance, has meant that European KIBS providers are increasingly locating their activities in these markets.

Offshoring does not necessarily involve the loss of jobs to the EU, however, but rather a relocation within. In 2005 IBM closed data processing facilities in Germany and relocated them to Poland. Some 600 jobs were lost in Germany in order to reduce staff costs. IBM's Polish operations increased from under 100 employees in 1991 to over 2,000 people in 2007²².

3.5.3 The automotive sector

The automotive industry is a major contributor to the gross domestic product (GDP) of many countries. On a global level, the assets of the top ten multinational automotive enterprises represent 28% of the assets of the world's top 50 companies, 29% of their employment and 30% of their total sales.²³ France and Germany dominate production in Europe. The auto industry has become a major source of employment worldwide. An ILO briefing paper suggests that in 2004 about 8.4 million people worked in automotive production in the EU (including the manufacturers and component firms) and that the global workforce was just under 10 million by the end of 2007.²⁴

Structural changes in the industry in the last 10 to 15 years include a radically altered approach to the supply chain with an increasing trend toward outsourcing and specifying the supply of complete functions or systems.²⁵ The recent economic recession had a damaging effect on the industry leading to a decline in demand and production and further highlighted the need for efficiencies in the supply chain and production process. An on-going response by producers at all levels has been investment in research and development (R&D), leading to more technologically advanced vehicles and a highly automated production process.²⁶

In addition the development of environmentally friendly technologies has intensified, driven in part by the EU's New Cars CO₂ Regulation²⁷ - specifying a stretching target of 130g/km CO₂ by 2015 and 95g/km by 2020. The Regulation is forcing the need for strategic planning decisions by the industry leading to investments into low carbon vehicle (LCV) research and development. Vehicle producers supported by niche technology developers are responding to an increasing shift in the market and demand for lower carbon emission vehicles supported by incentives such as exemptions from congestion charges or reduced vehicle excise duty. By 2025, LCVs are predicted to constitute 35% (25% hybrids, 10% pure electric vehicles) of all cars manufactured globally.²⁸

This response has resulted in a shortage of sufficiently skilled workers in some areas and a need for re-skilling and a re-focus on areas of opportunity (see Evidence Box 7 below).

²² European Foundation for the Improvement of Living and Working Conditions (2009) ERM case studies: Employment impact of relocation of multinational companies across the EU; Pg. 24

²³ European Monitoring Centre on Change, 2004, The automotive sector at a crossroads

²⁴ ILO, 2009, The crisis and the future of the automobile industry: Putting the spark back into the automobile industry: ILO Communication and public information

²⁵ Humphrey and Memedovic for United Nations Industrial Development Organization, The Global Automotive: Industry Value Chain: What Prospects for Upgrading by Developing Countries, 2003

²⁶ European Monitoring Centre on Change, 2004, The automotive sector at a crossroad,

²⁷ HMG, Ultra low carbon vehicles in the UK: the challenge, April 2009

²⁸ <http://www.streetinsider.com/Press+Releases/Reportlinker+Adds+Hybrid+And+Pure+Electric+Cars+2009-2019/4968830.html>

Evidence Box 7: The Automotive Sector – Shifting to Production in a Green Economy

The Case of BMW – Hybrid Cars and the Demand for Mechatronics Technicians (MVMTs)

The use of voltages up to 400 volts within hybrid systems creates obvious health and safety issues which require technicians to have good overall technical knowledge of hybrid technologies. This means MVMTs need to develop new skills. To meet this skills gap, BMW implemented a new training module in 2009 in its existing dual apprenticeship for MVMTs. The module comprises technical knowledge for hybrid car technologies. On completion, apprentices receive a special certificate - an extra qualification as an 'Electro Technician for Specified Tasks on Hybrid Vehicles' (Elektrofachkraft für festgelegte Tätigkeiten am Hybridfahrzeug).

Due to legislation only trained electricians or mechatronics technicians who have acquired the relevant knowledge may carry out work on hybrid cars. BMW has integrated this training directly into its dual apprenticeship as an extra module. This means all MVMTs who complete their training at BMW will be qualified to work with all hybrid cars.

From 2010 all BMW production plants in Germany will include the new training module. Altogether around 100 apprentices per year will receive the training which now lasts two weeks. BMW received the Innovation Prize 2009 from the Federal Institute for Vocational Education and Training (BIBB) for the exemplary function of the module, its close connection to the dual apprenticeship programme and its labour market relevance

Source: Cedefop: Green Skills: German Case Study

The Case of the Regional Response – North-East England

In the UK a Low Carbon Economic Area (LCEA) for Ultra-Low Carbon Vehicles has been established in North East England to lead the transformation of the automotive industry to a zero emission future. This builds on the area's strengths in automotive engineering, energy engineering and new fuels. It includes leading vehicle manufacturers Nissan (who are to invest more than £200m over the next 5 years in a European Centre of Excellence for Battery Manufacturing), Smith Electric Vehicles, specialist technology companies, research organisations and universities. The North East will work with partners across the UK, including the Midlands and North-West, who possess advanced manufacturing and efficiency in existing automotive technologies. The NAIGT regards the UK as having strengths in the automotive industry which will help in the restructuring of the labour market. These factors include a diverse array of manufacturers; strong R&D, presence of premium brands, good labour relations and a flexible labour market²⁹.

3.5.4 The aerospace industry

Aerospace is a globally significant sector. In the EU27 the aerospace industry employed 375,300 people in 2008 and the output amounted to €127.8 billion³⁰ and value-added of some €35 billion. As a share of EU27-manufacturing, the aerospace industry accounts for around 1.8% of value-added and 1.2% of the number of employees.³¹

In order to maintain comparative advantage, aircraft manufacturers have substantially changed the aerospace supply chain management model to a global, super-supplier model for the Tier 1 suppliers that can take on increasingly complex design and manufacturing tasks; as well as outsourcing parts manufacturing to lower-cost countries.

For example, in the 1960s 98% of a Boeing aircraft was made by Boeing US. In the case of the latest plane, the 787 Dreamliner, 70% of the aircraft work was outsourced to 900 contractors, half of which were contractors outside the US, primarily in Japan, Italy and China. Boeing still completes the final assembly and maintains the overall IP.³²

²⁹ New Automotive Innovation and Growth Team (NAIGT) An Independent Report on the Future of the Automotive Industry in the UK, May 2009

³⁰ ECORYS (2009) Competitiveness of the EU Aerospace Industry; DG Enterprise and Industry.

³¹ *ibid.*

³² Personal communication with Boeing representative

This business model shift has experienced some initial problems, which has resulted in manufacturing delays (e.g. Boeing Dreamliner). As a result there has been some streamlining of supply chains to realise efficiency gains and to better manage programme performance. Some OEMs are identifying key suppliers and building collaborative, risk-sharing relationships as opposed to the more traditional, arm's-length transactional model³³.

Governments around the world are supporting the aerospace sector by funding R&D programmes relating to the use of composites, systems engineering, diagnostics, prognostics and health management. Given the scale of the global markets for these technologies, significant commercial benefits will accrue to early movers.

The slowdown in world trade has depressed both passenger travel and air cargo traffic. As the economy recovers, the sector will look increasingly for cost saving opportunities such as automated manufacturing and other new technologies, which will require higher-level skills. The focus will be on skills required for innovation and new product delivery. There will be more demand for professional engineers and technicians. Shortages in skills needs are expected and will require employers to upskill and develop those already in the workforce and redeploy them to best utilise their skills.³⁴

3.6 'Churn in aggregate' and the impact on EU employment

It is processes such as firm entry and firm exit that are at one and the same time processes of structural change and which, in aggregate, create new sectors and define new sectoral balances within the economy. In turn, this impacts on both the quantitative and qualitative nature of employment in the economy.

3.6.1 Sectoral change and employment change in the EU

As noted previously in Section 1.3, at a broad sector level there has been a long term transition in the EU towards a service sector dominated economy, with significant output and employment decline since the 1970s in the primary and manufacturing sectors. Evidence suggests, however, that the pace of these broad shifts has slowed over the past two decades³⁵. Instead, shifts are taking place within these broad sectors, in response to the pressures of structural changes. This is particularly true of the services sector which is adapting rapidly to technological change and the pressures of international competition³⁶.

In employment terms, these major sectoral changes have been associated with real increases in GDP and, between 1995-2004, an increase in total employment in the EU25 of almost 1% (see Figure 3.3)³⁷. Yet this slight increase hides substantial shifts in employment share across both Europe's sectors and its member states.

During the same period, employment in primary and secondary activities declined: by 1.5% in agriculture, by 5.7% in mining and quarrying, and by 0.9% in manufacturing. In contrast, employment growth took place across the service sector, most notably in business services (an increase of 4.5%), and hotels and restaurants (an increase of 2.6%).

As Figure 3.8 shows, there is also a geography to sectoral restructuring in the EU, with the decline in employment in traditional sectors – mining, manufacturing, etc – largest in the NMS10³⁸ (where an overall employment decline of -0.21% was experienced between 1995-

³³ Deloitte US: 2009 Industry Outlook: Aerospace & Defence

³⁴ The Sector Skills Council for Science, Engineering and Manufacturing Technologies

³⁵ OECD (2005) Trade and Structural Adjustment

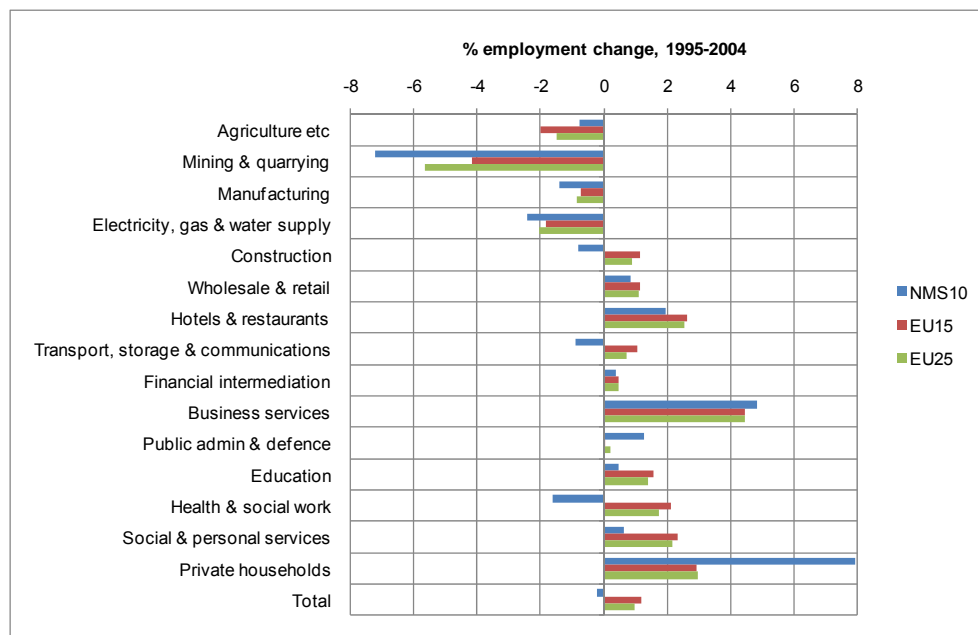
³⁶ European Foundation for the Improvement of Living and Working Conditions (2006) Restructuring and employment in the EU: Concepts, measurement and evidence

³⁷ Peneder et al (2009) Sectoral Growth Drivers and Competitiveness in the European Union

³⁸ The 10 New Member States which joined the EU in 2004: the Czech Republic, Cyprus, Malta, Poland, Slovakia, Slovenia, Hungary, Estonia, Latvia, and Lithuania

2004). Conversely, the NMS10 experienced faster growth in business services and public administration than was the case in the EU15³⁹.

Figure 3.8 Employment change by sector in the NMS10, EU15 and EU25, 1995-2004



Source: Peneder et al, 2009

3.6.1 Employment trends in the manufacturing sector

The broad sector level analysis masks variations in sub-sector performance. Manufacturing employment decreased in the EU between 1995-2004, continuing a longer term trend that has been observable since at least the 1970s⁴⁰. However, employment in some manufacturing sub-sectors actually increased during this time (Figure 3.9 below).

A 2009 report⁴¹ found that, of 18 manufacturing sub-sectors, employment in the EU25 grew in 3 sub-sectors (rubber and plastics, medical, precision and optical instruments, and motor vehicles). In the NMS10, employment grew in 8 of the 18 manufacturing sub-sectors, and by as much as 5.7% in the manufacturing of office, accountancy and computing machinery. Notably, this sector saw substantial decline in the original EU15.

A 2006 OECD report into manufacturing and structural change concluded that employment in sub-sectors where developed countries continue to have a comparative advantage and where there is strong demand – for example, pharmaceuticals and motor vehicles – has either grown or remained static over the four decades since 1970⁴². In other sub-sectors, such as textiles, competition from low cost providers has been such that there have been large employment decreases. Interestingly, the OECD noted that between 1990-2003, employment decreases in the OECD countries took place in what would be considered high technology sectors (e.g. computing) as well as low-technology sectors, highlighting the complex role that offshoring and globalisation have played within sectoral performance in developed countries.

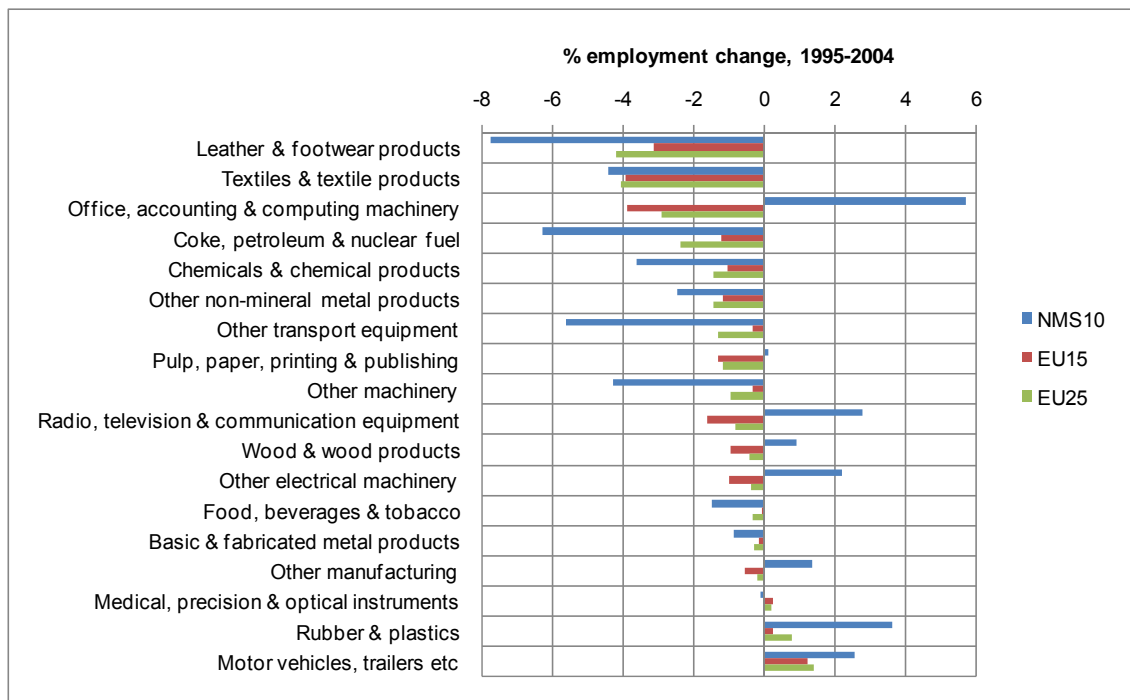
³⁹ The 15 Member States prior to the 2004 enlargement: Austria, Belgium, France, Germany, the Netherlands, Luxembourg, Ireland, the United Kingdom, Sweden, Denmark, Finland, Greece, Spain, Italy, Portugal

⁴⁰ Pilat, D. et al. (2006) The Changing Nature of Manufacturing in OECD Economies, OECD Science, Technology and Industry Working Papers, 2006/9, OECD Publishing

⁴¹ Peneder et al (2009) Sectoral Growth Drivers and Competitiveness in the European Union; pg. 98

⁴² Pilat, D. et al. (2006) The Changing Nature of Manufacturing in OECD Economies, OECD Science, Technology and Industry Working Papers, 2006/9, OECD Publishing

Figure 3.9 Employment change by key manufacturing sub-sectors in the NMS10, EU15 and EU25, 1995-2004



Source: Peneder et al, 2009

3.6.2 Employment trends in the service sector

Services have become quantitatively the largest sector within developed world economies. Explanations for this structural shift have included the higher relative productivity in the manufacturing sector leading to labour market restructuring, societal drivers of demand in developed countries (e.g. ageing populations, increased wealth), and a 'blurring' of the boundaries between manufacturing and services, such that intermediate demand for services from within the manufacturing sector has grown significantly (e.g. to meet human resource, marketing and advertising, and technical research needs)⁴³.

