



PRIME MINISTER'S OFFICE  
ECONOMIC COUNCIL OF FINLAND



20 September 2006

Richard Baldwin<sup>1</sup>

## Globalisation: the great unbundling(s)

This paper is a contribution to the project *Globalisation Challenges for Europe and Finland* organised by the Secretariat of the Economic Council. The project is a part of Finland's EU Presidency programme and its objective is to add momentum to the discussion in the European Union on globalisation, Europe's competitiveness policy and the Lisbon strategy.

---

<sup>1</sup> Graduate Institute of International Studies, Geneva.



# Contents

SUMMARY .....	5
1 INTRODUCTION .....	7
2 FIRST UNBUNDLING .....	9
2.1 Globalisation: six stylised facts.....	9
2.2 The deep economic logic of the first unbundling.....	10
2.3 Accounting for the facts .....	12
2.4 The old paradigm .....	16
2.5 Policy thinking based on the old paradigm .....	19
3 THE SECOND UNBUNDLING .....	22
3.1 Towards a new paradigm? .....	24
3.2 What is new about the new paradigm? .....	25
3.3 The unpredictability of globalisation's impact.....	28
3.4 Thinking about offshoring .....	31
3.5 Insight #1: Production unbundling as technical progress .....	31
3.6 Insight #2: Grossman-Rossi-Hansberg mechanism.....	32
3.7 Insight #3: Samuelson's caveat .....	34
4 HOW MANY JOBS WILL BE OFFSHORED? .....	36
5 POLICY IMPLICATIONS .....	40
5.1 Policy lessons from the new paradigm .....	40
6 CONCLUDING REMARKS .....	45
REFERENCES .....	47



## SUMMARY

Three eminent economists from Princeton University have recently argued that globalisation has entered a new phase that requires a new paradigm understand. This paper examines what is new in the new paradigm and considers the policy implications for Europe. Roughly speaking new-paradigm globalisation differs from the old in that it is occurring at a much finer level of disaggregation. Due to radical reductions in international communication and coordination costs, EU firms can offshore many tasks that were previously considered non-traded. This means that international competition – which used to be primarily between firms and sectors in different nations – now occurs between individual workers performing similar tasks in different nations. The really new feature is that deeper new-paradigm globalisation will seem quite unpredictable from the perspective of firms and sectors. Since individual tasks can be offshored, globalisation may help some workers in a given firm while harming others. Moreover, old-globalisation's correlation between skill groups and winners and losers breaks down. Certain highly skilled tasks may turn out to be offshorable, while other highly skilled tasks are not. Increased offshoring will therefore not systematically help or hurt skilled workers in the EU. In particular, many "Information Society" jobs are prone to offshoring so EU policies aimed at moving workers into Information Society jobs may be wasted since those jobs are only 'good jobs' because they do not yet face direct international competition. The paper argues that this has important implications for the EU's competitiveness strategy, education strategy, welfare states, and industrial policy. The underlying theme is that the increased unpredictability should make EU leaders more cautious about moving workers or skills in a particular direction. Flexibility is, as always, the key to allowing Europe to seize the opportunities of globalisation while minimizing the adjustment costs.



# 1 INTRODUCTION

Globalisation is a new and important phenomenon – and has been since the introduction of steamships, railroads and the telegraph. While there is much to be said for this nothing-new-under-the-sun scepticism, some leading economists have very recently argued that globalisation has entered a new phase. One of the world's leading trade economists, Professor Gene Grossman of Princeton University, argues that this phase is so different that understanding it requires a 'new paradigm.' His colleague, Professor Alan Blinder goes, even further; the title of his recent paper in Foreign Affairs is "Offshoring: The Next Industrial Revolution?"

The first goal of this paper is to review what is new in the new paradigm and to extract the lessons it holds for European policy makers. "Old-paradigm globalisation" however is still very important so the paper covers more traditional globalisation issues as well.

The new and old globalisation paradigms fit together most naturally when thinking of globalisation as two great unbundlings. The cost of moving goods, people and ideas has, since the dawn of human civilisation, tended to result in the geographic clustering of production and people. Rapidly falling transportation costs – a trend which has been going on since the late 19<sup>th</sup> century – caused the first unbundling, namely the end of the necessity of making goods close to the point of consumption. More recently, rapidly falling communication and co-ordination costs have fostered a second unbundling – the end of the need to perform most manufacturing stages near each other. Even more recently, the second unbundling has spread from factories to offices with the result being the offshoring of service-sector jobs. In a nutshell, the first unbundling allowed the spatial separation of factories and consumers. The second unbundling spatially unpacked the factories and offices themselves. The old paradigm – essentially traditional trade economics – was useful for understanding the impact of the first unbundling. Understanding the second unbundling (which has variously been called fragmentation, offshoring, vertical specialisation and slicing up the value-added chain) may require a new paradigm, especially when it comes to the offshoring of services.

Before the second unbundling, firms and sectors were the finest level at which globalisation's impact was felt. More open trade spurred the fortunes of some firms while spiking the fortunes of others but the firm was the finest level of disaggregation worth looking at. Since most firms in a sector stood or fell together, the type of labour used most intensively in the sector typically shared the fortune of the firms and thus labour groups were a useful aggregate for analytic purposes. In the EU, the first unbundling systematically spiked the

fortunes of unskilled-labour-intensive industries and spurred the fortunes of skill-intensive sectors, so unskilled labour found the first round impacts of globalisation to be highly negative while skilled workers found them to be favourable.

As the second unbundling opened up firms – viewed as a black-box package of ‘tasks’ in the old paradigm – global competition came directly into factories and offices; global competition occurred on a task-by-task basis rather than firm-by-firm or sector-by-sector basis. The new paradigm helps us understand the impact of globalisation when international competition plays itself out at the level of tasks within firms. This trade-in-tasks versus trade-in-goods has subtle but important implications for policy. Before getting to these, the paper first covers the first unbundling (Section 2), the second unbundling (Section 3) and estimates of how many jobs may be offshored (Section 4). After considering the policy implications (Section 5), the paper closes with some concluding remarks (Section 6).



## 2 FIRST UNBUNDLING

The first unbundling occurred in two waves – one from roughly 1850 to 1914, the other from the 1960s to the present (Baldwin and Martin 1999). At a high level of abstraction, the impact of the first unbundling can be grouped into a set of stylised facts.

### 2.1 Globalisation: six stylised facts

Globalisation's first bundling has been marked by six features:

**Industrialisation/Deindustrialisation.** In the first wave, the 'North' (Western Europe and the US) industrialised while South (especially India and China) deindustrialised. In the second wave, the South (East Asia) industrialised while the North deindustrialised.

**International divergence/convergence.** The first wave saw North and South incomes diverge massively, while the second wave witnessed a convergence, at least between the North and the industrialising South.

**Trade.** International trade in goods and factors exploded in the first wave. After being shut down by two world wars, a surge of protectionism and the Great Depression, the second wave was marked by a return of trade and capital flows to levels that have recently topped those seen in Victorian England. Mass international migration, however, remains small by the standards of the first wave.

**Growth Take-off.** Sometime before the first globalisation wave kicked in, the "Industrial Revolution" triggered modern growth in the North, but the South continued to stagnate in per capita terms. Modern growth, that is a self-sustaining growth process whereby output per hour rises steadily year-by-year, begins in the UK but spreads to Western Europe and the US around the middle of the 19th century. Of course, this is not independent of the income divergence since big differences in income levels come from sustained differences in growth rates. The income convergence in the second wave is also linked to spectacular growth in the industrialising South and a moderate slowdown in the North.

**Urbanisation.** While some of the largest cities in the world were in the South prior to the 19th century, the first globalisation wave is accompanied by a rapid and historically unprecedented urbanisation in the North. Northern urbanisation continued during the second wave but cities grew even more rapidly in the South.

**Internal divergence.** During the second wave, inequality in incomes and/or unemployment outcomes increased in the North.

## 2.2 The deep economic logic of the first unbundling

Globalisation has been driven by a steady reduction in the cost of moving goods, people, capital and ideas. The effects of globalisation, however, have been anything but steady. Expanding markets allowed firms and industry to exploit scale economies in the production of manufactured goods, but the results were not a gradual change. The impact came at different times to different nations, but when it did come it was considered to be a revolution, the Industrial Revolution. Likewise, the industrialisation process that occurred in some developing nations during the late 20<sup>th</sup> Century was even more revolutionary, with income growth rates often being 4 or 5 times faster than the GDP growth rates during the 19<sup>th</sup> Industrial Revolutions (Crafts 1995).

This section considers the basic economic forces that allow us to account for the six stylised facts. We begin with agglomeration forces.

### ***Agglomeration's hump-shape***

Agglomeration forces inevitably involve circularity in their definition. Agglomeration refers to the tendency of a spatial cluster of economic activity to generate forces that foster spatial clustering. While this may seem less than fully straightforward when written in this manner, agglomeration forces are things that everyone observes everyday. People choose to live and work in big cities despite higher prices and congestion costs exactly because jobs tend to be better in big cities; the jobs are better in the big cities because there are so many suppliers and customers, i.e. because so many people live there.

The extent of agglomeration at the city level tends to be influenced by the forces that are quite limited in their geographical impact – basically commuting distances and the need for face-to-face interaction. The agglomeration forces that are most relevant for globalisation, by contrast, operate on a vast geographic scale. For example, firms tend to set up, say, truck factories in Europe since the market for trucks is quite dense in Europe. The result of such calculations by millions of firms results in a dense network of manufacturing facilities in Europe. Thus Europe is attractive to manufacturers due to its spatially dense network of suppliers and customers, but that attractiveness serves to keep the networks dense. Note that the basic long-distance agglomeration forces stem from nearness to customers (demand side linkages) and nearness to suppliers (supply side linkages). These demand and supply linkages are traditionally known as forward and backward linkages, respectively. The way market size and agglomeration forces feed on each other is called circular causality, or cumulative causality.

One of the many unexpected features of agglomeration forces is the fact that they tend to be strongest for intermediate levels of trade freeness. The point can be illustrated by considering two extremes: when trade is completely closed and when trade is perfectly costless. When trade is completely restricted, production is necessarily bundled together with consumption since everything must be made near the consumers. Production cannot agglomerate since output cannot be shipped to customers in other nations. At the other extreme, the extreme of perfectly costless trade, the location of production becomes irrelevant. It could be completely agglomerated or it could be completely dispersed with no impact on firms' bottom-lines. At intermediate levels of trade cost – where agglomeration is both possible and useful – agglomeration forces are strongest.

The hump-shaped nature of agglomeration forces is the key to understanding the hump-shaped impact of globalisation on the location of industry, i.e. the fact that the first wave of globalisation was associated with a massive concentration of manufacturing in the North while the second wave involved industrialisation of the South and deindustrialisation of the North.

### ***Home market magnification effect***

A second somewhat counter-intuitive effect concerns the way that lower trade costs make industry more footloose, not less. In trade theory, this is known as the Home Market Magnification Effect. Paul Krugman's famous Home Market Effect explains how trade costs, scale economies and imperfect competition combine to give large markets a disproportionate share of world industry. That is, market size itself can influence a nation's comparative advantage. It explains, for example, why successful car companies are located in the world's biggest nations, the US, Germany, Japan, etc.

A first-cut explanation of the Home Market Effect notes that firms want to locate near their customers in order to economise on shipping costs. This first-cut intuition, however, is not enough. It is necessary to explain the equilibrating force as well, i.e. to explain why not all firms in the world locate in the biggest market. While there may be many forces that discourage this sort of extreme agglomeration, an important one – and one that is affected by trade costs and thus affected by globalisation – is called 'local competition.' The local competition effect turns on the way that trade costs provide a partial shield against competition from firms located elsewhere. This tends to discourage firms from clustering in the biggest market since local competition is most intense in the biggest market.

It is useful to see how the two forces interact in a small thought-experiment. Consider a two-country world where the two nations are initially identical in size and each region has half the world's industry to begin with. Some sort of exogenous migration occurs and one region – call it the North – becomes bigger than the other region (the South). If there were no change in the spatial distribution of industry, firms in the now-big North would be especially profitable (they get to serve a larger fraction of their customers without incurring trade costs while the degree of local competition is unchanged). By the same token, firms based in the South would earn below-normal returns. Quite naturally, some industry would move from the South to the North and this movement would tend to equilibrate the profitability of the two locations. The share of industry that must move northwards to equalise profits depends upon the level of trade costs. If trade costs are quite high, then the increase in competition in the North will be quite localised and thus only a moderate amount of industry needs to move to the North in order to restore equality of profitability. And this local competition effect acts in a scissor-like manner. As more firms move northwards, competition in the northern market rises while at the same time competition in the South diminishes. This scissor-like effect is the key to the Home Market Magnification effect, so it is useful to examine it more closely.

