

INTERNET: THE ELUSIVE QUEST OF A FRICTIONLESS ECONOMY

By

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INTRODUCTION AND OVERVIEW

Despite the demise of many a dot-com at the dawn of the 21st century, there is little doubt that the ICT revolution is having an important impact on business organization, productivity, and trade flows in OECD countries. Conveying thorough, reliable, timely, and rich information has always been integral to the organization and conduct of economic activity, and this function has undoubtedly been improved by the revolution in information and communications technologies (ICT) – including network technologies such as cell phones, fax machines, electronic data interchange (EDI¹) and the internet, as well as others such as personal computers and laser scanners. In historical perspective, the internet has diffused at a far faster rate than earlier generations of communications technology: from 1990 to August 2001, the estimated number of internet users grew more than twelve-fold to more than 500 million.² In the United States, the number of internet users surged 26 per cent in 2001, with the result that for the first time more than half the population is now online. Internet diffusion is even more rapid, from a far smaller base, in some other parts of the world.

The naïve approach to the Internet views it as a means to make the world perfectly competitive. In particular, by making information cheap and readily available, e-commerce would allow consumers to raise competitive pressure on firms, helping them in turn to exert pressures on suppliers. As far as poor countries are concerned, the story goes, internet would lower the barriers to entry on rich countries' markets for both intermediary (business-to-business, B2B) and final (business-to-consumers B2C) products, thus fostering the inclusion of their firms into the world markets. As it is explained in this report, not all is false of the “naïve” story of the Internet as the great equalizer.

Yet, the idea that this revolution in communication will deliver a frictionless world may fail to grasp the core of the Internet story. First, it is worth emphasizing that not everyone has access to internet, no more than everyone could read a book in Gutenberg's time. In rich countries Internet penetration remains low in poor neighborhoods and poor regions -- and so it does in poor countries in general. Moreover, only two-thirds of connected individuals actually surf and network externalities are unsurprisingly strong – time on the internet is positively correlated to the number of fellow users in a given country. This does not only exclude the poor, it also has a direct bearing on the way price competition operates in the internet world. Firms are typically successful

¹ EDI systems are proprietary networks that enable firms to send data between remote establishments or to link with other firms and conduct business transactions.

² According to NUA Ltd.

in discriminating between on- and off-line customers, reinforcing the divide between the two groups.

But there is also a set of more fundamental reasons to caution against the naïve view. First, far from creating a frictionless world, the new medium may instead result in a world with **entry barriers** and frictions of its own kind. As John Sutton has demonstrated in a famous book, the benefits of lower barriers may be more than offset if new costs arise endogenously. The case of digital television provides a telling example. When it was launched, the new technology was expected to lower the barriers to entry and open the spectrum of choices available to the consumer. The outcome, however, has been very different. Digital TV may allow very small specialized broadcast such as opera-all or weather-all to reach the consumer, but major channels have kept their share. In France for instance, the first channel (TF1) still commands one third of the market, the second channel (Antenne 2) one third of the remaining market (21% of the overall market), the third channel one third of what remains, and so on. The explanation can be found in the soaring costs for purchasing the rights of soccer championships and other major events that the consumer cherishes.

So, if the digital TV precedent holds true, Internet may help tiny players in small market segments but pose no challenge to big firms. Our evidence supports this hypothesis. Despite the availability of the same good through many different on line intermediaries, the abundance of information available, and the possibility to compare prices, consumers tend to purchase at a relatively limited number of internet retailers. In fact, for internet-based intermediaries branding is an important aspect of marketing,³ and branded B2C retailers can charge a premium over cheaper unbranded retailers. This evidence hints at the fact that simple price competition may be unlikely to dominate among B2C e-commerce. There is a strategic aspect to branding and reputation building which also has consequences for the market structure of B2C retailers.⁴ Marketing, advertising, or any other type of reputation-building expenditures are likely to be high because to a large extent they will determine market shares.

Another naiveté of the frictionless view is the idea that ICT solves most of the **information** problem. Information is not an entirely digitalizable commodity. A wide number of transactions require face to face (F2F) interaction. You do not buy a car without trying it, not to mention a house without visiting it. This may explain why Internet does not appear to have a major bite on some B2C transactions. An OECD publication predicted in 1999 that up to perhaps 10 to 20% of cars would be purchased on line within the next 5 years. The numbers today remain homeopathic. Internet may have a massive impact on the productivity of the F2F match, but rarely suppress it. For most goods, the routine procedure today is to gather price information online and close the deal eye-to-eye. Similarly, the invention of the telephone allowed a new mix of voice communication and F2F encounters, where the former can solve trivial problems and the latter can easily be organized whenever needed.

It is true that in the B2B world, which accounts for most of today's internet transactions, firms are using internet widely to outsource non-essential activities along their supply chain. Yet this is again a far cry from generating a frictionless world. Indeed firms which resort to on-line suppliers of intermediate products do not simply do without the F2F stage – they typically require them to undertake an (expensive) certification process to check for the quality of the good they supply.

³ A consumer survey on the use of internet conducted in January/February 2000 in Austria showed that the most important criterion for consumer choice was brand name of the B2C company followed by the trade mark of the good purchased. (Latzer and Schmitz [2001]).

⁴ Incidentally, reputation and more generally complementary attributes will also be important aspects of B2B e-commerce; business firms have specific means for solving problems related to reputation and reliability, which will be analysed below.

The result is then likely to be what we call a second digital divide, between the firms which go through the certification process and those that do not.

This takes us to the third naïveté of the internet apologist, namely interpreting it as a means to kill **distance**. To start with, economic geographers do not support the naïve idea that location becomes irrelevant as the cost of distance is reduced. Instead, when investigating the impact of the first communication revolution in the 19th century, they point to quite opposite trends. Rather than fostering the “dispersion” of economic activity across territories, railways, telegraph and telephone produced extraordinary concentration – centripetal forces proved much more powerful than centrifugal ones. The intuition behind that outcome is quite obvious: railways allowed producers to reorganize their organization, concentrating in one (or few) site, exploiting economies of scale, and sending the goods into the whole territory. Similarly, as pointed out by Leamer and Storper, the invention of the telephone has raised the equilibrium size of big cities rather than the size of small ones.⁵ It is the small villages, hamlets and so on, spread out over the entire territory that are destroyed. We get here a somehow different story from the one that we told with television: it is the tiny niches that are destroyed. But the two stories are obviously not inconsistent. Internet may raise the tiny segments of each market, and yet foster the forces of geographic concentrations. In neither case however should we expect the advent of an atomistic economy.

Besides, the advent of internet is not happening in a vacuum. One of the most important features of business organization in recent years has been so-called flexible/lean production. One implication is that, according to a saying, suppliers need to be within a 24 hours truck journey from the client – in the car industry case the trend is indeed for suppliers to co-locate with assemblers. Although new technologies may make it possible to achieve “just in time” practices over longer physical distances, and therefore to relocate far from traditional industrial centres, there are also important advantages in clustering similar companies. Agglomeration economies are not the consequence of ‘physical’ transportation costs only, but also the result of less material positive external effects.

This leads us to the fourth naïve expectation concerns the links between economic geography and the **development** process. Following the previous discussion, some observers have argued that, by “killing distance”, the internet is an unstoppable driver of delocalisation to low-wage areas. Others are more skeptical and tend to see the emergence of a “digital divide” as the most likely by-product of the New Economy. In the report we examine five industries to highlight the effects of internet on the organization of supply chains and international production. While in a few cases – notably Indian software and IT-enabled services – IT diffusion has opened up new opportunities for developing country entrepreneurs and workers, in more traditional sectors like agricultural commodities, the new technologies have had a less dramatic impact, with powerful industry incumbents (e.g., the big trading houses and auctioneers) resistant to the dissipation of their rents and in a relatively strong position to use the technologies to their advantage. Other examples include ornamental horticulture, where the bottleneck is the information on quality, and coffee, where it is the ability of producers to create premium products. In travel and tourism, finally, the raising profile of on-line agencies in industrial countries has no parallel in developing countries, where small-scale operators seem unlikely to by-pass source country travel agents and online “info-mediaries”.

In the Bangalore case – the classic success story of the internet – we argue that the critical factor has been the very nature of the good which is supplied. Software is a perfectly digitalized product, whose quality is readily identified by the consumer. In other (albeit possibly less impressive)

⁵ In fact, if one follows the results known as Zipf law, the big cities remain stable in their relative size to one another.

success stories such as the data-processing industry in the Philippines, local companies could also build on the weightless nature of the good they supply – in this case the ability to answer phone calls across the time barriers, which allows to have 24 hours a day response. Whenever the nature of the good becomes more material, however, failure stories are more often the case. In clothing, for instance, design and brand names remain in the hands of rich countries' firms. Producers in developing countries have found it extremely difficult to climb up the ladder of production, middlemen and importer typically extract up to 40 per cent of the total bill of production. Upgrading is not impossible, as demonstrated by the success of some Asian firms, but case studies show that this takes an enormous investment in building reputation, gathering information, and mustering the organisational know-how needed to manage the production chain.

What policy implications can be drawn from our results? From the perspective of reducing income and wealth inequality between rich (OECD) countries and “the rest” through more intensive trade flows, it should be borne in mind that in the past economic growth have played a much greater role than falling transport costs – which comes a distant third after tariff reductions in explaining North-South trade growth. This suggests that even if the actual governance of global industries and supply chains became more friendly for developing countries, technology-induced lowering of transport and transaction costs would still have a relatively insignificant impact on trade opportunities. Simple claims about the links between equity, well-being and the unhindered development of ICTs are also not correct, and may in some cases be dangerously wrong. The legal system, the stability of institutional and political conditions, and levels of government distortions are important determinants of ICT diffusion – although our results shed a skeptical light on the role of telecommunication deregulation (proxied by the price of local calls and telephone subscription) when considering fixed effects.

None of this is meant to imply that internet is not a welcome innovation. The internet and ICT are often referred to as advanced technologies, the presumption being that only people with advanced education and high levels of skill can make effective use of them. This does not seem plausible, since they are designed to serve a mass market consisting mostly of people with only moderate levels of education. The fact that young school children are often more adept at using computers and the internet than their doctorate-toting parents should give pause. In this there is some cause for optimism: the technology itself does not appear to be inherently skill-biased, so modest human capital endowments should not exclude a developing country from enjoying its potential benefits. The diffusion of ICT will thus have potentially significant consequences for productivity improvements – as highlighted in the companion report for this Conference. Internet-based commerce will also set in a significant reshaping of the intermediation sector, with benefits of ICT not limited to the confines of information-intensive activities -- what is known as the ‘weightless’ economy.⁶ New technologies also offer new opportunities for managing ‘weighted’, ‘material’ goods.

But this reshaping process needs to be carefully examined, on a case by case basis, before sweeping claims can be made about winners and losers. On the down side, neither is the technology as powerful a leveler as some had originally believed if not hoped. While in many applications using the technologies may not pose insurmountable barriers, apart from the familiar one of affordability of infrastructure and capital equipment, producing the ideas that underlie the major innovations that make up ICT and the internet is what generates the truly big technological rents; likewise the use of the technologies to support other knowledge production. Moreover, even with widespread internet access and use, existing market structures and sources of competitive

⁶ According to Danny Quah, the weightless economy comprises four main elements: (i) Information and communications technology (ICT), the Internet; Intellectual assets; (ii) Electronic libraries and databases; (iii) Biotechnology; (iv) Carbon-based libraries and databases, pharmaceuticals.

advantage cannot so easily be overturned. There may be welfare changes at the margin, some benefiting developing country entrepreneurs, probably many more benefiting online customers, but if a revolution is in the offing it is at best a gradual one, on the model of previous “general purpose technologies” whose economic and social impacts have unfolded over decades rather than years.

The evidence of real benefits and costs from the adoption of the internet is still scattered and anecdotal. At the same time, economic models lead to open-ended predictions: as Hal Varian puts it, “the Internet certainly affects transaction costs, but determining whether that means companies will be bigger or smaller requires careful analysis of competing forces”. This is why we have chosen to build our analysis on a wide range of case studies, ranging from banking, real estate or insurance to software, clothing, flowers and travel and tourism, in order to illuminate how organizations – companies, governments, business associations, international cartels – react to this extraordinary revolution by adopting old and new strategies, erecting old and new barriers, and innovating. Our report will then proceed as follows. In section 1, we document the unequal access to internet across and within countries – the first digital divide. In section 2, we examine how the internet is reshaping the functioning of B2C markets and the role of intermediaries. In section 3, we examine how the increasing importance of B2B markets and of the certification process is altering the balance between firms, the second digital divide. In section 4, we examine how internet modifies the strategies of poor countries’ organizations to gain access to rich countries’ markets, the third digital divide between producers and intermediaries.

I. A FIRST DIGITAL DIVIDE

Like all technological revolutions, the diffusion of ICT is sometimes naively expected to bring substantial productivity and welfare gains. The 'digitalisation' of information combined with the use of efficient information-processing technologies is expected to improve the efficiency of the production process through a dramatic decrease in the costs of transacting, and particularly costs related to routine transactions: payments, processing and transmitting of financial information, maintaining records... Thus, some information-intensive activities are likely to benefit to a large extent from the diffusion and use of ICT: health care, banking, insurance or public services for instance.⁷ The new technologies have the potential to substantially increase consumer choice: consumers have access to a wider range of products through internet since they are no longer limited by the product choice that a physical intermediary can propose, but can shop anywhere on the planet, provided that sellers are on line. Internet also helps buyers and sellers to find each other much more easily. When the product itself is digitalisable, online distribution cuts costs dramatically: there is no longer a need for physical storing, delivery vehicles, etc. The drop in intermediation costs benefits customers but provides new opportunities for sellers as well. Producers will have access to a much larger market thanks to the internet. This market-widening effect should foster competition and favour entry in many industries, ultimately leading to price reductions and welfare improvements.

There is another aspect to the diffusion of internet commerce. Lower search costs mean that consumers are better informed about prices. This gives new power to customers: they can search, compare and even bargain more efficiently. A direct consequence is that the position of some intermediaries is threatened and their rent should decrease. The diffusion of ICT and internet commerce should thus set in a significant reshaping of the intermediation sector. Lower information costs would lead to the vanishing of some 'traditional' intermediaries in favour not only of direct producer/consumer transactions (Business to Consumer, B2C), but also producer/producer transactions (Business to Business, B2B) and even C2C (i.e. Consumer to Consumer), for instance for second-hand goods, real estate... This process involves another transformation; F2F (face to face) transactions may no longer be as necessary as before since new 'digital' intermediaries can provide a better service at a lower cost. Not all intermediaries face the same threat however. Those that provide a service that sellers or buyers cannot produce themselves will certainly maintain their market shares. Besides, rather than a process of disintermediation, one may actually see the emergence of new intermediation, where portals will be strategic places. This is probably all the more significant for inter-company transactions.

