What Have Changes to the Global Markets for Goods and Services Done to the Viability of the Swedish Welfare state?

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Preliminary Draft

The viability of aspects of the Swedish welfare state is under attack externally because of six fundamental changes in the global markets for goods and services:

1. The Internet, which has been likened to the printing press in terms of its potential effects on the way we communicate, is increasing the intensity of price competition among manufactures and allowing the costless delivery of some knowledge services across borders.
2. Improvements in transportation and communication, and the increasing force of global governance that has reduced business interruptions at national borders have allowed firms to fragment supply chains, seeking the most cost-effective location for each point in the chain, in particular moving mundane labor-intensive assembly operations to low-wage locations. (According to the LA Times, Sept.18,2005, 60 to 70% of the new Boeing 787 Dreamliner will be produced overseas, some of it in China.)
3. The number of high-wage jobs producing innovative new products has been reduced by the increased speed at which standardization and mechanization are turning rooted innovative new products into footloose standardized commodities where cost is the competitive driver. This has allowed Asian low-cost suppliers, particularly China, to enter markets in electronics and machinery that heretofore were completely controlled by the high-wage countries.
4. The liberalizations of China, India, Eastern Europe, Russia and so on and so on, have increased the effective global supply of workers willing and able to do mundane manufacturing jobs at very low wage rates under quite uncomfortable working conditions. The transfer of manufacturing jobs from Europe and North America to Eastern Europe and Asia, tends to reduce the global total of manufacturing jobs because the loss in demand for manufactures in high-wage low-saving Europe and North America is not offset by an increase in demand for manufactures in low-wage high-saving Asia and Eastern Europe.
5. The unification of Europe, with a common currency and increased capital and labor mobility, has altered the economic relationship between European periphery and European center, and changed the preferred locations of production.
6. Last, but not least, the fraction of the global workforce in manufacturing is under persistent pressure to contract because of the steady march of productivity which allows fewer workers to do the tasks of many. This technological reduction in the number of manufacturing workers can be offset by new demand for new manufactured products and by increases in demand for existing products because of rising income levels. But in the last three decades, the force of process innovation has greatly outstripped the opposing forces of product innovation and

rising income levels, and the fraction of the workforce in manufacturing has substantially fallen in Sweden and in every other OECD country. (Swedish share of manufacturing has fallen from 26% in 1970 to 16% in 2003.[1]) Economic growth and prosperity in high wage countries will therefore come increasing from the export of intellectual services of one form or another.

In this paper, we will sketch the economic theory that puts each of these phenomenon into a clear conceptual framework, and then we will offer a Swedish "report card" showing how well the Swedish economy is performing relative to its competitors. The basic premise of this paper is that a minimum wage or other like interventions in the labor market, have effects that depend on how the exportable is produced (e.g. college grads or high school grads, manufactured products or intellectual services) and how elastic is the demand for that exportable. Three possibilities are

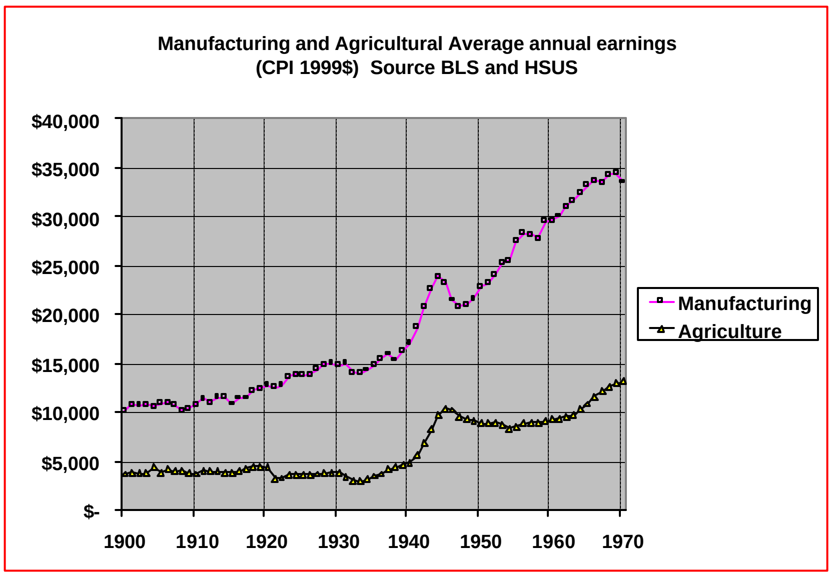
- A "company town" in which a large fraction of the high school educated workforce is employed producing a manufactured exportable facing an inelastic external demand.
- A low-cost competitor in which part of the high school educated workforce is employed producing manufactured exportables facing an elastic external demand and competition from low-wage foreign workers.
- A "knowledge economy" in which foreign exchange is earned by selling knowledge services produced by the college educated, and with all the high school graduates working in the local service sector.

[1] OECD STAN database.

The Difficult Transition to a Post-Industrial World

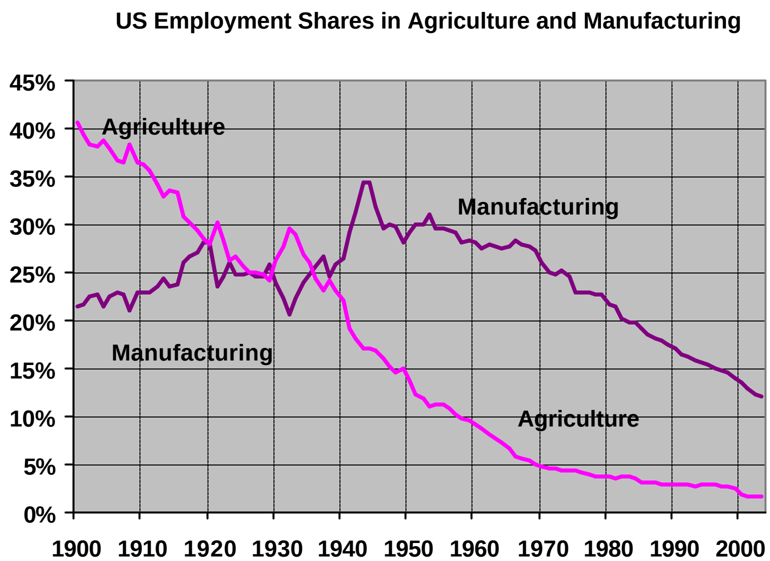
For more than a century beginning in the mid-1800s, the US economy created wealth by moving workers off the family farm where annual earnings were low and onto the factory floor where annual earnings were three times as high. (Figure 1)

Figure 1 Annual Earnings in Agriculture and Manufacturing



The transition from agrarian to industrial society reduced the fraction of the US workforce on farms from 41% at the beginning of the 20th Century to 2.5% at the end(Figure 2). During the first seven decades of the 20th Century, job losses in agriculture were partly offset by job gains in manufacturing as the fraction in manufacturing rose from 22% in 1900 to a peacetime peak of 31% in 1953.

Figure 2 US Employment Shares in Agriculture and Manufacturing



1970 marks the beginning of the post-industrial age for the United States

The US transition from agrarian to industrial society ended in 1970 with the workforce in agriculture down to 5% and the workforce in manufacturing hovering at 27%. Thence commenced the more difficult transition from industrial to post-industrial society whose prominent symptom is a collapse in manufacturing jobs from 27% in 1970 to a meager 11% after the recession of 2001.

The speed of this decline in manufacturing opportunities after 1970 from a 28% share to an 11% share is every bit as rapid as the speed in the decline of agricultural jobs in the first seven decades of the 20th Century. Though the recession of 2001 ended with renewed growth in 2002, and the total employment has stabilized, manufacturing jobs have continued to disappear at record rates. It seems likely that many of the 2.5 million jobs lost in manufacturing in the last years will ever be "found" in the US.

It is not only the United States that has experienced a sharp decline in manufacturing jobs. Figure 3 illustrates the declining fraction of manufacturing for all OECD countries.

In the middle you can see the both the industrialization period and the post-industrial period for Korea, which the fraction of the workforce in manufacturing peaking in 1990 at 28% of the workforce. The only other exception to the experience of sharply declining manufacturing jobs is the Czech Republic that has small increase in the share of manufacturing in the 1990s.

Further information about the transitions experienced by these OECD countries is reported in Table 1, which includes information on the declining shares in agriculture as well as manufacturing. Scan through this list to find the countries that has some of the greatest reduction in their share of employment in manufacturing: Korea, and Ireland for example. Those are of course high growth countries. Figure 4 compares the growth in real per capita incomes for 14 OCED countries in three decades for which the data are complete with the corresponding decline in agricultural share. Sure enough, we see the force of the old "business model": those countries that most rapidly moved workers off the farms are the ones that experienced the most rapid increase in per capita incomes. With agricultural shares very low in many OECD countries, most notably only 2% in Sweden, that industrialization process is mostly historical. Now economic growth will come in the intellectual service sectors.