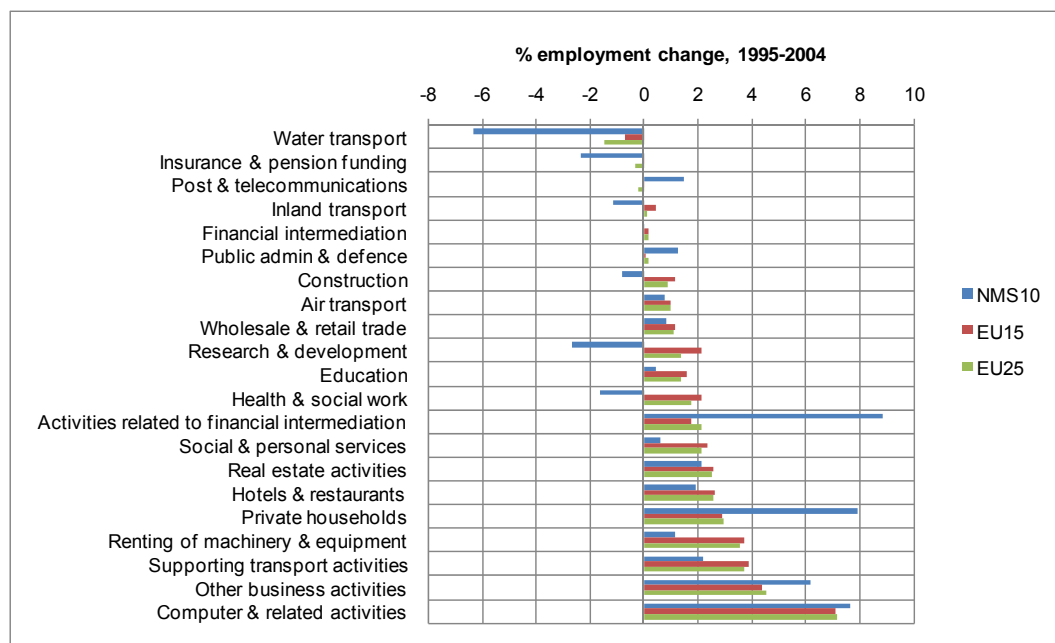
Figure 3.10 shows how employment in key services sub-sectors changed between 1995-2004 in the EU, disaggregated between the EU15 and the NMS10. Comparison with the data in Figure 3.9 highlights the differences in performance between the manufacturing and service sectors; a total of 18 of the 21 service sub-sectors shown in Figure 3.10 saw employment growth in the EU25 between 1995-2004 (compared to just 3 of the 18 manufacturing sub-sectors).

Evidence suggests that much of the recent growth in the services sector has taken place in finance, insurance and business services, which in OECD countries typically account for between 20-30 per cent of value added, compared to between 10-20 per cent in the 1980s⁴⁴. Demand for transport and communications services increased during the 1990s, but technological and related productivity improvements have affected employment in these sectors (which Figure 3.10 indicates have recorded decline or limited employment growth between 1995-2004).

⁴³ Wölfl, A. (2005) *The Service Economy in OECD Countries*, OECD Publishing; Pg. 20

⁴⁴ Wölfl, A. (2005) *The Service Economy in OECD Countries*, OECD Publishing; Pg. 7

Figure 3.10 Employment change by key services sub-sectors in the NMS10, EU15 and EU25, 1995-2004



Source: Peneder et al, 2009

In summary, Europe's national economies experience on-going firm entry and exit at substantial rates as part and parcel of the everyday processes of the economy, and in response to a range of structural drivers of economic change. At a macro-level, and over decades, this has seen a common shift towards service-dominated economies and the reduction of manufacturing employment. Nevertheless, at the meso-level, this has seen manufacturing and service sub-sectors experiencing both a mix of growth and decline and strongly influenced by any national economy's position within the global and European economy. In conclusion, a complex picture of both a positive and negative balance of costs and benefits associated with structural economic change can begin to be discerned.

3.6.3 Sectoral change and the changing nature of employment in the EU

In 2008, a report by the European Foundation for the Improvement of Living and Working Conditions investigated the nature of job creation and job destruction in the EU and highlighted the effects of structural change on employment patterns⁴⁵. The report looked at the extent to which jobs were being created or lost within five quintiles between 1995-2006, defined by the average hourly wage (i.e. the top 20 per cent lowest paid jobs, etc). A distinction was drawn between the EU15 and the NMS10. It was found that:

- Overall, between 1995-2006, the EU15 gained jobs in all five income quintiles, particularly so in the top two highest earning quintiles. Over 5 million net jobs were created, for instance, in the top 20 per cent highest paid jobs. The NMS10 also recorded a net overall increase in employment over this period in all but the lowest paid quintile, where just under 300,000 jobs were lost between 1995-2006;
- Trends varied between countries. In some cases the period 1995-2006 saw a process of 'polarisation', with a growth in employment in the highest and lowest paid quintiles (e.g. in the Netherlands and France), whilst in others there was a process of 'upgrading' (job loss in the lowest paid quintiles and job gains in the highest paid quintiles (for example, Finland and Portugal);
- Analysis of the position for broad sectors confirms the picture of a shift to a service economy, but highlights variations in how sub-sectors have performed. Between 1995-

⁴⁵ European Foundation for the Improvement of Living and Working Conditions (2008) More and better jobs: Patterns of employment expansion in Europe

2006 significant numbers of jobs were lost in the manufacturing sector in the EU15, though this was particularly acute in the lowest paid quintile, where around 1.4 million jobs were lost in low-paid, low-technology manufacturing positions. Interestingly there was also a net loss of employment in higher-technology manufacturing positions in the EU15 as well between 1995-2006. Only the highest paid quintile of manufacturing positions saw a net gain in employment in the EU15 (by around 600,000 positions), suggesting an increasing process of polarisation;

- In the NMS10 there were also significant job losses in the lowest paid manufacturing positions between 1995-2006 (e.g. a loss of some 300,000 jobs in the lowest paid low-technology jobs), but without the partially compensating increase in higher-paid positions. Instead, manufacturing employment increased in the second lowest and middle quintiles. The report notes that these trends reflect a long-term destruction of low-paid, low-value added manufacturing jobs in the face of international competition, exacerbated recently by globalisation and the growth of offshoring. In the NMS10, the modernisation of old inefficient industries was seen to be a key cause of employment loss in the lowest-paid positions;
- The report also looked at the services sector. Between 1995-2006 job numbers in services increased across all quintiles in the EU15, compensating for the job losses in manufacturing and driving the overall net gain in jobs over this period. By far the greatest amount of job creation, however, was within the top two highest paid quintiles in the knowledge-intensive services sector, where some 14 million jobs were created between 1995-2006;
- The NMS10 also saw significant increases in employment in the services sector between 1995-2006m, though this growth was more equally spread across the five income quintiles, suggesting less of a process of polarisation.

The shift from a manufacturing to a services driven economy has affected the nature of employment in other ways. Across the EU15 there has been significant job creation in part-time positions (which have increased in absolute numbers to the same degree as full-time positions), though concentrated in the lower-paid quintiles. In the NMS10 there has been no large scale job creation in part-time positions.

Whilst job creation has primarily been in employee positions, there has been a significant growth in self-employment. These positions have been concentrated in higher-income quintiles. Between 1995-2006, female employment rates across the EU increased from 50 per cent to 58 per cent while male employment rates grew from 70 per cent to 72 per cent, indicating that significant numbers of the jobs created in the last ten years have been filled by women⁴⁶. Whilst this is partly related to social transformations around changing gender roles and the education and training of women, the changing nature of employment instigated by structural change (including, for example, the move to service sectors and part-time work) has been a key element.

Given a longer run trend to both higher quintile and lower quintile jobs – and at the expense of mid-quintile jobs - a recent report has focussed on long-term trends in occupational structures to investigate the issue of labour market ‘polarisation’ within the EU⁴⁷.

Analysing trends in broad occupational groups within the EU27 workforce between 1970 and 2008, the study reported that there has been a significant increase in the proportion of people employed in ‘higher skill’ occupations (professionals, technicians, etc). The share of the workforce employment in lower skill elementary occupations has remained steady until around 2000, since when there has been a slight increase. The major decrease over the past 40 years has taken place in the number of people employed in what the report termed ‘intermediate’ occupations (craftsman, skilled agricultural workers, etc). These long-term occupational changes have been attributed to a range of structural drivers, primarily

⁴⁶ European Foundation for the Improvement of Living and Working Conditions (2008) More and better jobs: Patterns of employment expansion in Europe; pg. 41

⁴⁷ European Centre for the Development of Vocational Training (2011) Labour-market polarisation and elementary occupations in Europe: Blip or long-term trend? Research Paper No 9

technological changes (e.g. computerisation) which has impacted most on medium-skilled routine activities (e.g. assembly-line workers and clerical positions). These changes are linked also with sectoral shifts, specifically the decline in manufacturing positions (characterised by routine occupations) and the growth in knowledge intensive services (which require more professional occupations) and other services (e.g. personal services, which often require elementary occupations).

3.7 Processes of structural change at the sub-national scale

It is often at the sub-national scale that the impacts of structural change are most keenly felt – in localities or regions that experience the death of an industry, the rise of unemployment and the social disjuncture which may occur as ‘the new’ takes over from the old. As was noted in Section 1.3, the relationship between structural change and economic growth is complex⁴⁸ – with the legacies and opportunities of such change demonstrated by the complex mosaic of regional growth in Europe (from Old Industrial Regions to new Technopoles to Peripheral Regions and Capital City Regions).

Whilst there remains a legacy across Europe of specific localities – such as coalfield communities – which have struggled to adapt to the passing of an economic age (or Kondratieff wave), more recent work is now focused on both the resilience of region’s to such economic shocks and the capability of certain region’s to encompass the ‘creative destruction’ of Joseph Schumpeter as the basis for new rounds of accumulation and regional growth.

3.7.1 Creative destruction and regions

There exists a growing literature in economic geography and heterodox economics which recognises the growth of new forms of economic process which encapsulate fluidity, creation and destruction as the vehicle of economic development. These include the temporary organisational networks and project based business structures (or ‘ecologies’) of the German software and advertising sectors⁴⁹, the development of UK high performance engineering clusters based upon firm family trees and knowledge networks⁵⁰, and the serial entrepreneurship (and failures) of Silicon Valley gurus.

At the heart of these new forms of development are further processes of ‘churn’ akin to the heightened firm entry and exit statistics reviewed in Section 3.2; whereby such entities as firms are merely temporary containers for the delivery of products or services and of more significance are networks and economic relationships, including their manifestation in agglomerations and clusters. In essence, creation and destruction go hand-in-hand as part of concentrated flexible production systems to the extent that certain regions are recognised to have incorporated such turbulence within their economic systems and, ultimately, to their economic advantage in their ability to re-invent their economic dynamism in the face of structural challenges. One such example is the USA’s Silicon Valley (see Evidence Box 8).

Evidence Box 8: The development of Silicon Valley

Silicon Valley is widely seen as the global centre of technology-led economic growth. From the 1950s onwards, Silicon Valley grew around the electronics industry, initially semiconductors, and latterly software and internet services. Silicon Valley is home to most of the leading electronics and software firms, including Google, Apple, Hewlett-Packard and Intel. Despite its reputation as the centre of high-technology growth, analysis of the development of Silicon Valley over time indicates that the region has experienced several periods of both growth and severe decline in its 60 year

⁴⁸ See OECD (2009) Regions Matter

⁴⁹ See Grabher, G. (2002) The project ecology of advertising: tasks, talents and teams. In Grabher, G. (Ed.), Production in projects: Economic geographies of temporary collaboration. Regional Studies Special Issue, 36(3), 245-263; Grabher, G. (2004). Temporary architectures of learning: knowledge governance in project ecologies, Organization Studies, 25(9), 1491-1514.

⁵⁰ Pinch, S. and Henry, N. ‘Paul Krugman’s Geographical Economics, Industrial Clustering and the British Motor Sport Industry’, *Regional Studies*, 33, 9, 815-827; Sunley, P, Pinch, S, Reimer, S. and Macmillen, J. (2008) Innovation in a creative production system: the case of design. *Journal of Economic Geography*, 8, (5), 675-698.

history. The key to the continued success of the region has been in its ability to adapt and to take advantage of emerging opportunities.

Technology has been the key driver of these structural changes. In the 1950s the region developed around defence expenditure, in the 1960s and 1970s the economy grew around the commercialization of the integrated circuit, during the 1980s the microprocessor and personal computer fuelled the expansion of Silicon Valley, and during the 1990s and 2000s growth was centred around the application of the internet. In each case a period of technology-driven “boom” was followed by recession and decline. Cutbacks in public sector defence expenditure in the early 1970s triggered investment and expansion in the commercial application of technologies. The expansion of the microprocessor and personal computer sectors slowed with the onset of global competition, prompting moves towards software and internet technologies. Through the 1990s the economy grew on the opportunities provided by the internet, with employment in Silicon Valley increasing from 800,000 jobs in 1994 to 1,020,000 jobs in 2000⁵¹. The “dot-com crash” of the early 2000s resulted in significant job losses, business closures and economic decline.

In the latter half of the 2000s employment in Silicon Valley grew again around a new wave of technological applications, concentrated in existing sectors (information technologies), and new industries (life sciences)⁵². In 2008 the information technologies and services industry employed 285,600 people in Silicon Valley, an increase of 4.1 per cent on 2007⁵³. Between 2008-2009, employment in the sector then decreased by 7 per cent⁵⁴, highlighting the effect of the most recent recession and challenge to the region’s growth trajectory.

This dynamism is centred around its regionalised economic system – for example, the region heralded the birth of venture capital (and accounts for 1/3rd of the USA’s venture capital investment), introduced the idea of the serial entrepreneur (an individual who spends their life setting up new firms, including failures), and is viewed as the centre of the ‘dot-com bubble (when internet-based companies were valued on stock markets to extreme levels and then saw their values fall rapidly to virtually nothing). It remains the USA’s largest centre of high technology manufacturing, employing some 400,000 high tech workers.

3.7.2 Resilient regions

The concept of resilience in regional economic development has been drawn from recent analyses, mostly in the USA, of how regions, localities and public policies have responded, adapted and demonstrated resilience in the face of extraordinary events and shocks, ranging from 9/11 to Hurricane Katrina and even military base closures. Regional theorists have subsequently looked to transfer resilience thinking to the field of local and regional economic development which, as Simmie and Martin (2010)⁵⁵ note, is:

“...far from a smooth and incremental process but is subject to all sorts of interruptions and disruptions: periodic economic recession, the unpredictable rise of major competitors elsewhere, unexpected plant closures, challenges arising from technological change and the like.”

Whilst the concept remains contested it does capture the idea of the ability of regions to both resist disruptive changes, adapt and ‘bounce back’. Drawing from a mixture of ideas in engineering, ecology and complexity theory – and including reference to ideas of the ‘plucking model’ and ‘hysteresis’ in economics – it opens us the possibility that regional responses to recession and other structural shocks may be varied, including both enhanced and suppressed growth paths (Martin, 2010)⁵⁶. Thus, as shown in Figure 3.6, regions may return to an existing growth rate - but at a permanently lower (a) or higher (c) trend path of

⁵¹ Joint Venture Silicon Valley Network (2001) Next Silicon Valley: Riding The Waves Of Innovation

⁵² Joint Venture Silicon Valley Network (2009) Special Analysis: Economic Restructuring and Workforce Transitions

⁵³ Joint Venture Silicon Valley Network (2009) Special Analysis: Economic Restructuring and Workforce Transitions

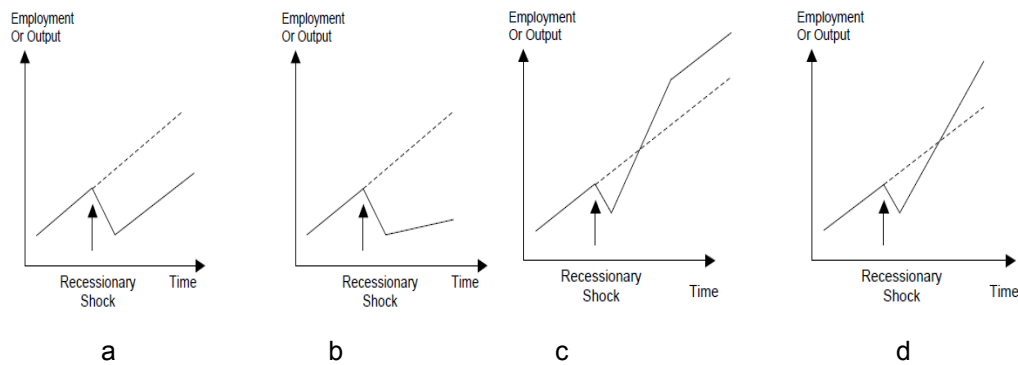
⁵⁴ Joint Venture Silicon Valley Network (2011) Index of Silicon Valley

⁵⁵ Simmie, J. and Martin, R.L. (2010) The Economic Resilience of Regions: Towards an Evolutionary Approach, Cambridge Journal of Regions, Economy and Society, 3, 1, pp. 27-44.

⁵⁶ Martin, R. (2010) Regional Economic Resilience, Hysteresis and Recessionary Shocks, Papers in Evolutionary Economic Geography, Utrecht

output or employment – or the shock will be so destructive on the region’s economic infrastructure such that it returns to a permanently lower path of output and employment and a reduced growth rate (b) or the creative destruction of the shock is so intense that it triggers a wave of growth promoting innovation and productivity such that the rapid growth rate of recovery is maintained.