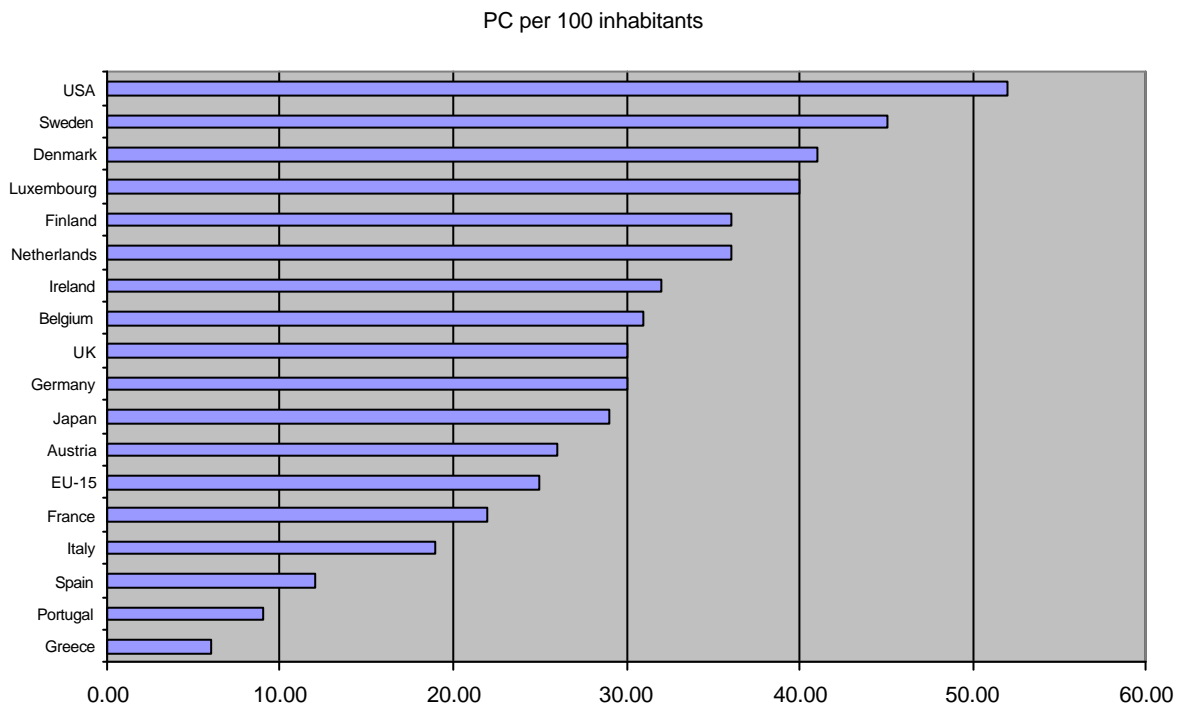
However, if the benefits brought by the diffusion of ICT and the internet are potentially very large, there remains to be seen whether they are likely to be that substantial in practice. In this respect, we shall qualify the above-mentioned points in analyzing the evidence showing that internet use is far from being widely diffused, which limits in practice the impact of ICT on the economy.

⁷ Danzon and Furukawa [2000] note that the potential for transactions cost savings from transition to the Internet is especially high in the health care sector, because it is large (14 percent of GDP), information-intensive, and dependent on paper records. For the US, they estimate that internet could divide by a factor of 100 the cost of processing claim forms. No more than 50 percent of doctor's claims are now processed electronically, but a complete shift to web processing would represent a total saving equivalent to 0.2% of the GDP.

I.a. A Large Country Divide ... Underestimated

Based on the combination of national surveys, the OECD (2001) opus on the digital divide reveals that, in 2000, OECD countries differed markedly in access by individuals and households to the Internet. These sharp differences were driven by the PC penetration in Households; in 2000, to have a PC was necessary to have access to the internet. Two groups of countries can be distinguished. Roughly, the Anglo-Saxons countries –United States, Australia, Canada and the UK- and the Nordic European states (Denmark, Norway, and the Netherlands) presented both large PC penetration and a large access to Internet: at least one quarter of the households were concerned. On the contrary, large European countries –France, Italy and Germany- were characterized by a deep backwardness. Finally Japan is in an intermediate situation: a high PC penetration but a limited internet penetration.

Figure 1



Internet users per 100 inhabitants

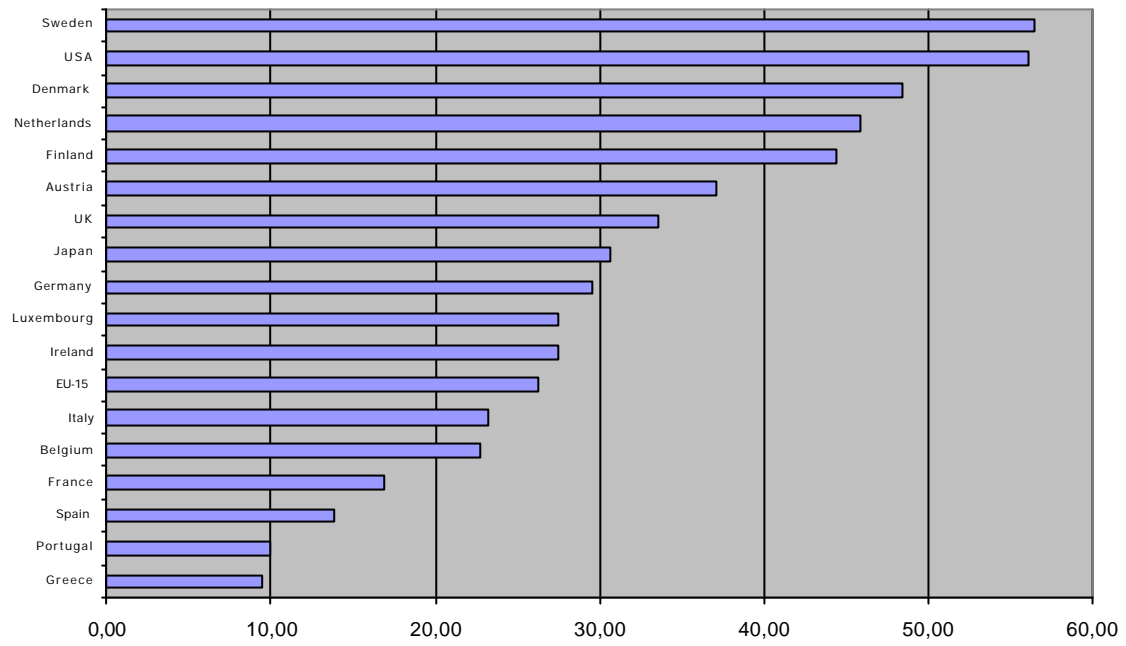
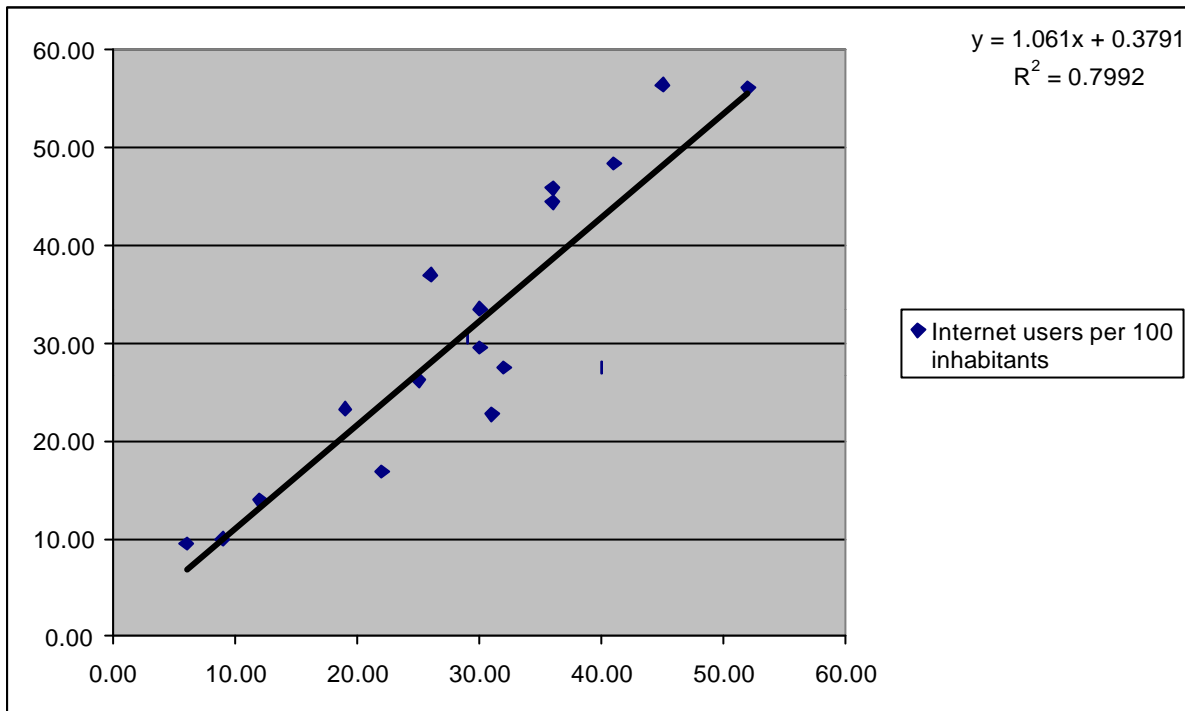


Figure 2 Internet Users per 100 Inhabitants vs Number of PC per 100 Inhabitants



Source: Eurostat

Figure 2 above shows that the diffusion of internet is strongly related to the diffusion of personal computers in OECD countries. The same result applies to a sample of 160 countries over the 1995-2001 period. Regressing the log of internet use over the log of PC diffusion yields significant elasticities of 1.2 (OLS regression with trend) and 0.95 (country fixed effects regression with trend).⁸ However, in 1999 or 2000, the Internet was still a very new technology especially for continental Europeans. Now, the example of the mobile phone shows that the diffusion of an information technology dedicated to consumers can be extremely rapid. We can thus expect that Italy or France should reduce the gap vis-à-vis other countries just as they have become the champions of the use of mobile phones in Europe. Therefore, it is crucial to correct this view using updated statistics. Using homogeneous and comparable data from Nielsen Netrating, we computed internet penetration in 15 OECD countries plus Hong Kong and Singapore (Table 2). Nielsen provides the estimates of the number of individuals connected who have access to internet at home or at work, the number of active web surfer and the average monthly number of hours of surfing⁹. Because data on internet at work are available only for 5 countries, we exploit the statistics on internet at home. Normalized to the total population, we have constructed three indicators of the internet penetration:

⁸ The data set used for these regressions come from the International Telecommunication Union. See below for further precisions.

⁹ The number of individuals connected to Internet is estimated by public poll. Nielsen has composed in each country a panel of Internet users (at home or at work). The panel member installs a patch to her internet browser. This patch sends the information of each internet connection. The panelist should indicate the member of the family currently connected.

- gross internet penetration: defined as the ratio between the number of individuals with an access to internet at home to the population
- active internet penetration: defined as the ratio between the number of individuals who have been connected at home to internet during November 2001 to the population
- internet penetration weighted by the surfing duration: defined as the product of active internet penetration and the number of hours spend on internet by active internet user during November 2001.

Table 1. Internet Penetration Rate (November 2001)

Country	Internet penetration	Rank	Active internet penetration	Rank	Internet penetration weighted by surfing time	Rank
Sweden	64%	1	42%	1	2,5	4
United States	63%	2	38%	2	4,0	1
Hong Kong	61%	3	28%	9	3,1	3
Netherlands	58%	4	34%	4	2,2	6
Denmark	56%	5	38%	3	2,0	7
Norway	56%	5	34%	4	1,9	9
Canada	56%	5	33%	6	3,1	2
Singapore	56%	5	23%	12	2,0	7
Australia	53%	9	32%	7	2,5	4
New Zealand	50%	10	29%	8	1,8	10
United Kingdom	41%	11	24%	11	1,4	13
Finland	39%	12	25%	10	1,2	14
Germany	37%	13	22%	13	1,8	10
Japan	37%	13	16%	15	1,5	12
Italy	34%	15	16%	15	0,9	15
Ireland	33%	16	17%	14	0,6	17
France	19%	17	11%	17	0,7	16

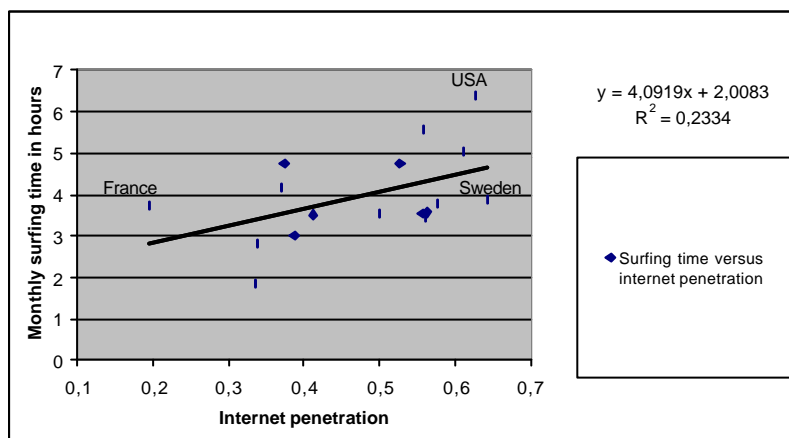
Source: Authors' computation based on Nielsen panel ratings

So, being connected does not necessarily imply that internet use will be intensive. An important point shown by the Nielsen data is that only two-third of the individuals connected to the Internet actually surf. Thus, the active internet penetration is for most countries between 20 and 40 per cent only. The hierarchy of countries is not affected except for Singapore and Hong Kong where the active internet surfers weight less the half of the individuals with an access to Internet. Moreover, the network effect strengthens the existing apparent gap between countries. Figure 3 reports the average monthly surfing time plotted against gross internet penetration as defined above. Time spent on the internet is positively correlated to the number of Internet users in the country.

However, Figure 3 also shows an important dispersion; for example the average surfing time per internet user is similar in France and in Sweden while France has the lowest internet penetration and Sweden has the largest. Therefore, the country hierarchy is actually different from what one may first imagine. Weighted by the observed surfing time, it appears that the internet use is far more developed in the US and Canada than in Europe. An American spends on average 4 hours

per month on the Internet while the maximum surfing time for Europeans is only 2.5 hours (Sweden) and the average surfing duration should be no more than 1.5 hours. These results show that the gap between US and Europe in the diffusion of Internet is generally underestimated and remains large. They also suggest that an active European policy should be needed to fill this gap. The issue is particularly relevant for southern Europe. Indeed, Italy with a low average surfing per internet user joins France as the only large OECD countries below one hour per individual spend on Internet.

Figure 3. Average Monthly Surfing Time of Internet Users (in hours) Versus Internet Penetration (Proportion of Individuals with Access to Internet)



Source: Authors' tabulations and estimations using Nielsen monthly data; the reported countries are one of table 2.

If we assume that the supply of goods and services is mainly national or local even on Internet, another face of the digital divide between countries is the potentiality for individual with an access to the web to purchase via this media. Table 3 reports for selected OECD countries the intensity of the national offer on the Internet. Again, it appears that the US are far ahead of Europe and Japan for the development of Internet. The average number of secure servers per internet user is three times higher in the US. The figure is quite similar for the number of internet hosts. The differentials inside Europe are also large; however, they do not deepen the internet divide, except for Italy, among European countries because there is no clear connection between internet penetration and the intensity of internet hosts or secure servers.

Table 2. Internet Offer for Europe, US and Japan in 2001

	Secure server per 1000 internet user	Internet hosts per internet user
Belgium	0,115	0,129
Denmark ¹⁰	0,112	0,126
Germany	0,155	0,083
Greece	0,087	0,111
Spain	0,138	0,065
France	0,131	0,112
Ireland	0,236	0,107
Italy	0,059	0,073
Luxembourg	0,367	0,098
Netherlands	0,074	0,209
Austria	0,149	0,161
Portugal	0,116	0,063
Finland	0,149	0,232
Sweden	0,162	0,119
UK	0,220	0,084
USA	0,426	0,524
Japan	0,075	0,120
EU	0,168	0,103

Source: Authors' computation using Eurostat (2001).

1.b. Regulation Failure ?