Figure 3 Declining Manufacturing Shares in OECD Countries

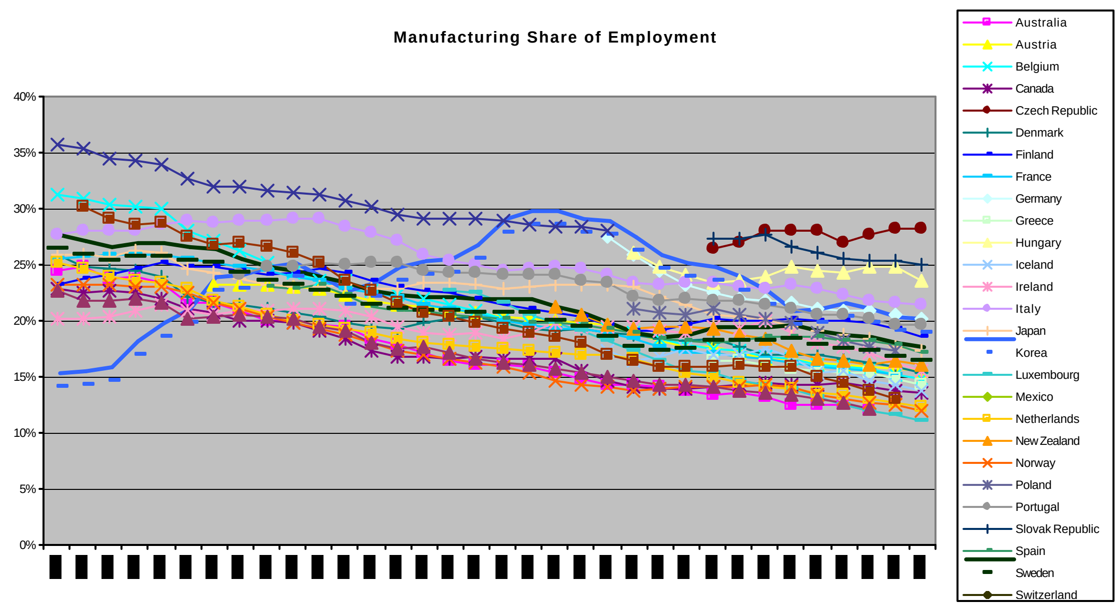
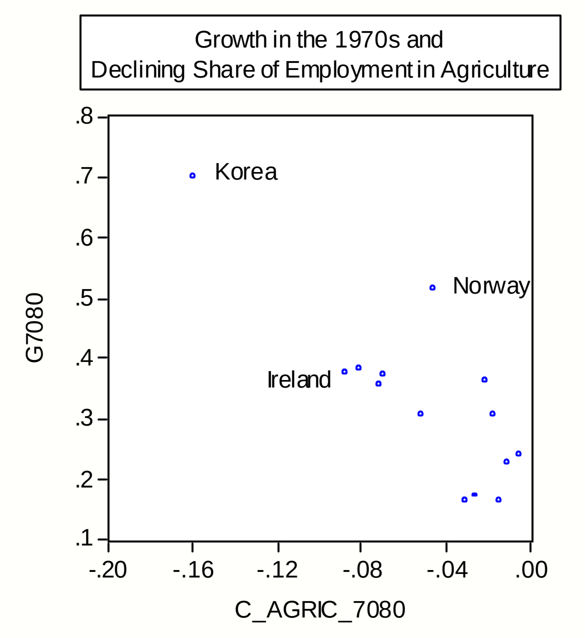
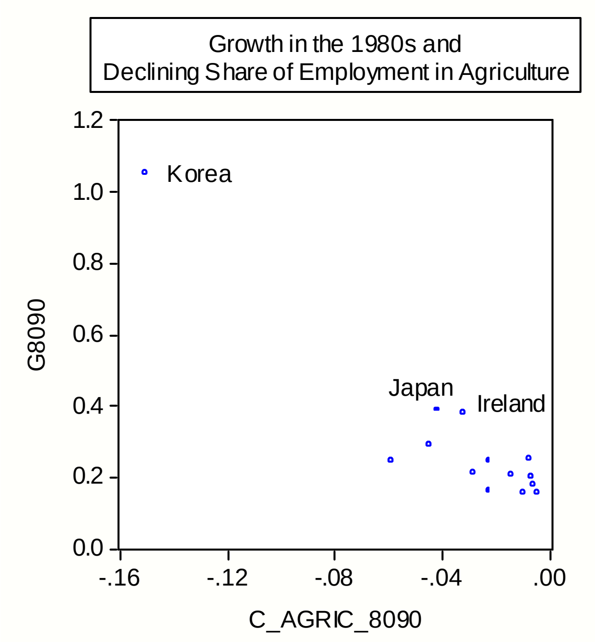
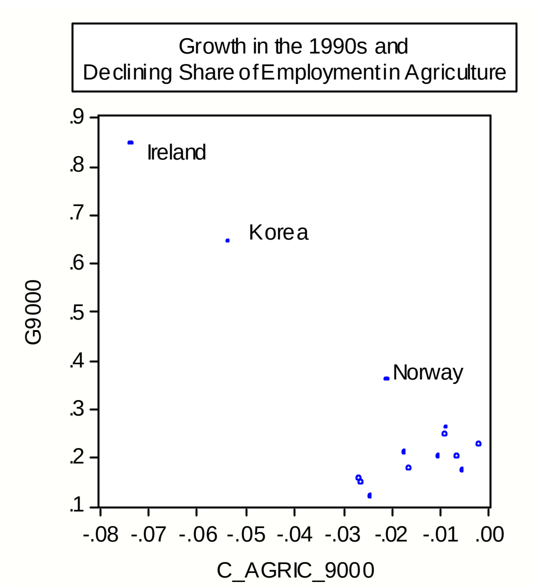


Figure 4 **Growth and The Movement of Workers Off the Farm**



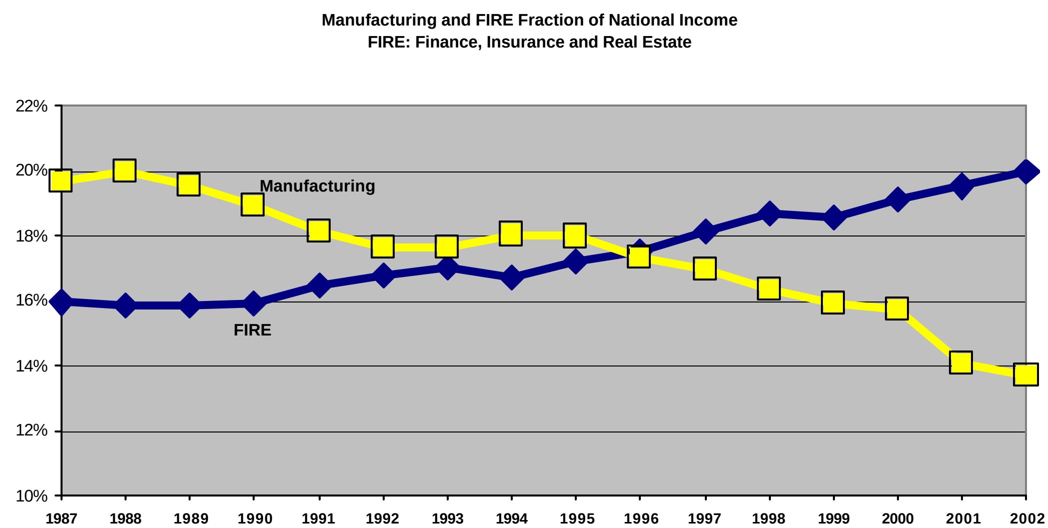




AUSTRALIA
BELGIUM
CANADA
DENMARK
FINLAND
FRANCE
IRELAND
ITALY
JAPAN
KOREA
NETHERLANDS
NORWAY
SWEDEN
UNITED STATES

Figure 5 displays the fractions of manufacturing and Finance Insurance and Real Estate over time for the US. Back in 1987 the 20% of US GDP originated in manufacturing and 16% in FIRE. But the data trace out a large and ominous X with FIRE crossing manufacturing in 1996, just when the Internet Rush was beginning.   Is that the essence of the New Economy? We don't make anything anymore, but instead celebrate our genius in a gigantic parasitic bonFIRE?

Figure 5 Manufacturing and FIRE



Marx and The Transition from Agriculture to Industry

This transition to the post-industrial age has consequences that are at least as profound as the transition from agriculture to industry. This will alter the way wealth is created and all that flows from the "means of production," including politics and social structures.