Figure 3.11 Regional resilience and ‘bounce back’ (adapted from Martin, 2010)

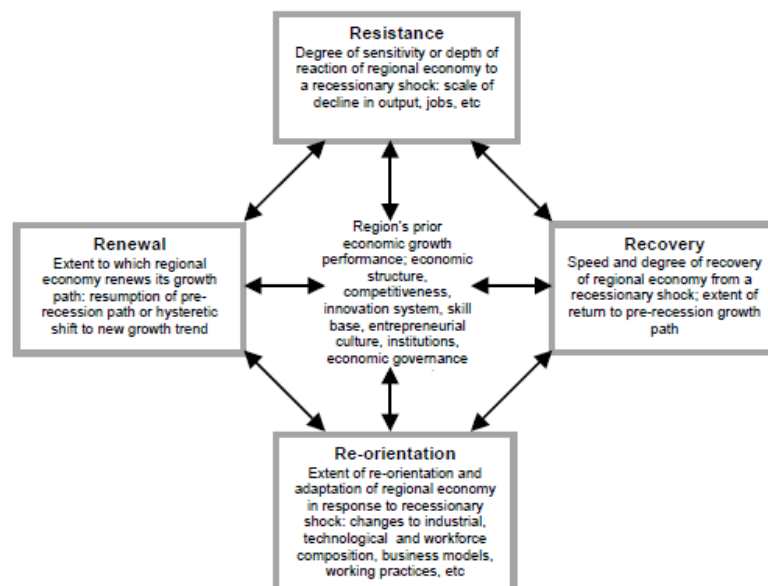


Source: Martin 2010

On this basis, Martin (2010) suggests there are four dimensions against which the response of a regional economy to recessionary or other structural shocks might be measured – resistance, recovery, re-orientation and renewal (see Figure 3.7). In turn, he provides a (very) preliminary analysis of the response of UK regions over three successive recessions to test whether systemic patterns in how regional economies react can be discerned.

For the purposes of this paper, then, we should note that there exists a literature which recognises the potential for a positive response to the shocks of structural change at a regional level – including probably the most fundamental of economic recession – alongside the more commonly noted and described regional costs of recession.

Figure 3.12 Dimensions of regional economic resilience to recessionary shock (from Martin, 2010)



Source: Martin 2010

3.8 Summary: processes of structural change and their costs and benefits

The material presented above highlights both the complexity and ‘everyday nature’ of the processes of structural change, and their impacts on the nature of economies, including the

industrial structure and its dynamics, sectoral balance, employment patterns and geography. Nevertheless, a number of findings can be brought forward.

The first is to affirm that the processes of structural change are a constant feature of capitalist societies – never in stasis, always on-going and not just a feature of recession or periods of exceptional growth. Moreover, these processes are evident across the economy and its elements – through firms, sectors, labour markets and regions to name but some instances.

Nevertheless, whilst these processes are ever present, capturing the extent and nature of such change remains highly challenging, including to the typology of concepts we use to understand the economy. Few policymakers, politicians and industrialists, for example, would be aware of the substantial levels of firm turnover (birth and death) which are common place to any dynamic economy and their parallel effect on employment. Levels of economic churn in the UK and US, for example, suggest that in employment terms at least, a quarter of private sector jobs at the beginning of a year are lost and replaced during the course of the year; in other words the business economy refreshes itself every four years.

Furthermore, the evidence for destruction and creation in the economy put forward here is predicated from some perspectives on the basis that one begets the other – or put another way, ‘creative destruction’ to quote Joseph Schumpeter.

The costs and benefits of such processes of structural change are undoubtedly extremely difficult to assess and enumerate (see forthcoming Section 4) – although most often they are encapsulated in the limited reporting of firm closure and job loss. In contrast, evidence reported here highlights small, but net positive impacts in employment, and output in some instances; in part because the process contributes, mainly through the introduction of new businesses, to increases in productivity.

Such new firm formation, alongside in-situ restructuring of mature firms using modified business strategies has, for example, led to the revival and/or at least retention of more traditional manufacturing sectors in Europe alongside offshoring and the absolute growth of the service economy.

The processes of structural change have a geographic dimension also. Here, too, some regions such as Silicon Valley reflect the process of creative destruction although there remains much uncertainty about how to support myriad distinctive regions to overcome and adapt to the challenges of structural change such that the benefits are likely to outweigh the costs. There remain long-standing regional differences even within countries, and indicative of long-standing barriers to effective creative processes of renewal.

This section, then, highlights the perhaps surprising level of substantial flux and turbulence within modern, healthy economies, driven by a range of structural processes and which, over time, substantially reshape the nature and characteristics of the economy. This implies, in turn, that the economy is in a continuous process of adjustment – engendering both costs and benefits to society. The next section moves to assess the balance of such costs and benefits and, in particular, the risk that such adjustment or transition costs may be created in the first instance.

4 The consequences of structural economic change

4.1 Long-term gains and short-term costs

Currently, the conventional economic argument suggests that the negative consequences (and costs) associated with restructuring (or structural adjustment) are more than outweighed by the positive consequences (and benefits) of subsequent economic growth associated with a more competitive economic structure.

For example, an OECD (2005, 4-5) study of the relationship between foreign trade activity and structural adjustment concluded that:

'Freer trade and investment can lead to firm closures and job losses in some sectors, while creating new opportunities in others. The adjustment costs resulting from job displacement reduce the short-term efficiency gains from structural changes and place the burden on a narrow segment of the population, raising equity concerns and potentially eroding political support for trade liberalisation and, more generally, efficiency-enhancing structural change. Nonetheless, the process of transferring resources to more productive uses has been an important driver of sustained growth and higher living standards'.

This argument has much in common with the arguments in favour of the single market in the EU - while increased competition does create losers, in the longer run the economic benefits of enhanced economic growth and job creation more than outweigh those costs. Similar arguments are also made in terms of the overall positive economic benefits of globalization (World Bank 2009).

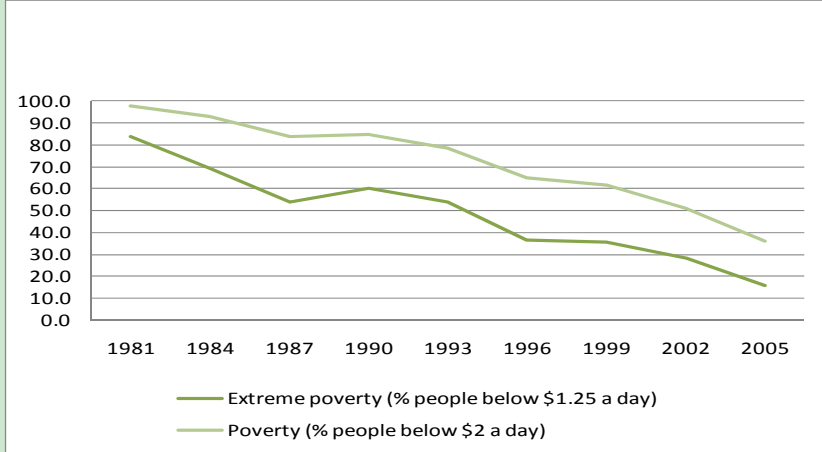
Evidence Boxes 9 through to 12 provide evidence as to the benefits of structural change in China, Poland, Spain and the USA.

Evidence Box 9: The Benefits of Structural Change: The Case of China

In the last thirty years, China has passed through a substantial economic transformation from a planned to a socialist market economy. Since 1991 it has also been exposed to increasing globalisation, leading to a notable increase of exports and imports and the attraction of major foreign direct investment. The consequences of these processes of economic reform have been a stable average growth rate of about 10% of GDP per annum.

In particular, the economic reforms in the agricultural and industrial sectors have provoked major change within sectors and a complete redistribution of the weight of these sectors in the economy. As a consequence, the number and the distribution of firms has changed, as has the sectoral workforce distribution. This economic transformation has made possible a two-thirds reduction in extreme poverty and improvement in the overall quality of life (for example, education, health, and life expectancy).

The incidence of poverty in China between 1981 and 2005



Source: World Bank

Politically, China has emerged as an important political actor in the global arena.

Chinese reforms have generated economic costs during the transition process. In particular, the movement of workers from the rural to urban areas (and out of agriculture) has seen a mismatch of skills and qualifications and an increase in unemployment. Overall, however, labour market adjustment has occurred with the absorption of the majority of labour into the restructured Chinese economy. Similarly, whilst China has experienced a substantial rise in income inequality, especially at a regional level, it has also achieved a substantial absolute reduction in poverty rates.

In conclusion, it can be said that Chinese reforms have been an economic success and triggered substantial social and economic benefits for its population.

Evidence Box 10: The Benefits of Structural Change: The Case of Poland

Poland, and the rest of Central and Eastern Europe (CEE), has experienced structural reform and the opening and internationalisation of national economies during the last twenty years. There have been two phases to this structural change: firstly, triggered by political change and the collapse of the old industrial planning system in the late 1980s; and, secondly, the accession of Poland and other CEE countries to the EU in 2004 (and 2007).

For Poland, these changes have delivered substantial reform of industrial and economic structures. There has been a significant shift in employment from agriculture and manufacturing, to business and financial services. The manufacturing focus has also shifted from heavy industry towards higher value activities and, particularly, automotive manufacturing.

Initially, this structural change resulted in a severe 'transitional recession' in the early 1990s, which saw significant unemployment and declining GDP. More recently, Poland has also experienced considerable demographic and social change including reduced natural population growth (and a declining population from 2000) and the migration of young people to other member states. Other 'transition costs' have included: a rapidly increasing public debt which is more than 50% of GDP; and significant spatial differences in the distribution of costs and benefits of transition between regions and localities.

However, these costs have been offset by some significant longer term benefits including: the emergence and growth of private entrepreneurship and a growth in business numbers; increased consumption, international trade and foreign direct investment; increased GDP, value added, labour productivity, employment and incomes, particularly in the service sectors which now account for more than half of total employment and more than 70% of gross value added; increasing education provision and attainment; recent growth in the knowledge-based economy; a strong economic resilience, as evidenced by Poland being the only country in Central Europe and the Baltic States to avoid recession in 2009; improvements to technical infrastructure (access to water and sewage, transport infrastructure, etc.); and, improvements to quality of life and the standard of living.

The accession of Poland to the EU has been an important driver by increasing trade opportunities and increasing the mobility of investment and labour, but also by providing valuable funding to facilitate the changes, growth and benefits. In conclusion, it can be argued that there has been something of a balance between the costs and benefits of transition in Poland. The benefits of transition in terms of economic structures, employment and growth have been significant, but some of the costs in terms of demographic and social changes have also been high, with high variability between areas and social groups.

Evidence Box 11: The Benefits of Structural Change: The Case of Spain

Spain underwent a period of rapid transition between the mid 1970s and the late 1980s, which resulted in increased modernisation and an opening up of the national economy. Prior to this time, the Spanish economy was focused on low value, labour intensive sectors (particularly mining, heavy manufacturing industries and tourism sectors), and which were highly susceptible to changes in exchange rates and energy and oil prices. The oil crises in 1974 and 1979 had a significant impact

on the Spanish economy, resulting in very high rates of inflation. Economic growth was also being driven by significant imports of foreign capital and technology and Spain had a large trade deficit.

The transition of the Spanish economy was driven by political change and a subsequent programme of economic reform through a process of industrial reconversion from the previous economic development model, based on traditional manufacturing industries. This was followed by the accession of Spain to the European Community in 1986. These changes have combined to provoke deep changes in the Spanish economic structure.

The main costs of transition have been focused on the persistently high unemployment rate, for at least 15 years after the structural changes. Around 12% of jobs were lost between 1977 and 1984 while participation in the labour market also fell significantly over the same period. Unemployment remained higher than 15% of the Spanish working age population for much of the following 15 years and peaked at more than 24% in 1994. Although the effects of transition have now been fully absorbed, the inability of more recent reforms to increase the flexibility of the labour market is viewed as at the root of continued unemployment problems in the Spanish economy.

Following the oil crises, the Spanish economy started growing again from the mid 1980s, with employment increasing from 1995 onwards and, overall, the transition process has provided large economic and social benefits for Spain including: high and sustained growth rates over the last twenty years, macroeconomic stabilisation (i.e. inflation fell from more than 24% in 1977 to below 9% by 1986), increased competition and exports and a positive trade balance; increased income and productivity per capita; a reduction in poverty and income inequalities across Spain; and, increased quality of life, which has seen indicators improve over time and converge with the rest of the EU.

In conclusion, long term structural economic changes have delivered strong economic and social benefits for the Spanish economy and population but unemployment remains a long run concern.

Evidence Box 12: The Benefits of Structural Change: The Case of the USA

The USA has evolved from a pre-industrial to a post-industrial economy and society in little more than a century. This transformation of American society and economy began in the early 1840s when the pre-requisites for rapid economic growth based on industry were put into place. There was a shift in attitude toward entrepreneurial risk-taking, applied sciences, productive technology and capital investment and a commitment to economic progress that translated itself into industrial and business development. Over this period, the USA evolved from a predominantly agricultural economy oriented towards foreign commerce into an industrial and service oriented economy with a vast and expanding domestic market.

The competing and previously dominant European economies suffered as a result of the First and Second World Wars, which caused destruction and chaos to their countries and economies. At the same time, the USA became the world's most powerful economic power and its major creditor. This position remained largely unchallenged until the late 1960s -when ideological conflict and the military cost of opposing communism, coupled to the increasing economic challenge of Germany and Japan and the newly formed European common market, weakened the US dominance of global markets. More recently, USA dominance has receded as global markets and knowledge economies have become increasingly integrated and inter-dependent, and with the continued rise of new global competitor nations.

The key costs of transition in the USA economy have included rising and persistent income inequality, unemployment and poverty rates. These inequalities have resulted from the regional decline in manufacturing activity, together with the shift towards service sectors, which in many cases have offered only poorly paid, low-skilled, part-time and insecure employment.

The process of structural change in the USA has delivered a prolonged period of near continuous economic expansion for the last century and a half, resulting in the US being the pre-eminent force in the global economy for almost a century. For example, the US has become the world's largest foreign direct investor, the largest exporter of commercial services and agricultural products and the third largest exporter of manufactured goods. Most recently, the USA has been central to pioneering the emerging IT and financial sectors that have been at the forefront of recent global economic structural change.

4.2 Structural change – leading to adjustment (or transition) costs

The process of structural change brings with it winners and losers (Massey 1995). Those individuals, companies and regions that specialise in the production of goods that are no longer competitive face unemployment, failure and decline. At the same time, those that are riding the wave of new demand benefit from increased income, profitability and prosperity. In a healthy economy, while companies fail and shed their labour, new business formation creates new employment opportunities and allows the reallocation of resources from declining to growing activities, subject to possible barriers (the need for new skills in the case of labour and, for example, the need to clean-up land contaminated by previous uses).

The long-term gains from structural change are clear and strong in terms of continued growth in output and real incomes in national economies (although not necessarily for all income groups). However, to the extent that the process of the continuous reallocation of resources from declining to emerging / growing activities is limited in some way then (largely) short-term costs arise where resources are allocated to less productive uses that they otherwise could be or are actually unused for a period. Essentially, the process of structural change, because of frictions preventing the smooth and timely reallocation of factor resources, generates a series of opportunity costs (most of which tend to be short-term), and, in the case of institutional capital, almost zero.

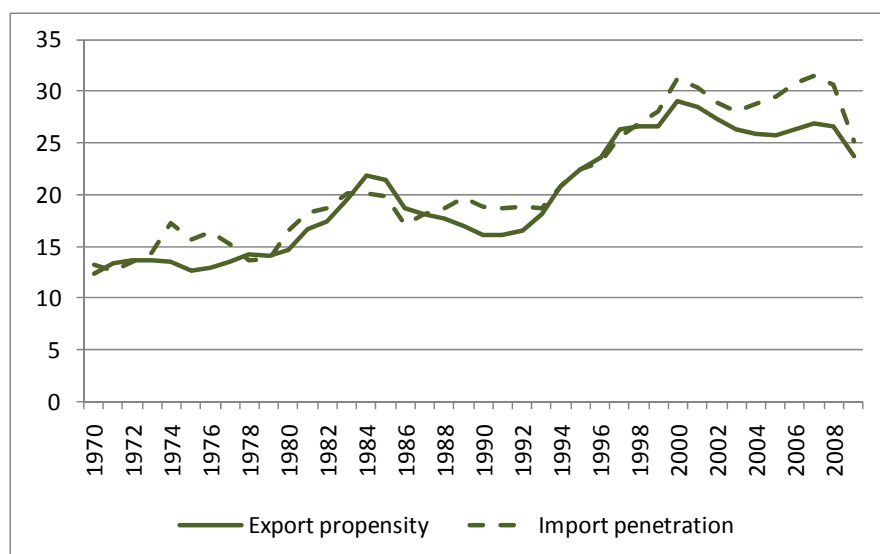
The following sections review a range of factors that could potentially give rise to transition costs in the short-term (and possibly in the long-term) from structural change.

4.3 The risk of transition costs – capital

A substantial driver of structural change in national economies has been the growth of global financial flows coupled with the opening up of national economies.