A simple look at the above Tables could lead one to wonder whether international differences in the competitive structures of the telecommunication sectors could not partly explain the international divide in internet diffusion. The argument is most straightforward: low competition brings high communication prices and subscription costs. In most countries, internet access is free of charge apart from the local communication costs. Therefore, the international differences mentioned above could simply reflect different competitive telecommunication structures: For example, the historical operator –France Telecom, is still prominent on the French market, and tariffs are far higher than in the US. Table 1 shows that France is among the lagging countries in terms of internet penetration. A key to an increasing diffusion of internet could then be deregulation of national telecommunication markets. This should not only reduce the international divide, but also care for the digital divide within each country. If high prices prevent the less affluent households from surfing, deregulation should reduce inequality within countries.

In order to check whether this line of argument has any substance, we test below for the existence of a correlation between the price of telephone communications and internet diffusion. We use the World Telecommunication Database 2002 of the International Telecommunication Union (ITU). This base provides data on telecommunication prices and use, be it residential main lines, mobile phones or internet, and infrastructures (investment, number of ISDN channels...) for 209 countries. We will exploit the database for the 1995-2001 period. We test a simple model where the dependant variable is the ratio between the number of estimated internet users and the

¹⁰ For example, France and Sweden experienced similar development of offer per internet users while the latter have the higher penetration of internet in Europe and the former the lower.

population. The explanatory variables are the GDP per capita, because the level of development influences the extent of net diffusion, a time trend and two variables reflecting the cost of phone calls. We consider the unit cost a local call (peak cost because off-peak costs were not available) and the cost of a residential monthly telephone subscription. Two specifications for these price variables have been tried: the absolute levels (prices in US dollars) and the relative costs (dollar prices divided by the GDP per capita also in dollars). Both models gave comparable results. We report here the regressions made with the first specification, which delivered the most significant price effects. We have not specified a model with the logs of the variables because it would have biased the sample: in some countries (Canada for instance), the marginal cost of local communication is nil. Taking a log specification would have us drop Canada and other such countries.¹¹ We however restrain the sample to countries where internet diffusion is strictly positive. We further consider two different samples. The first one includes all possible countries, the second sample is restricted to the 26 richest and largest ones.¹²

Table 4. The Effect of Telecom Rates on Internet Diffusion

	1	2	3	4	5	6	7	8
	OLS	OLS	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects
GDP per capita (million dollars)	5.2***	3.1***	1.5	2.0	2.0	1.4	-0.7	1.0
Cost of a local 3 minute phone call (peak)	-0.09***	-0.25***	-0.07	0.03	-0.04	0.02		
Residential monthly telephone subscription	-0.0	0.003**	0.0	-0.002			0.0	-0.0
Time trend	0.02***	0.05***	0.02***	0.05***	0.02***	0.05***	0.02***	0.05***
Number of countries	175	26	175	26	175	26	181	26
Number of observation	748	131	748	131	752	133	795	133
R ²	0.53	0.60						

All variables in logs. *: 10% level significance, ** 5%, *** 1%. Authors' own estimations.

OLS regressions suggest the existence of a strongly significant negative effect of the price of local calls for the whole sample of countries (regression 1) as well as for the restricted sample (regression 2). However, the residential monthly telephone subscription had no impact on internet adoption. As expected, both the time trend and the GDP per capita variables exhibit clearly significant positive coefficients.

We tested for the presence of individual effects with the Breusch and Pagan Lagrangian multiplier test and the Hausman specification test. For all models, the result was the same: the Breusch and

¹¹ In spite of the potential bias in the sample, we tested a log specification of the model. The results are mostly similar to the ones reported here and do not alter our conclusions.

¹² defined as having a GDP per capita over 15000\$ in 1995

Pagan test led to accepting the presence of individual effects. Therefore the OLS model should be rejected. The Hausman tests concluded in favour of the fixed effects model. Unfortunately, none of the price effects carry over when one considers fixed effects regressions. The only significant variable left is a simple time trend, for the whole sample as well as for the restricted one. The lack of robust results suggests that the expected positive consequences of deregulation in the telecommunication sector might be overestimated.

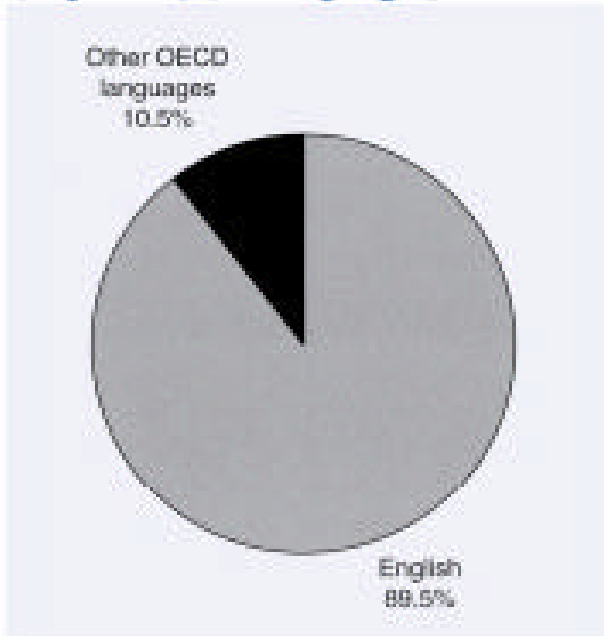
I.c. Is English Speaking a Key to Access to the Internet?

If, contrary to the previous paragraph, we assume that the services on Internet are mainly global, one potential explanation of poor internet penetration in Europe may be the language barrier¹³, especially for Mediterranean European citizens. This argument is far from the standard ones (market failures...). In July 2000, English secure servers represent 90 per cent of all secure servers while continental European languages are used for only 5 per cent of the secure servers!

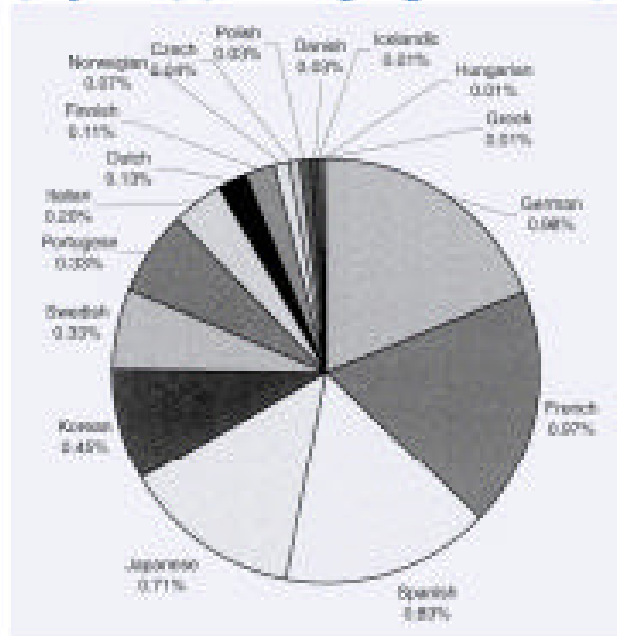
¹³ This explanation is necessarily partial. Indeed, Ireland is an English speaking country and is a backward state for internet penetration.

Figure 4

Links to secure servers by language (July 2000) (All languages)



Links to secure servers by language (July 2000) (Excluding English: 89.5%)

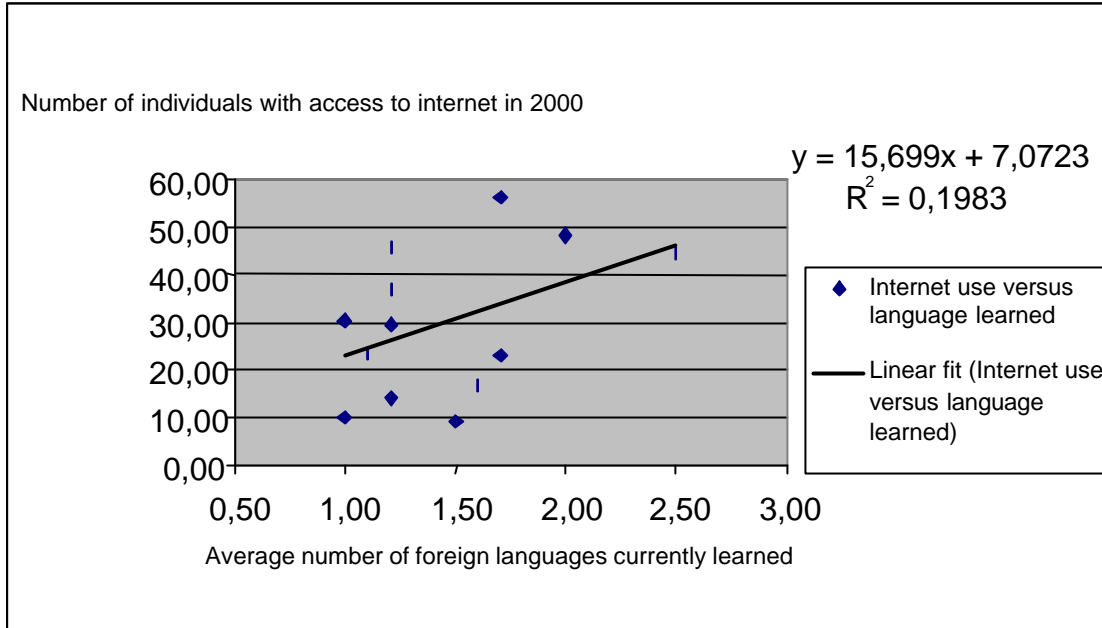


Source: OECD (2001)

The language hypothesis is supported by a simple plot: internet use versus foreign languages knowledge. Unfortunately, homogenous data on the stock of individuals speaking one or more foreign language, especially in OECD countries is not available. We will thus consider that the number of foreign languages learned in secondary education is a correct proxy for this stock. Figure 5 shows a clear positive correlation between internet penetration (defined as the percentage of households connected to the net in 2000) and the indicator of education of foreign languages for Belgium, Denmark, Germany, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Finland, Sweden, and Japan. Note also that the most obvious outlier for this correlation is Spain, a country where the main foreign language learned in secondary school is not English but French... These results suggest that, regarding their connection to the Internet, English knowledge is a key for individuals.

The on-going development of European subsidiary companies of American on-line firms (Amazon, Yahoo...) should narrow this dramatic disparity, although it is unlikely to disappear due to the persistent supremacy of the English-speaking Internet community and to network effects. This pre-eminence of the English language in commercial internet plays a role in the digital divide among countries but should also be a factor of divide within the non-English speaking countries or for the non-English groups of citizens. Actually, parallel to the country divide, the diffusion of internet is characterized by a large divide between the consumers according to their education (including English speaking) or their income.

Figure 4b. Internet Use and Number of Foreign Languages Learned in Secondary Education in Selected OECD Non-English Countries (2000)

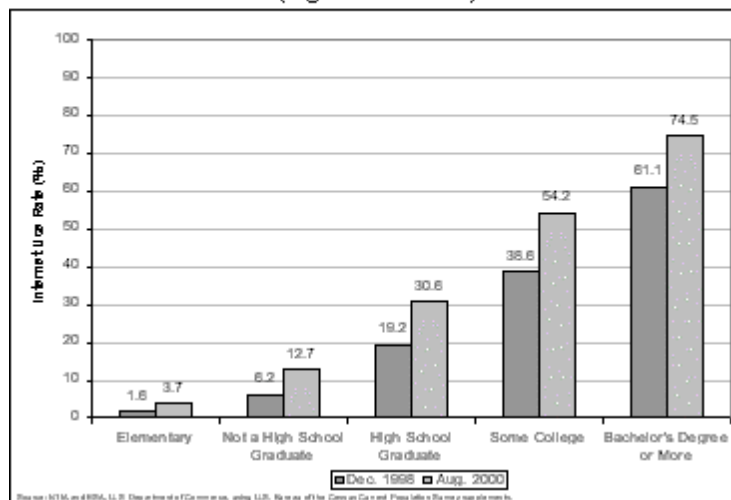


Source: EUROSTAT (2001) and authors' estimations.

I.d. Education and Income are Important Determinants of PC Penetration and Internet Access

Even in English-speaking countries, education seems an important determinant of Internet access. The Current Population Surveys shows that despite the generalization of Internet in the U.S., it remains a large gap between the college educated adults and the non high school graduates. In august 2000, while 60 per cent of the former have an access to internet, only 10 per cent of the latter

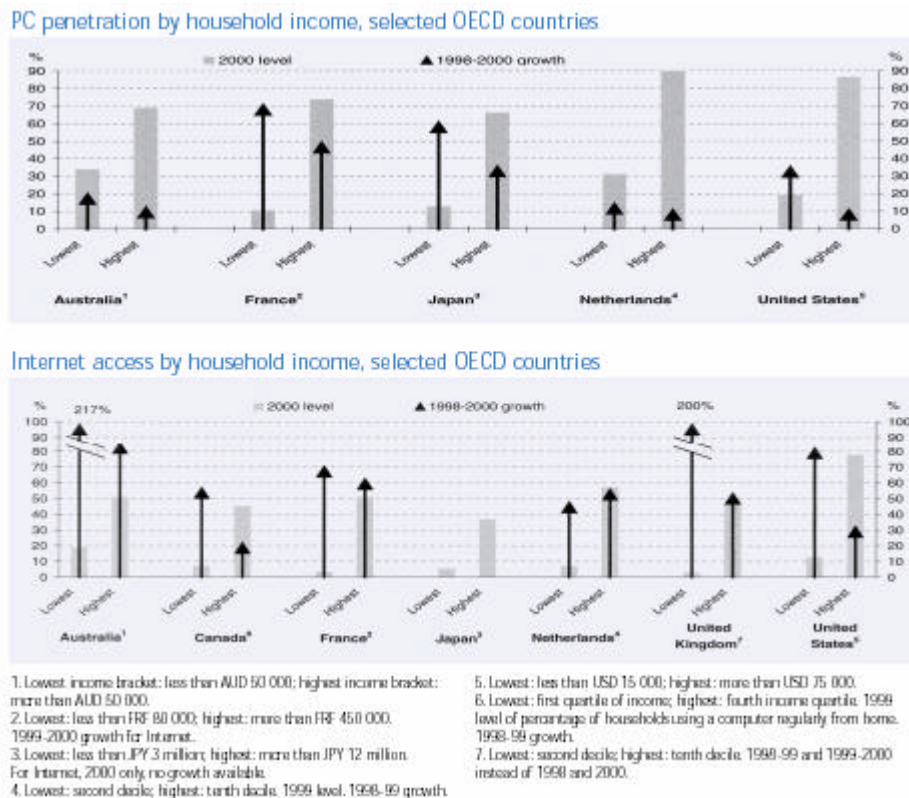
Figure II-8
Internet Use Rates by Educational Attainment
(Age 25 and Older)



The fact that at work, highly educated workers generally have office jobs and thus training and access to computer technology should play in this dramatic divide. Internet is by nature a technology which generates divide according to the occupation of the individuals. In that sense, a particular effort should be focused on the workers who do not benefit from computers in their occupational environment, and, of course, also the non-workers.

The digital divide according to education reflects also partially a large divide according to the households' income. Figure 6 reports the PC and internet penetration rates for selected OECD countries for the lowest and highest deciles of the household income distribution. On average, the households in the highest deciles are five times more connected than the households at the lowest deciles. Actually, the costs of a multimedia personal computer remain a weighted investment for most households. In France, a basic computer costs at least 1,000 euros while the median monthly wage is about 1,200 euros. However, these data also shows that the growth of internet access rate and the PC penetration rate between 1998 and 2000 was more dynamic for the lowest income deciles suggesting a convergence between the income categories in the use of ICT.