A natural source of ideas about the transition ahead are studies of the transition from agrarian age to industrial age. Nathan Rosenberg, **Inside the Black Box**, page 42, offers a cogent view of technology and production in the industrial age:

> "Although, therefore, the manufacturing system achieved a growth in productivity through the exploitation of a new and more extensive division of labor, a rigid ceiling to the growth in productivity continued to be imposed by limitations of *human strength, speed and accuracy*. Marx's point, indeed, is more general: Science itself can never be extensively applied to the productive process so long as that process continues to be dependent upon forces the behavior of which cannot be predicted and controlled with the strictest accuracy. Science, in other words, must incorporate its principles in impersonal machinery. Such machinery may be relied upon to behave in accordance with scientifically established physical relationships. Science, however, cannot be incorporated into technologies dominated by large-scale human interventions, for human action involves too much that is subjective and capricious. More generally, *human beings have wills of their own and are therefore too refractory to constitute reliable, that is, controllable inputs in complex and interdependent productive processes*." (My italics.)
>
> "Relics of by-gone instruments of labor possess the same importance for the investigation of extinct economical forms of society, as do fossil bones for the determination of extinct species of animals. *It is not the articles made, but how they are made, and by what instruments, that enables us to distinguish different economical epochs*." Marx, *Capital*, quoted by Rosenberg, page 40.

Not all tasks can be embodied in equipment

Thus, per Marx, we are what we operate, and what was essential about the industrial age is not what we produced but how we produced it. During the industrial age, Science and Industry collaborated to embody in equipment those tasks that are repetitive, codifiable and programmable, thus freeing the productive process from the caprice of human intervention. Mechanization of work was not limited to manufacturing but occurred also on the farm. But mechanization of services was much more limited. Getting a haircut in 2003 is not much different from getting a haircut in 1850. And having a will drawn up in 1970 was about the same as having a will drawn up in 1900.

The mundane physical tasks that have been left to humans require a degree of dexterity that is difficult (expensive) to achieve with a machine, but year after year advances in Science transfer more and more of these functions to machines. Meanwhile, the economic liberalizations over the last three decades have added to the global workforce an enormous number of workers in Mexico, and Brazil and China and India and so on, offering to do the mundane physical tasks at rates of pay that are barely subsistent. Thus globalization and technology have ganged up after 1970 to rapidly reduce the demand for mundane physical labor in the US and all other industrialized countries.

Most of the innovations of the Industrial age have made very little encroachment on intellectual tasks, mundane or otherwise. An attorney, an architect, a teacher all did about the same work in 1970 as they did in 1800. Absent innovations in production and communication, one might image a globalized post-industrial US in which mundane physical tasks like cutting hair would remain only in the local non-traded sector, and the rest of the jobs would be mixtures of mundane-intellectual tasks (clerks), creative-intellectual tasks (designers and researchers and repairmen) and social/organizing/motivating tasks (managers).

But the microprocessor has changed the future of intellectual work, eliminating the mundane-intellectual tasks. Think about an architect. In 1970 the time of a creative architect was partly consumed by the task of rendering the drawings. Some of this work could be done by assistants, but the communication costs were often so high that it made more sense to have the master do the drawings. The personal computer, however, allowed the architect to render the drawings with great efficiency, thus freeing up time to do the creative tasks that the computer cannot ever perform. While for mundane programmable tasks, it is true that "*human beings have wills of their own and are therefore too refractory to constitute reliable, that is, controllable inputs in complex and interdependent productive processes*," the opposite is true for creative tasks. It is machines that lack wills of their own and are therefore too obedient to constitute reliable, that is, innovative inputs in complex and interdependent creative processes. Indeed, when I teach data analysis I emphasize the constant struggle between machine and man for control of the process. We data analysts really want to be able to press a button and have the computer do the work, but the creative task of drawing inferences from data always requires a heavy human input, and if, through laziness and seduction, we come to imagine that the computer can think, we will surely be making major misinterpretations of the data. When one starts to lose control and not know if one button on the computer is any different from another, it is wise to shut the computer down and go play a round of golf. The human will be better able to maintain control after a little time off.

Is a computer a forklift or a microphone?

Education may be a solution to the temporary and permanent income inequality problems caused by the increased supply of Microprocessors. We just need to teach everyone how to write computer code. This might work, but it might not. I like to raise some doubts by posing the rhetorical question; "Is a computer more like a forklift or more like a microphone?" It doesn't matter much who drives the forklift, but it matters a lot who sings into the microphone. Think about the forklift first. You might be a lot stronger than I, but with a little bit of training, I can operate a forklift and lift just as much as you or any other forklift operator. Thus the forklift is a force for income equality, eliminating your strength advantage over me. That is decidedly not the case for a microphone. We cannot all operate a microphone with anywhere near the same level of proficiency. Indeed, I venture the guess that I would have to pay you to listen to me sing, not the other way round. And I seriously doubt that a lifetime of training would allow me to compete with Springsteen, or Pavarotti.

The effect of the microphone and mass media have been to allow a single talented entertainer to serve a huge customer base and accordingly to command enormous earnings. This creates an earnings distribution with a few extremely highly paid talented and trained individuals and with the vast group of slightly less talented working in LA restaurants, hoping someday to hit it big. Thus, opposite to the forklift, the microphone creates a powerful force for inequality. Think Silicon Valley, with extraordinary riches accruing to some, but with the manual service workers living in their cars.

A computer is both a forklift and a microphone. Clerks in MacDonalds no longer have to be able to read or to compute - they only have to recognize the picture of a hamburger on the cash register. That's the forklift. It doesn't much matter who punches the buttons. Thus your intelligence advantage over me is eliminated by the computer, just as your strength advantage was eliminated by the forklift. But for many other operations it matters enormously who types on the computer. One example is computer programming. The vast majority of people are incapable of producing commercially viable computer code. That's the microphone. It amplifies your natural advantages. Without a computer, an architect's time is partly consumed by mundane tasks such as rendering drawings. A lawyer's time is consumed writing and checking sentences in wills. An economist's time is consumed making data displays. These mundane tasks are now transferred to computer assistants, who listen infinitely more attentively and who carry out the tasks with much greater precision than any human assistant. A talented architect with a computer assistant can serve a much enlarged customer base. A talented attorney, or a talented economist, or a talented radiologist, with computer assistants, can serve much enlarged customer bases. These talented individuals command high wages while the less talented struggle for customers.

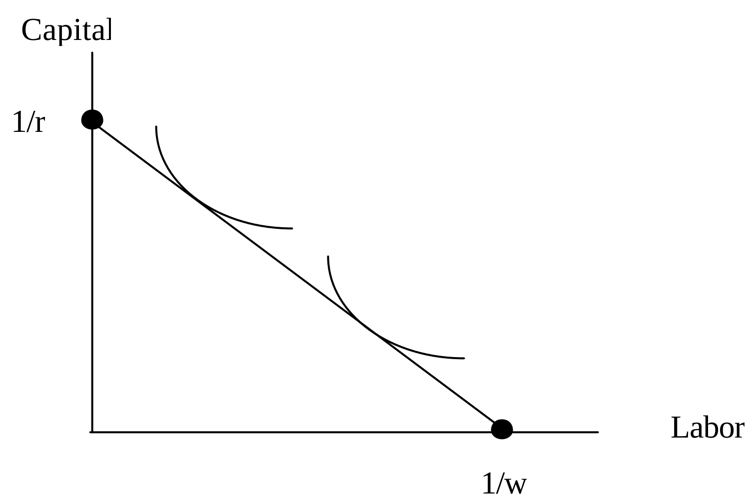
Computer technology seems therefore to be taking us into a future where there are a few very talented very well-paid people, and the rest of us are doing the mundane computer-assisted tasks which don't require us to read, write or even think very much. Just push the right button now and then.

In other words, the information revolution may be a powerful force for income inequality by raising the compensation for natural talents and also the interaction between talent and training. It is the interaction between talent and training that is particularly difficult to deal with. If talent and training had additive effects on earnings, then compensatory education for the disadvantaged could be a low-cost solution for income inequality problems. But if training is much more effective for the talented, the talented will naturally receive more of it, and the amount of compensatory training that is needed to equalize incomes may be enormous and a great social waste - think of me and Pavarotti again.

A simple theory of post-industrial inequality.

The point that industrialization comes with higher wages and more equal incomes while post-industrial growth comes with more unequal incomes can be illustrated with a diagram routinely used to demonstrate the Factor Price Equalization Theorem. The Lerner-Pearce diagram Figure 6 illustrates two unit-value isoquants and the only equilibrium (efficiency and zero profits) unit cost line that is compatible with the production of both goods. The formula for this unit value isocost line is $1 = wL + rK$, where L and K refer to labor and capital inputs and w and r refer to wages and the rental rate on capital. From this equation, we can solve for the points of intersection with the vertical and horizontal axis: $1/r$ and $1/w$. Thus given the two unit value isoquants, we can solve for the nominal wage rate and the nominal return on capital. These determine the capital/labor ratios in both sectors and the corresponding real wage rate rate and real return on capital. (Inputs paid their marginal products.)