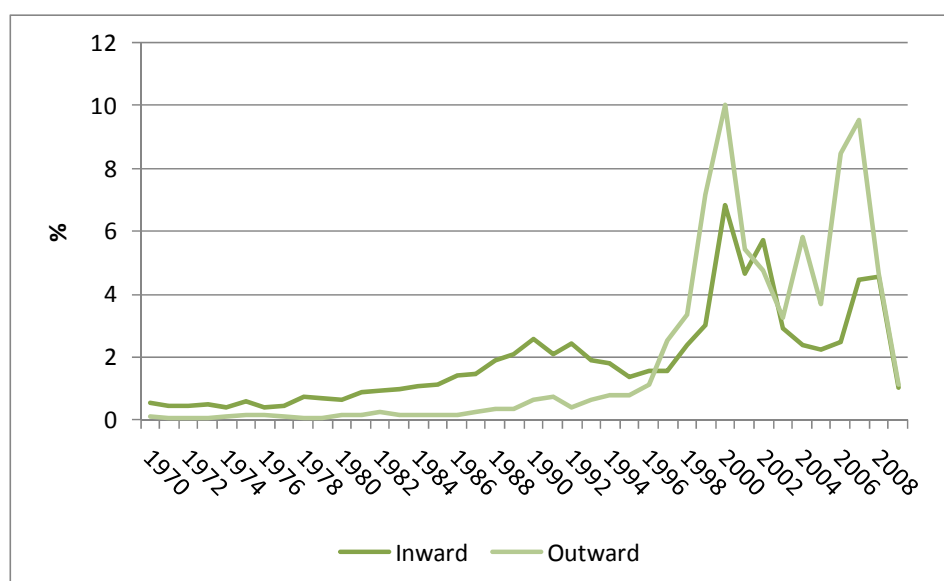
Spanish economic history since the decades following the Franco dictatorship reflects several phases of opening up of the economy, culminating in accession to the European Community in 1986 and the long expansion of the Spanish economy following entry in to the European Monetary Union in 1998. Levels of both exports and imports have increased substantially (see Figure 4.1 below) alongside flows of Foreign Direct Investment (Figure 4.2 below). It is recognised that this process accelerated the process of industrial restructuring within the Spanish economy – and its openness to global economic swings – but, for example, over the period 1986 to 2006 Spain averaged a real annual GDP growth rate of over 3%.

Figure 4.13 Export propensity and import penetration rates



Source: National statistics, OECD

Figure 4.14 Spain - Inward and Outward Foreign Direct Investment



Source: UNCTAD

Similarly, a recent EBRD report by Friedrich et al. (2010)⁵⁷ has noted:

“the European transition region benefited much more strongly from financial integration in terms of economic growth than other developing countries since the late 1990s. The effect of financial integration on growth is not only statistically significant, but also economically important. Hence, the experience of emerging Europe seems to conform to neoclassical growth theory, which predicts that openness to foreign capital should allow countries to grow faster towards their steady state income levels.” (Friedrich et al, 2010, p.3)

Nevertheless, the work of Nuti (2010) highlights how the transition countries faced two substantial shocks in the recent economic crisis due to such opening of the economy: a sudden stop and reversal of capital inflows (including funds withdrawal by foreign banks) and an exports collapse due to the global slump⁵⁸. Indeed, this reflects how the massive expansion in global flows of money across economies have been accompanied by the sustained global growth of the financial and business services, and which has seen the rise of the role of institutional and private investors in economic development and growth.

This role needs to be understood in the wider context of economic change and the importance of investment. There is a debate about the tendency of developed economies to require an increasing share of capital investment in GDP to sustain growth⁵⁹. This is argued in part from the need to recycle the increasing levels of savings that accrue as countries get richer. The implication of the analysis, if accepted, is that the level of capital investment becomes an increasingly important determinant of economic growth as economies grow, and that labour inputs become of declining relative significance.

This growth in institutional investment has not occurred without related risks. Today, institutional investors are increasingly responsible for investment in enterprises across national economies, including the ability to reallocate investment funds from declining to growing businesses and in to emergent parts of the (global) economy. For example, in the US, institutional investors owned 76% of the equity in the 1,000 largest corporations at the end of 2007⁶⁰.

⁵⁷ Christian Friedrich, Isabel Schnabel and Jeromin Zettelmeyer (2010) Financial Integration and growth – is emerging Europe different? European Bank for Reconstruction and Development Working Paper 123

⁵⁸ Nuti, M.D. (2009) The impact of the global crisis on transition economies, Economic Annals 54, 181, pp. 7-20

⁵⁹ See <http://ablog.typepad.com/keytrendsinglobalisation/2010/08/trends-in-nvestment-and-labour-inputs-with-economic-development-as-shown-in-the-data-of-jorgenson-an.html> for a recent contribution

⁶⁰ <http://www.pionline.com/article/20080905/REG/809049969>

The perspective of institutional investors (investment funds, pension funds, insurance companies, etc.) is focused on returns – although this shift has been criticised for introducing a too tight a focus on short-term business performance at the expense of long-term planning and expansion. Given the scale of financial flows that institutional investors now manage within the global economy and its constituent national economies, their combined ability to speedily reallocate capital funds from activities with declining returns to those with increasing returns makes them major agents of structural change.

There are, however, risks associated with a reliance on institutional investment as the vehicle for the allocation of capital funds due, in part, to the ‘herd instinct’ (including associated financial software systems) which can lead to a tendency to exaggerate certain sectoral trends, resulting in bubbles and crashes in asset prices (the ‘dot-com bubble’ is a prime example). Whilst the extent and nature of this hypothesis of financial instability remains open to much debate (Evidence Box 13), it means that the reallocation of capital is to a significant degree independent of the assets and investment choices of owners of businesses that decline or exit in the ‘real economy’.

Evidence Box 13: The ‘Minsky Moment’: the global financial crisis of 2007-08

“Twenty-five years ago, when most economists were extolling the virtues of financial deregulation and innovation, a maverick named Hyman P. Minsky maintained a more negative view of Wall Street; in fact, he noted that bankers, traders, and other financiers periodically played the role of arsonists, setting the entire economy ablaze. Wall Street encouraged businesses and individuals to take on too much risk, he believed, generating ruinous boom-and-bust cycles. The only way to break this pattern was for the government to step in and regulate the moneymen. Many of Minsky’s colleagues regarded his “financial-instability hypothesis,” which he first developed in the nineteen-sixties, as radical, if not crackpot”.

The mortgage subprime crisis and its aftermath changed all that – and has been nicknamed the Minsky Moment.

Minsky has five stages in his model of the credit cycle: displacement, boom, euphoria, profit taking, and panic. A displacement occurs when investors get excited about something—an invention, such as the Internet, or a war, or an abrupt change of economic policy. In this particular cycle a speculative real-estate boom developed that was much bigger, in terms of overall valuation, than the previous bubble in technology stocks. As a boom leads to euphoria, Minsky said, banks and other commercial lenders extend credit to ever more dubious borrowers (ultimately what he termed Ponzi borrowers), often creating new financial instruments to do the job – for example, junk bonds or securitization of mortgages. Then, at the top of the market (in this case, mid-2006), some smart traders start to cash in their profits. Then the panic sets in.

Source: http://www.newyorker.com/talk/comment/2008/02/04/080204taco_talk_cassidy

4.4 The risk of transition costs - entrepreneurship

The reallocation of resources takes place through the formation and expansion of businesses (and investment / disinvestment in the public sector). Even in individual businesses, there is scope to re-orientate the business to take advantage of new opportunities even where these lie within a different economic activity. The drivers and nature of entrepreneurial activity may vary across different economies – including the view of entrepreneurship as a key competence rather than merely the act of new firm formation – but is it generally viewed as a core process of economic change and transition (Evidence Box 14).

Evidence Box 14: Global Entrepreneurship

“Most policymakers and academics agree that entrepreneurship is critical to the development and well-being of society. Entrepreneurs create jobs. They drive and shape innovation, speeding up structural changes in the economy. By introducing new competition, they contribute indirectly to productivity. Entrepreneurship is thus a catalyst for economic growth and national competitiveness.”

In 2008-09, Global Entrepreneurship Monitor (GEM) surveyed over 175,000 people in 59 economies in 59 economies. Together, this group covered over 52% of the world's population and 84% of the world's GDP. In the economies analyzed, some 110 million people between 18 and 64 years old were actively engaged in starting a business. Another 140 million were running new businesses they had started less than 3½ years earlier. Taken together, some 250 million were involved in what GEM defines as early stage entrepreneurial activity – and despite conditions of global recession. Out of these individuals, an estimated 63 million people expected to hire at least five employees over the next five years, and 27 million of these individuals anticipated hiring twenty or more employees in five years. This illustrates the contribution of entrepreneurship to job growth across the globe. Furthermore, entrepreneurship does not impact on the economy merely through higher numbers of entrepreneurs (and the ensuing entry and exist processes of firm demography) but, additionally, through quality measures such as growth, innovation and internationalisation.

Source: Global Entrepreneurship Monitor 2010 Global Monitor Report, Executive Summary

In the case study countries, the growth of entrepreneurship has been a key process in the process of economic growth.

4.4.1 Entrepreneurship in Poland

In Poland, the first phase of structural change from the planned economy was triggered by political change and privatisation, which led to the emergence and growth of private entrepreneurship in the late 1980s and 1990s. However, private entrepreneurship was also influenced by two important preceding mechanisms under the previous centrally planned economy:

- Firstly, in the mid 1970s, so-called 'Polish-foreign' companies were allowed to be established. These firms were set up in Poland, were typically owned by Polish emigrants, and were estimated to employ around 81,300 people in some 700 firms by 1988⁶¹. Some of these firms then grew much more rapidly in the 1990s to become large enterprises.
- The second mechanism was the introduction of the Act on economic activity, introduced by the Ministry of Industry Mieczysław Wilczek in 1988. The Act contained relatively few regulations and introduced freedom for economic activity, which triggered the emergence of numerous private-owned firms. Around 6 million people had found employment in several million new firms by 1995. In turn, these new job opportunities made on-going restructuring of state-owned companies less harmful.

Together, these reforms have delivered a significant change in the ownership structure of firms in Poland. The number of state-owned enterprises has plunged from 8,500 in 1990 to 174 at the end of 2009, with around 6,000 of these firms being privatised and around 2,000 having closed. The total number of companies in Poland has increased from 2.1 million in 1995 to 3.7 million in 2009 (comprising 3.6 million private firms and 0.1 million public firms)⁶² much of which has been driven by an increasing number of micro firms. There has, additionally, been strong growth in public (state-owned and regional and local government-owned) firms as well as private firms as Poland continues to maintain a strong state involvement in the economy.

4.4.2 Entrepreneurship in China

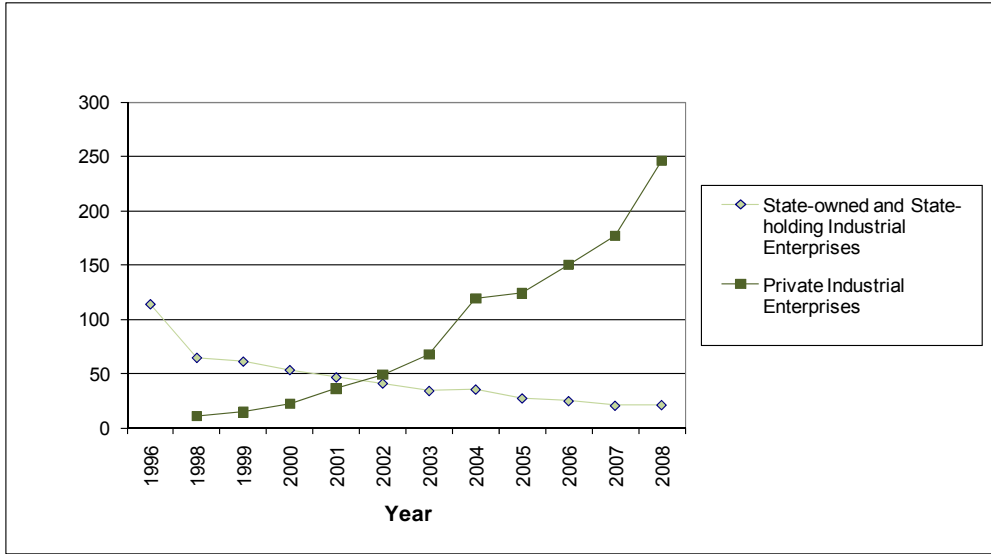
Small enterprises, and an entrepreneurial culture, have played an important role in driving growth during the transition process in China. The Chinese reforms implemented during the 1980s and early 90s were aimed at improving the competitiveness of state-owned enterprises (SOEs) but also, more importantly, at encouraging non-state enterprises that would create a new economic structure. As a result the number of SOEs in China has fallen from 114,000 in 1996 to around 21,000 in 2008. At the same time, the number of non state-owned enterprises has increased to 250,000 in 2008, some 23 times larger than the number

⁶¹ Bałtowski M., Minda Sz., (2005), Sektor nowych prywatnych przedsiębiorstw w gospodarce polskiej - jego geneza i struktura, *Annały UMCS*, XXXIX, 4, section H, str. 55-67

⁶² Bank of Local Data, Central Statistical Office of Poland

in 1998 (see Figure 4.3). This significant increase in the creation of new enterprises has, similarly, reduced the average size of enterprises in China.

Figure 4.15 Number of enterprises in China by ownership (thousands of enterprises)



Source: Chinese Statistical Yearbook, 2009

4.4.3 Framework Conditions for Entrepreneurship

A recent statistical study on the impact of policies on economic growth identified a small negative effect from barriers to entrepreneurship and trade⁶³, implying costs and inefficiencies in the process of business restructuring. Using the OECD’s product market regulation (PMR) index value for 2008, (with its three components of state control, barriers to entrepreneurship, and barriers to trade and investment), the analysis suggested that overly stringent anti-competitive product market regulations can harm steady state productivity inter alia by reducing the efficiency of resource allocation across firms and sectors and also within firms (so-called X-inefficiency).

GEM is one of a number of organisations to have articulated this range of framework conditions for enhanced entrepreneurship (see Figure 4.4 below). Evident to different degrees - and in different forms - across both national economies and regions, Figure 4.4 highlights the range of conditions (from access to venture capital to formal entrepreneurship training and non-punitive bankruptcy laws) that may enhance the adjustment process and reduce the risk of transition costs.

⁶³ Bouis, R., R. Duval and F. Murtin (2011), op cit

Figure 4.16 The GEM Entrepreneurship Framework Conditions

<p>Entrepreneurial Finance</p> <p>The availability of financial resources—equity and debt—for small and medium enterprises (SMEs) (including grants and subsidies).</p>	<p>Government Policy</p> <p>The extent to which taxes or regulations are either size-neutral or encourage SMEs.</p>	<p>Government Entrepreneurship Programs</p> <p>The extent to which taxes or regulations are either size-neutral or encourage SMEs.</p>
<p>Entrepreneurship Education</p> <p>The extent to which training in creating or managing SMEs is incorporated within the education and training system at all levels (primary, secondary and post-school).</p>	<p>R&D Transfer</p> <p>The extent to which national research and development will lead to new commercial opportunities and is available to SMEs.</p>	<p>Commercial and Legal Infrastructure</p> <p>The presence of property rights and commercial, accounting, and other legal services and institutions that support or promote SMEs.</p>
<p>Entry Regulation</p> <p>Contains two components: (1) Market Dynamics: the level of change in markets from year to year, and (2) Market Openness: the extent to which new firms are free to enter existing markets.</p>	<p>Physical Infrastructure</p> <p>Ease of access to physical resources—communication, utilities, transportation, land or space—at a price that does not discriminate against SMEs.</p>	<p>Cultural and Social Norms</p> <p>The extent to which social and cultural norms encourage or allow actions leading to new business methods or activities that can potentially increase personal wealth and income.</p>

Source: GEM 2010 Global Report, Figure 20

4.5 The risk of transition costs – lock-in and path dependency

A key barrier to structural change occurs in the form of technological paradigms that inhibit innovation and change and ‘lock-in’ prevailing production methods and approaches for substantial periods of time, leading to a ‘path dependency’ based increasingly on preceding choices and trends (see Evidence Box 15 below).

Even where there are demonstrable benefits of doing so, the ‘lock-in’ is so powerful as to resist pressures for change, partly because of cultural pressures to down play the significance of such arguments. Indeed the current dependence on hydro-carbon technologies is suggested as an example of a current technological paradigm that does not allow for radical changes in the current mix and deployment of these technologies (Perkins, 2003).

Recent modelling of environmental policy instruments in the context of technological lock-in (Castellucci, et al 2009), suggests that in cases where the preferred technology is not known, market based instruments are preferable to regulation based on technology choices, and allow the market instrument to provide time to establish the sustainability of technological pathways.

Evidence Box 15: Technological Lock-in and Fossil-based

Systems

Increasing returns to adopting a particular technology or system can be crucial in determining technology "lock-in" phenomena (Arthur, 1989), Unruh, 2000). Lock-in implies that, once led down a particular technological path, the barriers to switching to another, possibly more efficient technological, route may be prohibitive.

Environmental quality is significantly affected by technical progress and lock-in effects. Indeed, industrial economies have become locked-into fossil fuel-based energy and transportation systems through path dependent processes driven by technological and institutional increasing returns to scale. The above mentioned issues are largely ignored by standard environmental policy literature concerning the adoption of environment friendly technologies, as well as by dynamic models of technology diffusion.

Recognizing, correcting and, even more, avoiding technological lock-in phenomena, is a very ambitious task, plagued by uncertainty as well as rigidities that increase over time as the economy is increasingly locked-in along unsustainable paths.

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http://iaes.confex.com/iaes/Rome_67/techprogram/P3065.HTM

There are many examples of technological lock-in – we provide one illustration in Evidence Box 16 which exemplifies the factors that can give rise to lock-in and the economic and social costs that flow as a consequence.