Figure 6. Digital Divide According to the Income in OECD



Source: OECD (2001)

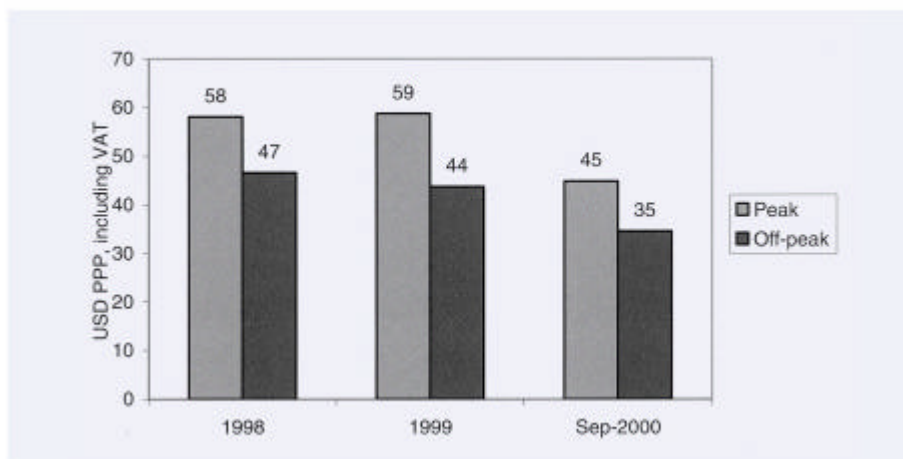
The richest part of the population is not likely to be affected by the diffusion of internet, since one may suppose that their time is too precious to be wasted surfing on the net. The digital divide may thus be supposed to split the middle class; the upper middle class will enjoy the benefits brought by the net, whereas the lower middle class will miss most the opportunities provided by ICT and the world wide web.

I.e. Towards Digital Inclusion?

As noted above, the cost of computers remains a barrier to the generalized access to Internet. However, another financial barrier progressively vanishes: the costs of surfing on internet. Prices are dramatically decreasing (Figure 7) due to a high competition between internet providers and, in some cases, to direct government intervention. Some providers are even free of charge except for the costs of communication.

Figure 7. Costs of Internet Access (Exclusive of Computer Purchase)

Internet access basket for 20 hours using discounted PSTN rates



Source: OECD (2001)

Again, in spite of the somewhat deceptive results obtained above, this mechanism might be accentuated by the deregulation of the telecommunication sector in Europe. Complete packages for 20 monthly hours of Internet including access to internet and the communication costs, in January 2002, less than 10 euros in most European countries. Financial digital exclusion may be then a transitory phenomenon. The case of the US seems to support that the overall level of digital inclusion can rapidly increase, through a saturation mechanism: “everyone has access to internet”. According to CPS data, between December 1998 and August 2000 the share of households with Internet access soared by 60 per cent, from 26 per cent to 42 per cent. More than half of all households have computers, up from 42 per cent in December 1998. There were about 120 million Americans online at home, work or other location in August 2000. The share of individuals using the Internet rose by about 35 percents from 33 per cent in December 1998 to 44 per cent in August 2000. The Nielsen data prove that the uptake has continued at an even larger rate because at least 70 per cent of the individuals use internet at home or at work. The rapid diffusion of communication technologies is occurring among most groups of Americans, regardless of income, education, ethnicity, location, age, or gender, suggesting that digital inclusion is a realizable goal. Groups that have traditionally been digital excluded are now making dramatic gains. As we already note the disparities due to income have narrowed.

Moreover, the gap in Internet usage between men and women has also completely disappeared. In December 1998, 34.2 per cent of men and 31.4 per cent of women were using the Internet. By August 2000, 44.6 per cent of men and 44.2 per cent of women were Internet users. The disparity between households in rural areas and households nationwide that access the Internet has been

reduced from 4.0 percentage points in 1998 to 2.6 percentage points in 2000. However, a digital divide remains. For example, gaps are large regarding Internet penetration rates among households of different ethnic origins. In August 2000, Blacks and Hispanics continue to experience the lowest household Internet penetration rates at 24 per cent. This result for Hispanic, who have higher income than blacks, can be again the consequences of the supremacy of English on Internet.

To sum up, the digital inclusion for all groups of individuals and households is still a challenge even for the U.S. The Europe will have thus to face both a clear backwardness and the risk of a persistent internal digital divide. The first digital divides between countries and between individuals can drive that only some countries or some groups of individuals will benefit from the e-consumer society. It is necessary to have access to internet in order to enjoy the benefits brought by the e-economy. Less affluent individuals will not benefit from price reductions or increased choice because they will not be online; this is the first digital divide. The divide can thus lead to an increase of inequalities between social groups and countries. This threat can become a reality if the e-consumer society is also a reality and induces gains for the on-line consumers or for some groups of consumers. The next section aims to synthesize the main arguments showing that the optimistic view of the effects of Internet on the efficiency of commerce and on the gains for the consumers should be taken with caution. The recent empirical contributions on the consequences of internet on on-line and off-line markets are also analysed.

II. MARKETS AND CONSUMERS

In spite of its rapid development, B2C –business to consumer- e-commerce is still anecdotic. In 2001, it weighted less than 5% of the whole retail trade in the U.S. and less than 2% in France. According to data concerning the main Business to consumers (B2C) companies, this share has doubled in 2001 in France, while statistics from the US Department of Commerce suggest that it share has slightly declined over the same period. Despite this mitigated performance, analysts continue to expect high growth rates for on-line retail commerce. ICT and internet technologies are expected to significantly improve the functioning of markets through the decrease in information costs associated to intermediation, and particularly the search costs. A first consequence is that these technologies are expected to substantially increase consumer choice: consumers have access to a wider range of products through internet since they are no longer limited by the product choice that a physical intermediary can propose, but can shop anywhere on the planet, provided that sellers are on line. Internet helps buyers and sellers to find each other much more easily. The drop in intermediation costs is then expected to benefits customers and to provide new opportunities for sellers as well. Producers will have access to a much larger market thanks to the internet. This market-widening effect should foster competition and favour entry in many industries, ultimately leading to price reductions and welfare improvements. The diffusion of ICT and internet commerce should thus set in a significant reshaping of the intermediation sector. This section critically reviews how this “rosy” scenario, if not entirely false, come to be implemented in practice.

II.a. Information and Other Barriers to Entry

A first limitation of e-commerce concerns the dramatic increase in the availability of information enabled by ICT. The amount of information treated by agents may increase substantially so that information costs do not decrease. For instance, one may not observe large productivity gains in the banking industry because the benefits of lower transaction costs will be offset by the sharp increase in the number of transactions. ICT may thus generate larger information flows, heavier to process. This caveat concerns on-line firms but also the consumers. The larger choice of distributors and products can overload confused consumers. Regarding the efficiency of the price mechanism, the drop in menu costs enabled by internet may provide incentives for frequent price changes. Therefore price variability may actually increase, making price comparisons more difficult, and robbing the consumers of the expected benefits of lower information costs.

In B2C as well as in B2B e-commerce, information-related costs matter more than in traditional F2F commerce. Following Latzer and Schmitz (2001), one may say that the utility derived from the purchase of goods through e-commerce depends on the quality attributes of a composite good: i.e. the purchased product itself but also several other complementary goods such as consumer and privacy protection, transparency of information, reliability and efficiency of the delivery service, efficiency and security of the payment procedure, etc. Indeed, security problems are a commonplace. Paying online involves mostly giving one’s credit card number to the selling firm. Encryption and other solutions exist, but they slow down information processing and do not entirely alley consumers’ fear. On-line retail companies must also face numerous logistic requirements, shipping charges, custom duties, payment, fraud... Furthermore, the efficiency of the service provided by the B2C e-intermediary is dependent on logistic factors (delivery...) which the intermediary itself may not have full control on.

The presence of all these complementary attributes increases the heterogeneity within any online market; the same good will be proposed by intermediaries offering different combinations of complementary attributes. Besides, buying under such circumstances involves thus a certain degree of uncertainty, even if the quality of the good itself is perfectly known. Buying online for the first time means making a bet on the quality of the complementary attributes. This type of decision tends to reinforce established market positions. A positive experience with one intermediary will be an incentive to stay with this intermediary. Thus, one of the most important criterion for consumer choice may not be the extent of the range of available goods but rather the reputation of the online seller.

This aspect of competition among B2C intermediaries can be expressed in terms of endogenous sunk costs. Following Sutton (1991), one may represent competition as a two-stage game. The first stage is the decision taken by a firm to spend the sunk costs which are necessary for entering the concerned market. The second stage is that of actual competition among firms having entered the market. First stage expenditures are a sunk cost since they cannot be recouped should the firm withdraw from the market. According to Sutton (1991),¹⁴ there are two types of such sunk costs: exogenous and endogenous. The former apply when advertising or R&D are unlikely to be an important feature of competition during the second stage. Firms' first stage investment is then determined by technology and costs which are outside the firm's influence. However, when R&D, reputation, branding or advertising have an important role in competition, spending on such items will enhance the market position of the firm in the second stage. In some markets, spending on quality during the first stage will dampen price competition during the second stage. Therefore, decision to incur first-stage costs is taken by the firm and these sunk costs are endogenous.

Differentiating between endogenous and exogenous sunk costs has consequences for the relation between market size and competition differs. In most cases,¹⁵ when sunk costs are exogenous, equilibrium concentration declines with market size. For instance, if the only first-stage cost is a fixed set-up cost, an increase in market size will lead to market entry and concentration will decline. This decreasing relation between concentration and market size also depends on the toughness of price competition during the second stage.

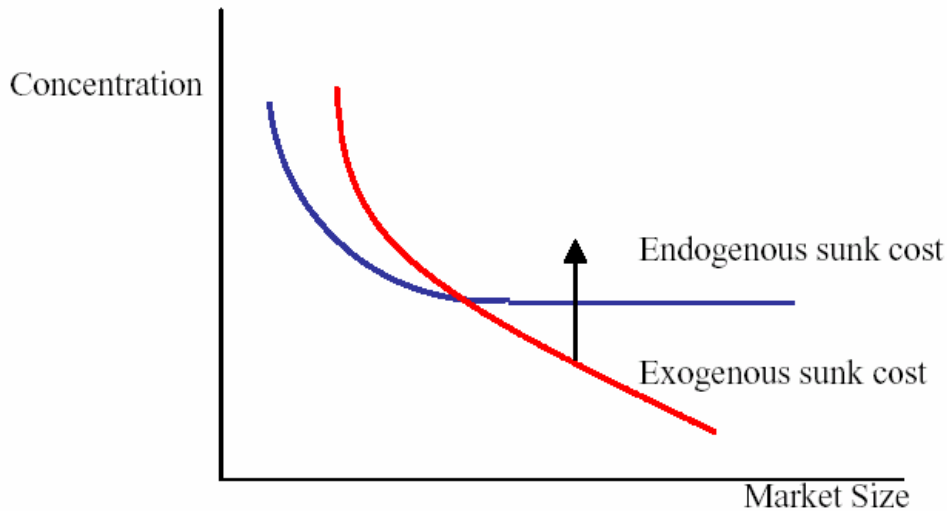
The picture is different when turning to endogenous sunk costs, when increased spending during the first stage augments the demand addressed to the firm during the second stage. An increase in market size may lead firms to augment first-stage spending in order to secure second-stage market positions. Therefore, larger markets lead to higher sunk costs, which may ultimately reverse or at least modify the slope of the decreasing relationship between size and concentration. There may thus exist a lower bound on concentration (see Figure 8), which depends on the responsiveness of the demand address to the firm to the increase in sunk cost during the first stage.

B2C e-commerce can therefore be characterised as an endogenous sunk costs industry, although some market entry costs are lower than for traditional, brick and mortar, intermediaries. The former rely more on ICT Equipment and software whereas the latter need outlet space. But the endogenous sunk costs related to reputation building are higher than in brick and mortar commerce, which should lead to a limitation of competition among e-intermediaries, and to a lower bound on price decreases since these sunk costs have to be recouped.

¹⁴ See also Sutton (1998).

¹⁵ One should also consider products' characteristics (homogeneity...) and there could also exist multiple concentration equilibria.

Figure 8. Concentration and Market Size



Empirical studies about the consequences of Internet for competition have concentrated on comparing price levels and price dispersion between online intermediaries and traditional intermediaries. Data availability has limited the analysis; existing work has mainly entailed collecting prices online and offline for a specific category such as books; moreover these data are rarely longitudinal and thus empirical work provides poor information on changes in price dispersion or price level over time. In a seminal work, Lee (1998) compared pricing of used autos in Internet and physical channels and found that prices were higher in the Internet channel!¹⁶ Bailey (1998) using matched sets of books, compact disks, and software also found higher price levels on the Internet for the 1996-1997 period. In a careful work on books and compact disks for 1998-99, Brynjolfsson and Smith (1999) found that Internet retailers had lower prices, made smaller price adjustments, and had larger or narrower price dispersion than conventional retail trade, depending on whether prices were weighted by proxies for market share. Clay *et al.* (2000 and 2001) studied book selling and found that prices were the same or lower online but that online price dispersion was greater than in traditional retail shops. Studies on European cases are still scarce. Friberg *et al.* (2001) provided evidence for the Swedish markets for books and CDs. On average, the prices of these goods were 15 per cent cheaper on the internet. However, transport costs would make the purchase of a single item as expensive as purchasing through a conventional retailer. Therefore, internet purchases are cheaper when the basket is sufficiently large, since transport costs are largely fixed costs.

To sum up, these studies have generally found large dispersion of prices online and prices either modestly lower or actually higher than their offline counterparts. These results are not as supportive of the optimistic theory as most management analysts expect, especially they have not conformed to the standard view of falling search costs.

These results can be compared to the studies from the standard search theory on advertising. Comparisons of the prices of goods such as eyeglasses, optometry services, and prescription drugs in states that permitted or did not permit advertising showed that advertising was associated with

¹⁶ The authors claim that this finding can result from unobserved heterogeneity.

lower prices and price dispersion (Kowka 1984). Recent works confirm these findings in line with the search theory [Sorenson (2000), Milyo and Waldfogel (1999)¹⁷].

II.b. Price Discrimination

Firms prefer to be differentiated because it softens price competition. Although the prices of books are regulated in France (a bookseller cannot make a discount larger than 5 per cent), a practice of the main online booksellers shows large dispersion in the availability and the delivery time of books. Thus with product differentiation, prices may not converge in equilibrium and could actually diverge. Several authors have found evidence of product differentiation for on-line markets. In a seminal study of the online travel industry, Clemons, Hitt, and Hann (1999) find agents responded to identical requests with different time/price pairs. This evidence suggests that online ticket agents engaged in significant product differentiation. Clay *et al.* (2000), using data from April 1999, find indirect evidence that online booksellers were engaging in product differentiation through price, selection, and other non-price attributes. Brynjolfsson and Smith (1999) also find evidence that is consistent with product differentiation for books and compact disks. This result is supported by Clay *et al.* (2001): online bookstores have succeeded in differentiating themselves even though they are selling a commodity product. These results are also consistent with a low menu cost mechanism. It is straightforward that the dramatically low menu costs on the Internet should lead to high price dispersion. While high menu costs make the prices sticky, the Internet ensures every online store to often change its prices (e.g. for following the demand trend) inducing higher dispersion.

However, the impact of Internet on price can be under-estimated. First, C2C (consumer to consumer) commerce can lead to dramatic price changes by dropping the commission of the intermediaries. Second, on-line and off-line firms can use price-discrimination.