Figure 6 **Lerner Pearce Diagram: Unit Value Isoquants and Unit Cost Line**



To make the point about industrialization, we need to include in this diagram two kinds of workers who might earn different levels of compensation. Figure 7 below depicts unit value isoquants for the strong and for the weak in agriculture, with the weak requiring more labor time and more capital to get the job done (Two men with two shovels do the work of one man with one shovel.) Also depicted is a single unit value isoquant in manufacturing, where the strong and the weak are equally productive because they can "drive the forklift" equally well.

Tangent to the manufacturing unit value isoquant and the weak agricultural unit value isoquant is the only unit value isoquant compatible with the deployment of the weak in both manufacturing and in agriculture. The intersection of this unit cost line and the vertical axis is the inverse of the rental rate of capital and the intersection with the horizontal axis is the inverse of the wage of the weak. Given this rental rate on capital, the strong opt for the sector that offers the higher wage, which is agriculture, where their special abilities earn them a wage premium.

This depicts a setting in which there is not enough capital to pull the weak all into manufacturing. Thus this is the early stage of the industrialization process in which inequality continues to be driven by productivity differences on the farm.

Figure 7 **Preindustrialization is a period of low wages and worker inequality**

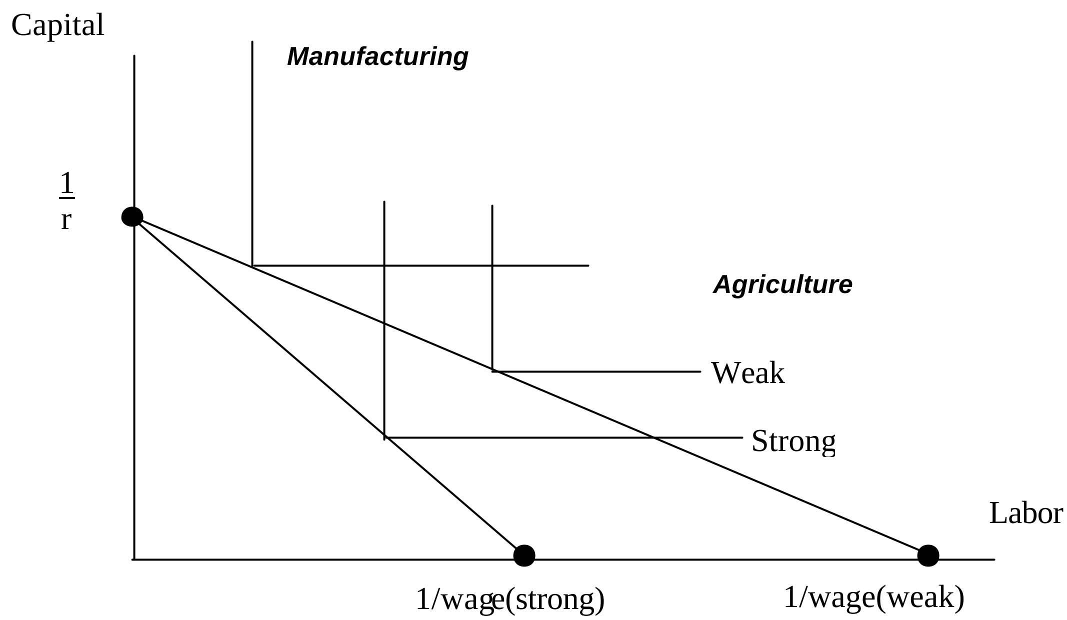
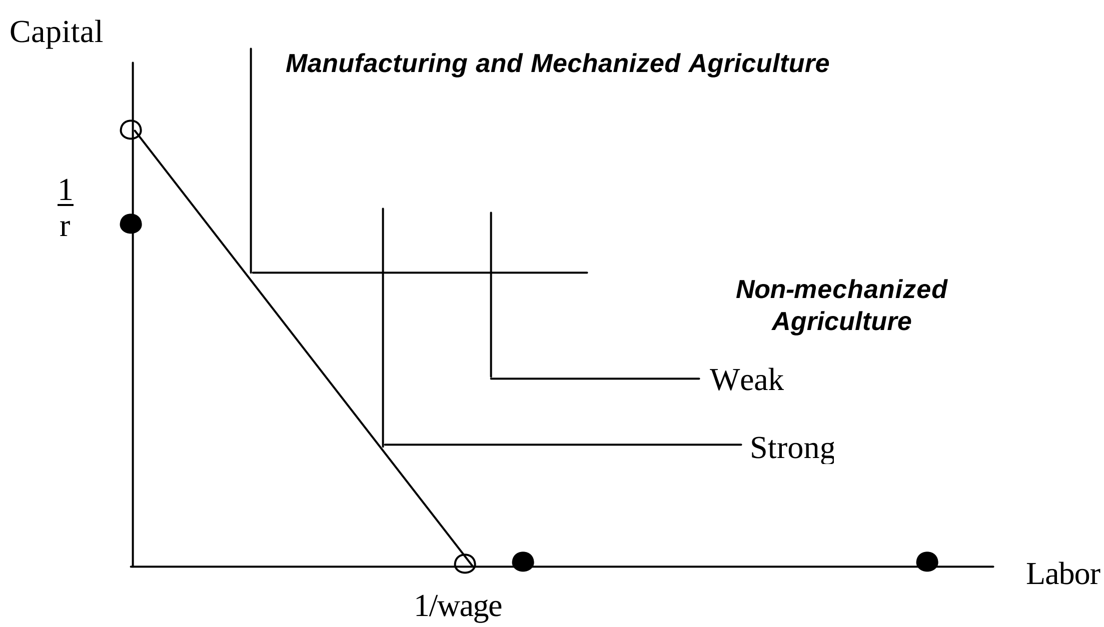


Figure 8 depicts an equilibrium in which the strong have jobs in both agriculture and in manufacturing – thus there is a unit cost line tangent to the manufacturing isoquant and the agricultural unit value isoquant of the strong. The intersection of this unit cost line with the vertical and horizontal axes selects the inverse of the rental rate on capital and the inverse of the wage rate of the strong. These are indicated by open circles while the solutions from Figure 7 are retained but with shaded circles. Thus this new equilibrium has cheaper capital and dearer strong workers. But in addition, faced with this rental rate of capital, the weak all choose to work where they have a comparative advantage – in manufacturing – and they earn exactly the same wage as the strong. Where the strong and the weak are working side-by-side, they have the same productivity. Where the strong have superior productivity, they are the only ones doing the job.

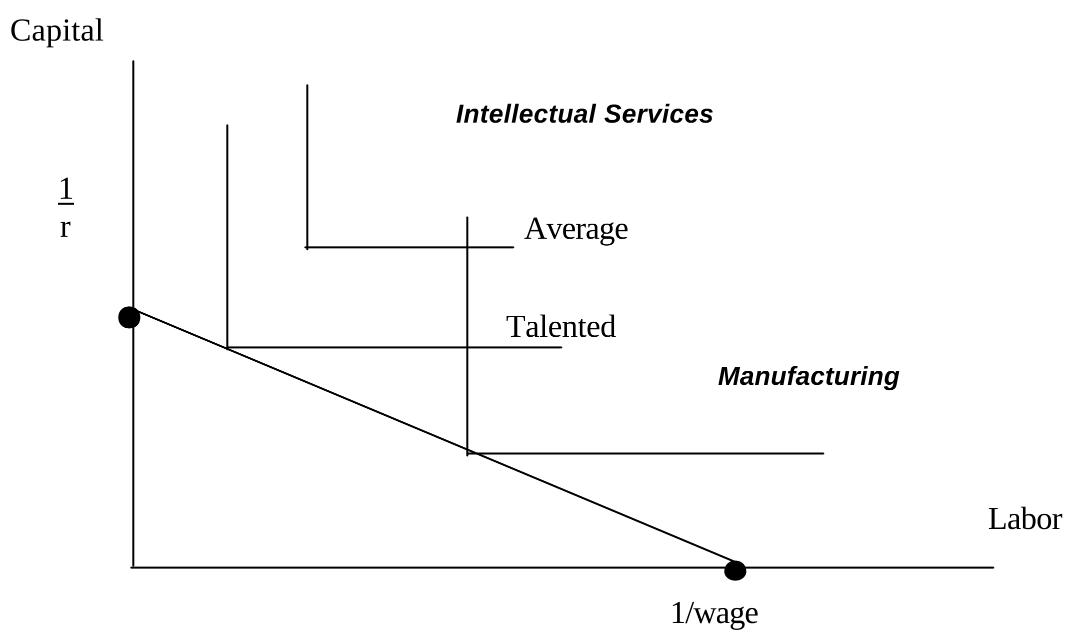
Thus industrialization naturally brings higher and more equal wages.