Evidence Box 16: An illustration of technological lock-in and path dependency – the case of US industrial corn

The case of American industrial corn production illustrates the complex social, economic, environmental and political processes that both encourage and restrict structural change over time.

Industrial corn production in the United States represents a case of lock-in, whereby a combination of embedded technological systems and policies of governing institutions, developed over decades, has resulted in a series of economic and ecological inefficiencies and negative externalities across the American food chain. Today, a bushel of corn is worth a dollar less than it costs to produce. Farmers are unable to remain financially solvent from corn production, relying on government subsidies and second jobs to cover their costs, yet they continue to produce corn and in ever-increasing quantities.

Industrial corn production also has negative environmental impacts, contributing to reduced biodiversity, water pollution and climate change. Livestock have been trained to consume corn, which was not part of their natural diet, facilitating their move to factory farms and leading to further environmental and health consequences, including a biological dead zone in the Gulf of Mexico larger than the US state of New Jersey and the introduction of novel pathogens that lead to food poisoning. The combined economic, social, environmental and health consequences of industrial corn production suggest a compelling case for seeking alternatives, but this has not been the case. Industrial corn is locked-in as the dominant form of agriculture in the US for myriad reasons.

High yielding corn was made possible through the development of hybrid varieties in the 1930s. Their main feature was shorter stalks that could be planted closer together and did not topple over. A farmer could therefore plant more corn per acre and harvest the crop mechanically, reducing the time and labour inputs previously required. Corn yields rose sharply at midcentury and as a result farmers planted more corn and less of other crops. They were encouraged to do so by New Deal-era policies whereby government established a target price based on production costs; when the market price fell below that target, the farmer was offered the opportunity to take out a government loan, using the corn crop as collateral. This allowed the farmer to store grain until prices recovered (when the farmer would sell the corn and repay the loan) or, if prices stayed low, the farmer would keep the loan money and give the corn to the government, which was stored until a period of national deficiency.

Chemical fertilizers were introduced in the 1950s — a result of the transition from war to peacetime. The American government had a large surplus of ammonium nitrate after World War II, which is the principal component in explosives, but which is also a good nitrogen source for plants. Hybrid corn consumes more fertilizer than any other plant, and corn yields rose dramatically as a result.

By the 1960s, the price of corn was low enough that it became profitable to fatten cattle on feedlots instead of grass and to raise chickens in factories rather than on farms. Livestock farmers could not compete with factory-farmed animals and eventually these animals left the farm almost entirely. Farmers planted more corn in the place of these animals and the pastures and hay fields that would have been required to support them.

In the 1970s, the US government changed its farm support structure. Loans were replaced with direct payments to farmers and the government stopped purchasing grain when prices were low. The previous system was successful at keeping surplus corn out of the market when prices fell, but the new policy encouraged farmers to sell their corn at any price, further driving down the price. During the same period, farmers began rotating corn with soybeans, which allowed farmers to maintain greater soil health and reduce the incidence of pests and disease that would otherwise accompany large-scale monocultures. Farms consolidated and grew, while labour requirements declined.

Standard F1 hybrid corn can now yield 180 bushels of corn from one acre of land – in 1920, the yield was only 20 bushels an acre. The productivity gains are astounding, and have facilitated America's ability to transition from eating small amounts of meat, to regular meat consumption and larger portion sizes. Processed corn has also become a cheap replacement for cane sugar and driven down the price of processed foods. Obesity is said to be an effect of the availability of low-cost, high sugar foods in the US.

Low corn prices, however, have driven down farmers' ability to maintain economic viability from agriculture and resulted in a system whereby the US government spends around \$5 billion per year subsidizing corn (which represents almost one-half of current net farm income). The tradition of farm support dates back to food security concerns during the Great Depression, but has proven difficult to subsequently dismantle. And farmers lack alternative options: the local grain elevator only pays for corn and soybeans and government subsidies are targeted to corn. High levels of mechanisation on farms have driven down the labour base, restricting conversion to more labour-intensive crops.

Every bushel of industrial corn produced today requires the equivalent of between a quarter and a third of a gallon of oil to grow it—or 50 gallons of oil per acre of corn (possibly more). It takes one calorie of fossil fuel energy to produce a calorie of food—before the introduction of chemical fertilizers, a farm could produce more than two calories of food energy for every calorie of energy invested. This is an ecologically expensive way to produce food, and in economic terms, remains viable only so long as fossil fuel energy is cheap and available.

'Unlocking' the reliance on industrial corn production requires adjusting the current US price support system, by reducing and restructuring corn subsidies (and for other commodity grain inputs such as wheat and soybeans) and redirecting funds currently spent on corn towards a range of alternative crops. Fund allocation could also be redistributed, focusing on small and medium-sized farmers rather than the large agribusinesses and ensuring that payments are only made when they are required. Expanding on current trends in the farm support system, 'unlocking' the system would also require additional support to conservation and pollution prevention programmes, in order to account for the negative externalities of corn production.

Source: Pollan, Michael (2006) The Omnivore's Dilemma: A Natural History of Four Meals, New York: Penguin Press.

4.6 The risk of transition costs – land

The use of land for development can lead to the unavailability of land for subsequent uses if the costs of reusing the land are greater than the increased returns from a new use. As a result land can continue to be under-used or left unused.

This can be a particularly significant problem in older industrial regions where the use of land for industrial activity has left the land contaminated and/or derelict. Low end-use values of land in such areas means that the resources are not available to fund the necessary remedial works to bring the land back into productive use.

Whilst the low end values could be said to indicate low opportunity costs associated with the problem, it is the case that land problems add to the problems of seeking to attract investment to these regions, worsening other problems such as structural unemployment.

Table 4.1 summarises the data on total land area and areas of contaminated land in three selected Member States. This suggests that contaminated sites are not a general problem in

overall development patterns. However, for certain regions⁶⁴, the lack of availability of land represents a major cost of, and impediment to, the reallocation of resources.

Table 4.2 Land uses in Germany, Netherlands and United Kingdom (hectares)

	Germany	Netherlands	United Kingdom
Total land area	35,702,200	4,154,300	24,361,000
Built up area	4,573,474	575,400	N/a
Contaminated site area	128,000	27,500	63,750
% of total	0.4%	0.7%	0.3%
% of built up area	2.8%	4.8%	N/a
Number of contaminated sites	362, 000	420,000	325,000 (England only)

Source: GHK analysis, Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_la_luq1&lang=en. Accessed 24 February, 2011

Member States are required to undertake land remediation programmes in order to comply with the following EU directives:

- Water Framework Directive;
- Landfill Directive;
- Environmental Liability Directive;
- Soil Framework Directive.

Regulations for the development of contaminated sites are in place in the EU and in 2004 total EU expenditure on soil remediation was estimated at €5.2 billion⁶⁵.

4.7 The risk of transition costs – labour

As discussed in Section 3.0, the major structural change in the EU has been the transition from a manufacturing to a service economy, with the loss of employment in manufacturing compensated by the growth in the service sector. Although essentially employment neutral overall, this reallocation of labour from old to new jobs has presented challenges.

Employment characteristics – skills requirements, working patterns – are different between sectors, making reemployment hard⁶⁶:

'Re-employment in social and producer services can be particularly hard, as they typically rely on workers with a much higher level of formal education. By contrast, personal and distributive services provide a large number of jobs for low-skilled workers, and both these sectors are also expanding in terms of employment in most OECD countries. This makes it easier for displaced manufacturing workers to enter these sectors. However, other job characteristics differ substantially from manufacturing, including the incidence of part-time jobs. Moreover, some personal and distributive services (including hotels and restaurants and retail trade) offer lower pay than manufacturing, even for workers with comparable skills and other characteristics'.

⁶⁴ For example, the Black Country, a sub-region of the UK West Midlands, was heavily industrialised. Structural change has resulted in the loss of the economic base. Of land available for economic activity, only 30% is readily available without the need for significant remedial investment. West Midlands Employment Land Survey, 2005

⁶⁵ Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU. Ernst and Young, European Commission, DG Environment. September, 2006.

⁶⁶ Kongsrud, P. M. and I. Wanner (2005) The Impact of Structural Policies on Trade-Related Adjustment and the Shift to Services, OECD Publishing; pg. 13

The principle negative socio-economic effect of restructuring are job losses, and problems at the level of the business (e.g. reduced morale and labour conflicts), and at the level of employees (e.g. negative psychological impact, and potentially the impoverishment of localities if job losses are on a large scale)⁶⁷.

Companies' responses to restructuring vary, and need not involve job losses. Examples of short-term measures that preserve employment whilst reducing costs include: production stops, the introduction of shorter working days or weeks, and wage freezes or cuts. During the recent recession these approaches were particularly popular in Germany, for example⁶⁸. Where redundancies have taken place – for instance due to the closure of a business – a range of public policy support measures have been utilised. These have primarily focussed on retraining, recognising that structural changes mean that the jobs that have been lost are unlikely to be replaced, and that future employment opportunities will be in new areas. In Ireland, for example, the National Training and Employment Authority provided retraining for construction workers made redundant in the recent recession, focussing on emerging areas of expertise, such as the installation of equipment and materials to increase energy efficiency⁶⁹.

Other proactive measures designed to reintegrate people into the labour market following job losses include: job matching designed to bring together supply and demand for labour; incentives for companies to employ people (e.g. wage subsidies and apprenticeship schemes); the retraining of unemployed people; mobility grants designed to facilitate commuting to areas of labour demand; and measures designed to support self-employment (e.g. advice and support, or financial incentives such as tax 'holidays')⁷⁰.

4.8 The problem of structural unemployment

The adjustment periods whilst unemployed resources are reallocated are typically very short: capital can be reallocated almost instantly, and skilled labour can be re-employed within months (on average 3-6 months in the US and on average within 12 months in the EU; see earlier Section 3.3.2). However, the adjustment and reallocation of labour can take much longer, particularly where labour lacks the necessary skills to be redeployed or is not prepared or able to relocate to locations where there are employment opportunities. In these cases, economic restructuring can give rise to structural unemployment, which can impose high social costs in certain locations and create significant local development and wider social problems.

There are several different components of unemployment including:

- Cyclical unemployment, which occurs when there is insufficient demand to employ all those who want to work. This level of unemployment follows the business cycle and will decrease when the economy is booming and demand is high, and increase when the economy slows and demand falls;
- Seasonal unemployment, which occurs in industries that exhibit seasonal patterns of work, such as tourism or agriculture;
- Frictional unemployment, which arises when an individual is temporarily unemployed while looking for, or waiting to start, a new job; and,
- Structural unemployment, which occurs when skills become obsolete as production and consumption shifts away from certain activities.

It is widely accepted that there will always be some level of unemployment, even in healthy economies without labour-market constraints, in order for the labour market to function. This level of unavoidable unemployment is the 'natural rate of unemployment' and represents the rate of unemployment at which the labour market is in equilibrium. It is also referred to as

⁶⁷ Corall, A. Isusi, I. and Stack, J. (2006) Support measures for business creation following restructuring; pg. 7

⁶⁸ European Monitoring Centre on Change (2009) ERM Report 2009: Restructuring In Recession

⁶⁹ European Monitoring Centre on Change (2009) ERM Report 2009: Restructuring In Recession; Pg 58

⁷⁰ European Monitoring Centre on Change (2009) ERM Report 2009: Restructuring In Recession

the 'non-accelerating inflation rate of unemployment' (NAIRU): the level of unemployment below which inflation rises, based on the assumption that policymakers could reduce unemployment by having higher inflation.

The natural rate of unemployment changes over time, in line with technological, structural and skills-related changes in the economy, and is difficult to define and measure, thereby creating uncertainty for policymakers. The natural rate of unemployment is estimated to be between 5% and 6% in the US, although estimates have varied between 4% and 7% in recent decades. The EU has generally experienced higher unemployment than the US over the last 20 years and estimates of the natural rate of unemployment in the EU are also typically larger than the US. For example, one study of EU unemployment⁷¹, builds on previous estimates to suggest a natural rate of unemployment of 7.8% for EU-15 and 8.7% for EU-25 over the period 1994 to 2005.

The natural rate of unemployment excludes cyclical and seasonal unemployment that results from seasonal and business cycles and comprises only frictional and structural unemployment rates. As described above, frictional unemployment is caused by the fact that it takes time for employers and workers to find an appropriate match. OECD data suggests that the average duration of unemployment was approximately 12 months in the EU in 2008 and 2009, having fallen from an average of around 16 months between 2001 and 2006. These durations are also significantly longer than those in the US, which are estimated to have remained between three and six months from 2001 to 2009.

The above is the mean average duration of unemployment and will therefore be inflated by the long-term unemployed. Eurostat data suggests that around 46% of individuals in the EU have been re-employed within six months of being made unemployed in 2008 and 2009, although this figure has increased recently after averaging approximately 35% between 2000 and 2005. In 2009, only one-third of unemployed individuals had been unemployed for more than 12 months, although this had fallen from an average of 45-50% for much of the last ten years.

Structural unemployment results from changes in the basic composition of the economy leading to a mismatch between demand in the labour market and the skills and locations of the workers seeking employment. Vacancies may exist but are not able to be taken up because of a lack of skills or because they are located in different places. The extent of structural unemployment depends upon a number of factors including:

- Mobility of labour – i.e. how quickly are workers able to switch jobs from a declining to a growing industry?
- The pace of change in the economy – i.e. the faster the structural changes taking place, the more structural unemployment there may be as economies are forced to adapt more quickly; and,
- The regional structure of industry – i.e. if declining firms or industries are heavily concentrated in particular areas, then it is likely to be more difficult to find new jobs, since the number of unemployed workers is more likely to exceed the employment opportunities in that area.

Structural unemployment is a more acute and longer term issue and the 'structurally unemployed' will typically remain unemployed for longer than the 'frictionally unemployed'. The effects of long term structural unemployment can also be more concentrated within particular social groups, although this tends to vary over time and between different economies and the particular industries and types of jobs most affected, and can be very difficult to predict. For example, the impact of the recent global recession has been particularly strong for younger workers in the EU, compared to previous industrial decline in the UK, which was more concentrated amongst older, semi-skilled workers, for example.

⁷¹ Pallis, D. (2006) The Trade-Off between Inflation and Unemployment in the New European Union Member States

Structural unemployment will also increase during times of economic downturn. An OECD paper⁷² has examined the effect of economic crises on structural unemployment across 30 OECD economies from 1970 to 2008 and found that economic downturns usually materialise into a marked increase in the level of structural unemployment. Previous downturns have increased levels of cyclical unemployment, which frequently leads to higher structural unemployment through persistence or hysteresis effects. The paper also suggests that the scale of impacts depends upon the severity of the downturn and the subsequent resilience, adjustment and speed of recovery of different economies. For example, whilst some EU countries have experienced sustained increases in structural unemployment during past economic downturns, these developments were much less pronounced in more developed economies such as the UK, Canada and Australia.

Another OECD paper has assessed the impact of the recent financial crisis on structural unemployment in OECD countries⁷³. The analysis found that long-term unemployment rates increase by an average of 0.5-0.6 percentage points after three years for every 1 percentage point increase in the aggregate unemployment rate, although individual country estimates varied from 0.25 to 0.75. The paper suggests that one-third of this increase in long-term unemployment is estimated to translate into higher structural unemployment in the US, the UK and other non-European economies, compared to around two-thirds in the rest of Europe. Overall, the recent financial crisis is expected to increase structural unemployment by 0.75 percentage points on average, although this will vary widely between countries.

4.8.1 Structural unemployment in the US

A recent study conducted by the Federal Reserve Bank of San Francisco has found that the rise in US unemployment during the last three years has been uneven across sectors and also geographically.⁷⁴ In addition, vacancies have risen while unemployment has failed to fall appreciably. Both findings are, in themselves, suggestive of a rise in structural unemployment.

The study concludes that structural unemployment may have risen by around 1.25 percentage points, between the first half of 2007 and the end of 2009, to 6.25%. This is largely due to the concentration of job losses in the construction industry. Compared with the increase in unemployment of more than 5.25 percentage points (to an overall unemployment rate of 10%), the study suggests that structural unemployment has caused little of the overall increase. However, the study suggests that although there has been some rise in the long-term structural rate of unemployment, this rise would have been much greater if particular workers had not exited the labour force over the past decade.

Structural unemployment, even if modest in aggregate terms, may also have long-term implications for growth, particularly where those structurally unemployed are younger workers. This is partly because younger workers are less likely to be able to leave the workforce, but also because they are not acquiring skills and work experience. The long-term lack of opportunities for younger workers also has significant implications for social justice and cohesion.