Consider the impact of a firm that moves from South to North in response to the shift in profitability. The firm now sells its wares in the North without incurring trade costs, but at the same time, it is no longer exporting to the North. Thus on one hand, the firm's relocation raises the degree of competition in the northern market directly, but on the other hand it reduces the extent of import competition in the North. The total impact on the degree of competition in the North is the net of the two conflicting effects. As long as trade costs are positive, the South-to-North relocation will raise the degree of competition in the North, but the net impact is *higher* when trade costs are high. This means that it takes fewer migrating firms to re-equilibrate profitability when trade costs are high. Intuitively, competition is more localised when trade costs are high, so the competition effect of a single firm's South-to-North relocation is greater when trade costs are higher.

Extending this logic, it is straightforward to see that the number of firms that must move from the South to the North in order to equilibrate profitability after the initial change in market size must be larger when trade costs are lower. In other words, firms become more footloose with trade costs are low, not less.

### 2.3 Accounting for the facts

The hump-shaped nature of agglomeration forces can account for three of the six facts. The account begins in 1750 or so when the world's economic

geography was quite homogeneous. With the exception of a handful of cities, every region in every nation was quite similar, namely poor and agrarian. Trade costs were nearly prohibitive, both within and between nations, so each village's consumption was bundled with its production. Since the village had to make all of its own goods but could not export any surplus, it was impossible to realise scale economies. Manufactured goods were dear and the available range of varieties limited. As trade costs fell specialisation became feasible and this triggered a process of cumulative causality.

Migration of firms and workers de-homogenised the world, turning it into economically big and small markets. Due to Krugman's Home Market Effect, industry was drawn disproportionately to large regions. But since industries are marked by increasing returns, getting a disproportionate share of industry means a region's labour is disproportionately productive and this in turn results in higher real wages and/or a higher return to capital. The circle is closed by noting that capital and labour are then attracted to regions with higher rewards and their migration makes the big region bigger and the small region smaller. This agglomeration process is balanced by numerous dispersion forces. An important one in the first wave of globalisation was the diminishing productivity of labour in agriculture. As labour left the land, the productivity of the remaining labourers rose and thus it became ever more expensive for industry to hire workers away from farms.

Advances in transport technology in the early 19th century triggered this de-homogenisation of the world's economic geography. As history would have it, the North won at the South's expense. This single event is the root cause of the first three facts: northern industrialisation and southern deindustrialisation, the rapid expansion of international trade (England becomes the world's workshop providing cheap and varied manufactured goods in exchange for raw materials), and income divergence (due to increasing returns, a high share of industry in GDP means high labour productivity and thus high incomes). This line of logic was first presented by Krugman and Venables (1995) in a paper entitled "Globalisation and the inequality of nations," but which was widely known by its working title: "History of the World: Part I."

This interplay of economics forces explains the North/South income divergence in qualitative terms, but cannot explain the massive income gap that emerged in the 19<sup>th</sup> century and persists today. To get the magnitudes right, we have to connect the location of industry to GDP growth rates. This brings us to the fourth symptom of globalisation – growth take-offs.

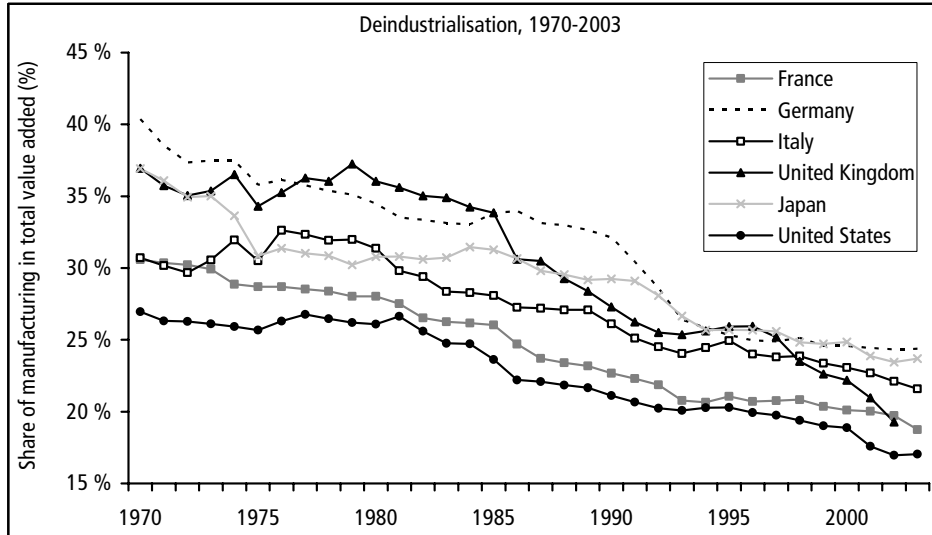
### ***Growth take-offs and economic geography***

The literature combining economic geography and economic growth models is based on the simple notion that transporting ideas is expensive. The result is that learning spillovers tend to be localised geographically, so a spatial clustering of industry will produce a spatial clustering of innovation, technology progress and growth.

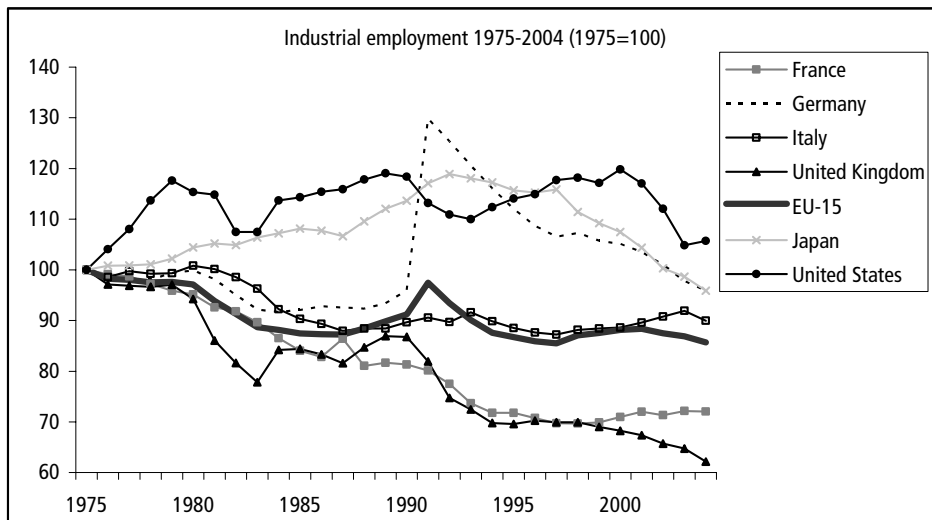
The first growth take-off occurred in Europe. Before manufacturing was clustered geographically, industry never achieved the critical mass necessary to trigger the learning-innovation cycle on which modern growth is based. As the transport cost of goods fell with the development of inland water transport and eventually railroads, industry and thus industrial innovation and learning became geographically concentrated. The resulting innovation and specialisation gave northern industry a powerful cost-advantage over industry in the South. This favoured the North as a location for industry and it destroyed incentives for innovation in the South. In this way, lower internal and international transport costs produced industrial agglomeration that generated industrialisation and a growth take-off in the North. The same forces produced deindustrialisation and growth stagnation in the South (see Bairoch 1982 for data on the deindustrialisation of the South, especially India and China). This growth gap – which persisted for much of the twentieth century – produced what Lant Pritchett (1997) calls 'divergence big time,' i.e. the massive income gap that continues to mark today's world. This line of logic was first presented by Baldwin, Martin and Ottaviano (2001).

The 1914 to 1950 turmoil put many aspects of globalisation on hold. When it restarted, the cost of transporting goods continued to fall but it appears to be asymptotically approaching some natural limit. By contrast, and importantly, the cost of trading ideas decreased rapidly in the post-war period, with the trend accelerating in the last 20 years or so with the spread of the internet and deregulation of the telecommunications industry. At some point, the lower cost of 'transporting' ideas generates a rapid industrialisation in the South as the South is more easily able to benefit from historical innovation in the North and more easily able to access northern markets. The emergence of southern industry forces a relative deindustrialisation in the North. The resulting deindustrialisation of the North is shown in Figure 1 and Figure 2. It is important to note, however, that globalisation has been only part of the reason why rich nations have been making a steady transition to services and away from industry.

**Figure 1** Industry as share of GDP, large OECD nations, 1970–2003.



**Figure 2** Industrial employment in large OECD nations, 1975–2004.



Source: Debande (2006).

Debande (2006) notes that deindustrialisation is driven by internal and external factors. Globalisation plays an important role on the external side as freer trade with the South has resulted in a shift in the production of labour-intensive activities that better reflects comparative advantage. The internal side concerns the way that OECD consumers have started to shift their consumption patterns towards non-traded services such as medical services, tourism and government services. Since they are non-traded, prices and wages adjust until sufficient

labour is pulled into these sectors to meet demand. Given that there is so little labour left in agriculture, the shift to services necessarily comes at the expense of industry. A second internal factor concerns the rapid productivity growth in industry which tends to reduce the number of workers necessary to produce any given output.

Two studies, Rowthorn and Ramaswamy (1998), and Rowthorn and Coutts (2004), decompose the decline in industry's share of employment into internal and external factors. For the 1970–1994 period (i.e. before the 'new economy' boom), they estimate that more than 80% of deindustrialisation was due to internal factors in the US and the EU and 90% in Japan. Post-1994, they find that external factors are much more important in all three regions. Boulhol (2004) confirms these findings.

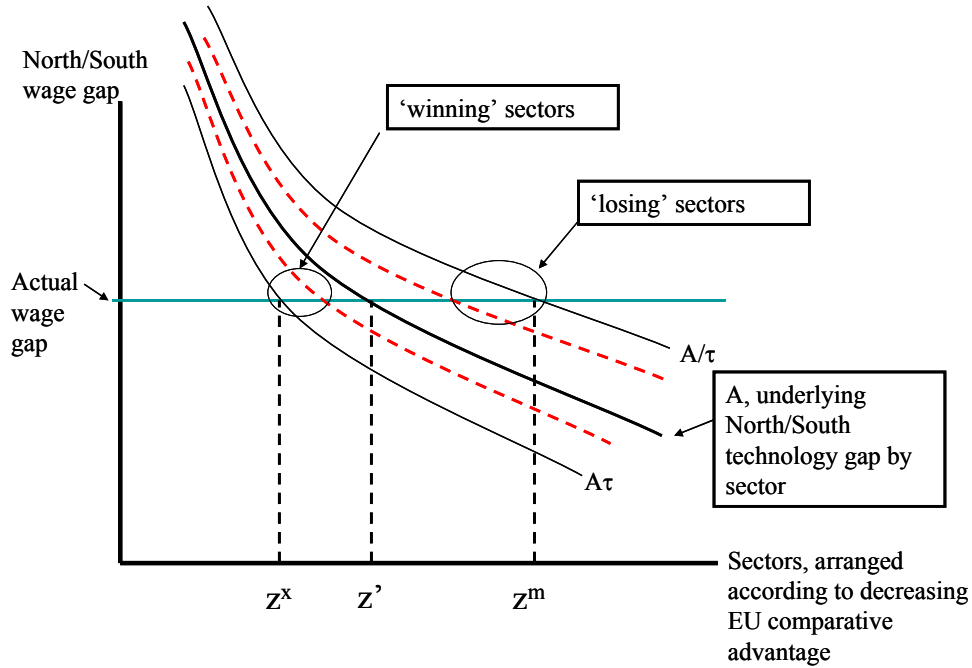
The only facts left unaccounted for concern urbanisation. To get this into the story, one would have to allow internal geography in nations (Baldwin-Martin-Ottaviano follows Krugman-Venables in assuming that regions are just points in space), but once the technical difficulties were mastered, the economics would be straightforward. In the first wave of globalisation, economic activity characterised by localised spillovers is concentrating in the North. It would not therefore be too surprising that urbanisation proceeded faster in the North than in the South during this era. Likewise, in the second wave of globalisation, the industrialisation of the South (emergence of the Asian tigers, etc.) strengthens the forces that foster within-South concentration of economic activity, i.e. urbanisation, while the deindustrialisation of the North does the opposite.