Figure 8 Industrialization brings high wages and equal wages



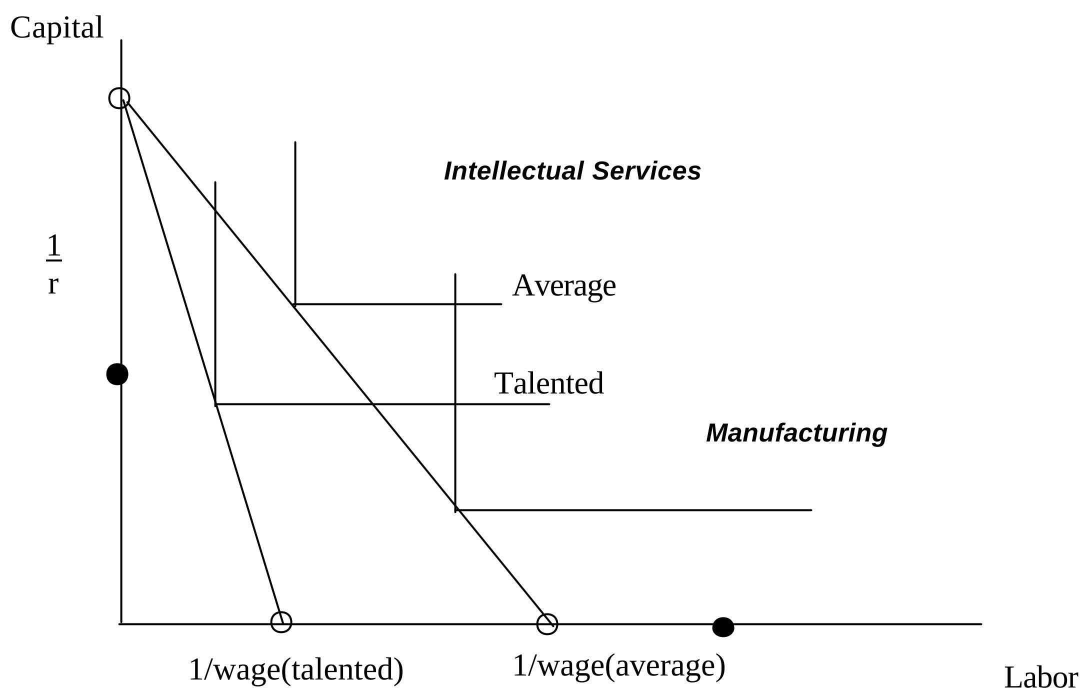
As we move into a post-industrial age, jobs are emerging that require high levels of capital per worker in the form of education and experience. These include sectors like finance, health care, business consulting, and entertainment. Like the artisan jobs and the farm jobs in the pre-industrial period, not all people are equally suited to these tasks. Figure 9 depicts the equilibrium early in the post-industrial period in which the talented people are still working in manufacturing as well as intellectual services. With these talented in both sectors, it is the talented who determine the cost of capital. Given this cost of capital, the average folks all work in manufacturing. Thus once again we have an equilibrium in which comparative advantage doesn't matter: where the average and the talented are doing the same tasks, they are equally productive. Thus the same wages are earned by all.

Figure 9 **Early in the Post-industrial period wages of the average and the talented are equal**



With further accumulation of the education and training needed to perform the intellectual services, the economy shifts to a different equilibrium like the one depicted in Figure 10 in which it is the average folk who work in both sectors while the talented are confined exclusively to intellectual services. Here we have the talented and the average both doing a task in which they have productivity differences. Here comparative advantage matters. Here the talented are paid more than the average.

Figure 10 **With the accumulation of human capital come higher wages and greater inequality.**

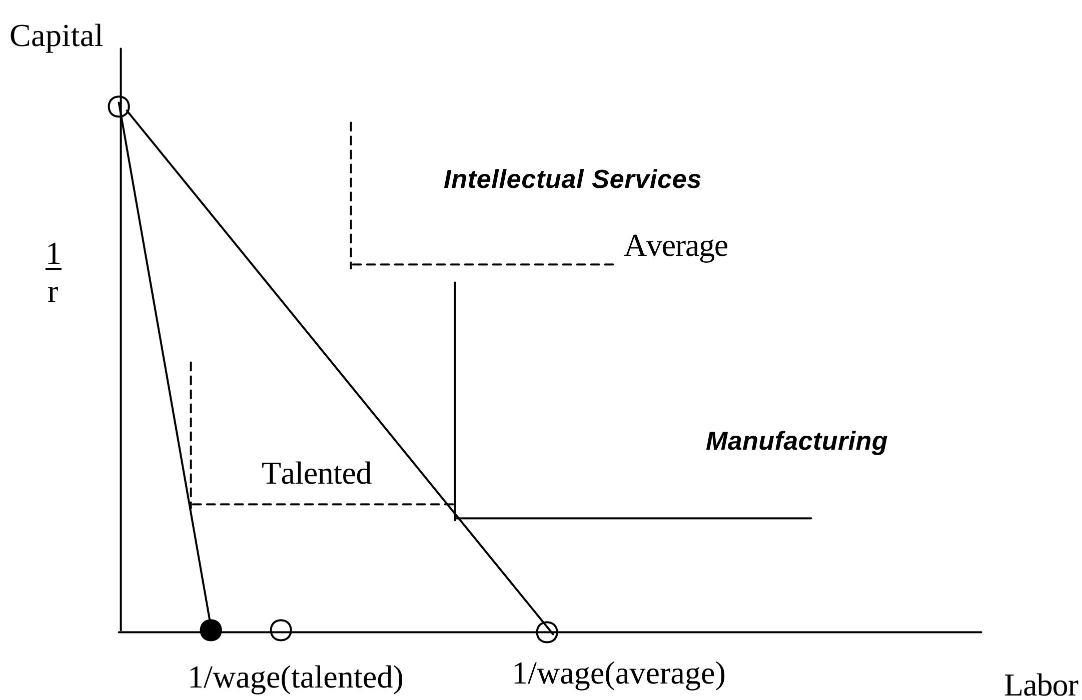


The personal computer and China are changing this equilibrium.

Chinese competition is lowering the price of manufactures and thus increasing the capital and labor needed to produce a unit-value of output. This shifts the manufacturing unit-value isoquant away from the origin. If the manufacturing unit-value isoquant shifts outward in the industrialization period, illustrated in Figure 7 and Figure 8, this comes with a lower return to capital and a higher wage rate. But if the manufacturing unit-value isoquant shifts outward in the post-industrialization period, illustrated in Figure 9 and Figure 10 this comes with a higher return to capital and a lower wage rate.

The personal computer and the Internet are also changing this equilibrium. The worktime of a professional is partially consumed doing mundane tasks for which talent doesn't matter: an architect rendering drawings, a lawyer writing a standard will and an economist finding the data and running a regression. In 1970, these professionals did their work in much the same manner as their counterparts in 1870. They read, they wrote with a pencil, and they proofread typed versions. But by the year 2000, the personal computer had dramatically changed the lives of most intellectual service providers, carrying out many mundane tasks at the push of a button or two. Those who could only do the mundane tasks like writing a standard will or finding data or running a regression find themselves now in direct competition with electronic devices and find their earnings eroded. But those who are well endowed with talent have the time previously consumed by mundane tasks now freed to do the work that demands the talent.

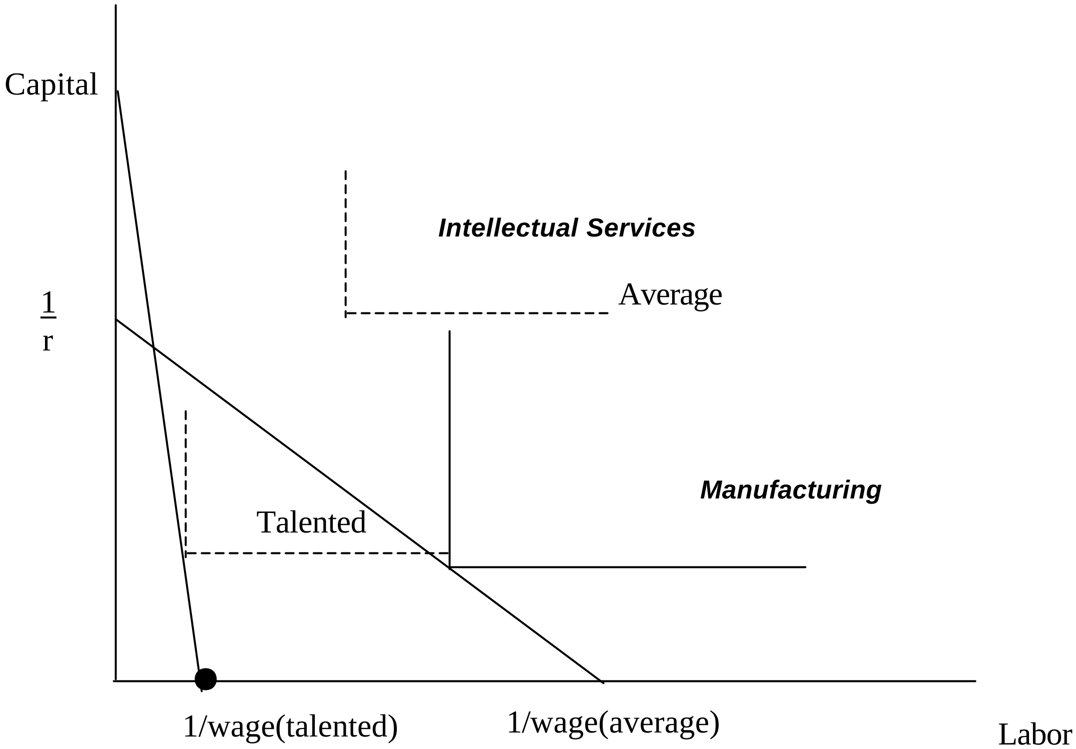
Figure 11 **The Personal Computer Amplifies the Inequality**