The real estate market is a stimulating example. On specialized web-sites, sellers can write or modify themselves their advertisements, which can be still also published on a standard paper journal. The sellers can also add photos or plans of the product. The buyers can fill application with their requirements (size, view, style, ...) to the leading online C2C intermediaries; the latter then send alert e-mail including new fitted announces. For example, an individual seller with a nice product at a reasonable price can find a buyer within three days on the housing market of central Paris, while it takes at least two weeks through professional real estate agents. The cost of the advert on Internet is about 100 euro that is marginal compared to the size of the potential transaction. Unfortunately, the consequences on prices are hard to measure because of the high heterogeneity of goods. The main question is the sharing of the rent, induced by this disintermediation, between the buyers and the sellers. However, an illustration can be given using a comparison of average sell prices in Paris. We exploit the data of the Parisian notaries who centralize the exhaustive logs of the transactions and the statistics of the leading C2C actor (De Particulier à Particulier¹⁸) on the sales of their clients. The total number of apartment transactions is about 40 thousands in 2000 and 38 thousands in 2001. PAP contacts its clients when they should renew their advert; if they have sold their good, PAP tries to collect information on the transaction. PAP uses this survey to provide a commercial service of estimation of your apartment; unfortunately, it does not communicate the details of its methodology, especially the

¹⁷ Sorenson finds that average price-cost margin and price dispersion of drugs across drugstores are lower if the prescription is purchased repeatedly.

¹⁸ "From individual to individual". The adverts are printed each week, and are available on the internet and on the French Minitel. During winter 2001, about one million pages have been visited per month on the web-site of PAP (for the whole France).

number of logs (presumably between 2000 and 4000 per year) but it gives the summary statistics. Most of the transactions on the Paris market are still through intermediaries (real estate professionals, notaries, lawyers...); the standard fees are about 8 per cent for small apartments and about 5 percents for wider ones.

**Table 5. Parisian Real Estate Market (Apartment Only)
Average Price Paid by the Buyers During the Three First Quarters 2001 (Thousands Euro)**

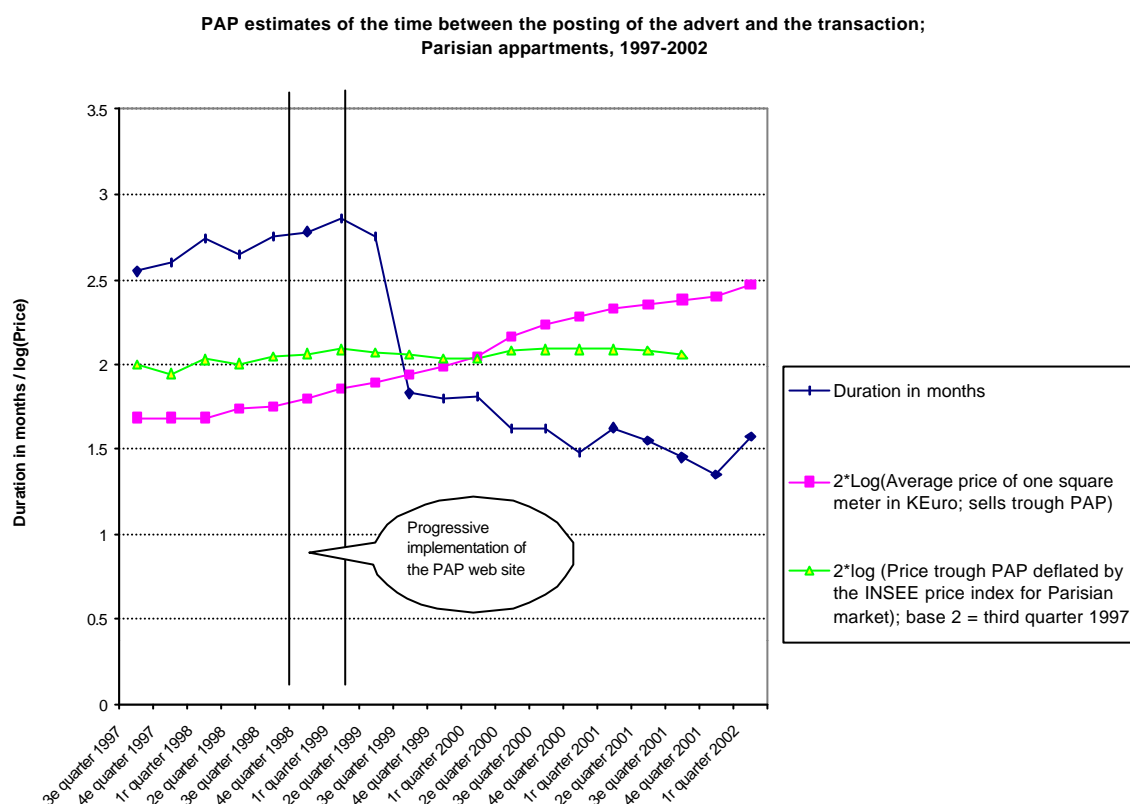
	Studio	1 bedroom	2 bedrooms	3 bedrooms	4+ bedrooms
Whole transactions	70	116	200	321	634
Growth compared to 9 first months of 2000	+8.3	+12.3	+9.8	+9.6	+2.3
<i>Price minus standard commissions of intermediaries</i>	<i>64</i>	<i>109</i>	<i>190</i>	<i>305</i>	<i>Na</i>
Final price through C2C	65	116	194	296	385
Estimated rent surplus for the seller in %	1,6	6,4	2,1	Na	Na
Estimated rent surplus for the buyer in %	7,1	0	3.0	Na	Na

Sources: Authors' calculation based on Parisian notaries statistics; Fourth Quarter 2001, PAP study of the sells.

Table 5 reports the estimations for the first quarters 2001. The comparison for four-rooms or more flats is difficult because the whole transactions include some exceptional apartments which are not sold through C2C. The fact that the price of the apartment potentially sold by C2C is lower than the average price of transaction is consistent with the idea that the buyers with very high revenue will still use intermediaries. The results for smaller flats suggest that, as expected, the direct bargaining between the seller and the buyer drives to a transaction price between the standard price paid by the buyers and the amount that receives the seller if their transaction holds through an intermediary. Moreover, it seems that the sharing of the rent is intuitive: the seller captures the rent when her good is relatively scarce (higher price growth) and thus the market is tight.

Despite these potential gains for the seller and the buyer, the number of advert posted each week by PAP is not clearly growing much more than the overall number of transaction. For PAP, internet seems to just offer a media complementary to the French minitel and the hard copy. However, the number of new adverts has steadily increased. Indeed, Internet should have induced a dramatic decrease of the duration between the first posting of an advert and the transaction. We do not have direct evidence for supporting this view; however it is suggesting that this duration has felt after the implementation of the web site (see Figure 9) while the market was not particularly tight. Note that we can estimate that about one third of the Parisians had access, in summer 1999, to internet at home or at work.

Figure 9



Source: First quarter 2002 PAP survey of sells; INSEE.

Moreover, the introduction of the web site does not seem to have changed the price of the goods sold through PAP since the PAP price deflated by the index of whole transactions is basically flat. Therefore, the gains for buyers and sellers are 1) they can split the commissions of the intermediaries as in a standard C2C transaction, and, this is the specific improvement due to Internet, 2) the C2C market is dramatically fluidified.

Another facet of the potential consequences of Internet is price discrimination. Most studies have focused on the price differential between online stores and off-line stores. With a more competitive view, the off-line stores should bring their price into line with those of on-line ones. In that case, the correct empirical method is to compare the trend of prices of goods according to their presence or absence on the web. In a very stimulating work, Brown and Goolsbee (2000) provide empirical evidence on the impact that the rise of Internet comparison shopping sites has had for the prices of life insurance in the 1990s. Term life insurance is a simple quite homogenous service good. Using micro data on individual life insurance policies, they find that, controlling for individual (mortality...) and policy characteristics, a 10 percent increase in the share of individuals in a group using the Internet reduces average insurance prices for the group by as much as 5 percent. Moreover, prices did not fall with rising Internet usage for insurance types that were not covered by the comparison websites, nor did they in the period before the insurance sites came online. The results suggest that growth of the Internet has reduced term life prices by 8 to 15 percent. Finally, Brown *et al.* (2000) also show that the initial introduction of the Internet search

sites is initially associated with an increase in price dispersion within demographic groups, but as the share of people using the technology rises further, dispersion falls.

Therefore, a key point for understanding the potential consequences of Internet for inequalities is that if firms can price discriminate, off-line firms will lower prices only for on-line customers. Again, the available statistics clearly show that income and education are important determinants of PC penetration and Internet access. Online shoppers are thus likely to be the most affluent and educated citizens. The benefits of internet diffusion will not be evenly spread throughout the society, and the first digital divide may thus widen. This mechanism of increasing inequality can hold only for goods which can be purchased through internet. It is thus crucial to determine which products or activities will be offered on-line.

II.c. Consequences for Industries

As analyzed in the previous section, companies face information and technical pitfalls that may prevent some industries from developing on-line activities. However the main determinant of the development of activities through EDI or Internet is their digitalisation. This issue concerns weightless and weighted activities. Indeed even information is not necessarily digitalisable. Some information is very difficult (costly) or impossible to codify, and thus to digitalise. Particularly various transactions will still require Face to Face (F2F) in order to exchange sensitive information. For some industry goods, a direct contact with the product is necessary before buying so that not all information will be gathered online. For some information-sensitive products (e.g. real-estate loans...) information asymmetry can only be overcome through F2F contacts, except in the case of perfectly standardised products (consumer loans for instance). This part aims to evaluate these claims through the study of internet on some activities and their associated value chains.

Internet Car Retailer

In a study published in 1999, the OECD forecasted that by 2002, 10 to 20 per cent of cars would be purchased online!¹⁹ Actually, car selling on Internet is currently still anecdotic. However, a new type of intermediaries – the so-called on-line referral service agencies -- has appeared in the car retailer activity, weighing about 3 to 5 per cent of the GDP in OECD countries. Scott Morton *et al.* (2000) have studied in details a major U.S. online referral service: Autobytel.com. This type of internet service is also developed in Europe. Car buyers using an Internet referral service submit a purchase request. They specify the characteristics of car they want and the time frame in which they expect to make their purchase. In theory (and also in practice), a buyer needs to visit the dealership only to pick up the car. The referral sites have contracts with one or two car dealerships in each geographic area. The online referral company sends the consumer requests to their affiliated dealerships in the consumer's area. In return, the dealerships finance the online site through either an annual fixed fee for referrals or a combination of annual fee and a fee for each referral. The Internet sales person at the dealership then contacts the potential buyer with a non-binding price for the requested car. Referral sites control quality indirectly, using consumer satisfaction surveys and by tracking the number of referrals that result in sales. Dealerships with conversion rates that the referral service deems too low, or who generate large numbers of consumer complaints, may be dropped from the referral network. Emphasizing the conversion rate gives dealerships an incentive to offer an attractive initial price to customers referred by the Internet service. Scott Morton *et al.* (2000) find that the average Autobytel customer pays 2 per

¹⁹ OECD [1999] p. 44.

cent less for her car. According to the authors, about one quarter of this price difference is due to purchasing at Autobytel affiliated dealerships, which have lower prices than average; and The remainder of the price difference is due either to know-how buyers choosing to use Autobytel, or Autobytel improving the bargaining position of standard customers.

For auto retailers, the question of whether the Internet makes it easier for previously naïve buyers to educate themselves, or whether those who have always been savvy car buyers have migrated to the referral services is crucial; the first story would be expected to reduce their profits, while the second would not. The authors restrict the sample to less sophisticated buyers who obtain financing from the dealer and find that the Autobytel price discount remains for buyers referred via the Internet. In addition, the more cars a dealership sold through Autobytel.com, the smaller was the observed spread in the prices consumers paid at that dealership. Again, they conclude that their results suggest that Internet referrals increase buyer information and bargaining power.

Although Internet car buyers pay less for their cars, the authors claim that participating in an Internet referral service can be profitable for individual dealers. Using data from one Midwestern dealership, Scott Morton *et al.* (2000) estimate that the cost of a traditional sale could be as much as US\$ 600 higher than the cost of selling to an Internet referral. Given that the average Internet buyer pays only some US\$ 500 less for his car, the profitability of a dealership can increase despite the lower purchase price. Consequently, the authors conclude that both consumers and dealers can win through the internet car retailing. Such study seems an excellent argument for an extension of the internet car retailing. However, this prediction should be qualified.

A simple criticism of Scott Morton *et al.* (2000) helps to understand the gap between optimistic prediction and even serious interpretation of statistical study, on the one hand and reality on the other hand. First, as shown by the authors, people using the referral service were less likely to finance their cars through the dealer, to buy insurance through the dealer, or to buy a repair contract from the dealer. Despite the potential selection biases (buyers also tended to live in areas with higher average income) and the restriction of the authors' analysis to the buyers who obtain a financing through the dealer, the profits for the car dealer seem then overall limited. So, why car dealer cut Internet price? The response is given by Autobytel itself. Far from the idea of an improving bargaining for the consumer, the car dealer chooses to cut their price because they have incentive from the manufacturers to increase their results or to sell non-sexy cars. This dealer rebate is money given back to the dealer by the manufacturer to move certain cars. Dealer incentives are often offered in tandem with other incentives that depend on the regional manager's specific judgment call. They are particularly volatile from a dealer to an other.

Autobytel specifies that the buyers should check the date the vehicle you want was actually manufactured. If it's been in the showroom for 6 months or more, some kind of dealer incentive may be placed on it. Dealers pay money to keep cars on their lot (they are financed through a bank) especially after a car's been on that lot for more than three months, and they have an increased incentive to sell. In the U.S. and in Continental Europe, European manufacturers also impose a minimum level of sells in a year. For example, in France, Renault or PSA can completely cut the dealer rebate if the dealer does not reach the minimum amount of sold cars. In this case, a dealer can just sell of cars in order to reach the key level.²⁰ Therefore, the real market for internet referral service is reduced to a marginal share of total available cars. The own logic of Autobytel suggests that the 2per cent price reduction should be not the result of a higher

²⁰ Note that the project of the European Commission to open the car market should destabilize this system. Car manufacturers that weight 15% of the market will have to accept to sell car via non-affiliated dealers. Therefore, even if this project does not include plans devoted to enhance e-trade.

competition, but rather a better between dealer and consumers, who have the chance to want the car that nobody else will buy.

However, the consequences of Internet can be dramatic for traditional car intermediaries. The traditional job of a car retailer consists in giving advices and information, price bargaining and other financial services (loan, insurance, package...), car repair and maintenance. On the one hand, the advice task is dramatically affected by the Internet. Indeed, the main constructors have internet sites which offer to the potential buyers can design their car. For instance, on the site of Volkswagen you can choose all the options of your car, can try its colors and can find the complete constructor information. According to confidential studies of constructors, the time spent with the car retailer by a buyer who has first designed her car on Internet is divided by a factor four; therefore, the labor productivity of the car intermediary can increase twofold. These indirect gains explain that the constructors invest massively on the internet while the number of cars purchased directly on their sites is virtually null.

On the other hand, the car retailer is still necessary. First, the constructors do not offer discount to the internet users. The buyers should bargain the price, and eventually the credit and the insurance; the retailer should evaluate the bargain clout of the buyer, determine if this client can be a long-term client or if she should buy a second car... In France, a buyer can obtain a discount as large as 7 per cent and for example, the reimbursement of the car registration. Such deal is extremely complex, cannot be performed via the web and thus still needs face to face.

To sum up, the Internet as a pure information media should not induce the end of the traditional car retailers but should dramatically improve their productivity and thus should lead to employment reduction in that sector. The previous mechanism should also hold for various commercial activities where the information is crucial and the Face to Face exchange of standardized information is time consuming.

Banks

The banking system weights about 5 to 10 percents of the workforce in the OECD countries. The internet -- especially Etrading -- affects mainly the brokers. Securities and commodity brokers and dealers buy and sell securities and commodity contracts and provide advice to investors. Traditionally, full-service firms bundled the execution of trades and investment advice into one transaction fee, with advice provided by securities, commodities, and financial services sales workers (registered sales representatives) assigned to specific customers. Discount brokers, who existed in the United-States before the advent of online sales of securities, permit customers to place buy or sell orders, provided less advice, and charged a commission that was discounted from the one charged by full-service brokers, have appeared in continental Europe with the development of the Internet. Actually, online brokers are an improvement of discount brokers, but are able to offer a vast amount of investment information and advice through their websites and e-mail; these brokers are currently developing the ability to customize their online investment advice.