## 2.4 The old paradigm

In the first unbundling, one views firms as 'black boxes' since global competition occurred at the sector-to-sector level, or at the firm-to-firm level, so firms constituted the finest level of disaggregation worth looking at. The fortunes of sectors tended to be shared with the productive factors used most intensively in the sectors, so labour skill-groups were also a useful aggregate for analytic purposes.



**Figure 3** The old paradigm and the first unbundling.



This logic naturally directed Europe's policy responses to sectors, firms and labour skill groups. The second unbundling and the so-called new paradigm alter some of this logic. To clearly lay out what is new in the new paradigm, it is useful to present a simple framework that explains the old paradigm, i.e. the paradigm of trade in completed goods. It is important to note that the old paradigm focuses on sectors, not tasks, and on the falling cost of trading goods, not ideas.

The basic story is illustrated in Figure 3. When factories stay bundled, international competition plays itself out along the dimension of sectors, so sectors are the natural unit of analysis. The diagram shows EU sectors along the horizontal axis, ordering them according to their competitiveness. The EU's most competitive sectors are on the left (e.g. commercial aircraft) and the least competitive are on the right (say, inexpensive rope-soled sandals). What does competitiveness mean here? The curve A shows the productivity of EU firms relative to rest-of-world firms (call them 'South' to be concrete). The curve is very high to the left of the diagram since in these sectors, EU productivity is high relative to that of southern firms. This makes EU firms very competitive since they can afford to charge lower prices or produce higher quality for any given wage. The actual EU/South wage gap, i.e. the ratio of EU wages to South wages is marked with the flat line.

The borderline sector is marked as  $z'$ . This is where the wage gap just equals the productivity gap so for sector  $z'$ , EU and South are equally competitive in the sense that the EU's higher wages are exactly offset by its superior labour productivity. In all sectors where the EU is more competitive than  $z'$  (those to the left of  $z'$ ), EU firms can out-compete South firms in terms of price, quality, etc. For sectors to the right of  $z'$ , it is the southern firms that have the overall edge since their productivity disadvantage is more than offset by the wage gap. All this ignores the central character in globalisation – trade costs. To add in trade costs, we have to adjust the productivity gap concept a bit. The cost of EU products in the southern market will be higher due to trade costs, so the EU's productivity edge in the southern market is dampened by trade costs. This is shown by the curve marked  $A_\tau$ , where  $\tau$  is short for trade costs. For example, without trade costs, EU and southern firms were equally competitive in sector  $z'$ ; now with trade costs, we see that southern firms would have the edge in the southern market ( $A_\tau$  is below the wage gap). For the EU, the with-trade-costs borderline good in the southern market is  $z^x$ . Trade costs have the same sort of impact on the competitiveness of southern goods in the EU market. This is shown by the curve marked  $A/\tau$ . For the South, the new borderline good is  $z^m$ ; this is where the wage gap and trade-cost-adjusted productivity gap are just equal for southern goods sold in the EU market. There is a gap between the borderline-competitive sectors of the EU ( $z^x$ ) and the South ( $z^m$ ). These sectors will be nontraded because EU firms will be more competitive than southern firms in the EU market while the southern firms will be more competitive than EU firms in the southern market. In other words, production and consumption are still bundled nation-by-nation for the sectors from  $z^x$  to  $z^m$ . Consider what the first unbundling looks like in this diagram.

Figure 3 shows the impact when trade costs come down. The EU's borderline-competitive sector shifts to the right, so EU production and exports rise in these sectors. The South's borderline-competitive sector shifts to the left and this means that EU production in these previously non-trade sectors gets downsized and replaced by imports. To sum up, if international competition takes place at the level of sectors and trade costs fall more or less evenly for all sectors, then globalisation's winners in the EU will be the sectors that were most competitive to begin with (and the citizens who work in these sectors). The losers will be the EU's least competitive sectors and the citizens who work in them. This outcome is roughly in line with Europe's actual experience (Greenaway and Nelson 2001).

Of course, globalisation was not the only force in effect. Ongoing technical changes, such as computerisation, also played a large role in determining the fate of northern unskilled labour (Hanson and Feenstra 1999). In nations with relatively unfettered labour markets, this was met with a price response – northern unskilled workers saw their incomes stagnate or fall. In nations with highly regulated labour markets, the response came in the form of a quantity

adjustment – reduced employment and heightened unemployment for unskilled workers.

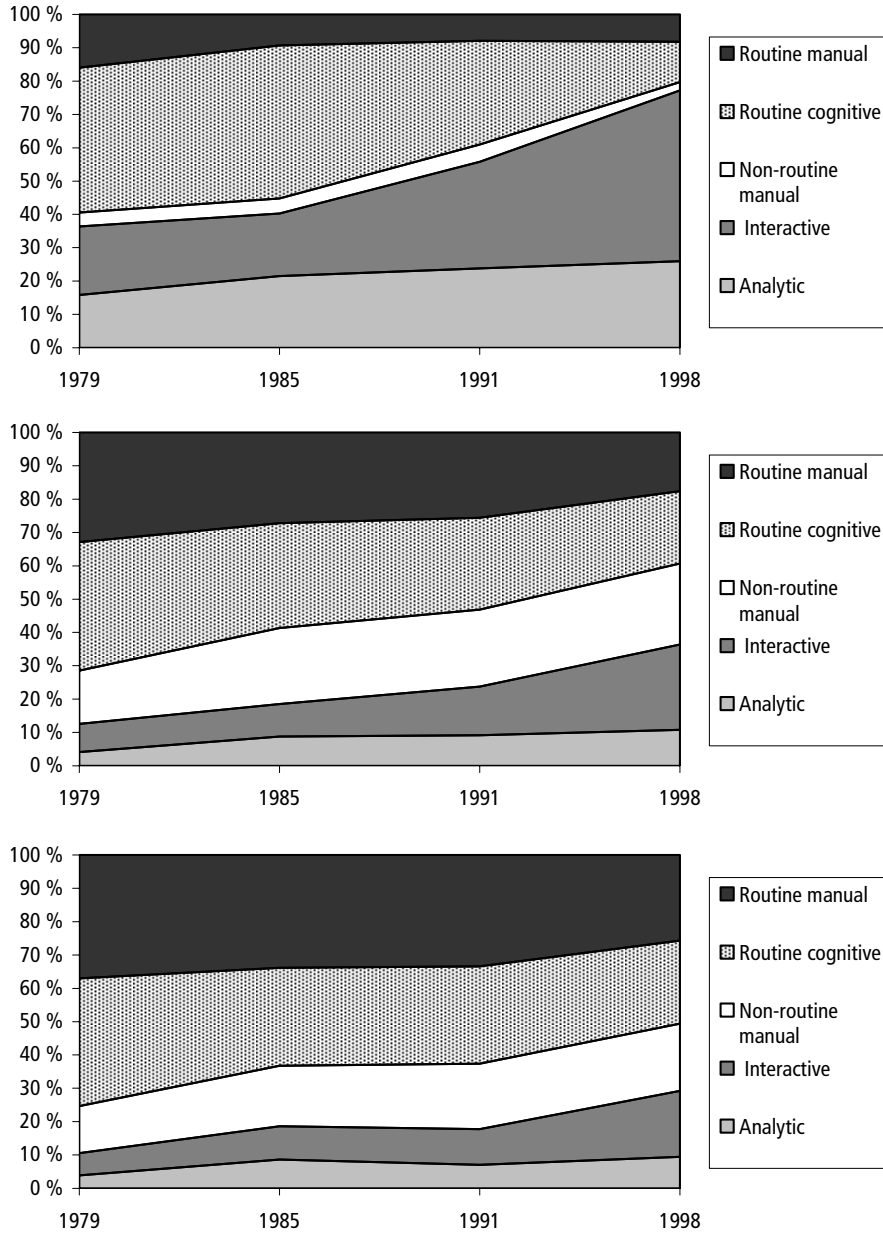
## 2.5 Policy thinking based on the old paradigm

This correlation between current competitiveness and the impact of deeper globalisation has had a profound effect on policy thinking in the EU and around the world. The sectors that 'won' from globalisation were the EU's most competitive sectors. The 'losing' sectors were the least competitive sectors. Going further, one could roughly associate the EU's most competitive sectors with high-tech, human-capital-intensive sectors, and the least competitive sectors with unskilled-labour-intensive sectors. In turn, one can roughly associate the winners from globalisation as the EU's high-skilled, high-education workers and the losers with the low-skilled, low-education workers.

Extrapolating from the historical experience, the old paradigm made EU leaders feel confident that they could predict which sectors would win from future globalisation and which would lose. For example, this extrapolation using the old paradigm appears to underpin EU policymakers' belief that more education is one of the ways Europe should address the challenges of future globalisation. It also seems to be part of their belief that the EU should push its economy towards an "information society".

The old paradigm also guided the interpretation of empirical evidence. For example, an excellent paper on West German labour, Spitz (2004), shows that high, medium and low skilled workers have been doing fewer and fewer routine tasks in their various jobs – and this regardless of which sector they work in. The numbers are depicted in Figure 4. The clear trend is for a reduction in the routine task performed by workers. This has been called an 'upgrading' of skills and is used to argue that the jobs of the future will require European workers to have a higher level of skills than they do now.

**Figure 4** Share of tasks by type for high-skilled (top), medium-skilled (middle) and low-skilled (bottom) workers in West Germany 1979–1998.



Note: the numbers show the share of all the tasks an employee performs that fall into the five categories of tasks, so apart from rounding issues, each row sums to 100. The survey behind this did not ask employees about the amount of time they spent on each task.

Source: Spitz (2004). Table 6.

When policymakers interpret evidence like this using the old paradigm, the policy implications are clear. More education and skill-upgrading for employed workers will help Europe adjust to future globalisation. In particular, Europe's workforce should be shifted into more analytic intensive activities and provided with more analytic skills.

As we shall see below, the new paradigm introduces a line of thinking that should make EU leaders much more cautious about predictions concerning globalisation's winners and losers, the role of education and the information society.

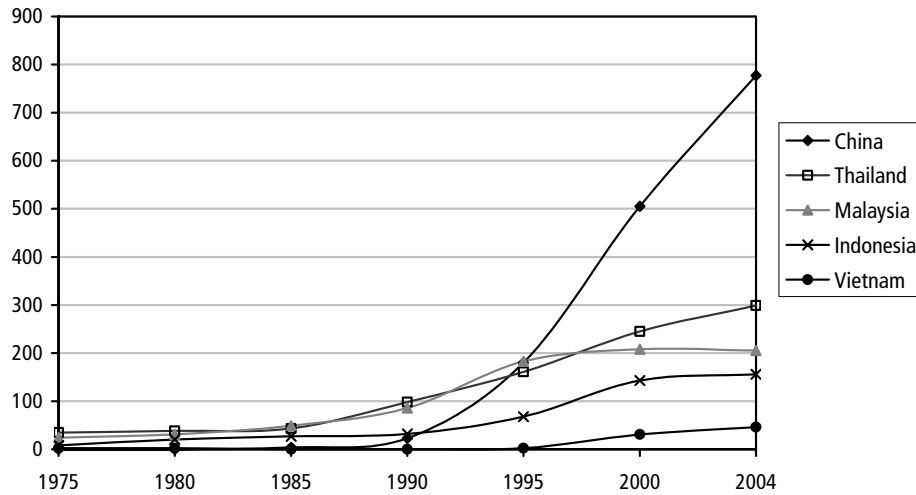
### 3 THE SECOND UNBUNDLING

Up until the mid-1980s or so, globalisation played itself out at the level of firms, or sectors. While it might have been cheaper to undertake some labour-intensive stages of production in the South, production stages tended to be spatially clustered in a single facility, i.e. factory, because this made it easier for managers and workers to co-ordinate their work. The innumerable small and large problems that arise during production could be settled directly with little interruption to the manufacturing process and without managers and workers having to travel. Both financial and timeliness considerations meant that spatial bundling of EU labour, EU capital and EU technology in the EU made good business sense despite the wage gap.