Education Subsidies Create Inequality

The foregoing diagrams are built on the assumption that investments in human and physical capital are made from the same pool of savings and have the same rate of return. In fact, the acquisition of education assets is heavily subsidized by families and by government. In a post-industrial age, these subsidies benefit the talented and amplify the natural inequality.

Figure 12 **The Effect of Educational Subsidies: Greater Inequality**



European integration and the location of production

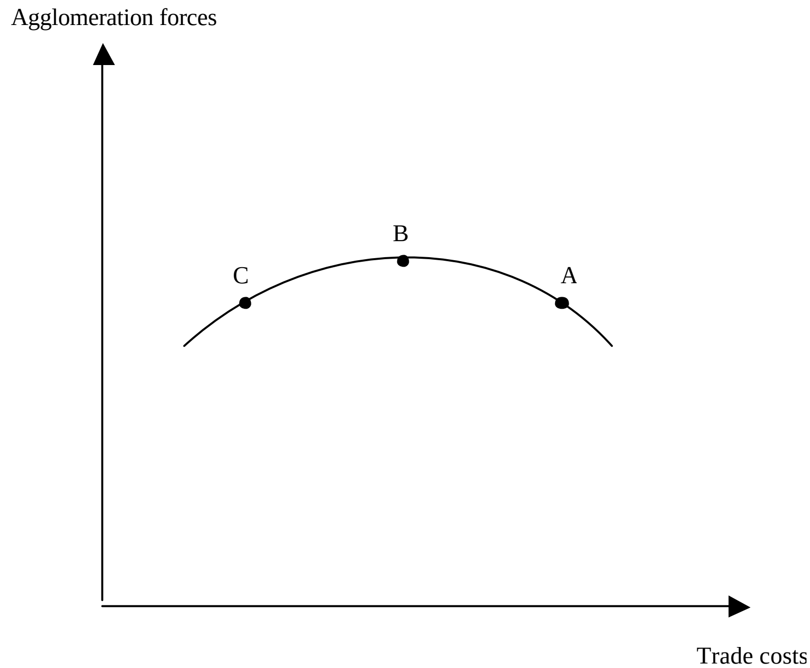
The improved access to the European market makes it easier for Swedish firms to export to Europe, but it also makes it easier for European firms to compete in the Swedish market. A question then is if the development on the whole is beneficial or harmful for producers located in Sweden, which after all is a somewhat peripheral country in relation to the Central European market. A framework for analysing this type of question is the new economic geography literature, where internationally mobile factors and firms are introduced in standard imperfect competition trade models.

Consider at setup with a service sector and a manufacturing sector. The service sector has constant return to scale, whereas the manufacturing sector consists of firms producing differentiated products under increasing returns to scale a la Dixit-Stiglitz. Asuming that there are many firms (Chamberlinian large group assumption) firms set price as a constant mark-up on marginal cost, which in turn, implies operation profit (profit not counting fixed cost) to be a constant fraction of nominal sales. Suppose now that there are two markets of different size separated by trade costs. Firms clearly prefer, ceteris paribus, to locate in the large market to minimise trade costs and maximise sales and operating profits. Consequently there will be a proportionally larger equilibrium share of manufacturing firms in the larger market, because it provides better market access.[2] This is called the 'home-market' effect, and it was identified by Krugman (1980) and Helpman and Krugman (1985). Adding the possibility that factors and firms and therefore expenditure moves between countries creates a circular causality that can produce agglomeration of firms in one market. It is achieved in Krugman (1991) by having labour moving with firms, and in Krugman and Venables (1995) and Venables (1996) by assuming that firms buy goods from each other as intermediate inputs. In the latter case downstream firms use an aggregate of upstream varieties as an intermediate input. When trade across borders incur costs, a larger number of upstream firms in your region implies a lower price level for intermediate inputs. More downstream firms, however, also imply a larger home market for upstream firms, which increase their sales and profits. Against the forces of concentration stand dispersion forces such as local competition and various forms of congestion costs. These forces prevent full agglomeration from always being the outcome.

The tendency for agglomeration depends on the level of trade costs, and it is shown in the new economic geography literature that the relationship between trade costs (level of integration) and agglomeration is bell-shaped. The intuition for this is that trade is difficult when trade costs are high, which leads to local production rather than agglomeration in one market, since the agglomerated firms all would wish to export to the other market. Firms also have weak incentives to agglomerate when trade costs are low, since market access is then relatively unimportant. Agglomeration tendencies are

[2] An exception is when a physically smaller market actually provides better access e.g. because of asymmetric trade costs.

therefore most pronounced for intermediate trade costs, implying that they are bell-shaped in trade costs (the level of integration), as shown in Figure ??.



The tendency for manufacturing industry to locate in large markets may be a worry for a small somewhat peripheral country like Sweden, since it means that firms have a tendency to choose Central Europe over Sweden as location. The tendency is strongest when trade costs (or the level of integration) are intermediate (point B in figure), and weaker when trade costs are high or low. This implies that further integration in Europe (which implies a movement leftwards in Figure??) may lead to more or less concentration of industry. Further integration leads to more concentration if Europe is not sufficiently integrated (point A), and to dispersion of industry if the level of integration is high (point C).

It is immediately clear that Sweden would be more comfortable with deeper economic integration if Europe was to the left of point B in Figure ?? , and we will return to what data indicate on this issue.

An important issue is how these models relate other trade models; for instance the neoclassical model where trade is driven by comparative advantage. A first point is that different industries or sectors may be driven by very different forces. The Swedish steel and wood related export is almost surely determined primarily by comparative advantage, whereas agglomeration forces may be relatively important for e.g. the pharmaceutical and car industry. Second agglomeration forces tend to be most important for intermediate trade costs, as explained above. The importance of comparative advantage, however, increases monotonically as trade costs fall. This implies that comparative advantage forces may come to dominate in all industries if trade costs where to fall low enough.

Data on the location of manufacturing industry in Europe

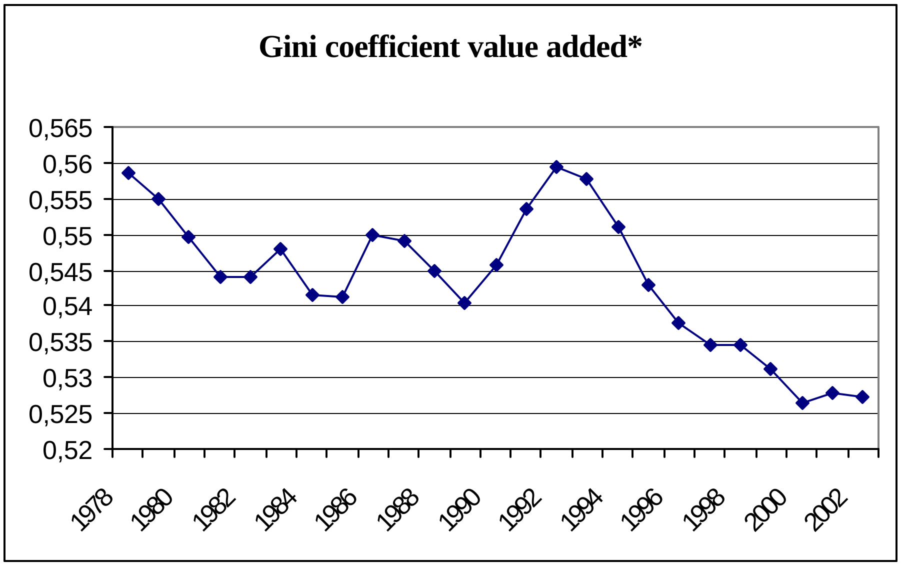
We use the Gini-coefficient[3] as measure of the concentration of manufacturing industry in Europe from 1978-2002 . The most satisfactory measure of production from a theoretical point of view would be value added. However, this measure is difficult to calculate in practice and countries use somewhat different principles in their national statistics. It has therefore been suggested that production or employment may be better measures for international comparisons of manufacturing production. We take an agnostic view and present all three measures. Our sample of countries is the present EU except Luxemburg and the former Eastern European countries, which entered in 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

Manufacturing Production

*Data for Ireland and Greece missing

[3] We have tried other indices with qualitatively the same result.