4.8.2 Structural unemployment in China

There is only limited evidence available regarding structural unemployment and the duration of unemployment in China. However, there is research to suggest that the reemployment probability for the first cohorts of redundant workers in China was quite low after 2 years. For instance, workers made redundant in 1994 had a 21% probability of reemployment after two years. The probability has increased over time as those made redundant in 1998 had a

⁷² Furceri, D., Mourougane, A. (2009) How do Institutions Affect Structural Unemployment in Times of Crises, OECD Economics Department Working Papers No. 730

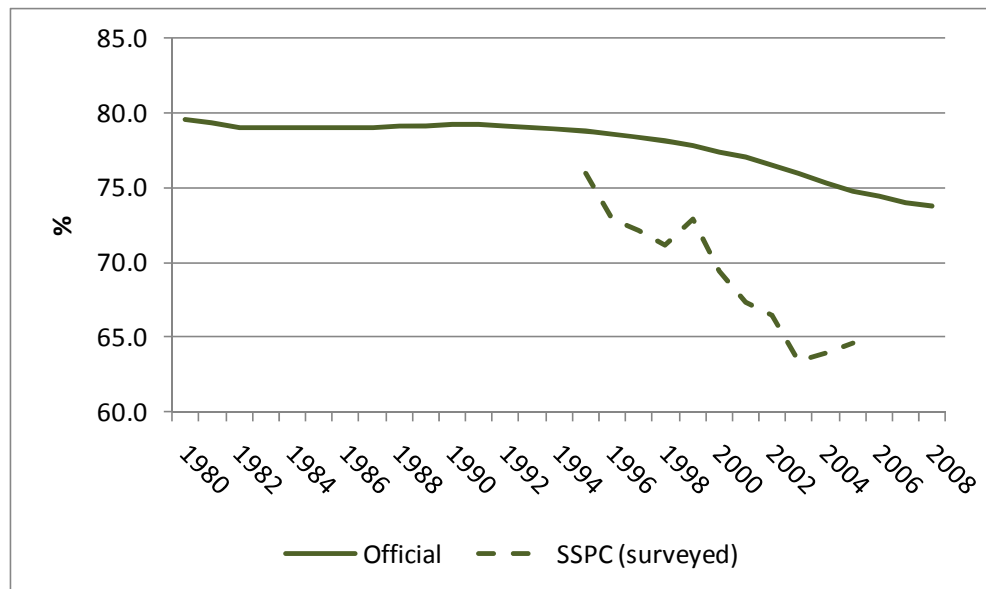
⁷³ Guichard, S., Rusticelli, E. (2010) Assessing the Impact of the Financial Crisis on Structural Unemployment in OECD Countries, OECD Economics Department Working Papers No. 767

⁷⁴ Daly, M., Hobijn, B., Valetta, R 2011, The Recent Evolution of the Natural Rate of Unemployment, Federal Reserve bank of San Francisco

39% probability of being reemployed two years later⁷⁵. The research suggests that the average duration of unemployment is almost four years.

Figure 4.6 shows how the Chinese labour force participation rate has declined over time and particularly during the last 15 years. Again there are differences between the official and the SSPC survey, which suggests the participation rate fell from 75.9% in 1995 to 64.6% in 2005. Cai and Wang (2010) attribute this decline to long-term unemployed workers becoming discouraged and disengaging from the labour force⁷⁶.

Figure 4.17 Labour participation rate in China (% of working age population)



Source: World Bank and Cai and Wang (2010)

Furthermore, despite the increasing levels of unemployment, labour shortages have started to emerge in China since 2003. Prior to this the seemingly unlimited supply of labour was a major driving force behind the rapid growth in China. These labour shortages, together with the scale and duration of unemployment, suggest that much of the increase in unemployment is likely to be structural unemployment related to skills or qualifications mismatches or inefficiencies in the labour market.

4.8.3 Regional structural unemployment

The social costs associated with structural unemployment are perhaps clearest in the context of older industrial regions where the process of structural change has led to the decline of economic activity but, because of a lack of adequate resources, the region cannot attract investment and support significant amounts of new competitive industry; which, in turn, leads to a downward spiral of decline and deprivation that generates social inequality as skills and income levels fall making it less likely that new investment opportunities can be generated.

Europe's traditional coalfield regions (which frequently also contain linked industries such as steel production and/or shipbuilding) demonstrate the negative effects of structural change. A paper exploring trends in GDP and employment in a 'a return to the old industrial regions' spread across the UK, France, Germany and Spain⁷⁷ found that, in virtually all cases, these regions had lagged behind national economic growth rates in recent years. The study looked

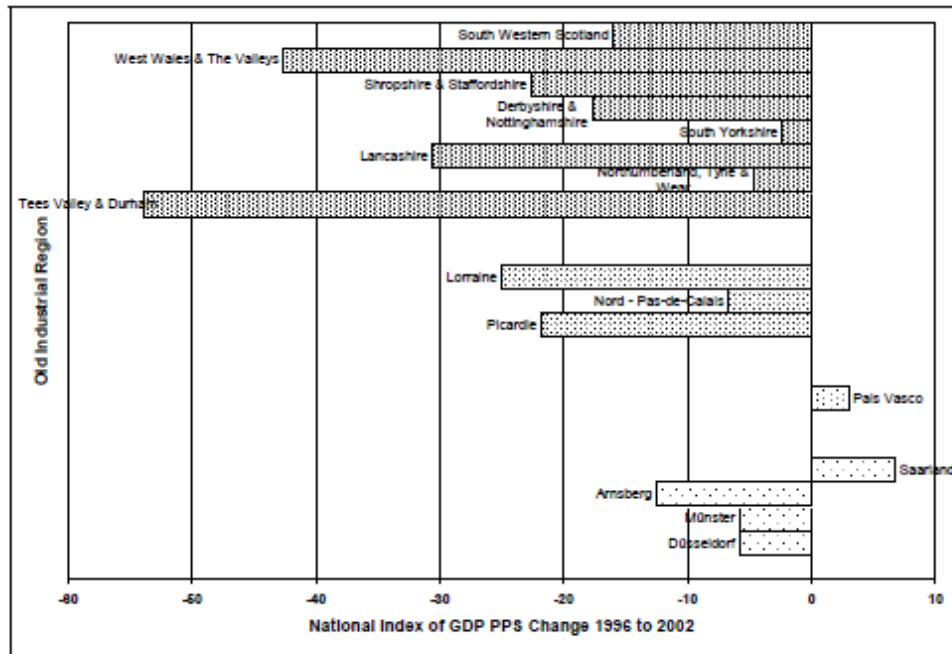
⁷⁵ Knight, J., and Li, S. (2006), "Unemployment duration and earnings of re-employed workers in urban China", *China Economic Review*, 17, pp. 103-119

⁷⁶ Cai, F. and Wang, M. (2010), "Growth and structural changes in employment in transition China". *Journal of Comparative Economics*, 38, pp. 71-81

⁷⁷ Cumbers, A., Birch, K. and MacKinnon, D. (2006) *Revisiting the Old Industrial Region: Adaptation and Adjustment in an Integrating Europe*. Working Paper No.1

at GDP growth rates between 1996-2002 and found that only two of the sixteen regions had outperformed their respective national economy average (see Figure 4.6).

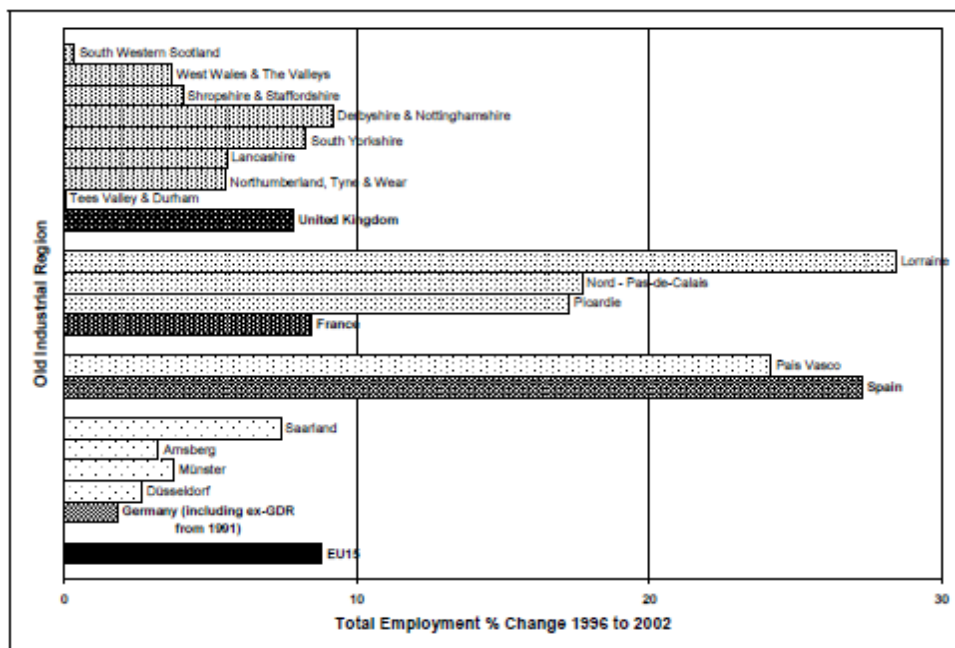
Figure 4.18 National Index of GDP (PPS) Change 1996 -2002 for Europe's Old Industrial Regions



SOURCE: Eurostat, Economic Accounts

The employment picture was slightly better. A total of nine of the sixteen regions had outperformed their respective national average in terms of employment growth but, even then, only five had outperformed the average for all of Europe's regions (Figure 4.7).

Figure 4.19 Total Employment % Change 1996-2002: EU15 Old Industrial Regions



SOURCE: Eurostat, Science and Technology

As is now recognised, the regional factor has a substantial influence on regional performance – and it remains the case that some regions face significant long run challenges of structural adjustment (see Evidence Box 16).⁷⁸

Evidence Box 16: Structural unemployment and long-term structural decline - the UK West Midlands and Black Country sub-region

As the name implies, the Black Country played a crucial role in the industrial revolution and contains many traditional industrial communities. Such communities tend to have a distinctive geography, often characterised by a multiplicity of small urban centres. The very specific requirements and characteristics of the single industry associated with their development has also resulted in ‘barriers’ to successful longer term adjustment to change and creation of more sustainable communities. In brief, these constraints include:

- A high dependence on manufacturing activity and less diversified / resilient economies;
- Low levels of entrepreneurialism, the dominance of previous single industries and major employers being a key inhibiting factor;
- The resident population have low levels of educational attainment and high levels of worklessness, reflecting the dominance of lower skill occupations;
- The complexity of small scale but densely developed urban areas complicates connectivity and wider accessibility and can exacerbate problems of congestion; and,
- Early industrialisation has also left a physical legacy of poor quality land (often small sites and /or contaminated land) and environment to deal with.

Research points to powerful processes of persistence and ‘path dependence’ reflecting the continuing influence of historic development patterns. The Black Country has been significantly impacted by recession and continues to display problems symptomatic of an economy in long term structural decline, including:

- Population decline and out-migration;
- Protracted employment decline;
- Limited levels of entrepreneurialism;
- Issues around built environment and image;
- A high proportion of the workforce with no / limited qualifications;
- Low demand for sites and housing; and,
- High levels of deprivation.

Moreover, developments in technology increasingly mean that investment is relatively ‘footloose’. Hence, left to its own devices the market can tend to reinforce existing patterns of social and spatial inequality.

Source: The Black Country: Summary of Key Economic Issues, AWM, 2011

4.9 Income Inequality

In addition to the impacts of structural change on labour in the form of structural unemployment, another, well reported, social cost of structural change is the effect that growth has on increasing income inequality.

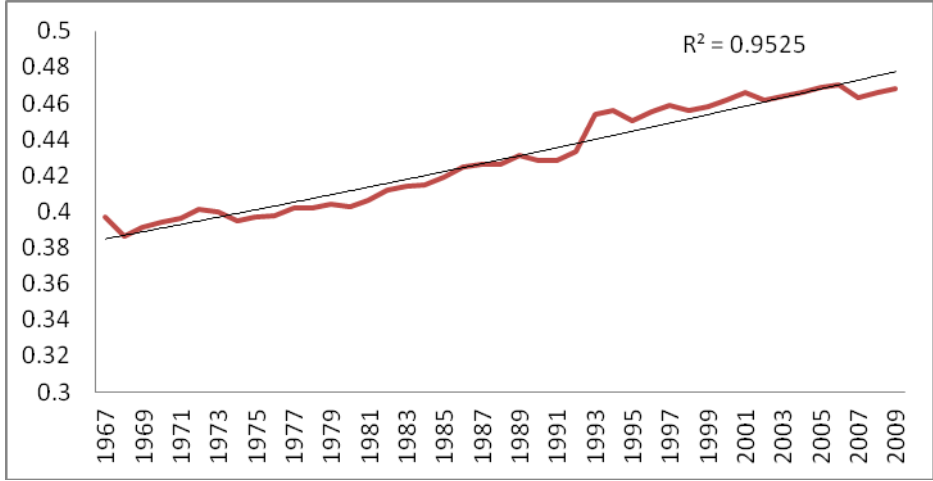
4.9.1 Income inequality in the US

In the US economy income inequality has increased since since the 1960s. Figure 4.8 tracks the change in the Gini coefficient of household income for all US households from 1967 to 2009 and shows how income inequality has increased in the US over time. This

⁷⁸ OECD (2009) Regions Matter

growth in income inequality has been exacerbated by the cyclical and often high rates of unemployment. For example, after the economically successful years of the 1950s and 60s, the decades of the 1970s and 80s ushered in rising unemployment at a time when income inequality was also increasing.

Figure 4.20 Gini ratios of household income for all US households for the years 1967-2009



Source: US Census Bureau

However, it was not solely the result of a sector shift toward lower paid, less secure service sector work that impacted on incomes. The regional decline of manufacturing also saw local economies affected and, in conjunction with economic transformation, saw regional income inequalities become pronounced during the 1970s and 80s. The regional income inequalities often corresponded with the declining older regions of the US, suffering from ageing public infrastructure, a deteriorating urban environment and obsolete capital stock as well as declining employment and incomes.

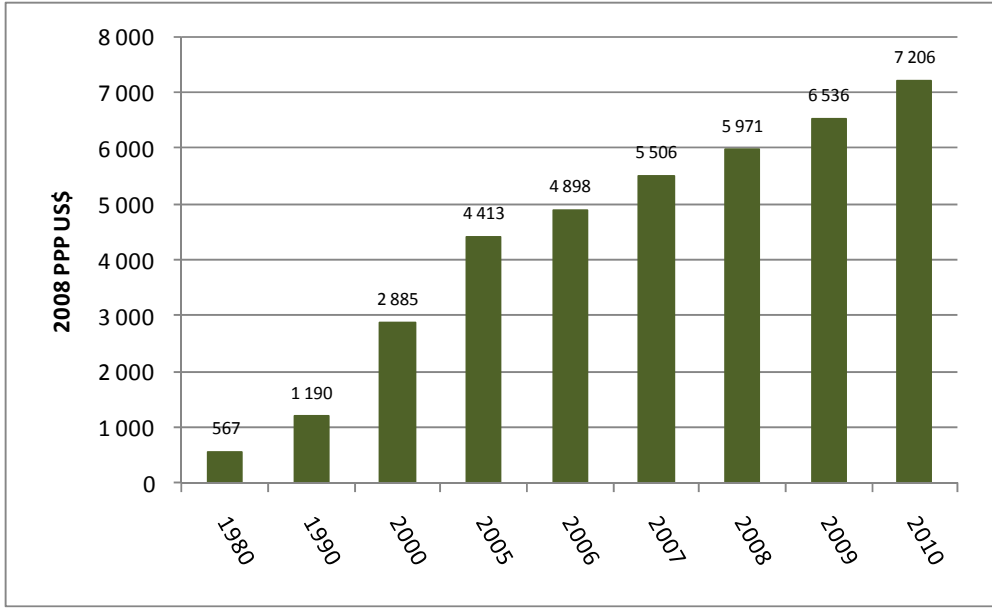
Growth in income inequality peaked in the mid 1990s and after this the rate of income inequality slowed over the next 15 years or so, at a time when unemployment fell to lower levels, but was never fully reversed. Autor (2006) explains this peak in the middle of the 1990s as a result of the rate of job creation occurring more rapidly at the bottom and top, relative to the middle, of the skill distribution⁷⁹. However, the recent financial crisis and ensuing recession has increased US unemployment levels to 9.3 per cent in 2010, which could lead to another increase in income inequality.

4.9.2 Income inequality in China

China has achieved rapid and consistent economic growth over the last 30 years. Figure 4.9 shows that GDP per capita has more than doubled in each decade from 1980 to 2010 and has been accelerating over this period. Similar trends are evident in terms of household disposable income as shown in Figure 4.10. Average disposable incomes have increased amongst both rural and urban households, at average annual growth rates of 14.5% and 15.1% respectively.