Geographically separating various production stages became more attractive as the North-South productivity-adjusted wage gap grew, and separation became less costly with cheaper telecommunications and air shipping. The importance of distance, especially the travel cost of managers and skilled workers, can be seen in the fact that the first large-scale production unbundling took place over very short distances. In North America the Maquiladora programme saw the widespread emergence of 'twin plants', one on the US side of the border and one on the Mexican side. Although the programme has existed since 1965, it only boomed in the 1980s with employment growing at 20% annually from 1982-89 (Dallas Fed 2002, Feenstra and Hanson 1996).

The world's most spectacular second unbundling has taken place in East Asia where distances are short compared to the vast wage differences (Tokyo and Beijing are about 4 hours apart by plane, yet in the 1980s the average Japanese income was 40 times the Chinese average). Production unbundling by Japanese industry started roughly at the same time as it did in the US, namely in the mid-1980s (Fukao, Ishito, and Ito, 2003). The phenomenal growth of Japanese incomes and wages eroded Japan's comparative advantage in manufacturing. Japanese manufacturers reacted by offshoring labour-intensive production stages to nearby East Asian nations (Figure 5). Interestingly, while this started around 1985, overall Japanese industrial employment did not fall despite the offshoring of almost all labour intensive stages of production (Figure 2), at least not until much later. Evidently, Japanese companies found that the Japan-China wage gap was justified by the Japan-China productivity gap for many industrial jobs, just not the low-skilled ones. Moreover, the offshoring of some low-wage jobs made Japanese companies more competitive in the US and European markets and this helped maintain high-wage industrial jobs in Japan. Offshoring, in other words, was a source of Japan's comparative advantage in US and EU markets.

**Figure 5** Placement of Japanese automobile and electronics plants in East Asia, 1975–2004.



Source: Baldwin (2006), Figure 2.

This tendency, which has been called the 'hollowing out' of the Japanese economy, started so-called 'triangle trade' where Japanese firms headquartered in Japan produce certain hi-tech parts in Japan, ship them to factories in East Asian nations for labour-intensive stages of production including assembly and then ship the final products to Western markets or back to Japan (Urata 2001). The division of East Asia into headquarter (HQ) economies and factory economies strengthened as Taiwan, Korea, Singapore and Hong Kong experienced their own 'hollowing out' and followed the lead of Japanese manufacturing companies in off-shoring the most labour-intensive manufacturing tasks to East Asian nations whose low wages more than compensated for their low labour productivity in such tasks. China's decision in the 1980s to join the world economy accelerated the erosion of the HQ nations' comparative advantage in labour-intensive production processes while simultaneously expanding the attractiveness of the off-shoring solution. China thus added a pull-factor to push-factors and this quickened the hollowing out of the industrial economies of Japan, Korea, Taiwan, Singapore and Hong Kong.

Even more recently, the second unbundling has reached into offices. Tasks that were previously viewed as non-traded became freely traded when telecommunication costs dropped to almost zero. Those tasks where the North-South wage gap was not justified by an offsetting productivity gap were offshored. The classic example is the moving of US call centres to India.

The second unbundling has been extensively documented at the level of intermediate goods with Yi (2003) being the classic reference. More recent evidence can be found in Hanson, Gordon H., Raymond J. Mataloni Jr, Matthew J. Slaughter (2005), and Ando, and Kimura (2005). The more recent unbundling of services has been documented by Amiti and Wei (2005); they argue that it is very difficult to measure accurately but that the available statistics suggest that it is still small although growing rapidly.

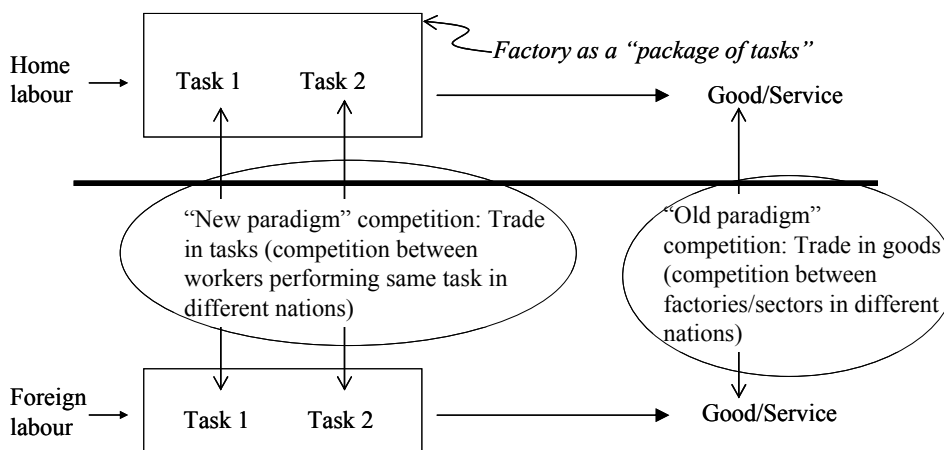
### 3.1 Towards a new paradigm?

When David Ricardo elaborated his theory of comparative advantage two centuries ago, he illustrated it with trade in complete goods – the famous wine-for-cloth example. This made sense since the high cost of moving goods, people and ideas kept the various stages of production spatially clustered. For this reason, one could think of the UK cloth sector as a “package of tasks.” Since the competition was between Britain’s package of tasks and Portugal’s package of tasks there was nothing to be gained from opening up the cloth sector black-box technology, i.e. thinking about the exact tasks necessary to make cloth. The radical fall in the cost of moving goods, people and ideas – especially the drop in the cost of moving ideas – has resulted in the second unbundling.

This meant that international competitive pressures operated on economies with a finer resolution; instead of harming or helping the fortunes of a firm as a whole, it could reach right into the factory and help or harm one particular production stage, or even one particular department, or job. A key aspect of this is that the type of job – call it a ‘task’ – that is harmed by extra international competition may well be a task that exists in a wide range of sectors. For example, data-entry tasks may be offshored by labour-intensive sectors and capital-intensive sectors alike. One implication of this is that it will be less useful to classify the winners and losers from future globalisation according to the sector in which they work, or the skill group to which they belong. The task becomes the common denominator rather than the traditional sector and/or skill aggregates. This is illustrated schematically in Figure 6.



**Figure 6** The first and second unbundling schematically.



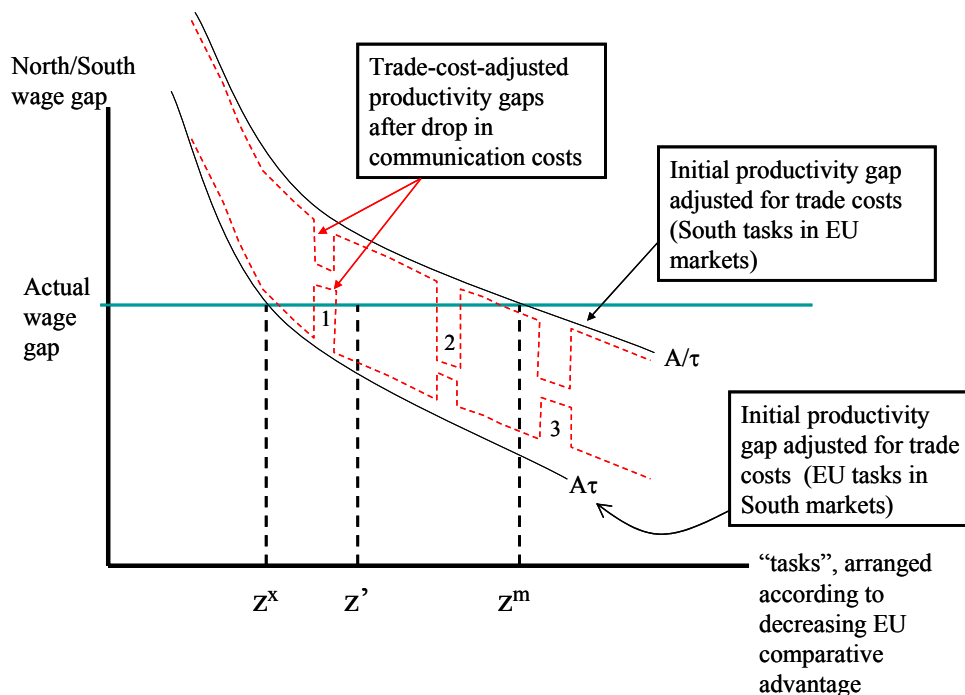
These changes have very recently led three eminent economists – Alan Blinder, Gene Grossman and Esteban Rossi-Hansberg – to call for radical new thinking (Grossman and Rossi-Hansberg 2006a, b, Blinder 2006). Indeed, Gene Grossman, who is one of the world’s leading trade theorists, calls for a “new paradigm” in trade theory, one that puts ‘tasks’ rather than goods and firms at the focal point (Grossman and Rossi-Hansberg 2006b). Alan Blinder’s contribution finds its strength more in its inspiration and motivation than in its precision, so it is not perfectly clear what is new in his view. The papers by Gene Grossman and Estaban Rossi-Hansberg by contrast are based on a specific mathematical model, so their newness can be precisely identified. The Blinder paper is addressed first.

### 3.2 What is new about the new paradigm?

As shown below, the new paradigm introduces a line of thinking that should make EU leaders more cautious about predictions concerning globalisation’s future winners and losers, the role of education and the information society. To make this point – how and why the tasks-versus-sectors distinction is critical – it is useful to portray the new paradigm in a diagram akin to Figure 3. The new paradigm diagram, Figure 7, is very similar to the old paradigm diagram, but the EU’s competitiveness is defined by task rather than by sector. As before, the tasks are ranked according to trade-cost-adjusted comparative advantage, with the EU’s most competitive tasks to the left. Note that this ordering may bear no resemblance to common perceptions of the EU’s competitiveness since common perceptions assume that global competition occurs among firms, i.e. specific packages of tasks. For example, the EU might have a big productivity edge in,

say, fission engineering, so fission engineering would be on the far left. This is different to the old paradigm since fission engineering is used in several sectors (electric power generation, medicine, military, etc.) so the productivity edge in fission engineering was bundled together with the productivity edge of all sorts of other tasks, such as the design of machine tools, complex project management, accounting and marketing services. Moreover, tasks where trade costs are prohibitive, say taxi driving, are also on the far left.

**Figure 7** The new paradigm: tasks not sectors.



Although the diagram is quite similar in the initial situation, the analysis of lower trade costs is quite different. Rapid advances in information technology and plummeting costs of communication have radically reduced the cost of trading some tasks but not others, and this is important. Under the old paradigm, the unbundling mainly concerned goods. Since the cost of shipping goods does not vary radically according to the nature of the good, it was reasonable to view the lower trade costs as affecting all the sectors in the same way. When it comes to tasks, however, the situation is very different. Some tasks, say truck driving, are completely unaffected by reduced international co-ordination costs, while others, say, call-centre services are highly affected. It could happen that the truck drivers and the call centre employees were working for the same sector, say a home PC delivery company. In the old paradigm, there was little wrong in lumping the two tasks together as long as one could be fairly sure that the driving and call-answering jobs would remain bundled geographically. The

second unbundling questions this belief, so it becomes important to look at the impact of globalisation on tasks rather than sectors.

To illustrate this, the new A curves are shown as jumping around due to the lower cost of trading ideas. Some tasks that were previously non-traded become traded. For some of these tasks the EU starts exporting (see point 1 in the diagram), while for others it starts importing (point 2). Other tasks may see a big change in trade costs but no massive switch in competitiveness; the South was competitive in tasks 3 before and after the trade cost reduction.

In Figure 7, the change in trade costs look arbitrary and this is intentional. More precisely, there is no reason to believe that changes in trade costs will be correlated with the initial competitiveness of tasks. As far as policy making is concerned, there are three really new things going on here.

1. Unpredictability. The winners and losers from globalisation are much harder to predict.

By their very nature, lower trade costs for goods tend to affect all traded goods in roughly similar ways and this is why one could tell which sectors would win from further trade cost cuts in Figure 3. When the main barrier is the cost of exchanging information and coordinating production across distances (trading ideas), it is difficult to identify winning and losing tasks. Knowing the direct cost of telecommunications is not enough since it interacts in complex and poorly understood ways with the nature of the task and the task's interconnectedness with other tasks. Economists do not really understand the 'glue' that resulted in the bundling of various tasks into packages (factory and offices), so the way in which various tasks come unglued will be unpredictable until economists know much more about the glue.