The consequences of the development of online banking on employment are a priori ambiguous. On the one hand, E-business should dampen employment requirements in this industry. E-trading permits security sales without the need for marketing and sales workers, who are primarily securities, commodities, and financial services sales agents. E-business also permits partial self-service as customers of traditional brokers obtain account, market, and investment information online and then place orders with sales agents (who can handle more customers in this model). E-

trading also makes self-service or automates functions of administrative support workers (who help open accounts, provide information to clients, write up orders, and handle account records). More generally, most commercial banks offer free services such as checking the balance of the individual account. For example, in France, according to the Accenture e-banking index (March 2001), 5 millions customers regularly check online their bank account, 4 millions do bank transfers and 1.5 millions buy or sell asset via the web. Finally, ICTs simplify long-distance services in accountancy, banking, secretarial services; therefore, a part of the remaining jobs in the banking system should be delocalised in some low-wage a high-human capital countries²¹.

On the other hand, to the extent that transactions entail assistance by customer service representatives, employment requirements in this occupation will rise. Moreover, drop in costs of bank intermediation should stimulate the demand and therefore the employment in this sector. In France, the online asset brokers estimates that about half of their customers are new active asset investors; this mechanism should hold particularly in countries with a limited share of individuals already playing on stock markets. However, this miracle is not so obvious for historical commercial banks. . On a study of thousands of client records of four leading commercial banks in the US, Frei and Hitt (2001) show that seventy to eighty-five percent of adopters are existing customers. Compared to the regular customers, the PC banking ones has a higher rate of adoption of assets. Among the customers holding assets, the value of these assets is 20 to 100 per cent larger. Similar figures hold for the level of the deposited liabilities, the number of bank products and the account balance. A part of these differences can result from the heterogeneity of consumers; especially, on-line adopters have higher income and are younger. Now, correcting for the observed characteristics (income, age, time as customer, marital status, own home), the gap in holding assets and liabilities between regular and PC banking clients remains large and even deeper. Demographic differences between the two population account for very little of the differences in consumption behavior. The authors have also longitudinal data for consumers from two banks. They know their demographic and income characteristics but also their consumer behavior before and after the adoption of online banking (for those who adopt it). The careful exploitation of these statistics reveals that online customers have statically changed their behavior. Nevertheless, these changes do not contribute substantially to overall observed differences. For instance, online customer, following adoption acquires at most 0.2 more products than the similar non-online customers while the cross-section estimates are 1.5 products (the average number of products per consumer is between 3 and 4). Therefore, this study on early adopters of online banking suggests that the internet should only slightly stimulate the activity of historical commercial banks.

However, a part of the banking activities will not be concerned by the internet. An important case is the home loan. Numerous providers of home loans have appeared with the development of internet. Actually, online companies face a considerable amount of applications but the number of real online customers is anecdotic. Overall, this online activity seems not profitable because of this overload of false clients. The web users exploit the home loan brokers in order to have global information on the market especially the interest rate. The customers will bargain, Face to Face, with a physical sale agent. A home loan is still too complex a deal. Because such loan can represent a large part of the income for numerous years, the client wants to have the best combination of the interest rate, the file charges, the caution costs, and the insurance. The financing can also include credits supported by the national or local government, or by the employers. Moreover, for giving the best offer, the bank sellers need to accumulate information

²¹ This claim is fragile. Indeed, long-distance banking using standard EDI technology is already developed. For instance, the European American express cardholders receive their account positions from the US.

on their potential clients. This information is sometimes suggestive; for example, if the customer is young, it should gauge if she or her will be a future profitable client (growing income, trustful, aims to buy bank products or assets).

Again, we see that the key to understand which activities will be online is not their physical weight but the potential digitalization. Overall, for banking labor, the internet will mainly extend the previous trend of a reduction of employment in the commercial agencies such as done the development of the ATMs.

Insurance

The example of the home loan and the associated insurance suggest that the mechanisms and logics playing for banks should also concern insurance activities. Actually, industry analyses have emphasized the still conservative character of the offline insurance business and their reluctance to conduct commerce online (e.g. Klauber 2000). However, by 1996, in the U.S., there were a number of insurance-oriented web sites that provided consumers with access to on-line quotes for insurance products. These sites have also multiplied in Europe for the past 3 years. The customer would, essentially, answer the medical questionnaire online including age, gender, personal medical history and the like and then enter the amount of coverage they sought. The sites would then report numerous companies that would offer such a policy and would give a price quote from each. But with the the creation of these sites, the costs of comparing prices for a given set of risk factors, age, gender, etc. became extremely low. Users can get dozens of quotes in a matter of seconds that would previously have taken a great deal of searching. These Internet search sites provide information sources between the consumer and the life insurance company was formerly available only to brokers (see Garven, 2000). Clemmer *et al.* (2000) indicate that by 1999, more than 5 million American households had researched life insurance online.

With these search services a connection to the offline seller remains. Consumers must still take a blood test, for example, to qualify for various policies. Therefore, the consumers generally do not buy the product online directly from the web sites. Nevertheless, insurance carriers, agents or brokers should be concerned by the new intermediation driven by the internet. Insurance carriers underwrite annuities and insurance policies against various risks, pay benefits, and may also sell their own products. Insurance agents and brokers sell annuities and insurance policies issued by one or more carriers, primarily as independent contractors. Websites of pure e-insurance businesses, as well as those of traditional establishments, permit customers to calculate their insurance needs and design policies, and insurance malls permit customers to fill out just one application, yet receive quotes from a number of companies.

By permitting the sale of routine personal²² insurance (e.g. auto, homeowner, health, and term life insurance) without the need for insurance sales agents or brokers, online business should dampen employment requirements in this industry. As for banking or car retail trade, E-business also develops partial self-service, with customers obtaining product information online and then purchasing those products they wish through a sales agent; here again, this arrangement induce that these agents can handle more transactions. The efficiency of the sale agent are also increased by intranets and extranets that improve the access to information on products provided by companies they represent, offer detailed explanations of procedures, and permit to directly download forms. The insurance business is also a long-term relation between the company and the customers; the latter have to update personal information on policies, to request changes in

²² The online sales also include some routine commercial insurance,

coverage, to pay bills and even to complain. Theoretically, these functions can be handle through a self-service online system. This reduces the requirement for both sales agents and administrative support workers. However, online transactions that require assistance from customer service representatives stimulate employment in that occupation.

III. B... 2B OR NOT 2B?

Benefits of B2B e-commerce have been unnoticed by large firms. In order not to let intermediaries reap all the benefits enabled by e-commerce, a number of large buying or selling companies have taken ownership stakes in B2B companies. Furthermore, some companies have made alliances in order to create new marketplaces called ISMs –Industry-Sponsored-Marketplaces: some major aerospace companies (Boeing, Lockheed Martin, BAE Systems, and Raytheon) have formed an exchange for aerospace parts; in the car industry, DaimlerChrysler, Ford Motor Company and General Motors have formed a single global business-to-business supplier exchange (COVISINT), later joined by Renault and Nissan²³... One may also find examples of exchanges formed by sellers rather than buyers (in the paper industry for instance).²⁴ The ownership of the exchange is a crucial issue; in general, it is on the side of the market where the greatest concentration of market power is. This indicates that internet technologies might not only lead to transaction cost decreases and associated productivity gains, but also to changes in the relative distribution of market power within an industry. This again qualifies the optimistic predictions concerning the effects of ICT and web-based technologies on markets' efficiency.

The development of B2B implies a significant reorganisation of industry. Internet and IC technologies promise to significantly reduce transaction costs (for search, contract, monitoring...) between companies if firms implement changes in their purchase and buying functions, but also if firms modify their make or buy decisions. It is well-known, at least since Coase (1937), that transaction costs define the frontiers of the firm.²⁵ By altering the structure of relative transaction costs, the diffusion of internet commerce will influence the pattern of outsourcing and redefine the boundaries of the large corporation.

In that framework, e-commerce should accentuate the current trend of outsourcing emphasized by recent research. Firms are outsourcing inputs and services that formerly they have produced in house. For example, in Europe, the business services have taken about 4 points of the GDP in the two last decades. The increase of outsourcing is both national [see Abraham and Taylor (1996) for evidence of rising outsourcing of business services in U.S. industries] and international (Feenstra 1998).

III.a. Certification (Information vs. Digitalisation)

As mentioned before, although less prominent in popular representations of the benefits of e-commerce, B2B transactions and information exchanges should not be overlooked. B2B e-commerce alone is expected to experience a tenfold increase worldwide between 2000 and 2004;²⁶ In Europe alone, B2B e-commerce should see its transactions volume be multiplied by a factor of 30. In fact, the most important transformations in e-commerce may very well take place in business transactions.

²³ Note that Covisint is still far from its initial objective announced in February 2000. It expected 750 billion dollars of annual purchasing. Actually, Covisint's launch was delayed due to technological pitfalls and administrative squabbles. However, its activity is growing. For example, in May 2001, DaimlerChrysler has held an online auction over 1200 parts changes hands for a total value of 3 billion euros. Five suppliers have participated to this auction.

²⁴ Lucking-Reilly and Spulber (2000).

²⁵ Garicano and Kaplan (2000). See Grossman and Hart (1986) or Grossman and Helpman (2002) for improved model of integration versus outsourcing decision.

²⁶ eMarketer (2001)

However, transactions between companies through the internet involve substantially different issues from those concerning B2C e-commerce. As was noted earlier, the commerce of direct (i.e. intermediate) or indirect parts differs substantially. The reasons for and advantages related to making the latter type of exchanges online have already been exposed in Section 2; products bought are standardised and little more than price and delivery date is necessary to strike a deal. The former type of transactions are a different matter altogether. Purchases of direct parts have much more significant consequences for the efficiency of the productive process and value chain of the buying company; the issues of quality of the parts bought, the design specifications and the overall reliability of the selling company are crucial. For some industries where the issue of safety is most important (aerospace, airlines, automobile...) purchasing of parts implies a high degree of confidence in the suppliers. This is why direct purchases generally involves long-term relationships and not the type of 'faceless' exchange that e-commerce is suppose to make possible since most business transactions are not anonymous. Some sort of F2F would then be involved here too, for basically the same sort of reasons as mentioned earlier: if ICTs decrease the cost of conveying and treating information, they do very little when it comes to decreasing information asymmetries. This is why it is sometimes said that internet will be used to deepen already existing business relationships between companies rather than to create new ones.²⁷

Indeed, inviting tenders on line is complicated and involves fixed costs: it requires standard processes as well as elaborate preparations. Again, specifications other than price matter much and are more difficult to standardise and digitalise. Therefore, Cairncross (2001) argues that the impetus is to work with existing suppliers in new and more sophisticated ways rather, i.e. using internet rather than proprietary EDI with existing suppliers, than order the cheapest product from the lowest cost producers, which is what internet commerce is supposed to enable. Internet would then be used to specify requirements with greater precision, track orders and more generally exchange information in a cheaper and more accurate way. One may nevertheless expect that EDI, and not just the internet as such, would have an important role, if only because of the sunk cost aspect of these infrastructures. In fact, some estimates on the growth of B2B e-commerce would give EDI as much as a 50 per cent share by 2004.²⁸

However, the issue of the quality and reliability of outsourced parts is not specific to e-commerce and can be dealt with in a number of ways, which all involve at different degree certification or quasi-integration. To recall and for simplification matters, one may say that some of the potential benefits that e-commerce should bring stem from the possibility for, say, a buying firm to discover through neturfing that there exists a potentially cheaper supplier somewhere on the planet that the firm had never heard of. However, if the buying firm cannot resolve the uncertainty regarding the reliability of this potential supplier, the value of the additional information brought by internet, i.e. the existence of the supplier, is of little value. But such a problem is not specific to e-commerce. In this example, internet has just been used as an information source for finding new potential suppliers. These suppliers having been found, the decision to include them in the firm's supply chain is taken by the firm according to standard evaluation and testing procedures. But this use of internet, limited to act as an extensive firms' directory, is far too restrictive. The exploitation of the full benefits of e-commerce implies automating as many steps of the purchasing function as possible. This means that the evaluation of the potential supplier should be itself partially 'automated'.

²⁷ Cairncross (2001).

²⁸ Lucking-Reily and Spulber (2000).

For complex quality-sensitive goods, the efficient functioning of B2B will necessitate certification of subcontractors by the buying firm. Certification allows alleviating problems related to information asymmetry. This aspect is all the more important that the subcontractor is not well known by the contractor, is small, has not a well established situation in the industry, etc. This, incidentally, is the profile of a firm that would most benefit from having from B2B e-commerce, in order to find new contractors and expand its activity towards new areas. Therefore, certification and B2B e-commerce – at least commerce concerning direct parts – should be complementary to each other: the firms that would benefit most from B2B would also benefit most from certification, and certification should be instrumental in generalising e-commerce between companies. One may further say that certification is a prerequisite for B2B e-commerce.

Certification can be made by third parties or by contractors themselves, in which case implications for competition differ accordingly. Whereas for B2C, certification is necessarily made by a third party because the individual consumer cannot afford to pay the cost of certification, both possibilities exist for B2B. Which option will be chosen depends on the market. Large contractors certify their own sub-contractors: they express minimum quality demands in order for the subcontractor to be allowed to bid for online tenders. This actually enables the contractor to have more control on the sub-contractor, in order to extract more rent. This process also favours the establishment of long-term business relationships through repeated contracts.

A telling example is provided by CISCO Systems: every day, the company posts its requirements on an extranet connecting the headquarter to 32 manufacturing plants, none of which it owns. But each manufacturer has been through a lengthy process of certification to ensure that they meet the company's quality standards. This is then a private certification procedure, which grants a company the privilege to do business with CISCO. However, this private arrangement does not imply that the contractor and the manufacturers should use a proprietary EDI to commerce with each other. There is no problem doing commerce through an extranet once companies have entered the circle of accepted sub-contractors. The improvements brought by exchanges over the net are considerable. Suppliers respond to requirements within hours not only with a price and a delivery time, but also with a record of their past performance on reliability and product quality. Thus ICT makes quality and reliability controls easier and more efficient and complement the initial certification process. Such a certification process is strictly private; it concerns a specific business relationship between a contractor and a sub-contractor.

There also exist more public ways for quality certification. The primary goal of certification is to give public information about a company to other companies, which could consider doing business with the former. Third parties may step in to certify that the company fulfils some previously specified quality demands. Concerning industrial norms, the International Standard Organisation (ISO) fulfils this task; it proposes a set of industrial norms, such as for instance the ISO 9000 norm.²⁹ This norm is meant to be applicable to all firms, irrespective of the industry or the size. Of course, some industries have developed specific norms in order to specify more precisely the quality requirements, but these norms complement the ISO 9000 norm rather than substitute to it. Obtaining the ISO 9000 certificate means fulfilling a set of quality requirements established by ISO. It is in general a lengthy (12 to 18 months) and somewhat expensive process.

A complementary face of the consequences of ICT on outsourcing and certification is connected to the information of the customers. Because ICT, especially Internet, induce that the consumers have a more complete information on the product and can simply perform comparisons and

²⁹ One may also mention the ISO 14000 norm which deals with environment aspects.