Manufacturing Value added



*Data for Ireland missing

Manufacturing Employment

*Data for Greece missing

The first thing to note about all these figures is that the Gini coefficient is relatively stable over time. (An increase from 50 to 55 percent implies that the average difference between two countries have increased by 10 percent).

The second feature is the marked peak around 1992/93. 1992 is the year of the launch of the single market programme, which implied a very substantial step towards integration of the European market. However, it is also the year when East Germany is added to the West German figure, and this makes it difficult to disentangle effects. Dropping Germany from the dataset lowers the peak significantly, but to study location without Germany is rather unsatisfactory since it is the largest central market in Europe and therefore a potential centre of gravity for European manufacturing.

With the caveats about German unification in mind, the data does not indicate that manufacturing industry overall has been concentrating since the launch of the single market programme 1992. The Gini-index has, on the contrary, fallen since 1992 for all our measures of industrial production. Relating back to theory, this would indicate that Europe is in point like C in Figure ??, which may be good news for small somewhat peripheral countries like Sweden. Further integration in Europe will in this case not lead to relocation of manufacturing from Sweden to Central Europe – a conclusion that may have a bearing on Sweden's decision to adopt or not to adopt the common European currency.

Discussion of Tables

Table 1 reports the total number of workers from the OECD STAN database in 1970, 1980, 1990, 2000, and 2003, together with the employment shares in manufacturing, agriculture, mining, and the rest (Services, including government). Countries are sorted by their manufacturing shares in 2000, from largest to smallest. The values that are in the top 20 percent are printed in bold.

This table indicates the rapid transition into a post-industrial economy for almost all of these OECD countries. The Korean data are particularly interesting since this period encompasses both the period of industrialization in which workers were moved off the farm and onto the factory floor and the beginning of the post-industrial period in which a diminishing share of the workforce finds jobs in manufacturing. The Korean agricultural share falls steadily in this period from a peak of 47% in 1970 to a low of 9% in 2003. That 9% is still among the highest, suggesting that this trend is not likely to abate. Meanwhile, the Korean share of the workforce in manufacturing rose from 14% in 1970 to a peak of 28%** in 1990** but in the 1990s has fallen dramatically to 20%.

The peak employment share in manufacturing for these OECD countries has been nearly 30%. is generally in the

Table 2 reports the current and the peak levels of employment in manufacturing since 1970 for the OECD countries in the STAN database. The penultimate column indicates the percent by which the latest available figure is less than the peak value, and the last column indicates the year in which the peak occurred. The countries are sorted by this last column, roughly the point at which this country begins the difficult transition into a post-industrial economy. By this measure, Sweden was among the first countries to experience the end of the manufacturing age. Employment in manufacturing in Sweden was the greatest at the very start of the time period covered. From that value of 1.04 million in 1970 manufacturing employment had fallen 32% by 2003.

reports the number of Swedish workers in 2-digit ISIC industries in 1980, 1990, 2000 and 2003. Industries are sorted by percentage job loss in this period, reported in the last column. That varies from 69.2% loss in textiles (wearing apparel, footwear and textiles) to a gain of 11.6% in motor vehicles.

Table 1 Employment: OECD STAN Database

Employment, OECD STAN Database
Values in the Top 20 percent in bold

	TOTAL: Millions of Employees					Manufacturing Share					Agricultural Share					Mining and Quarrying Share					Government and Servi		
	1970	1980	1990	2000	2003	1970	1980	1990	2000	2003	1970	1980	1990	2000	2003	1970	1980	1990	2000	2003	1970	1980	1990
Czech Republic				4.8	4.9				**27%**	**28%**				5%	4%				**1%**	**1%**			
Slovak Republic				2.0	2.1				**26%**	**25%**				6%	4%				1%	**1%**			
Hungary				3.8	3.9				**24%**	**24%**				7%	5%				0%	0%			
Italy	19.9	21.4	22.6	**23.1**	**24.3**	**28%**	**29%**	**25%**	**22%**	**21%**	21%	13%	7%	5%	4%	0%	0%	0%	0%	0%	52%	57%	68%
Portugal		4.5	4.6	4.9	5.0		**25%**	**24%**	**20%**	20%		**21%**	**16%**	**10%**	**10%**							54%	61%
Korea	9.6	13.7	18.1	21.1	**22.1**	14%	23%	**28%**	20%	19%	**47%**	**31%**	**16%**	**11%**	**9%**	1%	1%	0%	0%	0%	38%	45%	56%
Finland	2.3	2.4	2.5	2.3	2.4	23%	25%	20%	20%	19%	**21%**	13%	9%	6%	5%	0%	0%	0%	0%	0%	55%	62%	71%
Japan	**54.4**	**58.7**	**64.3**	**66.6**	**65.1**	26%	23%	**23%**	19%	17%	20%	13%	9%	6%	6%	0%	0%	0%	0%	0%	54%	64%	68%
Spain		12.4	13.8	15.7	16.6		23%	20%	18%	17%		17%	**11%**	6%	6%		1%	1%	0%	0%		59%	69%
Poland				15.0					18%					**26%**					**2%**				
Ireland	1.1	1.2	1.2	1.7	1.8	20%	21%	19%	18%	16%	**27%**	**18%**	**15%**	8%	7%	1%	1%	**1%**	0%	0%	52%	60%	65%
Sweden	3.9	4.3	4.6	4.3	4.3	26%	23%	19%	17%	16%	7%	5%	3%	3%	2%	0%	0%	0%	0%	0%	66%	72%	77%
Denmark	2.5	2.5	2.6	2.7	2.7	26%	20%	19%	17%	15%	11%	8%	6%	4%	4%	0%	0%	0%	0%	0%	63%	72%	75%
New Zealand			1.2	1.4	1.5			20%	16%	16%			1%	0%	1%			0%	0%	0%			**79%**
Austria		3.8	3.9	4.1	4.1		23%	20%	16%	15%		**20%**	**17%**	**13%**	**13%**		0%	0%	0%	0%		57%	63%
Belgium	3.8	3.8	3.9	4.1	4.1	**31%**	24%	20%	16%	15%	6%	4%	3%	2%	2%		1%	0%	0%	0%	63%	72%	77%
France	21.1	22.2	**22.9**	**24.3**	**24.9**	25%	24%	19%	16%		14%	9%	6%	4%	4%						61%	68%	75%
Iceland				0.2	0.2				15%	14%				**8%**	**7%**								
Greece				3.9	4.0				15%	14%				**17%**	**15%**				0%	0%			
Canada	8.4	11.1	13.4	15.2	16.0	23%	19%	16%	14%	13%	6%	5%	4%	3%	3%	**2%**	**2%**	**1%**	**1%**	**1%**	**69%**	**75%**	**79%**
United Kingdom	**26.5**	**27.1**	**29.0**	**29.4**			**25%**	18%	14%			2%	2%	2%			**1%**	1%	0%			71%	**79%**
Netherlands	6.1	6.2	6.7	8.1	8.3	25%	20%	17%	13%	12%	6%	5%	4%	3%	3%	0%	0%	0%	0%	0%	**68%**	**75%**	**78%**
Norway	1.6	1.9	2.1	2.3	2.3	23%	19%	14%	13%	12%	13%	8%	6%	4%	4%	1%	1%	**1%**	**1%**	**1%**	63%	71%	78%
United States	**86.9**	**107.1**	**128.3**	**149.7**		23%	19%	15%	13%		4%	3%	3%	2%		1%	**1%**	1%	0%		**73%**	**76%**	**82%**
Luxembourg			0.2	0.3	0.3			19%	12%	11%			3%	2%	1%			0%	0%	0%			78%
Australia	5.4	6.3	7.8	9.1		24%	20%	15%	12%		8%	7%	6%	5%		**2%**	**1%**	**1%**	**1%**		66%	**72%**	78%
Germany				**38.7**	**38.3**				**21%**	**20%**				2%	2%				0%	0%			
Western Germany	**26.6**	**27.4**	**30.3**			**36%**	**31%**	**28%**			9%	5%	4%			**1%**	1%	1%			54%	63%	67%
Mexico																							
Switzerland																							