2. Suddenness.

A job which 3 years ago was considered absolutely safe – say a German computer programmer designing custom software for a Landesbank – may today be offshored to India, or outsourced to a German software firm that offshores the job to India. The deep reason for this suddenness lies in the nature of complex interactions within factories and offices. Telecommunication costs have fallen rapidly but the impact has been quite different for different tasks. This may be due to the organisation of tasks within offices and factories. This organisation has changed more slowly. At some point – what might be called the tipping point – cheap communication costs line up with new management technology and a new task can be offshored to a lower cost location. More on this in the next section.

### 3. Individuals not firms, sectors or skill groups.

In the first unbundling, one could view firms as black-box bundles of tasks since firm-against-firm competition was globalisation's finest level of resolution. In sectors where backward and forward linkages among firms were important, a nation's sector could be viewed as a bundle of firms whose joint actions determined the sector's competitiveness. The competition was sector-to-sector, so individual firms that were not competitive on a stand-alone basis might still prosper due to the agglomeration economies flowing from their location. The new paradigm suggests that the forces of globalisation will achieve a far finer resolution; it predicts that international competition will increasingly play itself out at the level of tasks within firms. New paradigm competition is on a much more individual basis and this has some implications for policy that we discuss below. Policies designed to help sectors may miss globalisation's losers entirely.

Of the three novel features of the new paradigm, the most troubling from a policy perspective is its unpredictability. The next subsection discusses this feature in more depth.

### 3.3 The unpredictability of globalisation's impact

Under the second unbundling, the impact of globalisation becomes more unpredictable from the perspective of sectors and skill-groups. In Figure 7, the sectors where the EU gains and loses competitiveness are not easily identified ex ante. In particular, there is no reason to believe that workers in the EU's most competitive sectors will be the winners going forward. Nor is there any reason to believe that most of the winners will be highly educated, or involved in analytic tasks as opposed to manual tasks. Many of Europe's workers are now doing jobs whose price is set in the local market – not the global market – since their jobs face no realistic competition from abroad. As a consequence, one cannot be sure that the EU/South wage gap in these jobs is justified by the EU's productivity edge. Indeed, the logic of Figure 7 suggests that many of the non-traded workers in the EU are paid wages that are not justified by their productivity edge. If the second unbundling comes to their occupation, they are very likely to lose their job or suffer pay cuts.

#### ***Tipping points and critical-mass offshoring***

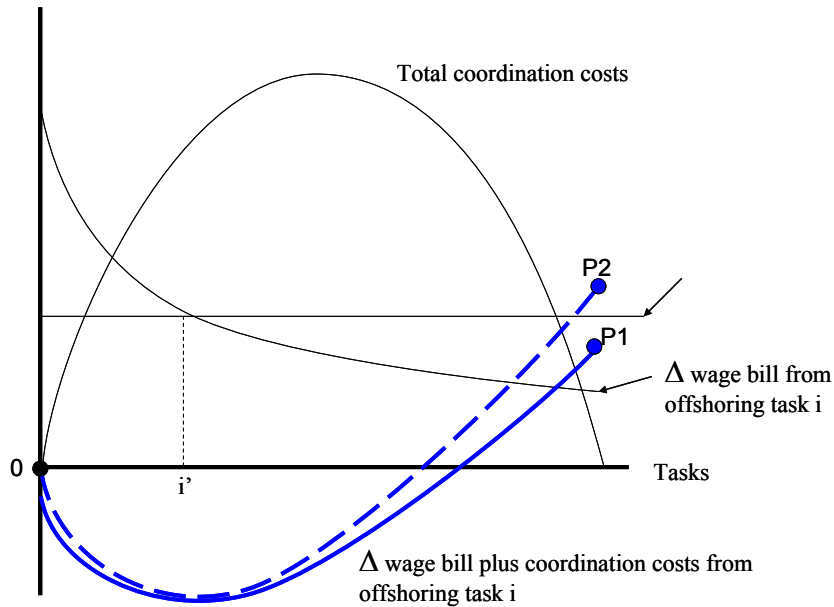
Blinder (2006) and Krugman (1996) hint at this unpredictability, but they do not flesh out any economic mechanisms. This section considers a number of economic mechanisms that could magnify the unpredictability.

Start from two assertions. First, it is not a random outcome that the production of goods and services is undertaken in factories and offices throughout the world. Spatially clustering production stages, i.e. packaging tasks in offices and factories, incurs certain congestion-linked costs so one can deduce the existence of congestion-linked benefits. Second, economists really do not understand the 'glue' that binds production stages and tasks together. The standard approach, production functions, is a black box; one assumes that certain amounts of productive factors are combined to produce a certain amount of output. Given this lack of modelling – to say nothing of a lack of empirical work in the area – economists cannot really pretend to understand the conditions under which various bits of a production process will be offshored. To illustrate this lack of understanding, consider two very simple frameworks that suggest the problem is analytically tractable, but might be very complex. Moreover, moving to empirical work in the area would seem to require data that is not currently collected since the current statistical agencies typically view the economy as a sequence of sectors rather than viewing sectors as packages of tasks.

The first framework concerns co-ordination costs. Consider a simple model that explains why a particular 'team' of tasks is spatially clustered in a single office. To be concrete, say there are 'n' tasks – each performed by one worker – that must be performed to produce the intermediate input (say a marketing report) which is itself fed into a larger production process. Co-ordinating the n tasks requires each worker to talk, say, once a day with every other worker. Turning to offshoring possibilities, assume that offshoring entails a fixed cost per task offshored, and that each of the tasks could be performed more cheaply in India. That is, the EU wage gap is not fully justified by the EU productivity gap for all five tasks, but the mismatch of wage and productivity gaps is larger for some tasks.

The situation is illustrated in Figure 8. The declining curve, marked ' $\Delta$  wage bill', shows the reduction in the wage cost per tasks (tasks are ordered so that this curve is declining). The flat line shows the per-task cost of offshoring. If one were to ignore the co-ordination costs – i.e. the reason that the tasks were packaged together into one office to start with – then one would conclude that all tasks from zero to i' would be offshored since the savings on wage costs would exceed the offshoring cost. Marginal changes in offshoring costs and/or the wage gap would lead to smooth changes in the number of tasks offshored. Moreover, one can see that detailed task-level information on the wage and productivity gaps would allow economists to predict which tasks would be the next to be offshored.

**Figure 8** Tipping points and all-or-nothing offshoring.



Taking co-ordination costs into account changes everything. To be concrete, suppose talking face-to-face is more efficient in terms of time than talking over the phone, Instant Messaging, or email. To keep things simple, say face-to-face communication is costless but over-a-wire communication has extra time costs per communication. If all the tasks are performed in the same office, the coordination costs are zero – and this is true whether the office is in Finland or India. Coordination costs are maximised when half the tasks are done in India and half in Finland. Thus coordination costs are convex in terms of the number of offshored tasks as shown in the diagram. How does this change the decision to outsource tasks?

The heavy curve that stretches from point O to point P<sub>1</sub> illustrates one possibility. The curve sums up the marginal drop in wage costs with the marginal change in co-ordination costs. In the example shown in the diagram, this curve starts out negative since it is assumed that the increase in co-ordination costs outweighs the drop in wage costs. This wage+co-ordination savings curve must be compared to the fixed cost of offshoring each task. Since the OP<sub>1</sub> curve is always below the fixed cost line, no tasks would be offshored.

Now consider a small change in the coordination costs due, say, to a reorganisation of the office, better team-management, or more efficient telecommunications such as video-phones. This would rotate the wage+coordination savings curve to, say, the OP<sub>2</sub> curve. Since point P<sub>2</sub> is now

above the fixed cost line all the tasks would be offshored. This is the tipping point. Due to the natural convexity of co-ordination costs, offshoring of tasks happens in a lumpy fashion. In this simple example, no tasks are offshored for all co-ordination costs up to a certain level, but beyond that point all tasks are offshored. Importantly, it might seem that the tasks from  $i$  to  $n$  were 'incorrectly' offshored, if one did not consider the coordination costs. Since it is extremely difficult to measure co-ordination costs in the real world, this incidence of offshoring might seem unpredictable given current statistical information available to governments. The second model assumes a richer set of interaction among the various tasks.

Another key source of unpredictability could come from agglomeration economies. In many cases, the provision of various tasks is subject to important backward and forward linkages that involve the cost of moving goods, people and ideas. Given the massive New Economic Geography literature, we have a whole library of analytical frameworks to draw from in modelling this. One particularly relevant model is that of Puga and Venables (1996). This so-called critical-mass-development model explains why, for example, industrialisation jumped from island to island in East Asia, starting with Japan and moving on to Taiwan, Hong Kong, Singapore and Korea instead of moving more gradually into all East Asian nations at the same time. Transferring the lessons to offshoring tasks, it suggests that the very low level of offshoring that is now seen in service sector cannot be taken as a good indication that the level will remain low. When agglomeration economies are important, marginal changes can lead to very large shifts.

### 3.4 Thinking about offshoring

Most of the elements identified above as new have not been thoroughly studied from a logical or empirical perspective. The mainstay models of the second unbundling focus on issues such as the size and distribution of the gains from offshoring under various assumptions. Most work in the simple setting of perfect competition and constant returns. This section covers the insights from this work that are most relevant to policy.

### 3.5 Insight #1: Production unbundling as technical progress

In 2004, Greg Mankiw announced to the US business media that offshoring was just like trade in goods: "More things are tradable than were tradable in the past," Mankiw said, "and that's a good thing." Mankiw was in good company since trade theorists have long modelled production unbundling as if it were just

like trade in goods. The key insight in this type of offshoring – what might be called Mankiw-offshoring – is that it acts like technical progress.

Mankiw-offshoring means new trade – trade in intermediate goods and services that were previously packaged together in a black-box production function. This new trade implies gains from trade as usual but because the new trade involves intermediate goods the end result is that more final goods can be produced from any given quantity of primary factors. That, of course, is just the definition of technical progress, so at a very deep level, production unbundling can be thought of as technical progress in final goods sectors. This insight, which stretches back to at least Adam Smith and his pin factory example, is very helpful in explaining why governments should view offshoring as an opportunity rather than a threat – despite the fact that it might cause displacement in the labour market.

The analogy is not perfect and many subtleties are hidden by it but the fragmentation-as-technical progress model has proved a popular and enduring way of organising our thinking about offshoring. The work by Ron Jones and co-authors and by Alan Deardorff on fragmentation are all variants of this Mankiw-offshoring, although of course they allow many more things to vary in their models, so the results are typically ambiguous.<sup>2</sup>

### 3.6 Insight #2: Grossman-Rossi-Hansberg mechanism

Grossman and Rossi-Hansberg (2006) argue that a new paradigm is needed to fully evaluate the implications of offshoring. Their version of the new paradigm, which will surely transform the debate on offshoring, decomposes the impact of offshoring on wages into three effects that might be called the terms of trade effect, the jobs effect and the productivity effect. To illustrate these three it is useful to think of the world as Adam Smith's pin factory. That is, imagine the only thing the world makes is pins, so everyone everywhere works in a pin factory. Of course this is wildly unrealistic, and one must generalise the point, but just as some of life's hardest lessons are best taught with simple parables, really hard economics is often best explained with simple examples.

In Adam Smith's pin factory, manufacturing a pin required twelve distinct 'tasks'; drawing out the wire, straightening the wire, cutting the wire, sharpening the pointy end, grinding the top end, making the pinhead (which itself involves three distinct tasks), attaching the pinhead, whitening the completed pin, and putting the pins into the packaging.

---

<sup>2</sup> For example see Dixit and Grossman (1982), and various papers by Ron Jones and Alan Deardorff (Findlay and Jones 2000, Jones and Kierzkowski 1990, 1998, etc., Deardorff 1998a,b). For an even older tradition see Batra and Casas (1973).



What would be the wage of a worker who did all twelve tasks for each pin? Roughly speaking, workers get paid a wage that is proportional to their productivity, so the wage would be tied to the average of the worker's productivity in all of the tasks. Now suppose that the cost of trading goods and ideas falls to the point where it becomes feasible to spatially separate 6 of the tasks, with these 6 tasks being offshored to a low labour productivity nation with correspondingly low wages. Which 6 of the 12 tasks would be offshored? Even if the home worker's productivity is higher in all 12 tasks, the home worker's productivity 'edge' is unlikely to be exactly the same in all 12. According to the usual principle of comparative advantage, the tasks that will be the most profitable to offshore will be the tasks in which the home worker's productivity edge is the least.