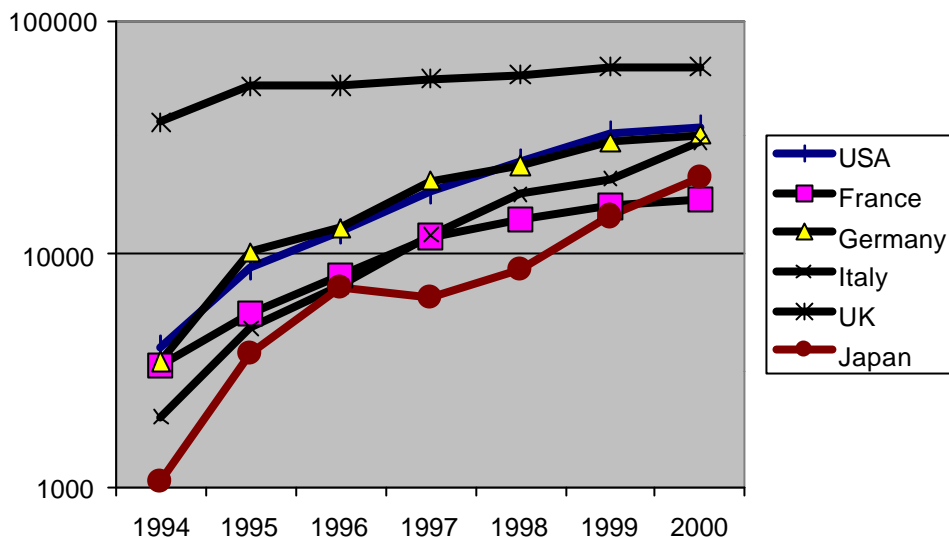
benchmarking, the emphasis on quality is more acute in firms. The development of ISO 9000 certification has been rapid in most developed countries over the 1990s. The increasing trend is almost universal, but one may notice some persistent international differences, which are most probably related to industrial structures (average size of firms...) as well as differences in the pattern of information diffusion. The value chain is ISO certified at each step; that is for example the case for Nokia; the world leading manufacturer of mobile phone demands that all its suppliers be compliant to ISO standards, and the main ones should also demands that the suppliers are compliant to those standars, and the main suppliers shall have also Quality Management System certificates.³⁰

Certification through industrial norms may not be the only means for communicating information about quality and reliability to prospective business partners or to consumers. A private company may also be assessed through financial and accounting information. In a way, being listed on a stock market is also a means of communicating information about quality which involves a third party assessment. Although such information communication procedure is not strictly equivalent to obtaining an ISO 9000 certificate, it may be more commonplace in some countries to rely on accounting-based information for such matters, presumably countries where accounting and financial information is sufficiently rich and reliable. Therefore, one may expect that ISO certification will not matter as much in the US as it does in Germany for instance, because 'financial' information is much more important in the former country than in the latter. In most European countries where 'market' information is not as readily available as in North-America, ISO certification is bound to be more important and accordingly more present. However, the Anglo-American type of financial control possesses major weaknesses as the hurricane driven by the ENRON embezzlements has shown.³¹ One may presume that the aftermath of the scandal should boost the diffusion of a more 'industry-based' certification process such as ISO in the U.S.

³⁰ Information provided by Unto Kuivalainen, Nokia Corporation, Finland.

³¹ The ENRON scandal seems to have far-reaching consequences for the 'certifying' party, Arthur Andersen Consulting, which faces indictment before a US Court.

Figure 10 Number of ISO 9000 Certificates (logarithmic scale)



Source: ISO survey (2001)

A final facet of the ISO norms is that they seem to act as an endogenous sunk cost. First, the principal tends to impose on all its suppliers the obligation to gain certification. Second, ISO standards are regularly improved by the quality experts.³² They raise the technical level of the norm (from ISO 9000 to ISO 9002) but they also extend the normalization to all activities (from manufacturing to services). Moreover, along with this quality-product approach, the ISO has developed environmental and ecological norms (ISO 14000). And the new project is to outline social norms (sexual or racial non-discrimination, safe workplace, job stability) that can drive to a new divide between the workers in certified firms and workers out of this system.

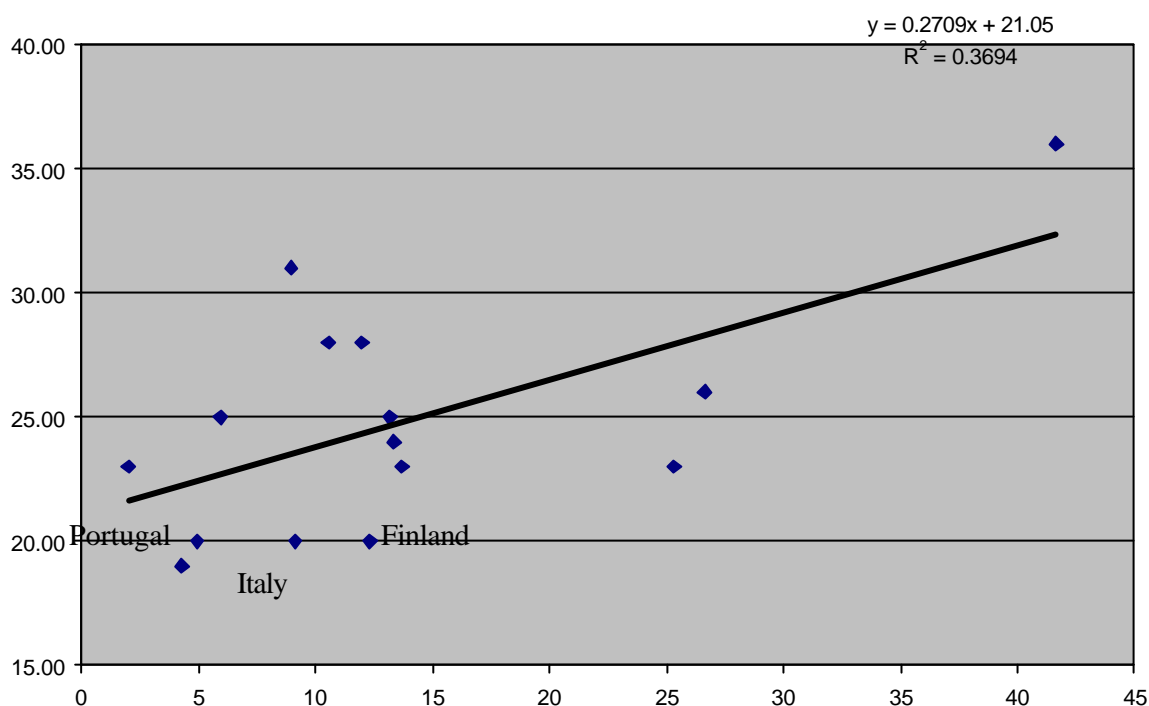
In any case, certification is deemed crucial for the development of B2B exchanges on the net. The development of e-commerce should then depend on the diffusion of industry certification. The available evidence does not contradict this alleged importance of industry certification for the development of B2B. Figure 10 plots the share of SMEs doing B2B in 2000 against an indicator of the diffusion of ISO 9000 norms.³³ Certification being a prerequisite for the development of B2B, countries where ISO certification is more common should be countries where B2B e-commerce has the best opportunities to develop. As shown in Figure 10, there is a positive relationship between the initial (1997) level of ISO 9000 certification and the diffusion of B2B among SMEs. Therefore, countries where ISO norms were diffused widely are also countries where B2B is more frequent. However, this relationship only hints at the links between certification and B2B. The share of ISO certified firms in the economy would have been a better indicator than the one used here, relative to GDP. It could have split apart countries where the industrial structure rests on a high number of small firms from the others and allowed a finer distinction between Italy and Portugal on the one hand, and Finland on the other. At around 20 per cent, the share of SMEs active in B2B is the same in these three countries, but Figure 11 makes it clear that the ISO diffusion indicator varies between 4.95 for Portugal and 12.3 for Finland (Italy

³² The so-called 'qualiticians'.

³³ We have used the following indicator: the number of firms with an ISO 9000 certification relative to the GDP. Sources: ISO and EU.

being the point in the middle of the three along the 20 per cent line). An indicator of ISO diffusion relative to the number of firms would have moved Italy to the left, nearer to the point representing Portugal and nearer to the regression line, most probably improving the fit of the linear relationship.

Figure 11. ISO 9000 Certification and the Propensity of SMEs to Trade B2B



Source: data from Eurostat, computations by the authors

We can test further the importance of certification for firms and check the correlations between internet or ICT use and certification procedures for a representative sample of French firms.³⁴ The second in a series of surveys which began in 1992, REPONSE 1998 (Relations professionnelles et négociations d'entreprises) contains detailed and statistically reliable information on workplace and technology practices in France.³⁵ The REPONSE 98 Cross Section survey contains data from interviews held with managers and worker representatives, as well as information from a self-completion questionnaire filled by employees in the selected workplace.³⁶ It has been conducted during the first months of 1999 and questions deal with the work organisation in 1998. The sample of 2000 observations covered French private establishments with at least 20 employees in manufacturing, construction, and services. The survey also includes a panel from 1992 to 1998 (600 establishments).

Managers were usually the most senior manager at the workplace with responsibility for employment relations. They were asked mainly factual questions covering a wide range of issues

³⁴ Insofar as it mixes European and North-American influences, the UK would be an interesting country for our analysis. Unfortunately, WERS (Workplace Employee Relations Survey 1998, previously known as the Workplace Industrial Relations Survey, WIRS), the main information source on workplace practices, does not provide data on Internet use nor direct statistics on the diffusion of certification.

³⁵ The REPONSE survey is exploited under a convention with the French minister of Labor.

³⁶ Actually, the survey includes three sub-surveys: the interview of a manager, the interview of a worker representative and the interviews of workers.

that deal with the employment relationship. Some examples include: technology use, business strategy, recruitment and training, consultation and communication, worker representation, flexibility and performance, change, and attitudes to work. Worker representatives were interviewed where there was a lay representative of a trade union or, if there was no trade-union member, with the senior employee representative of any joint consultative committee operating at the workplace. Employees were randomly selected. Questions asked were predominantly concerned with the employees' attitudes and impressions of work covering issues such as satisfaction and commitment.

Management interviews are interesting for our purposes since that part of the survey contains more complete information on the technology and certification process and because managers should have a more accurate view of the global workplace organization. In 1998, managers were questioned about:

- the proportion of workers who are connected to internet
- the use of total quality management processes and among them the involvement in ISO certification (ISO 9000 or ISO 14000)
- the development of outsourcing during the three previous year
- the just-in-time organization with suppliers or customers.

Numerous others questions or administrative information can be used as controls: industry, status (mono-establishments, affiliated to a corporate group), union representation, share of workers using a computer, composition of the workforce, employment, evolution of the activity (decreasing, stable or increasing), expectability of the demand, boundary of the market (local, regional, national, European, international), share of the main client... The complete set of controls is given in appendix.

Our main hypothesis is that certification is a requirement for making e-commerce. Unfortunately, REPONSE do not provide information on the implication of the establishment on B2B or B2C trade. Actually, in 1998, especially in France, Internet was still a new "revolutionary" technology. Therefore, we can assume that early investment on internet (meaning here connection of some workers to the net) is a correct proxy for the reality (for the pioneers) and the wish of the establishment to conduct business via Internet. Therefore, we will test the correlation between the involvement in ISO norm and internet use. Table 6 reports the estimations, derived from a standard logistic model, of this relation for the whole sample of French establishments and for the sample restricted to manufacturing or services. These results confirm a strong and significant correlation between the involvement in ISO certification and the connection to Internet for the private French establishment with 20 workers or more. The coefficient for the ISO variable is strongly significant everywhere. The correlation is higher in the manufacturing sector but is still statistically significant in tertiary activities.

Table 6. Internet and ISO Certification in French Business (1998)

Logistic Estimations (odds ratio)

	Dependant variable: connection to Internet					
	Whole sample	Whole sample	Manufacturing	Manufacturing	Services	Services
	(1)	(2)	(3)	(4)	(5)	(6)
ISO norm	1.58** * <i>0.19</i>	1.52** * <i>0.18</i>	1.91*** <i>0.37</i>	1.76*** <i>0.32</i>	1.39** <i>0.23</i>	1.38** <i>0.22</i>
Whole set of controls#	Yes		Yes		Yes	
Groups of significant controls#		Yes		Yes		Yes
N	2183	2294	871	906	1296	1369
Pseudo R ²	0.21	0.20	0.22	0.19	0.17	0.17
Log likelihood	-1175	-1247	-404	-434	-744	-790

see appendix 1 for details. Note that due to missing values for some questions, the sample is different for the even and odd columns; we have nevertheless verified that the result are not altered for odd columns if the sample is restricted to the observations used for even tests.

Standard errors in italic.

*** 1% significant,** 5% significant, * 10% significant

Coverage: French establishments with 20 or more workers in 1998

Source: Authors' calculation using REPONSE 1998

One may however question the relevance of such results. A certain number of recent papers have proposed improvements of the estimation methods. These methods, introduced by Heckman, are commonly used in labour economics (Heckman *et al.* 1999). They are also introduced in the economics of innovation and technical change. Their aim is to correct for a possible selection bias in the estimation driven by the heterogeneity across the sample. Actually, the logit estimation is biased when the dependant variable has different effects according to the characteristics of the firms. We have here two types of firms, those certified with ISO norms, and those which are not certified. We want to estimate the impact of certification on the adoption of internet. Correlations such as those of the table above could be interpreted as a causal relationship between certification and the use of internet. There is however a potential selection bias. Certain firm characteristics may affect both the certification policy and the internet adoption of the firm. If such is the case, we would estimate a parameter that includes not only the effect of certification for certified firms but also the contribution of the difference in average characteristics on the internet adoption differentials across both certified and non certified firms.

To correct for such a bias, we implement a 'weighted estimator' developed by Crépon and Iung (1999), inspired from Abowd *et al.* (2001)³⁷. This estimator W gives the average effect of the treatment: let X denote the theoretical average percentage of establishments using internet if ISO norms are not applied; then, $X+W$ will be the share of establishments exploiting Internet if ISO norms are fully adopted. Results of the new estimations are given in Table 7. The estimator W divided by the observed percentage of establishments using internet is also given.

³⁷ See Appendix for a more precise description. See also Lechner (2001) and Brodaty et al. (2001)

Table 7. Impact of Certification on the Adoption of Internet

	Full set of controls	Clean set of controls
Estimator	6.25 (4.51)	7.53 * (4.35)
Estimator divided by the observed percentage of establishments using internet	11	13
Number of observations	2180	2006

Weighted estimation in %

Standard errors in italic.

*** 1% significant,** 5% significant, * 10% significant

Coverage: French establishments with 20 or more workers in 1998

Source: authors' calculation using REPONSE 1998

The coefficient of the ISO variable in these new estimations turns out to be lower than with the original logit estimation. This result shows that the selection bias on the observable characteristics are large. However, using a clean set of controls, the coefficient is still significant (at a 10 per cent level). This result, i.e. obtaining a lower but still significant coefficient when implementing the unbiased estimator, is verified for all the other estimations we made. Therefore, in what follows, we present the results of the latter type of estimation only. Table 6 gives the increase in the probability of adopting the internet brought by certification. Therefore, being ISO 9000 certified implied a probability of adopting the internet augmented by 15 per cent.

It is certainly an exaggeration to consider all firms with an internet access to be trading on-line. Though lacking a variable accounting precisely for the extent of B2B e-commerce at the individual level, we can still try to improve our estimations by considering the joint use of inter- and intranet. Such a variable is of special interest considering what was said about B2B. As mentioned earlier, B2B associates both the internet and proprietary EDI, and will continue to do so for the next few years according to most business forecasts. Therefore, firms that are the most likely to do e-commerce certainly make use of both types of access to the net. We implement estimations of the effect of certification on this new and more complete 'net' variable. Estimation results are documented in Table 8.

Results using the net variable are improved in terms of fit when compared to the earlier estimations using of the internet variable. The impact of certification also seems to be higher with this new variable, showing that certification has a larger impact on the joint intra- and internet use than just on the latter. This is broadly consistent with the fact that firms doing B2B exchanges through the net most probably use EDI alongside the internet. Therefore, the estimates of Table 8 are certainly closer to the estimation of the effects of certification on actual B2B than those of Table 7. Again, these results are consistent with the hypothesis that certification is a prerequisite for making B2B commerce.