Table 2 **Employment in Manufacturing: Millions**

Transition to a Post-Industrial Society

Employment in Manufacturing

Millions of Workers

Sorted by Year in Which Maximum Occurred

	Post 1970	Latest Values				
	Max	2001	2002	2003	Loss	Year Max
Netherlands	1.53	1.08	1.06	1.03	-33%	1970
Swede n	**1.04**	**0.75**	**0.73**	**0.71**	**-32%**	**1970**
Belgium	1.17	0.66	0.63	0.61	-48%	1970
Denmark	0.64	0.45	0.43	0.42	-34%	1970
United Kingdom	7.88	4.08	3.88		-51%	1971
Australia	1.38	1.10			-21%	1973
Austria	0.88	0.66	0.65	0.64	-27%	1973
France	5.64	3.85	3.79		-33%	1974
Finland	0.58	0.46	0.45	0.44	-25%	1974
Norway	0.39	0.29	0.29	0.27	-30%	1974
Spain	2.98	2.93	2.92	2.86	-4%	1978
United States	**21.53**	**18.07**			**-16%**	**1979**
Italy	6.21	5.16	5.20	5.21	-16%	1980
Portugal	1.14	1.01	0.99	0.98	-14%	1981
Luxembourg	0.04	0.03	0.03	0.03	-12%	1986
Canada	2.20	2.17	2.15	2.15	-2%	1989
New Zealand	0.26	0.23	0.24	0.25	-4%	1989
Germany	10.58	8.13	7.95	7.74	-27%	1991
Korea	5.16	4.27	4.24	4.21	-18%	1991
Japan	15.27	12.16	11.58	11.33	-26%	1992
Hungary	1.05	0.96	0.96	0.93	-12%	1992
Greece	0.63	0.60	0.58	0.57	-9%	1996
Poland	3.13	2.64	2.56		-18%	1997
Czech Republic	1.45	1.34	1.38	1.38	-5%	1997
Slovak Republic	0.59	0.52	0.51	0.51	-13%	1997
Iceland	0.02	0.02	0.02	0.02	-13%	1997
Ireland	0.30	0.30	0.29	0.28	-6%	2001

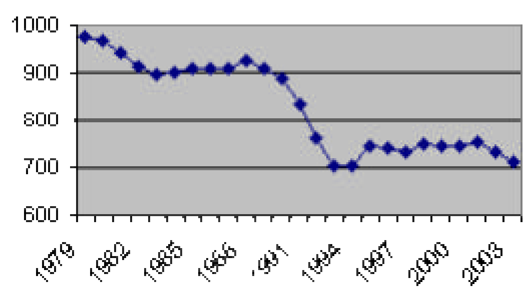
Table 3 **Employment in Manufacturing: Shares of Total Employment**

Forthcoming

Table 4 Swedish Number of Employees in 2-digit ISIC industries

Swedish Number of Employees in Manufacturing Sectors

	Number of Employees				Annualized Rate of Growth				TOTAL
	1980	1990	2000	2003	1980s	1990s	2000s	All	1980-2003
TOTAL	968.3	885.9	745.7	713	-0.9%	-1.7%	-1.5%	-1.3%	-26.4%
Textiles(17-19)	40.2	24.6	13.6	12.4	**-4.8%**	**-5.8%**	**-3.0%**	**-5.0%**	-69.2%
Metals Basic(27)	67.7	45	31	33.2	**-4.0%**	**-3.7%**	**2.3%**	**-3.1%**	-51.0%
Trans:other(35)	39.9	26.2	20.1	19.7	**-4.1%**	-2.6%	-0.7%	**-3.0%**	-50.6%
Mineral Products(26)	30.5	26.7	17.5	18.5	-1.3%	**-4.1%**	**1.9%**	-2.2%	-39.3%
Printing(22)	72.5	70.6	50.9	44.2	-0.3%	**-3.2%**	**-4.6%**	-2.1%	-39.0%
Paper(21)	61.6	53.9	42.1	38.4	-1.3%	-2.4%	**-3.0%**	-2.0%	-37.7%
Wood (20)	54	49.6	38.4	36.5	-0.8%	-2.5%	-1.7%	-1.7%	-32.4%
Food Processing(15.16)	82.8	79	62.2	62.8	-0.5%	-2.4%	**0.3%**	-1.2%	-24.2%
Electrical(30-33)	103.5	91.6	96.8	79.9	-1.2%	**0.6%**	**-6.2%**	-1.1%	-22.8%
Metal Fabricated(28)	95	93.7	80.4	73.9	-0.1%	-1.5%	-2.8%	-1.1%	-22.2%
NEC(36-37)	65.4	61.4	54	52.1	-0.6%	-1.3%	-1.2%	-1.0%	-20.3%
Rubber(25)	29.2	26.7	25.2	23.8	-0.9%	-0.6%	-1.9%	-0.9%	-18.5%
Chemicals(24)	44.3	39.2	38.6	39.5	-1.2%	-0.2%	**0.8%**	-0.5%	-10.8%
Machinery, nec(29)	110.7	116.3	96.5	99.3	**0.5%**	-1.8%	**1.0%**	-0.5%	-10.3%
Gasoline(23)	3	3.2	2.8	2.7	**0.6%**	-1.3%	-1.2%	-0.5%	-10.0%
Motor Vehicles(34)	67.9	78.2	75.6	75.8	**1.4%**	-0.3%	**0.1%**	**0.5%**	11.6%



Formatting by Size:	
Greater than	**0.0%**
Less Than	**-3.0%**

Sweden suffered two periods of substantial declines in manufacturing employment.
1980-83 and 1989-93
These declines were pretty much across all sectors, though somewhat greater in labor-intensive sectors.

Table 5

Swedish Value Added in Manufacturing: Millions of Constant $US (2003)

	1970	1980	1990	2000	2002	MAX	Year	Loss
Communication(32)		2,083	1,997	2,803	383	4,089	1998	-91%
Apparel(18)		584	277	119	112	584	1980	-81%
Trans:Ships(351)		1,221	473	251	242	1,221	1980	-80%
Computers(30)		1,019	588	253	267	1,269	1988	-79%
Leather(19)		212	103	50	48	212	1980	-77%
Textiles(17-19)	1,713	1,555	1,087	611	576	2,126	1975	-73%
Gasoline(23)		328	772	553	283	942	1986	-70%
Textiles(17-18)		1,343	984	560	528	1,343	1980	-61%
Metals:Non-ferrous		737	748	421	391	899	1988	-57%
Electrical(30-33)		5,319	5,738	6,144	3,886	8,291	1998	-53%
Trans:other(35)		2,557	2,005	1,208	1,246	2,557	1980	-51%
Trans: Railroad(352,359)		591	536	260	352	693	1992	-49%
Wood (20)	2,229	3,871	3,982	2,209	2,161	4,160	1974	-48%
Trans: Aircraft(353)		746	997	697	652	1,206	1992	-46%
Metals Basic(27)		4,047	3,387	2,323	2,207	4,047	1980	-45%
Metals:Steel(271+)		3,310	2,639	1,902	1,816	3,310	1980	-45%
Textiles(17)		759	707	441	416	759	1980	-45%
Mineral Products(26)	1,389	1,782	2,015	1,125	1,119	2,015	1990	-44%
Chem:other(not 2423)		3,082	3,022	2,193	1,931	3,269	1988	-41%
Paper(21)		4,784	5,722	4,830	4,120	6,697	1995	-38%
Machinery and Equipment(29-33)	6,302	12,335	13,986	12,457	10,094	16,290	1996	-38%
21-22	5,010	8,110	9,273	8,231	7,102	10,766	1995	-34%
Printing(22)		3,327	3,551	3,400	2,983	4,325	1996	-31%
Metals(27-28)	5,753	8,385	8,533	6,694	6,164	8,938	1975	-31%
Metals and Equipment(27-35)	15,252	27,100	29,847	26,792	22,209	32,161	1996	-31%
Food Processing(15.16)	2,350	3,670	5,346	4,020	3,975	5,576	1996	-29%
Motor Vehicles(34)		3,823	5,322	6,433	4,705	6,433	2000	-27%
Transport(34-35)	3,197	6,380	7,327	7,641	5,951	7,969	1988	-25%
Instruments(33)		541	1,462	1,480	1,703	2,279	1998	-25%
Machinery, nec(29)		7,017	8,249	6,313	6,208	8,249	1990	-25%
Metal Fabricated(28)		4,338	5,146	4,371	3,957	5,146	1990	-23%
NEC(36-37)	967	1,414	1,558	1,422	1,291	1,673	1996	-23%
Rubber(25)		1,432	1,540	1,433	1,381	1,752	1996	-21%
Electric, other(31)		1,675	1,691	1,608	1,533	1,810	1996	-15%
23-25	2,939	5,664	6,915	7,198	7,441	7,626	1998	-2%
Chemicals(24)		3,904	4,602	5,213	5,777	5,777	2002	0%
Chem: Pharma(2423)		822	1,580	3,019	3,846	3,846	2002	0%
TOTAL	31,848	53,166	60,022	51,609	45,875	61,182	1996	-25%

Value added in Manufacturing: Millions of $US, 2003