This offshoring will engender three effects. The first is the well-known terms of trade effect. Since some of the work is now done by low wage workers, the price of pins is likely to fall. Other things being equal, this would harm the real wage of home pin workers. The second is the jobs effect, that is to say since some of the home workers' work has moved offshore, the demand for home workers will fall and other things being equal, their wage would have to fall to maintain full employment. But all else is not equal. In particular, home workers are now focusing on tasks where their productivity edge is greatest. This, in turn, means that the home worker's average productivity will rise and because his wage is tied to the average of his productivity in all the tasks he performs, his wage will, all else being equal, rise to match the boost in his productivity; this is the productivity effect, which is one of the really novel element in the Grossman-Rossi-Hansberg paradigm. Letting larger doses of reality back into this parable does nothing to alter the basic message. In a nutshell, the Grossman-Rossi-Hansberg (GRH) paradigm stresses the fact that every worker's productivity is linked to his/her average productivity in the tasks he/she performs. Offshoring allows home workers to focus on the tasks that they do relatively well and this tends to raise their overall productivity and wages. This is true whether pins are the only good produced or just one of millions of goods produced. Moreover it is true whether there is only one type of labour or many types. Of course, the terms-of-trade and job-loss effects may overwhelm the productivity effect, but the Grossman-Rossi-Hansberg paradigm allows us to focus more clearly on the true alternative. If the price of traded goods falls and offshoring is not allowed, then home workers will face drop in wages that is even greater. Or to put it more colloquially, German auto companies' offshoring of some labour-intensive jobs to Poland may save German jobs since the alternative is that all auto jobs leave Germany.

Grossman and Rossi-Hansberg (2006) present some evidence that this new division of labour is already proceeding. They draw on a five-way division of the

US labour force prepared by Autor, Levy and Murnane (2003) from highly disaggregated data, aggregating the Auto-Levy-Murnane categories into 'routine' and 'non-routine' tasks. The idea is that routine tasks, which include "routine manual" and "routine cognitive" categories could be offshored to educated workers in low-wage nations. Non-routine tasks, by contrast, require face-to-face interaction and continual re-optimisation and re-evaluation; these are not, therefore, the sort of tasks that can be unbundled. These include the Auto-Levy-Murnane categories of "nonroutine analytic," "nonroutine interactive" and "nonroutine manual." Observe that a plumber performs a non-routine task while a low-level software engineer performs a routine task. According to this aggregation, the share of US jobs that entail routine tasks has fallen since 1970, with accelerating since 1990. By construction, the share of jobs in non-routine tasks has followed a mirror-image rise. Grossman and Rossi-Hansberg (2006) --- GRH for short – marshal this as evidence that the offshoring of routine tasks has already started. For Europe, Spitz (2004) shows that the actual range of tasks undertaken by German employees has moved away from routine tasks and towards tasks that one might think are harder to deliver via fibre optic cable (Figure 4).

### 3.7 Insight #3: Samuelson's caveat

One aspect that distinguishes GRH-offshoring from Mankiw-offshoring is GRH's assumption that offshoring involves task-specific technology transfer. Under GRH-offshoring, the home's superior technology gets combined with cheap foreign labour in the foreign nation.<sup>3</sup> This tying of offshoring and technology transfer suggests that GRH-offshoring might be harmful to the offshoring economy since not all technology transfers are good for technologically advanced nations – a caveat that Paul Samuelson so famously shared with the public in Samuelson (2004). The point is easily explained.

Every nation has a comparative advantage in something. When it comes to rich nations, the advantage is often based on superior technology. This productivity edge results partially in lower priced exports but partly in higher domestic wages – the nation's technological edge is split between consumers and workers. If this technological edge in the export sector is eroded, then the erosion will be shared between workers and consumers. The resulting fall in worker's wages may make the technologically advanced nation worse off. This is what Paul Samuelson was referring to. It is a point that has been well understood by trade economists for ages, but it does not apply to GRH-offshoring.

---

<sup>3</sup> In traditional trade theory, one assumes that technology is nation specific, so the offshored task is done using foreign technology.

The potentially harmful technology transfer concerns the nation's export sector. Such transfers can hurt since they are, in effect, giving a boost to the nation's competitors. By contrast, if the technology transfer is in the transferring nation's import sector, the net effect will be positive since it will induce a positive terms of trade effect (cheaper imports). As usual, cheaper imports create winners and losers, but the winners win more than the losers lose – basically because the nation consumes more of the good than it produces (the definition of imports). Notice, however, that the technology transfer in Grossman and Rossi-Hansberg (2006) inevitably ends up producing something that is then exported to the home country. Because of this, the GRH technology transfer is generally welfare improving for the home nation.

## 4 HOW MANY JOBS WILL BE OFFSHORED?

As an ongoing part of the first unbundling – the geographic separation of production and consumption of goods – industrial workers learned that they were competing with foreign labour via the price of goods. Service workers in rich nations, however, have typically not learned this lesson, but as the falling cost of moving goods, people and ideas continues to fall, the range of domestically produced services that face direct competition from foreign service-providers will expand.

Which jobs are likely to be subject to this new competition? Krugman (1996) emphasised that the key distinction lies in the tradability of services – not in the level of education. This point, which has recently been picked up by Blinder (2006) and Grossman and Rossi-Hansberg (2006a, b), indicates that the past may not serve as a good indicator of the future. In recent decades, high-education, high-skilled workers flourished in the face of globalisation while less-educated workers suffered. The basic force was the unbundling of production and consumption so that relative goods prices in all nations tended to converge. This was good for rich-nation workers whose skills were relatively abundant (their talents were un-priced by the bundling) but bad for those whose skills were relative scarce in the closed economy (their talents were over-priced by the bundling). Since education was relatively abundant in rich nations while unskilled labour was relatively scarce, globalisation seemed to be a boon for highly educated citizens.

In the on-going globalisation wave, the unbundling is not cleaving the labour market according to skill levels since the unbundling is taking place at a much, much finer level. Tasks that can be provided at a distance are likely to be offshored, but the list of these tasks is unlikely to line up with educational attainment or at least not as neatly as it has in the past.

Consider the following contrasting examples inspired by Blinder (2006). A taxi driver in Sweden is radically overpaid by world standards in the sense that although a taxi driver in Stockholm is probably somewhat more productive than a taxi driver in Delhi, the Delhi-Stockholm wage gap far exceeds the productivity gap. Given market forces, this situation is only possible since driving a taxi is non-tradable and this means that Delhi cabbies are in no sense in competition with Stockholm cabbies. The prices of non-tradable tasks are not set on the world market, they are set locally and no one would drive a cab in Stockholm unless the wage was high enough to pull workers out of other jobs (or the unemployment rolls). When it comes to taxi services, this situation is unlikely to change.

A computer security analyst was also a job that was, until recently, considered non-tradable. German companies hired security analysts in Germany and so their salary was set in the German market. Again, German programmers in Germany were probably somewhat more productive than Indian programmers in India, but the wage gap was not justified by the productivity gap. However, many routine security services can be provided remotely. At first 'remotely' may have meant an IT office located in the same building and then an IT office somewhere in Germany. The drop in communication costs and superior management technology means that 'remotely' may now mean Bangalore. This switch implies that German and Indian IT workers employed in these specific tasks are now in direct competition. Any German-Indian wage gap must be justified by an offsetting productivity gap. These examples illustrate that the new division of labour is more about whether the service can be easily delivered down a fibre optic cable – a divide that corresponds very little to the traditional distinctions between jobs that require high levels of education and jobs that do not.

Notice that cheaper trade in goods and ideas has a quite different implication in manufacturing where the North-South wage gaps have already been brought more or less into line with the North-South productivity gaps. In Japan, for instance, the emergence of China resulted in a massive offshoring of labour-intensive production jobs, but since this boosted the competitiveness of Japanese industry on the world market, there was very little downsizing of overall manufacturing employment. Japanese industrial workers specialised in tasks where they maintained a productivity edge that exceeded the wage gap with Chinese workers (as predicted by GRH-offshoring).

### ***Estimates from the US literature***

Bardhan and Kroll (2003) estimate that about 10% of the US labour force is employed in occupations that could be offshored; they include professions such as financial analysts, medical technicians, paralegals, and computer and maths professionals. The other prominent projections have been advanced by consulting firms. The dominant and most widely quoted projection of future job losses is Forrester Research's "3.3 Million US Services Jobs to Go Offshore" (McCarthy 2002). Jensen and Kletzer (2005) cite a variety of estimates of the jobs at risk of delocation.

Van Welsum and Reif (2005) and Van Welsum and Vickory (2006) classify "offshorable" jobs as those characterised by four features:

- IT intensity,
- output that is IT transmittable,
- tasks that are codifiable, and
- little face-to-face interaction.

They classified about 20% of the US workforce as being offshorable.

Mann (2005) uses detailed US Occupational Employment Statistics to trace out the change in the number of jobs. She points out that it is low-wage workers in IT industries that have been hit the hardest, with almost one-third of the jobs disappearing between 1999 and 2004, and this despite the very low salaries. In the occupations in this group, e.g. telemarketers, switchboard operators, telephone operators, computer operators, etc., the average annual salary was just \$25,000. By contrast, workers in occupations that were high-skilled, judgement-oriented and problem-solving earned almost three times as much and saw the number of these jobs increase by about 17% over the same period.

### ***European estimates***

The European work has been less comprehensive, focusing on individual nations. Marin (2004) estimates that production relocation produced the loss of 90,000 jobs in Germany and 22,000 jobs in Austria, which represents 0.3 percent and 0.7 percent of total employment in the two nations respectively. Another study of offshoring, Falk and Wolfmayer (2005), suggests that offshoring reduced industrial employment in Europe by 0.3 percent annually during the 1995–2000 period. They find a good deal of variation across sectors with some of the rapidly growing sectors experiencing no job loss from offshoring.

Amiti and Wei (2005) take a different tack by directly studying the services trade data. They find that service outsourcing has steadily increased in recent years, but since it started at a very low level, it is not yet an important phenomenon. US imports of computing and business services were just 0.4 percent of GDP in 2003, although this share has roughly doubled each decade from 1983. Evidence that these authors extracted from input/output tables paints a similar picture showing that material outsourcing is far more important than service outsourcing. They also demonstrate that the widespread media concern over service outsourcing is misguided; the US and other industrial countries are net exporters of these services. For the US, the net surplus has actually risen in recent years (the US is both the largest importer and largest exporter of computing and business services). Amiti and Wei (2005) also analyse the effects of offshoring on employment, taking Britain as the example. They find no evidence that suggests that offshoring fostered job loss during the period 1995 to 2001.

Ekholm and Hakkala (2005) analyse the effects of offshoring of intermediate input production on labour demand in Sweden, grouping workers by educational attainment. They find that offshoring to low-income countries reduces demand for workers with an intermediate level of education. Offshoring to high-income countries (the main type in Sweden's case) has no statistically significant effect. Other studies grouping workers by educational attainment also find that

offshoring reduces demand for middle-skilled workers, e.g. Falk & Koebel (2003) for Germany.

See Kirkegaard (2006) for a synthesis of the US, European and Japanese studies.

## 5 POLICY IMPLICATIONS

Globalisation can be thought of as an unbundling of things. Roughly speaking, the first unbundling meant that it became economical to locate factories far from consumers. The second unbundling meant that it became economical to 'unpackage' the factories and locate various production stages far from each other. Both unbundlings opened up new opportunities for European firms to raise their productivity. Seizing these opportunities in the past has required adjustments for European firms, workers and governments. Going forward, globalisation will continue to open up new opportunities and continue to require adjustment. This line of thinking underpins the standard policy recommendations when it comes to globalisation. Since the gains from trade almost always come with pains-from-trade, the government's job is twofold. Government policies, especially labour market, R&D and education/training policies should aim to reduce the pain by facilitating the necessary adjustments. Government social policies, especially safety net policies, should be in place so as to assure voters that the gains and pains of any new opportunity will be shared. This is essential to maintaining a political consensus in favour of change in general and globalisation in particular. Political support for change is essential since growth requires change.

The new paradigm does nothing to alter these basic policy implications. It may, by contrast, suggest that they need to be more subtly implemented in the future. Before turning to these novel thoughts, it is worth stressing that the old paradigm is still very much with us. International competition still plays itself out at firm and sector level.