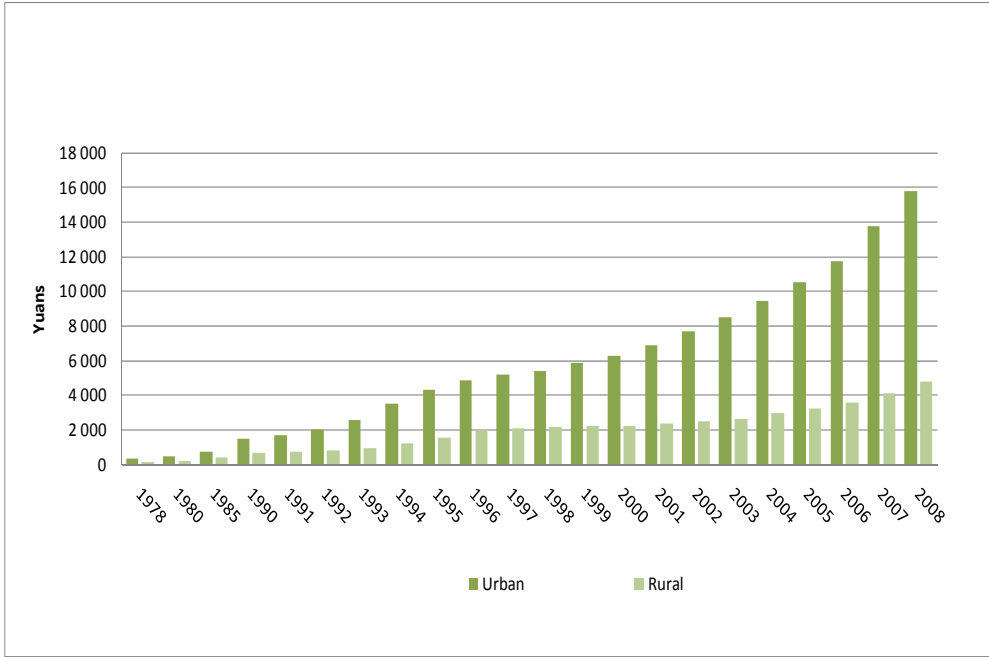
⁷⁹ Autor D, Katz L & Kearney M (2006) "The Polarization of the U.S. Labor Market" NBER Working Papers 11986, National Bureau of Economic Research

Figure 4.21 Chinese GDP per capita (in 2008 PPP US\$), 1980-2010



Source: UNDP

Figure 4.22 Chinese household disposable annual income, 1978 - 2008

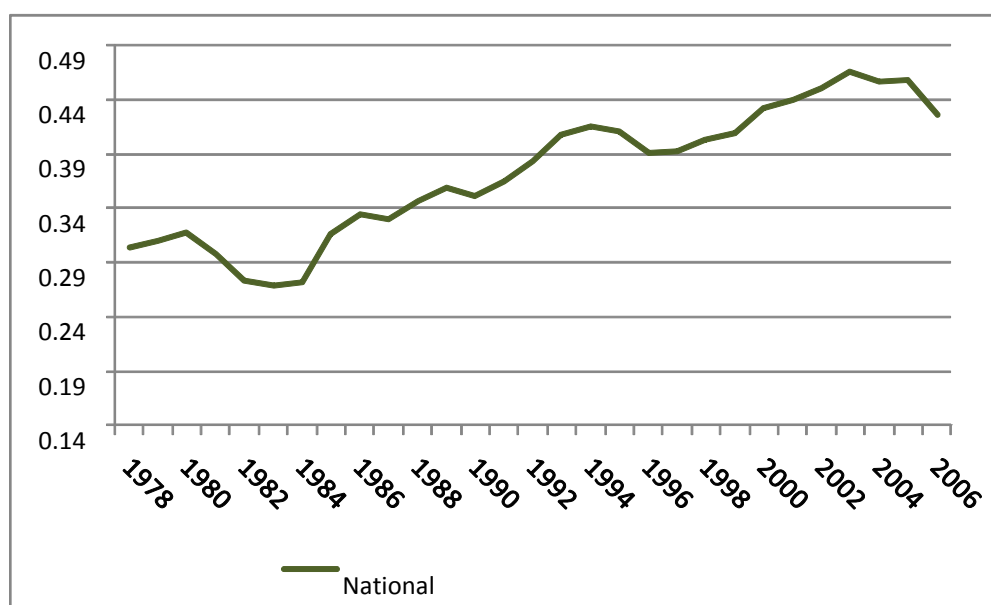


Source: China Statistical Yearbook 2009

However, while incomes have increased and poverty has declined overall, there has also been an increase in income inequality. For example, the gap between average disposable incomes in urban and rural areas has increased significantly over the last 30 years, such that in 2008, average incomes were more than 3 times higher in urban than in rural areas.

The Chinese Gini coefficient has increased from 0.30 in 1978 to 0.43 in 2006, reflecting increased income inequality over time (Figure 4.11).

Figure 4.23 Gini ratios of household income in China, 1978-2006



Sources: Chen, J., Dai, D., Pu, M., Hou, W., and Feng, Q. (2010), "The trend of the Gini coefficient of China", BWPI Working Paper 109, and Ghosh, J. (2010), "Poverty reduction in China and India: policy implications and recent trends", DESA Working Paper 92

Inequalities have also arisen between different locations. The increased openness in the Chinese economy and the introduction of SEZs (Special Economic Zones) placed greater emphasis upon the development of the Chinese coastal provinces, due to their access to the sea and proximity to other areas of major economic development. Economic development was also focused upon the more historically and politically important areas. As a result, the higher incomes and Chinese middle and upper-middle class populations are concentrated in the urban coastal zones, creating a large increase in inequalities between provinces.

The Chinese Communist Party has initiated the implementation of political and economic measures to help mitigate this inequality. One of these measures (the Western Development Plan) focuses on the economic development of Chinese western regions. According to the OECD "Economic Survey of China, 2010", this and other policies have resulted in a slight decline in income disparities between regions in recent years.

Finally, it is not clear whether higher inequality was an unavoidable cost to pay for the high economic growth rate in China. Ravallion (2009) suggests that the periods of faster growth did not entail faster increases in inequality, although high levels of inequality, especially in terms of opportunity, might endanger future growth rates⁸⁰.

4.10 Summary of the benefits and risks of structural change

To the extent that structural change can be said to drive economic growth and underlying rates of factor productivity then, historically at least, this has led to increases in the output of the economy and aggregate levels of income. This, in turn, has led over the long-run to general reductions in absolute poverty and rising average household incomes.

The ability to maintain economic growth and rising real income is understood generally as the ability to ensure rapid reallocation of factor resources by removing or reducing constraints that restrict the movement of factors between alternative uses; and by increasing the share of capital investment in GDP. Transition or adjustment costs can therefore be understood as the opportunity costs of factor resources made unemployed or underemployed as a result of structural change.

⁸⁰ Ravallion, M. (2009), "Are there lessons for Africa from China's success against poverty?" World Development, 37(2), pp. 303-313

The principal transition cost, which has a significant impact on social welfare, is structural unemployment. This is especially the case where there are spatial concentrations of structural unemployment, as found in some older industrial regions in developed economies, where spirals of decline set in, covering generations of workers. A further adverse effect (at least in terms of general social welfare, if not in terms of economic productivity) has been a general tendency to rising income inequality.

In terms of the greater risks to structural change processes, however, one might highlight the existence of technological lock-in, the need for entrepreneurship and engagement with institutional investment as critical factors in the process.

5 Contemporary structural change: 'green growth'

5.1 Resource efficiency as a driver of transformative structural change and economic growth

The Europe 2020 Strategy sees the transformation to a low carbon economy, and its exploitation of new technologies and delivery of high employment, as the major transformative challenge.

Over the past decade there has been growing recognition that the current resource intensive pattern of economic development is increasingly unsustainable, both because of the danger of exhausting the resource base that industries and lifestyles rely on (be it energy, water, access to clean air, food etc.) and because the processes of extraction, transformation and consumption are generating externalities that threaten the functioning of global ecological processes and systems. Thus, issues such as climate change, biodiversity and the notion of ecosystem services are forcing industrial societies to consider fundamental restructuring away from carbon and material intensive forms of economic activity towards a low carbon and more sustainable model of development.

This 'Green Transition' has the potential to unleash a 'Schumpeterian' wave of creative destruction that will create a new round of winners and losers. In this context, the current round of 'green stimulus packages' and the emergence of a 'green' industrial policy linked to energy strategy and climate change policy represents a new set of drivers promoting structural change.

For example, taking the case of energy, in their 2008 World Energy Outlook the International Energy Agency suggested that:

"the future of human prosperity depends on how successfully we tackle two central energy challenges facing us today: securing supply of reliable and affordable energy; and effecting a rapid transformation to a low-carbon, efficient and environmentally benign system of energy supply" (IEA, 2008, p37).

Research⁸¹ for institutional investors has calculated for a typical pension fund that climate change could account for up to 10% of the variability of investment portfolio value over the next 20 years. Managing the risk requires change by investors in asset mix to improve the resilience of portfolios:

"With the transformation of energy use in every sector, we'll see some creative destruction, in fact that's what we're already starting to see. They will have to invest in some of the less-traded asset classes such as private equity, timberland, sustainable assets and agriculture, which are the ones most likely to benefit." Danyelle Guyatt, Global Head of Research for Responsible Investment at Mercer.

With economic recovery, there are growing concerns that the oil price, which has now passed \$100 a barrel, may restrain growth in the short-run. However, such an increase has the potential to be a longer-term driver of technological transformation and further cycles of restructuring. Thus, there is a view that in the future economic growth will be driven by green technologies, such as renewable energy, more energy efficient products, electric vehicles, etc. as part of a new 'green technology-led Kondratieff cycle' (Allianz Global Investors 2010, WWF 2009).

"While in the previous Kondratieff cycle the information age led to a tremendous increase in labour productivity, the key to a strong and sustainable economy in the next long cycle seems to lie in an increase in the productivity of resources and energy. Growth will probably continue to be generated from a new mix of economics, ecology and social commitment. A structural change in the economy that we called „Eco-Trends" (Global Allianz Investors, 2010 p4)

⁸¹ Climate change scenarios – Implications for the Strategic Allocation of Assets, Public Report, MERCER, 2011

Thus, the EU 'Resource Flagship' reflects and supports an ecological/technological transformation that will result in a restructuring of economic activity above and beyond that which might be expected by the 'normal' cycle of technological change. This change will be 'purposeful' in the sense that it will have the explicit aim of increasing energy efficiency and reducing the carbon intensity of production and consumption.

It is worth noting in this context the latest conclusion from the UNEP Green Initiative⁸² which is that

"The Green Economy Initiative demonstrates that the greening of economies is not generally a drag on growth but rather a new engine of growth; that it is a net generator of decent jobs, and that it is also a vital strategy for the elimination of persistent poverty" (Green Initiative, UNEP, 2011, introduction).

The expectation of the likely impact of green transformation on investment requirements is increasingly understood by institutional investors. The Institutional Investors Group on Climate Change (IIGCC) has recently called for involvement in continuing policy development to ensure focused incentives, a high and sustained price on carbon, and credible policy frameworks which stimulate private investment⁸³.

5.2 The role of policy in mediating and influencing structural economic change

To secure an economically efficient shift to a greener economy, a policy framework that facilitates the reallocation of factor resources from less to more natural resource efficient activities would be a central element of a Flagship Initiative.

There are a number of reports that set out the dimensions of such policy⁸⁴. Typical dimensions include the mix of market and regulatory environmental policies measures to address international competition and impacts on income and equality. This includes regulations that facilitate the entry of new firms and the exit of firms in declining industries as well as policies that facilitate the re-deployment of labour to new firms and industries, such as minimising legal and administrative restrictions on job losses, consistent with necessary social protection goals⁸⁵.

In respect of labour 'adaptation' or 'labour market rigidities' as termed by the OECD, it is argued that countries with high labour market rigidities have tended to perform poorly and experience high unemployment⁸⁶. Employment costs – for example, non-wage labour costs such as social security contributions – are seen to act as a disincentive for employers to hire new people and create jobs in growing areas. Policies to facilitate structural change thus need to:

'Facilitate the reallocation of labour and capital to more efficient uses in response to the emergence of new sources of competition and new opportunities, while limiting adjustment costs for individuals, communities and society as a whole. Labour market policies can contribute to meeting this challenge by helping develop human skills and adaptability and facilitating labour mobility across occupations, firms, industries and regions, while providing adequate assistance to those who experience adjustment costs as a result of structural change'⁸⁷.

Policies that encourage entrepreneurship are also likely to be important. Evidence suggests that high levels of entrepreneurship are a key part of the process of responding to structural

⁸² UNEP, 2011, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers, www.unep.org/greeneconomy

⁸³ IIGCC Press Release 9th March, http://www.iigcc.org/_data/assets/pdf_file/0016/15217/IIGCC-statement-on-EU-Roadmap-2050.pdf

⁸⁴ See de Serres, A., F. Murtin and G. Nicoletti (OECD, 2010); and UNEP, 2011

⁸⁵ Policy recommendations from the OECD Jobs Strategy as well as from OECD Going for Growth and the Innovation Strategy provide useful policy suggestions

⁸⁶ OECD (1994) The OECD Jobs Study

⁸⁷ OECD (2006) OECD Employment Outlook 2006; Pg. 26

change, as ‘*new, more efficient entrants replace less efficient incumbents*’⁸⁸. Barriers to this process may provide short-term gain as businesses are protected but, in the long term, may act as a barrier to structural change⁸⁹. Measures that restrict entrepreneurship – for example, the administrative costs of start-ups, punitive approaches towards bankruptcy, etc. – are thus likely to be a barrier to the reallocation of factor resources.

Finally, as noted in Section 4, wider product market regulation including barriers to trade and investment is seen to adversely affect factor reallocation and impede productivity and innovation.

5.2.1 Policy responses

The general policy prescription outlined above is in part acknowledged in the latest Employment in Europe report (see Evidence Box 17).

Evidence Box 17: Employment in Europe 2010 report (DG Employment, Social Affairs and Equal Opportunities)

The report highlights that for many regions the economic recession has brought severe employment challenges, in particular for the Baltic States, Ireland and Spain. It has led to a substantial increase in unemployment, and potentially in long-term unemployment.

In order to become adaptive and resilient, the report argues that Member States need to seek to overcome structural challenges such as labour market segmentation to ensure a longer term recovery. Labour market segmentation is a prominent example of the structural obstacles, particularly as it weighs most heavily on young people and their employment prospects, therefore directly endangering the future competitiveness of the EU economy.

The new EU headline target of an employment rate of 75% for the population aged 20-64 demonstrates the EU’s ambitions in the field of employment. The implications of this target are that Member States must:

- include support for better combinations of flexibility and security in the labour market;
- increase participation levels including through inclusion of vulnerable groups;
- fight structural unemployment;
- develop a skilled workforce responding to labour market needs; and,
- promote job quality.

Source: Employment in Europe, 2010

5.2.2 The financial crisis and the ‘Green’ New Deal

As a result of the financial crisis, GDP in the OECD area fell by 2.1% in the first quarter of 2009, the largest fall since OECD records began in 1960. In the first quarter of 2009, G7 exports fell by 13.6%, while imports were down by 10.5%. The unemployment rate for the OECD was 8.3% in May 2009, 0.3% higher than the previous month and 2.4 percentage points higher than a year earlier. The crisis in the financial sector has meant that in some OECD economies (especially in the EU) firms and entrepreneurs have found it difficult to obtain capital investment to invest in new technology and capacity to increase their competitiveness and benefit from now market opportunities (a ‘credit crunch’).

This has resulted in governments stepping in with ‘stimulus packages’ to stimulate demand and, at the same time, there has been a strong trend to orient such support to the growth of so-called ‘green economic activities’. Thus, the ‘Green New Deal’ actually represents a state-funded attempt to bring about structural change (the OECD seems to favour the term ‘industrial renewal’) by stimulating the growth of the low carbon economy.

⁸⁸ OECD (2006) OECD Employment Outlook 2006; Pg. 25

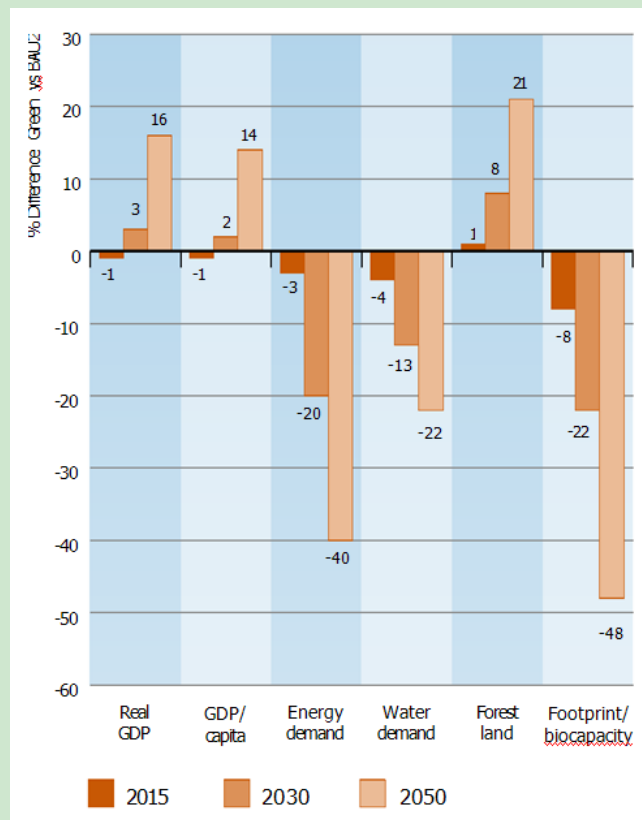
⁸⁹ OECD (2003) The Sources of Economic Growth in OECD Countries

A recent analysis by UNEP⁹⁰ comparing the economic impacts of a 'Green Investment Programme' (at a cost of 2% of GDP, 2011-2050, and some 1.3 trillion USD) with a 'business as usual' scenario indicates that it provides higher rates of GDP growth as well as securing an absolute decoupling in the use of natural resources.

Evidence Box 18: UNEP Green Growth Analysis

Even with conservative assumptions, a green investment scenario achieves higher annual growth rates within 5-10 years and an increase in renewable resource stocks that contribute to global wealth (see Figure below).