### 5.1 Policy lessons from the new paradigm

Section 3.2 suggested that there are three really new things in the new paradigm as far as policy is concerned: (1) unpredictability, (2) suddenness, and (3) individuals versus firms or sectors. Of the three, the most relevant to policy is unpredictability.

#### ***Unpredictability at sector and skill-group level***

How does unpredictability change policy conclusions? The old competition-at-sector-level paradigm and historical experience made EU leaders feel confident that they could predict which sectors would be sunrise sectors and which would be sunset sectors, which skills would face growing demand and which would face falling demand. Specifically, the old paradigm predicted that Europe's most competitive sectors and the people who work in them will win from future



globalisation while Europe's least competitive sectors and their workers will lose. This was perhaps what underpinned EU policymakers' belief that it would be useful to push the EU economy towards what most people felt would be a sunrise sector – the "Information Society". It also led to a widespread belief that more education and "skill upgrading" was one way governments could lower adjustment costs.

From the new paradigm's perspective, these policies seem too blunt and entirely too self-assured. Consider an example. The EU's medical sector is surely a sunrise sector. It is highly competitive on the world level due to its technological edge and highly skilled workforce. Patients from around the world would buy EU medical services if it were not for the difficulties of delivering the service over long distances. As technology progresses, certain medical tasks may well be able to be performed over long distances. Arthroscopy (so-called keyhole surgery) is done by a doctor manipulating controls while looking at a computer screen. In principle, the patient and surgeon could be in different rooms, and again in principle the rooms could be in different countries. If this happened, the best EU surgeons would become very busy; everyone would want their torn meniscus repaired by the world's leading expert. The worst surgeons would have to find something else to do.

In this example, it really matters that the competition is at the level of tasks rather than sectors. Here globalisation is helping one worker with an advanced university degree but harming another even though both are working in a 'sunrise' sector. Similarly, unskilled tasks in the hospital's billing and record-keeping departments might be offshored to low wage regions or nations, while unskilled patient-care tasks are not. As the examples of the winning and losing surgeons and winning and losing unskilled workers shows, the old correlation between skill/education and winner status need not hold as the second unbundling proceeds.

Another concrete example comes in how one should interpret the skill-upgrading observed in Figure 4. Using the old paradigm, the numbers suggests that EU policy makers should push education systems to stress analytic skills. With the new competition-at-task-level paradigm in mind, this may not be a good idea. Many analytic jobs are nontraded today in the sense that their price is set in local labour markets without direct international competition.<sup>4</sup> Tomorrow's globalisation may change this. After all, a great many analytic workers perform tasks that fit the Van-Welsum-Reif criteria for an offshorable job – IT intensity,

---

<sup>4</sup> Of course all wages are set in local labour markets, but wages in a traded good sector, say autos, are very constrained by international competition. In the German car industry, the German wage premium matches its productivity premium. If it did not, German cars would not sell, and the car firms would downsize the workforce until the premiums lined-up.

IT transmittable output, codifiable tasks, and little face-to-face interaction (Van Welsum and Reif 2005). Some analytic tasks may therefore be offshored to nations where inferior productivity is more than compensated by lower wages for analytic workers.<sup>5</sup> Or, to put it differently, it may be that many analytic jobs in the EU are currently overpaid in the sense that the wage premium paid to EU analytic workers is not matched by their productivity edge over, say, graduates of Indian management schools.

If these conjectures turn out to be true, the EU will be pushing workers into jobs that only seem to be good jobs since they do not yet face international competition. The moral of the story is one of caution. Since it will be more difficult to predict globalisation's winners and losers in the future, EU governments should be more cautious about pushing workers to acquire specific skills.

EU governments should be particular cautious about spending resources to push EU workers into specific "Information Society" jobs. If the trend in service-sector offshoring continues, many analytic jobs that now look like high-value added, good jobs may be offshored. On the whole, such offshoring will be an opportunity for Europe to improve its productivity, but the investments made in pushing workers into these jobs would turn out to be wasted. In particular, it would seem that the emphasis on analytic skills should at least be paired with an emphasis on an ability to be flexible, to learn new skills.

The point that moving Europe's work force towards the 'knowledge-based' economy may turn out to be entirely wrong is not new. It was stressed by Paul Krugman a decade ago and re-emphasised by Alan Blinder this year (Krugman 1996, Blinder 2006). The information economy produces intangibles, with the good jobs going to symbolic analysts who push symbols around computer screens. But an economy must ultimately serve consumers and consumers can only consume so much information. The billions of people in fast growing third world nations are going to want cars, consumer electronics and high-tech medicine – fancier analysis of symbols on a computer screen are not the first priority when your income moves from 2 dollars a day to 30 dollars a day. Moreover, pushing the information society risks running into what is probably the hardest economic law of all – abundant things are cheap. If ten or twenty percent of the two and a half billion people in China and India learn how to manipulate information online, the reward to "information society" jobs could plummet. As Krugman (1996) write: "A world awash in information will be a world in which information per se has very little market value. And in general when the economy becomes extremely good at doing something that activity

---

<sup>5</sup> To take another example, the final version of this report was delivered electronically while the author was in Singapore (attending a conference on offshoring, no less).

becomes less rather than more important. Late 20th-century America was supremely efficient at growing food; that was why it had hardly any farmers." If 21st-century Europe becomes supremely efficient at processing routine information there may be few information workers left.

The most important educational policy implication may be that it is more important for our children to learn how to learn than it is for them to learn any particular set of skills. The educational system should be preparing them for lifetime employability rather than for lifetime employment. As Blinder (2006) puts it: "Simply providing more education is probably a good thing on balance, especially if a more educated labour force is a more flexible labour force, one that can cope more readily with nonroutine tasks and occupational change. However, education is far from a panacea ... In the future, how children are educated may prove to be more important than how much."

#### ***How does suddenness change policy conclusions?***

Much of the recent attention focused on outsourcing stems from the losers-lobby-harder effect. Workers in manufacturing sectors have had their productivity-adjusted wages set in international markets for decades. Quite recently, this effect is reaching into the service sectors, creating new losers as well as new winners. Since losers almost always shout louder than winners, the political debate has been hijacked by the new losers from globalisation. The second unbundling has the potential to create new political special interest groups that oppose further globalisation. In the 1970s and 1980s, labour unions in low-skilled manufacturing sectors managed to force through a number of protectionist policies including the multi-fibre agreement (clothing and textiles) and the Common Agricultural Policy (farming). The tip of this iceberg can be seen in the reaction of French labour unions to privatisation and the Services Directive. EU governments should resist attempts to prevent offshoring by providing more accurate information and analysis of the phenomenon and committing to policies that redress the displaced workers' legitimate concerns.

#### ***How does individual-versus-sectors change policy conclusions?***

The first unbundling engendered many adjustments in the European economy, most of which occurred at the level of firms and sectors. European governments responded with firm-specific, sector-specific policies. For example, all EU members provide subsidies for ailing firms and sectors, especially if they are clustered in a declining region. The new paradigm suggests that future adjustments to globalisation may occur at sub-firm level rather than firm-level. It will be particular tasks that face adjustment and these tasks may be undertaken in a wide range of firms, sectors and regions. As such, they would escape the traditional adjustment-assistance programmes that are now firm-

specific and sector-specific. Given the unpredictability of adjustment needs, it may not be wise to establish lists of tasks that are eligible for globalisation-adjustment-assistance. Rather, the new paradigm suggests that some of the money spent on helping sectors adjust would be more effectively spent on helping workers adjust; general worker retraining programmes would be one example of a new-paradigm adjustment programme.

## 6 CONCLUDING REMARKS

It is useful to start with two assertions.

1. Globalisation will continue and it will continue to create pressures to reallocate economic resources across sectors, firms and occupations.

Globalisation means unbundling. All sorts of economic relationships were bundled spatially to avoid or minimise transportation; this situation implied that the price of many goods, services and wages were set in local markets, not global markets. This bundling meant that workers' pay was tied to the bundle's average productivity. By pure logic, we know that the link to the average dragged down the wage of some workers while pulling up the wages of others. Unbundling breaks the link to the bundle's average. Workers will increasingly get paid what they are worth on the world market. This will lead to gains and pains from trade.

2. The direction and nature of the change is impossible to predict with any accuracy.

Government statistical collection procedures were set up to track the post-war industrial boom when jobs were associated with particular firms and particular firms were associated with particular sectors. Now, jobs are associated with particular tasks and tasks are increasingly reallocated across firms across sectors (outsourcing) and across nations (offshoring). Economists do not have detailed knowledge of exactly what caused the bundling in the first place, so they will not be very good at predicting how the unbundling will occur, i.e. which tasks will be offshored and which will not. Moreover, as firms experiment with unbundling, they are learning that some jobs really cannot be done in India. It turns out that even firms do not fully understand the linkages among the tasks that had been bundled geographically for so long. However, it seems clear that it is probably not true that the biggest adjustments will be made by low skilled workers as it was in the past. Many unskilled workers are performing tasks that are entirely shielded from global competition due to their very nature; it is much easier to offshore a financial analyst's job than it is to offshore a shop assistant's job.

A clear implication of these two assertions is that promoting flexibility and adjustment will be one of the keys to successful government policy responses. This, of course, does not necessarily mean embracing Anglo-Saxon style flexibility where the market is allowed to reign free. Northern European governments routinely collect 50% of national output, so they have enormous scope for separating what workers care about (take-home pay) and what firms care about (total employment costs). The efficient reallocation of labour only

requires that firms see changes in the cost of employing workers – not that the workers themselves see a big change in take-home pay. If workers' costs to firms and prices remain flexible, then each nation's resources can be redeployed to exploit the new prices and the nation's income as a whole will rise. On the other hand, if prices or quantities are constrained in an attempt to thwart adjustment, the nation's income as a whole will suffer.

The final take-away message concerns European welfare states. The next decade seems set to throw up at least as many economic challenges as the past decade. Much of Europe's ability to adapt to the new world situation – in particular the emergence of China and India – rests on European's belief that both the gains and pains of globalisation are shared broadly across the population. This fact will surely be no less important in dealing with the challenges of the second unbundling. However, the exact nature of the welfare state will matter, as Sapir (2005) stresses. Offshoring will prove to be especially attractive to European firms located in welfare states that are based on the principle of resisting change with employment protection laws, government employment etc. After all, offshoring provides the ultimate flexibility and such flexibility may prove most attractive to firms in nations with the most rigid labour markets. This suggests that it will even more important to shift to welfare state models that protect workers rather than jobs, that encourage adjustment with employment insurance and re-training schemes. Or, to put it more directly, attempts to save jobs with employment protection laws may result in even more jobs being offshored.

To end, it is worth noting that the new paradigm does not push out the old. International competition at the firm level continues to be important and offshoring, especially in the service sector, is still relatively minor. The most robust policy message therefore is one of caution – globalisation's impact is likely to get harder to predict, so governments should be more cautious when they try to pick winning sectors.

## REFERENCES

- Amiti, M. and S.J. Wei (2005), "Fear of Service Outsourcing: Is it Justified?" *Economic Policy*, 20, pp. 308-348.
- Ando, M. and Kimura, F. (2005), "The formation of international production and distribution networks in East Asia," in T. Ito and A. Rose (Eds.), "International trade (NBER-East Asia seminar on economics, volume 14)," Chicago: The University of Chicago Press. First version, NBER Working Paper 10167.
- Autor, D. F. Levy and R. J. Murnane (2003), "The Skill Content Of Recent Technological Change: An Empirical Exploration," *The Quarterly Journal of Economics*, MIT Press, vol. 118(4), pages 1279-1333, November
- Bairoch, P. (1982), "International industrialisation levels from 1750 to 1980," *Journal of European Economic History*, 2, pp 268-333.
- Bairoch, P. (1982), "International industrialisation levels from 1750 to 1980," *Journal of European Economic History*, 2, pp 268-333.
- Baldwin, R, G. Ottaviano and P. Martin (2001), "Global Income Divergence, Trade and Industrialization: The Geography of Growth Take-Offs," *Journal of Economic Growth*, vol. 6, issue 1, pp 5-37, March 2001.
- Baldwin, R. (1999), "Agglomeration and Endogenous Capital," *European Economic Review*, vol 43, No. 2, 253-280.
- Baldwin, R. and P. Martin (1999), "Two waves of globalisation: Superficial similarities and fundamental differences," Chapter 1, pp 3-59, in H.Siebert (ed.), "Globalisation and Labour, J.C.B. Mohr for Kiel Institute of World Economics," Tubingen, 1999.
- Baldwin, R. and R. Forslid (1997a), "The Core-Periphery Model and Endogenous Growth: Stabilising and De-Stabilising Integration," *Economica*, 2000, 67, 3, 307-324.
- Baldwin, Richard (2006), "Managing the Noodle Bowl: The fragility of East Asian Regionalism", CEPR DP 5561. [http://hei.unige.ch/~baldwin/PapersBooks/ManagingNoodles\\_CEPR5561.pdf](http://hei.unige.ch/~baldwin/PapersBooks/ManagingNoodles_CEPR5561.pdf)
- Bardhan, A. and C. Kroll (2003), "The New Wave of Outsourcing," Fisher Center for Real Estate and Urban Economics, University of California, Berkeley.
- Batra, Raveendra N. and Francisco R. Casas (1973), "Intermediate Products and the Pure Theory of International Trade: A Neo-Heckscher-Ohlin Framework," *American Economic Review*, Vol. 63, No. 3 (Jun., 1973), pp. 297-311.
- Blinder, Alan S., (2005), "Fear of Offshoring," CEPS Working Paper No. 119, December 2005.
- Blinder, Alan S., (2006), "Offshoring: The Next Industrial Revolution?" *Foreign Affairs*, 85:2, 113-128.
- Burtless, G., R. Lawrence and R. Litan (1998), "Globophobia: Confronting Fears about Open Trade," Brookings, Washington D.C.
- Crafts, N. (1989), "British Industrialization in an International Context," *Journal of Interdisciplinary History*, XIX: 3, 415-428.
- Crafts, N. (1995), "Exogenous or Endogenous Growth? The Industrial Revolution Reconsidered," *The Journal of Economic History*, volume 55, number 4.

- Crafts, N. (1995), "Exogenous or Endogenous Growth? The Industrial Revolution Reconsidered," *The Journal of Economic History*, volume 55, number 4.
- Crafts, N. and A. Venables (2003), "Globalization in History: a Geographical Perspective," in (eds.) Bordo, M., A. Taylor and J. Williamson (2003), *Globalization in Historical Perspective*, Chicago/NBER.
- Dallas Fed (2002), "Maquiladora Industry: Past, Present and Future," Federal Reserve Bank of Dallas, El Paso Branch, Issue 2.
- Deardorff, Alan V. (1998a), "Fragmentation in Simple Trade Models," RSIE Discussion Paper 422, University of Michigan, January 8, 1998. [www.spp.umich.edu/rsie/workingpapers/wp.html](http://www.spp.umich.edu/rsie/workingpapers/wp.html)
- Deardorff, Alan V. (1998b), "Fragmentation across cones," RSIE Discussion Paper 427, Discussion Paper No. 427, August 7, 1998. [www.spp.umich.edu/rsie/workingpapers/wp.html](http://www.spp.umich.edu/rsie/workingpapers/wp.html)
- Debande, Olivier (2006), "Deindustrialisation," Volume 11, N°1, European Investment Bank Papers.
- Debande, Olivier (2006), "Deindustrialisation," Volume 11, N°1, European Investment Bank Papers. [www.eib.org/attachments/general/events/02\\_Debande.pdf](http://www.eib.org/attachments/general/events/02_Debande.pdf)
- Dixit, Avinash K & Grossman, Gene M, (1982), "Trade and Protection with Multistage Production," *Review of Economic Studies*, Blackwell Publishing, vol. 49(4), pages 583-94, October.
- Eichengreen, B. (1994), "International Monetary Arrangements for the 21st Century," Brookings, Washington D.C.
- Ekholm, Karolina and Katariina Hakkala (2006), "The Effect of Offshoring on Labor Demand: Evidence from Sweden," IUI Working Paper No. 654, Stockholm.
- Ethier, Wilfred J (1982), "National and International Returns to Scale in the Modern Theory of International Trade," *The American Economic Review*, Vol. 72, June: 389-405.
- European Commission (1996), "Evaluating the Completion of the Internal Market," *European Economy*, no. 4, Brussels.
- Faini, Riccardo, Jonathan Haskel, Giorgio Barba Navaretti, Carlo Scarpa and Christian Wey (2004), "Contrasting Europe's decline: do product market reforms help?" Manuscript.
- Falk, M. and Wolfmayer, Y. (2005), "The impact of international outsourcing on employment: empirical evidence from EU countries," Austrian Institute of Economic Research Paper, WIFO, March.
- Feenstra, R.C. and G.H. Hanson (1996), "Globalization, Outsourcing, and Wage Inequality," *American Economic Review*, 86, pp. 240-45.
- Feenstra, R.C. and G.H. Hanson (1999), "The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979-1990," *The Quarterly Journal of Economics*, 114, pp. 907-41.
- Findlay, Ronald and Ronald Jones (2000), "Factor bias and technical progress," *Economics Letters* 68, pp 303-308. [www.elsevier.com/locate/econbase](http://www.elsevier.com/locate/econbase)
- Flamm, K and J. Grunwald, (1985), "The Global Factory," Brookings, Washington D.C.



- Fukao, K., Ishito, H. and Ito, K. (2003), "Vertical intra-industry trade and foreign direct investment in East Asia," *Journal of the Japanese and International Economies* 17, 468–506.
- Greenaway, D. and D. Nelson (2001), "Globalisation and Labour Markets: Literature Review and Synthesis," Research Paper 2001/29, Nottingham.
- Grossman, G. and E. Rossi-Hansberg (2006a), "The Rise of Offshoring: It's Not Wine for Cloth Anymore," July 2006. Paper presented at Kansas Fed's Jackson Hole conference for Central Bankers. <http://www.kc.frb.org/>
- Grossman, G. and E. Rossi-Hansberg (2006a), "The Rise of Offshoring: It's Not Wine for Cloth Anymore," July 2006. Paper presented at Kansas Fed's Jackson Hole conference for Central Bankers. <http://www.kc.frb.org/>
- Grossman, G. and E. Rossi-Hansberg (2006b), "Trading Tasks: A Simple Theory of Offshoring," August 2006. PDF file. [www.princeton.edu/~grossman/offshoring.pdf](http://www.princeton.edu/~grossman/offshoring.pdf)
- Grossman, G. and E. Rossi-Hansberg (2006b), "Trading Tasks: A Simple Theory of Offshoring," August 2006. PDF file. [www.princeton.edu/~grossman/offshoring.pdf](http://www.princeton.edu/~grossman/offshoring.pdf)
- Gordon, Hanson & Robert C. Feenstra (1999), "The Impact Of Outsourcing And High-Technology Capital On Wages: Estimates For The United States, 1979-1990," *The Quarterly Journal of Economics*, MIT Press, vol. 114(3), pages 907-940, August.
- Hanson, Gordon H., Raymond J. Mataloni Jr, Matthew J. Slaughter (2005), "Vertical Production Networks in Multinational Firms," *Review of Economics and Statistics*, Vol. 87, No. 4, Pages 664-678.
- Hijzen, A. and Görg, H. and R.C. Hine (2005) "International Outsourcing and the Skill Structure of Labor Demand in the United Kingdom," *Economic Journal*.
- IMF (1996a), "International Capital Markets: Developments, Prospects and Key Policy Issues," IMF, Washington DC.
- Jones, Ronald W. and Henryk Kierzkowski (1990), "The Role of Services in Production and International Trade: A Theoretical Framework," in Ronald Jones and Anne Krueger, eds., "The Political Economy of International Trade," Basil Blackwell, Oxford.
- Jones, Ronald W. and Henryk Kierzkowski (1998), "Globalization and the Consequences of International Fragmentation", forthcoming in Rudiger Dornbusch, Guillermo Calvo and Maurice Obsfeld, eds., "Money, Factor Mobility and Trade: The Festschrift in Honor of Robert A. Mundell," MIT Press, Cambridge, MA.
- Kindleberger, C. (1996), "Manias, Panics and Crashes," Third Edition, Wiley, New York.
- Kirkegaard, J. (2006), "Offshoring and offshore outsourcing: Extent and impact of labour markets in origin and recipient countries," IIE, Washington DC.
- Krugman, Paul (1996), "White collars turn blue," article for centennial issue of the NYT magazine <http://mit.edu/krugman/www/BACKWRD2.html>.
- Krugman, P. (1997), "Currency Crises", mimeo prepared for NBER conference. Available on [www.mit.edu/krugman/www](http://www.mit.edu/krugman/www).
- Krugman, Paul and A. Venables (1995), "Globalization and the Inequality of Nations," *Quarterly Journal of Economics*, Vol. 110, no. 4 (1995): 857-880.
- Maddison, A. (1995), "The world economy: 1820-1992," OECD Development Centre, Paris.

- Mankiw, Gregory and Phillip Swagel, (2005), "The Politics and Economics of Offshore Outsourcing," working paper for the American Enterprise Institute for Public Policy.
- Mann, C. (2005), "Accelerating the globalisation of America," Institute for International Economics, Washington DC.
- Marin, D. (2004), "A nation of poets and thinkers – less so with Eastern enlargement? Austria and Germany," CEPR Discussion Paper No. 4358.
- Markusen, James (2005), "Modeling the offshoring of white-collar services: from comparative advantage to the new theories of trade and FDI," NBER Working Paper 11827.
- Martin, P. and G. Ottaviano (1999), "Growing Locations: Industry Location in a Model of Endogenous Growth," *European Economic Review*, vol 43, No. 2, 281-302.
- Martin, P. and G. Ottaviano (2000), "Growth and Agglomeration," *International Economic Review*.
- McCarthy, John C. (2002), "3.3 Million US Services Jobs To Go Offshore," TechStrategy Research, Forrester Research, November.
- Pritchett, L. (1997), "Divergence, Big Time," *Journal of Economic Perspectives*, 11, 3.
- Puga and Venables (1996), "The spread of industry: spatial agglomeration in economic development," *Journal of the Japanese and International Economies*, 10(4), December 1996: 440-464.
- Puga, D. and A. Venables (1996), "The spread of industry: spatial agglomeration in economic development," *Journal of the Japanese and International Economies*, 10(4), 440-464.
- Radelet, S. and J. Sachs (1998), "The Onset of the East Asian Financial Crisis," Available on [www.hiid.harvard.edu](http://www.hiid.harvard.edu).
- Rostow, WW, (1960), "The stages of Economic Growth: A non-communist manifesto," Cambridge University Press, Cambridge.
- Rowthorn, R. and Coutts, K. (2004), "Deindustrialization and the balance of payments in advanced economies," UNCTAD Discussion Paper No.170.
- Rowthorn, R. and Ramaswamy, R. (1998), "Growth, trade, and deindustrialization," IMF Working Paper No. 98/60.
- Samuelson, Paul (2004), "Where Ricardo and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalization," *Journal of Economic Perspectives*. Summer, 18:3, pp. 135–46.
- Sapir, André (2005), "Globalisation and the Reform of European Social Models." Background document for the presentation at ECOFIN Informal Meeting in Manchester, 9 September 2005, and Bruegel Working Paper.
- Spitz, Alexandra (2004), "Are Skill Requirements in the Workplace Rising? Stylized Facts and Evidence on Skill-Biased Technological Change," ZEW DP No 04-33.
- Strauss-Kahn, V. (2003), "The Role of Globalization in the Within-Industry Shift Away from Unskilled Workers in France," NBER Working Paper No. 9716.
- Urata, S. (2001), "Emergence of FDI-trade nexus an economic growth in East Asia," in Stiglitz and Yussuf (eds), "Rethinking the East Asian Miracle," Oxford University Press.

- Van Welsun Desirée and G. Vickory (2006), "The share of employment potentially affected by offshoring – an empirical investigation," OECD Working Party on the Information Economy Report DSTI/ICCP/IE(2005)8, Paris.
- Van Welsun Desirée and Xavier Reif (2005), "Potential Offshoring: Evidence from Selected OECD Countries," Brookings Trade Forum 2005, 165-194.
- Yi, K. (2003), "Can Vertical Specialization Explain the Growth of World Trade?" Journal of Political Economy.
- Yu, Zhihao (2003), "A New Push on An Old Fundamental: Understanding the Patterns of Outsourcing," GEP Research Paper 2003/25, University of Nottingham.