By promoting investment in key ecosystem services and low-carbon development, this economic growth is characterized by a significant decoupling from environmental impacts, also illustrated by a considerable decline in the global ecological footprint. With respect to energy, primary demand returns to current levels by 2050, which is about 40% less than what is expected under business as usual. The combination of demand and supply side measures would reduce energy prices below business as usual in the coming decades, reducing the vulnerability of the global economy to potential energy price shocks, and contributing to stable economic growth. Savings on capital and fuel costs in power generation under the green economy scenario are projected to average about US\$ 760 billion per year between 2010 and 2050.



Source: UNEP

5.2.3 The effect of a resource efficiency programme on sectoral change

In the context of this paper and the focus on structural change, the recent simulations by de Serres (2010, op cit,) of the effects of climate policy scenarios⁹¹ on sectoral change is of

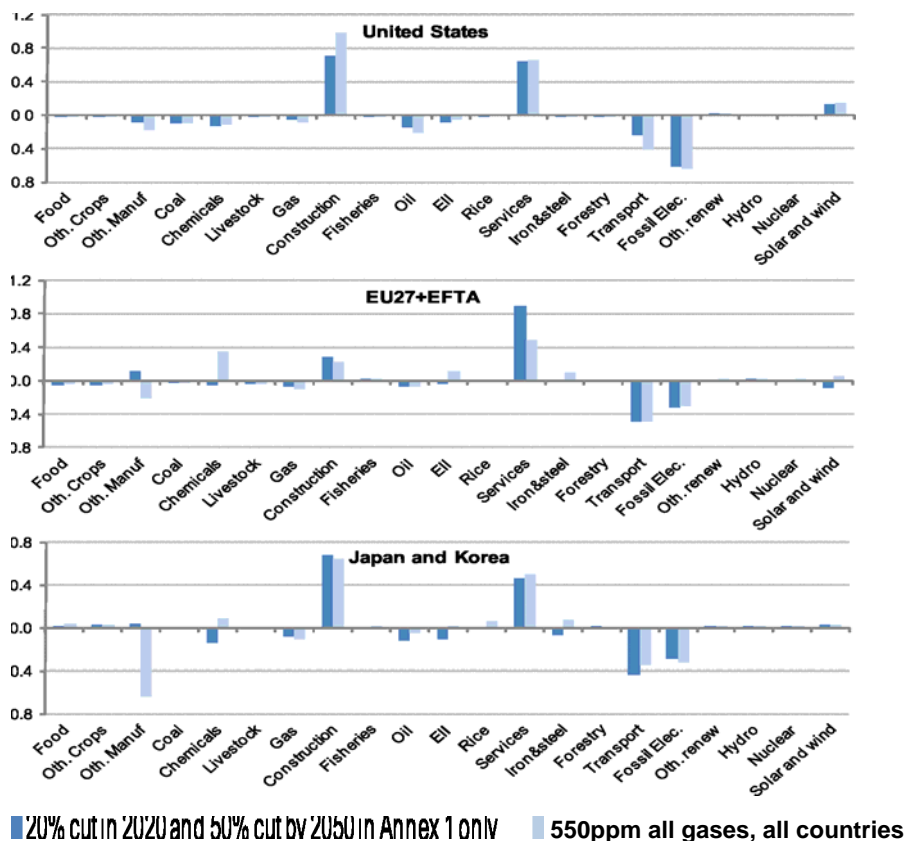
⁹⁰ UNEP (2011) op cit

⁹¹ In one scenario, worldwide emissions are reduced so as to stabilise CO2 concentration and 450 ppm and overall, GHG concentration at 550 ppm, with modest overshooting of the target before 2050. This is achieved through a uniform carbon tax applied to all countries and all sectors, which ensures equalisation of marginal abatement costs. In the second scenario, Annex I regions only are assumed to cut emissions by 20% in 2020 and by 50% in 2050, in both cases relative to 1990 levels. This is achieved through emission-trading systems put in

particular interest. This indicates that for the EU plus EFTA, policies could lead to a doubling of rates of sectoral change compared to that estimated in a business as usual scenario for the same time period.

The largest positive impacts in the EU are in the services sectors and to a lesser extent in construction. Losses are projected in transport and fossil-based electricity generation. The overall aggregate effect on output over the period is not reported, but would appear to be positive given the size of the service sector in the total economy.

Figure 5.24 Sectoral changes in output relative to business as usual (%) in 2050



Source: de Serres, et al, 2010

5.2.4 Sunk costs and compensation – searching for optimality

One of the problems of a major adjustment programme is likely to be the generation of a substantial level of sunk costs for producers (e.g. reducing asset values of less efficient plant) and workers (reducing value of skills for operating less efficient plant). The adjustment programme may therefore seek to include, as separate instruments, forms of compensation (for example, directly in the form of direct payments to compensate asset holders or in the forms of training programmes).

The level of sunk costs is obviously difficult to quantify; not least because of the uncertainties over the possible future value of assets in the absence of policy, recognising the inherent volatility and churn in the economy; and their sensitivity to the pace of change forced by the adjustment programme.

However, where there is a risk of substantial sunk costs as a result of policy, and the adjustment programme pursues a pace so fast as to cause the level of sunk costs to be greater than the policy benefits being sought, then it suggests a programme with a lower pace of adjustment would be (more) optimal. For example, a policy that required a very rapid transition to electric vehicles would clearly be too costly in terms of sunk infrastructure

place in each region and that operate independently from each other, implying carbon prices which vary across regions.

costs in petrol storage and loss of non-electric vehicle asset values, compared with the benefits attributable to an accelerated, compared to a slower, programme.

To reduce the problem of sunk costs, advance notice of policy change is required, together with timetables for the introduction of policy and guidance on the future types of investments required to provide some certainty and confidence to the market.

5.3 The costs savings of increased resource efficiency

Recent studies have estimated the potential resource savings achieved by improving resource efficiency in the EU to levels already achieved by the most efficient Member States. This provides an indication of the scale of benefits available using existing technologies.

The analysis is based on Eurostat data for EU27 on total domestic material consumption (DMC) and domestic inland energy consumption. The resource savings are based on Member States achieving the level of resource efficiency set by the average achieved by the five most efficient Member States.

The analysis (Figure 5.2) indicates that the scope for resource savings is greater for materials (46%) than for energy (20%), due in part to the higher unit costs of energy. The resource savings are estimated using the market price of materials and for energy, plus an estimate of the associated external cost savings from reduced pollution, based on available externality estimates. The saving at market prices is €550 billion a year. A further €60 billion a year in reduced externality costs might also be secured. The total economic value achieved is equivalent to over 5% of EU GDP.

Figure 5.25 Possible resource savings in the EU27 (€ billion)

Indicator	Unit	Materials	Energy	Total
Total resources (EU27)	mil tonnes; mil toe	8,200	1,800	
Resource saving (avg of top 5)	mil tonnes; mil toe	3,800	370	
Savings as a share of total	%	46%	20%	
Unit value of external cost	€/tonne; €/toe	2.40	151	
Unit value of market price	€/tonne; €/toe	9.80	1,508	
External cost	€ billion per annum	10	60	60
Market value	€ billion per annum	40	550	590
Total economic value	€ billion per annum	50	610	660

Sources: GHK own estimates from data from Eurostat. External cost estimates sourced from COWI (using a UK study of the externalities of primary aggregate production and likely to be a minimum estimate; and taken as 10% of market price for energy, at current price of \$100 a barrel, which approximates to €0.01 per kWh)

Notes: Materials: The total amount of materials directly used, defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports. Data for 2007. Source Eurostat; Energy: The total energy necessary to satisfy inland consumption of the EU based on consumption by the energy sector itself; distribution and transformation losses; and final energy consumption by end users. Data for 2008. Source Eurostat

5.4 The scope for resource savings from adjustment initiatives

In support of the general case that it is feasible to secure substantial resource savings without significant economic cost, or even achieve such savings at a surplus, two detailed case studies have been completed. These are summarised below and included as a separate bound document.

5.4.1 The case of energy efficiency in buildings

Improving the energy efficiency of the housing stock has long been suggested as a source of significant energy savings. This case study has examined the costs and benefits of an expanded renovation programme designed to improve the energy efficiency of the housing stock. The analysis develops a detailed model to examine the renovation requirements and associated costs; and the level of energy efficiency savings that could be achieved.

The model is based on a description of the existing EU housing stock and current levels of energy efficiency, and examines the effect of a 10 year ‘deep renovation’ programme (against a ‘do nothing’ no renovation case). The current renovation rate of the housing stock across the EU is at around 1.2% per year. The basic assumption of the proposed model is that the renovation rate increases gradually from 2011 towards 2.5% by 2021 using low-energy building standards.

The case study demonstrates that over a 20 year period the costs of the programme are more than recovered through energy cost savings (a net present value of €114 billion at 4% discount rate over the period 2011 to 2031). With a rebound effect (where beneficiaries use the additional income from cost savings in a product to increase their use of the product), the net value is reduced. A rebound effect of 20% would still leave a positive net value of €14 billion.

The case study also suggests a net positive employment impact. The ‘deep renovation’ programme may create or preserve around 440,000 jobs in the construction sector out of which 390,000 are in the SMEs sector. From the analysis of several EU and US renovation programmes, it is estimated that the full job potential of building retrofit activities of this scale has an overall employment potential of up to 1 million full time jobs by 2021, offset at the margin by a loss of jobs in the energy generating sector of around 15,000-33,000 jobs. The figures are similar to the findings of other studies.

However, in the short-term the employment impact is mainly due to the additional spending on renovation financed by reduced spending on other items. The net cost of the programme (2011-2021) is estimated at €150bn which, assuming it requires €0.2m of spending to support one full-time job, is a loss of 750,000 jobs⁹².

Overall the net employment impact is likely to be positive even in the short-term. In the long-term there will be a strongly positive net employment impact as consumer spending increases as a result of lower energy costs, offset only in part by the reduced demand in the energy sector.

There are also some additional indirect benefits of the renovation programme, such as an increased noise insulation of the buildings, a potential higher rental/property value and healthier living conditions for the inhabitants.

The energy savings from the programme (and reduction in the related greenhouse gas emissions) are very substantial. The model estimates that the programme will lead, by 2022, to an annual saving of some 34,000 ktoe, equivalent to around 12% of the EU-27 final energy consumption in 2007 or up to 50% of the final electricity consumption of the EU-27 in the same year. In terms of energy generation, the energy saving potential is the equivalent of the energy produced by around 70 standard power plants. By 2022, the renovation programme contributes to the avoidance of up to 276 Mt CO₂ emissions. These savings continue on an annual basis thereafter.

5.4.2 The case of organic farming

A detailed analysis of the costs and benefits from a conversion from conventional to organic farming has been undertaken, with reference to the experience in France. This indicates that the conversion process itself can be costly but, that once certified, organic farms are an order of magnitude more profitable than conventional farms (see the case for maize producers, Table 5.1).

Table 5.3 Profitability of organic maize compared to conventional maize, France

	Organic Maize – In conversion	Certified Organic Maize	Conventional Maize
Yield (kg/ha)	6 350	6 350	9 533

⁹² In some MS the loss of employment due to displacement in consumer spending is reduced because of a reduced requirement for heating subsidies

	Organic Maize – In conversion	Certified Organic Maize	Conventional Maize
Price (€/t)	128	246	128
Gross Revenue (€/ha)	812	1 560	1 219
Fixed Costs (€/ha)	563	563	519
Variable Costs (€/ha)	613	613	666
Total Costs (€/ha)	1 176	1 176	1 186
Net Revenue ⁹³ (€/ha)	-364	384	33

Sources: Own calculations based on FADN data for France. Yield for conventional maize: FADN data (France, Specialist field crops, 2007). Yield for organic maize: FranceAgriMer - ECS BIO 2008. Price for conventional maize: FAOSTAT (France, average 2003-2008). Price for organic maize: Based on the literature, an average price premium of 92.13% was applied to conventional price. Maize costs: FADN data (France, Specialist field crops, 2007).

In aggregate terms the impacts of a conversion programme to organic production, in line with national targets to 2020, have been estimated⁹⁴. The conversion process produces an increase in agricultural employment of some 13,000 jobs. Taking account of the reduced demand for inputs and displacement in consumer spending there is an estimated overall loss of employment of around 70,000 jobs in the economy as a whole (Table 5.2), equivalent to a reduction in total GVA of 0.3%. Long-run impacts, excluding the costs of the conversion process, would tend towards zero.

Table 5.4 Aggregate employment impact in France from the transition from conventional to organic farming, 2011 to 2020

Element	Change in Jobs	Comment
Direct	+13,000	Positive impact on aggregate jobs in the agricultural sector due to the higher labour intensity in the organic sector
Indirect – supply	-23,000	Negative impact due to reduced demand for inputs
Indirect -demand	-60,500	The effect of the price premium of organic food and the transfer of consumer spending to food from non-food items
Total net impact	-70,000	This may be an over-estimate. Second round effects such as the impact on aggregate demand of higher wages and labour related costs, which is one of the characteristics of organic farming, have not been accounted for in the present analysis.

Source: The costs and benefits of a transition to organic agriculture: Illustration in the case of France. Unpublished report prepared by BIOSS, separately bound

In social welfare terms, the conversion to organic farms results in avoided costs in terms of

CO₂-eq emissions in the range of €20 to €80 million per year. Other significant

environmental benefits also result, including reductions in water pollution.

⁹³ Net revenues do not take into account financial aids.

⁹⁴ National Organic Action Plan for France, Grenelle de l'Environnement, 2009 – sets a target that 20% of agricultural areas should be organic by 2020

6 Summary and Conclusions

6.1 Summary

In summary, it is evident that the national economies of the world are subject to a constant, if historically and geographically specific, set of drivers of structural change whose on-going dynamics create both short-run costs and benefits and the longer term benefits of re-invigorated growth. It is also the case that at certain times, and in certain places, these dynamics combine to produce particularly intense periods of change and restructuring, including on a global scale.

At present, restructuring is being driven by the global financial crisis, which has significantly reduced demand. But, there is a potentially much more significant long-term driver at play related to the transition to a low carbon economy and the related demand for key technologies such as nanotechnology and biotechnology. For some this heralds a new phase in the relationship between technological change and economic growth.

Authors such as Perez (1983) and Freeman (1994) offer an explanation of structural change with innovation and technological change as the prime mover. For them, it is Schumpeter's (1943) concept of 'creative destruction' that describes how the process of innovation constantly – but unevenly - introduces new processes and products and renders others uneconomic and obsolete. At a macro-economic scale, as each cycle of prosperity-recession-depression runs its course, a key outcome is an overall improvement in economic wellbeing. This model suggests (see Lin, 2009) that the processes of economic development involve:

- a process of continuous technical innovation leading to improved quality and/or lower production costs of the same goods; and,
- a dynamic process of 'churn' in the number and type of businesses leading to industrial upgrading and structural change with new and, different goods and services produced.

In sum, we can conceive of a cyclical relationship between economic growth and economic structure driven by technological change mediated through social change. Within the various cycles there are rhythms of growth and decline, but these do not challenge the integrity of the dominant socio-technical paradigm. In contrast, in certain moments in time, the process of innovation and technological change is such that a new socio-technical paradigm challenges the competitiveness of the established paradigm and triggers a much more fundamental process of structural change that eventually heralds a new period of prosperity. This is the vision encapsulated in the transition to a low carbon economy.

6.2 Conclusions from the Review

This review has examined the drivers, processes and consequences of structural change. This has tended to reveal:

- A broad agreement as to the range of drivers and their inter-action, as the source of structural change;
- A much more dynamic and turbulent process of economic change than that revealed through net aggregate economic trends, with very substantial churn and recycling of factor resources related to business demography and, in particular, closure and contraction of existing businesses alongside new and expanding businesses;
- A generalised economic model that understands that restrictions in the recycling and reallocation of resources and hence impediments to structural change, impede economic growth and real incomes;
- A general risk to structural change from the persistence and prevalence of technological lock-in, where technical and social/political paradigms interact and serve to block change, even where wider economic benefit would accrue;

- A principal role for institutional investment and the choices that such institutions make in the process of structural change, reflecting in part the general tendency for the rising importance of investment in sustaining GDP in developed economies;
- An almost universal rise in real incomes over long periods of time as a result of structural change (although the statistical relationships are hard to define given the interaction between economic outcomes and the process of economic change);
- A major social cost from structural change in the form of structural unemployment of labour resources, especially where spatially concentrated over long periods of time; and,
- A potential driver of a new wave of structural change and future economic growth from promoting a shift to a low carbon economy and a step change in the efficiency with which natural resources are used.

The implications for the resource efficiency flagship initiative are therefore:

1. **The capacity to generate structural change and economic growth:** The flagship, depending on the adjustment policies and associated scale of investment, has the potential to facilitate a new Kondratieff wave of 'creative destruction' resulting in the continuation of the dynamic economic changes at a micro-economic scale, increased factor productivity and long-term economic growth and rising real incomes at the macro-economic scale;
2. **The synergy with more conventional economic policies:** The adjustment policies are likely to coincide with the broader economic model in terms of supporting the recycling of factor resources and the avoidance of market restrictions and rigidities;
3. **The need to address the major barriers and opportunities:** The significance of technological change as an integral part of the transition process has to be recognised in terms of identifying and addressing major technological lock-in (especially that which would seek to perpetuate the use of fossil fuels) and by seeking to engage and frame the investment choices of the institutional investment community;
4. **The need to manage the risk of structural unemployment:** Structural change results in structural unemployment. The resource efficiency initiative is unlikely to be any different. Early recognition of the risks and development of responses (especially retraining) in key sectors and regions may alleviate the worst outcomes.

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