Table 8. Effect of Certification on Net Adoption

	Full set of controls	Clean set of controls
Estimator	9.18 ** (4.56)	8.61 ** (3.95)
Estimator divided by the observed percentage of establishments using internet	17	16
Number of observations	2180	2006

Weighted estimation in %

Standard errors in italic.

*** 1% significant, ** 5% significant, * 10% significant

Coverage: French establishments with 20 or more workers in 1998

Source: authors' calculus using REPOSE 1998

III.b. E-Integration and Spatial Location

Certification is also a key tool for the reorganisation of firms and the new pattern of international division of labour and relocation of activities. ICT, internet and intranet allow for an integration of information systems within the large corporation as well as between contractors and subcontractors which not only favours the deepening of existing subcontracting relationships but also encourages the development of new ones. Technology also gives the headquarter or contractor better opportunities for monitoring the subsidiaries or the sub-contractors. Some tasks may then be as well monitored as if they were performed by the 'centre' itself. This will redefine the frontiers of the firm according to the ease with which some parts of the supply chain can be externalised. This new pattern of outsourcing will have geographical consequences too.

As argued by Cairncross (2001), a large bulk of the transformations set in motion by the diffusion of ICT and internet will concern the new pattern of location of economic activities. The ease with which it is now possible to separate physical from information flows will open new opportunities for relocation. New technologies dramatically decrease the costs associated to the remote control of many activities:

- inventory control; for instance monitoring the position of electronically tagged containers or checking stock on supermarket shelves;
- navigation; electronic maps may be used to pinpoint the location of a lorry, a parcel or even a letter;
- alerting; new technologies help tracking stolen goods, monitor the state of a patient's health)

Gains are thus not limited to the conveying of information but affect also the transportation of physical goods. Anything that moves can be connected much more easily and cheaply.

The new technologies are then expected to favour new patterns of activity location. They reduce many of the costs associated with distance and allow firms to relocate activities to take better advantage of cost differentials. This 'death of distance'³⁸ should however not be overstated. If all industries may be concerned by the drop in transportation costs and improved ability to remotely control activity, they may not be affected to the same extent. Besides, just as there are tendencies to relocate far from traditional industrial centres, there are also important advantages to locating activities in the midst of a cluster of similar companies, for instance because of the presence of positive externalities related to a common labour pool of qualified personnel, proximity of universities... Agglomeration economies are not the consequence of 'physical' transportation costs only, but also the result of less material positive external effects. Intellectual activities such as research and development for instance involve a non negligible amount of F2F, not so much

³⁸ Cairncross (2001)

because of the type of information asymmetries mentioned in Section 2, but rather because value is created through interaction and direct communication.³⁹ Therefore, only routine intellectual activities are likely to be concerned by relocation. Some information intensive clerical activities may however be difficult to relocate because they rely much on paper input, for instance because of legal obligations: some banking or insurance activities require papers with an authenticated signature. These paper intensive activities could theoretically be relocated far from city centres, or even abroad, to locations where labour is cheaper and language not an issue. This relocation process may not take place in practice, at least not until electronic signature can be substituted to ‘physical’ signature so that all paper input can be replaced by electronic supports. The costs of transporting lorries full of bank forms to distant places may offset the wage cost savings that relocation would enable.

Therefore, the relocation movement enabled by the combination of ICT, inter- and intranet and internal reorganisation will not affect all activities with the same intensity. If easily digitalisable activities are likely to be relocated far from centres, more information-sensitive, especially information asymmetries sensitive, activities are likely to become more concentrated in ‘districts’. New technologies create forces for both deagglomeration and agglomeration.⁴⁰ Putting all the pieces (certification, B2B, relocation, JIT...), we come to a picture of a new pattern of integration and location. Certification of firms enables them to make e-commerce with large contractors. The use of the web allows a better monitoring of subsidiaries by the core company. This process of quasi e-integration allows generalising the diffusion of Just in Time practices and favours externalisation.

The reality of these transformations can be assessed with our sample of firms. We can test whether the use of the web has favoured the type of reorganisation mentioned above. We need to define a variable that would account for this type of ‘flexible reorganisation’ since there is no ready-made solution available in the original survey. We need a variable related to the pattern of externalisation of the firm’s activity as well as Just in Time techniques. We define our flexible reorganisation variable as the product of two variables available from the answers to the survey: the first variable reports whether the firm has a Just in Time organisation with its customers or suppliers; the second variable informs whether the firm has developed outsourcing during the last three years. Making use of the information provided in the survey, we take into account firms that have successfully implemented outsourcing only (about 90 per cent of the relevant sample).

We therefore test the impact of the use of the worldwide web on this flexible reorganisation process using the ‘net’ variable, i.e. the connection through intra- and internet, as a regressor. Results are reported in Table 9. The correlation between the use of the net and flexible reorganisation is even more significantly positive with this variable. The probability of having made a flexible reorganisation can be augmented by as much as 50 per cent. Therefore, the correlations between the type of firm reorganisation that ICT and web-based technologies are supposed to set in motion and the effective use of the net can be said to be well established.

Table 9. Effect of Net Use on Flexible Reorganisation

	Full set of controls	Clean set of controls
Estimator	3.87 *** (1.45)	3.74 *** (1.43)

³⁹ Communication at distance through electronic media in the field of R&D can also be hindered by security devices. Anecdotal evidence suggests that private company researchers often communicate overseas through fax instead of e-mail because firewalls considerably slow the speed of messages delivery down to that of a fax machine anyway.

⁴⁰ Leamer and Storper (2001)

Estimator divided by the observed percentage of establishments using internet	51	50
Number of observations	1736	1733

Weighted estimation in %

Standard errors in italic.

*** 1% significant; ** 5% significant, * 10% significant

Coverage: French establishments with 20 or more workers in 1998

Source: authors' calculus using REPONSE 1998

This pattern of reorganisation through quasi e-integration will have geographical consequences. But just as much as industries differ in this respect, we can argue that countries will have different opportunities too. It is worth emphasising that Europe and the US are different with respect to the process of outsourcing set in motion by the diffusion of ICT. The American specificity in this context is its peculiar geography. In order to reap the benefits of externalisation and e-integration, relocation of subcontracting activities may not take subcontractors too far from the centre (i.e. contractors) because there are still limits to the productivity gains achieved in the transportation of physical goods. Digitalised information may travel far at great speed and low costs, but most 'physical' goods may not. The limits of flexible reorganisation through e-integration may well be set by technical progress in physical transportation.

Considering the patterns of outsourcing of parts and the organisation of Just in Time practices (low inventory stocks, immediate adaptation to the consumer demand), the standard in manufacturing seems to be that one day of road transport is the acceptable norm. Beyond this distance, the costs related to outsourcing and relocation exceed the benefits, in spite of all the progress made in ICT – as suggested by the experience of Zara (see Box 1). The consequences for Europe and the US are immediate in terms of opportunities. The US geography makes it difficult to expand such a relocation/integration process too far outside of the country and even too far from the traditional industrial districts. Only two countries (Canada and Mexico) are accessible within one day's lorry driving from the most important American industrial centres. Therefore, the range of cost differentials that the US industry can potentially exploit is limited to these two countries as far as going abroad is concerned. The European situation is very different because of the existing diversity of countries with respect to labour and production costs within a relatively restricted geographical space. One day of road transport from the most important industrial centres opens many opportunities to European firms for exploiting the advantages provided by the existence of significant cost differentials in Southern EU countries (Greece, Portugal, and Spain), Eastern Europe, and even the Maghreb.

Box 1. The Zara Case

Established in 1988, Zara, part of the Inditex group, is a Spanish apparel manufacturer and retailer that has been able to achieve a sales growth of 20 per cent in consecutive years since 1990. Its profit margin of 10 per cent is the highest among its competitors. In March 2002 it operated 500 shops in five continents, including 220 units in Spain. With sales of US\$ 1.6bn, Zara is largest European apparel retail store, although Gap is about 6 times larger.

The two companies have adopted very different business models. While Gap has a nine-month lead time, operates on four seasons, and refreshes its stock one a month, Zara makes extensive use of sales and demographics data to create new products on a rolling basis, price their products aggressively, and quickly

make products obsolete in response to market signals. Demand-Based Management enables it to introduce new products every week, amounting to 12,000 new products introduced each year.

The company also makes use of a very efficient and flexible design and manufacturing supply chain so that the design to sales cycle can be as short as 20-30 days. Zara has heavily invested in ICT and has appointed an ICT specialist as CEO. Designs are scanned into computer and electronically transmitted to factory computers, including computer controlled cutting equipment. Store managers carry handheld computers to communicate regularly selling trends, customer comments, store orders, and design suggestions to headquarters. On the other hand, Zara it has maintained very low advertising costs (as opposed to competitors such as H&M). It encourages “impulse buying” by showing to customers that if they like something, they must buy it now, because it won't be in the shops the following week.

Efficient supply chain management is key. Zara delivers to each store twice per week and while it still holds textile in inventory, this stock is less risky than finished garments. Small-batch production allows planning flexibility. What is of course peculiar is that most textile cutting and apparel manufacturing is made in Southern Europe. Capital-intensive functions, such as dyeing and cutting fabric, are performed in highly automated factories in Spain, whereas responsibilities for labour-intensive steps are subcontracted to 300 SMEs in Spain and Portugal. Zara helps with info/logistics technology. Production in Europe obviously drives labor costs higher, but it also allows to speed up transport to local stores (mainly in France, Spain, and Portugal) by truck. Overseas stores (e.g. in New York) are replenished from Spain using air transport, although Zara plans to start production in Mexico if the US store network grows.

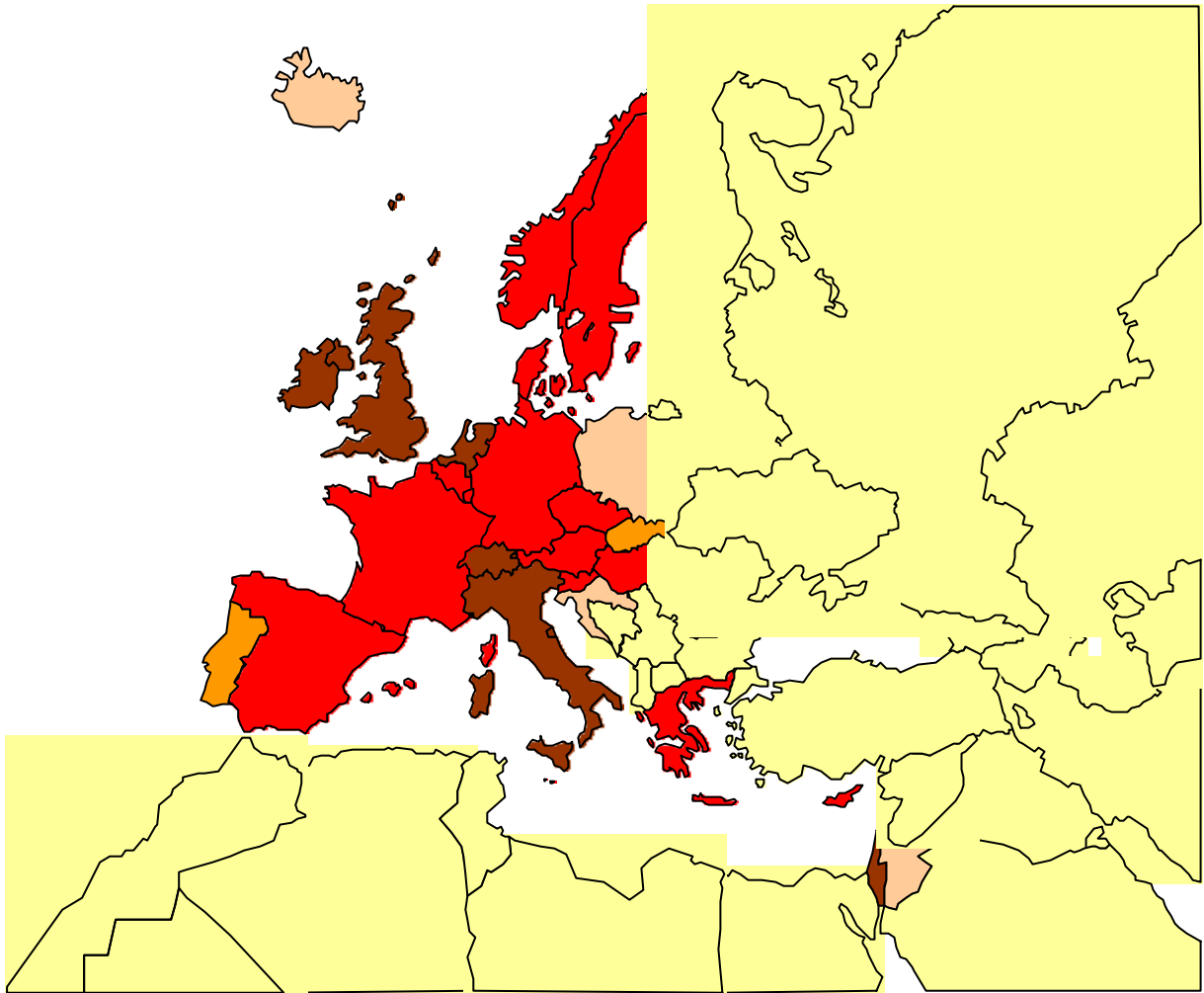
This emerging organisation of the supply chain is illustrated by the geographic localisation of ISO certified firms in Europe and closed regions (North-Africa and West-Asia). Map 1 reports the number of certified business per million of inhabitants⁴¹. It shows that the European Community (and Israel) experienced a large diffusion of ISO norms. But, firms in bordering countries also extensively enter in the ISO process. This figure is clear for “west eastern” Europeans and main candidate for joining the European Community: Czech Republic, Slovenia, and Hungary. The intensity of ISO certifications decreases along the east direction to become negligible in Russia, Byelorussia and Ukrainian. This figure is also true in the Northern Europe: the Baltic republics (Estonia, Latvia, Lithuania) closed to the highly certified Finland have also numerous ISO firms. Significant geographical connections appear between Italy, Malta and even Tunisia, between Greece and Cyprus, and between Israel and Jordan.

Note that while the consequences of ICT on the level of outsourcing are straightforward, their effects on the relative localisation of outsourcing are ambiguous. Grossman and Helpman (2002) develop a simple model of location of sub-contracted activity between North and South (in our European perspective from West to East). Outsourcing requires search for a partner and relationship-specific investments that are managed by incomplete contracts. The development of international outsourcing depends on the relative cost of searching in each market, the relative cost of customizing inputs, along with the contracting environment in each country. In that framework, internet that facilitates B2B matching plays as a technological shock that reduces the cost of search and also the cost of customisation. When this improvement is worldwide and homogenous, the profitability of search rises in the West and in the East. Therefore, final producers will conduct more intensive searches for outsourcing partners, irrespective of the location of this search. Actually, outsourcing activity can shift from West to East if and only if the improvement of search or customisation technology is larger in the East. Now, more than the internet, the complementary ISO certification acts as such positive shock on search technology;

⁴¹ Unfortunately, we do have the number of firms or establishments in most of the European countries. Therefore, we use the overall population to normalize the number of certified firms (labour force ponderation drives to similar figures).

this shock is disproportionate in the East. Indeed, Eastern companies are harder to control, and the regulation does not ensure a reliable protection of the contractor. The certification process guarantees that *a priori* low-quality eastern firms meet the high standards of normalization.

**Map1: Diffusion of ISO 9000 norms in Europe, North Africa and West-Asia
(December 2000)**

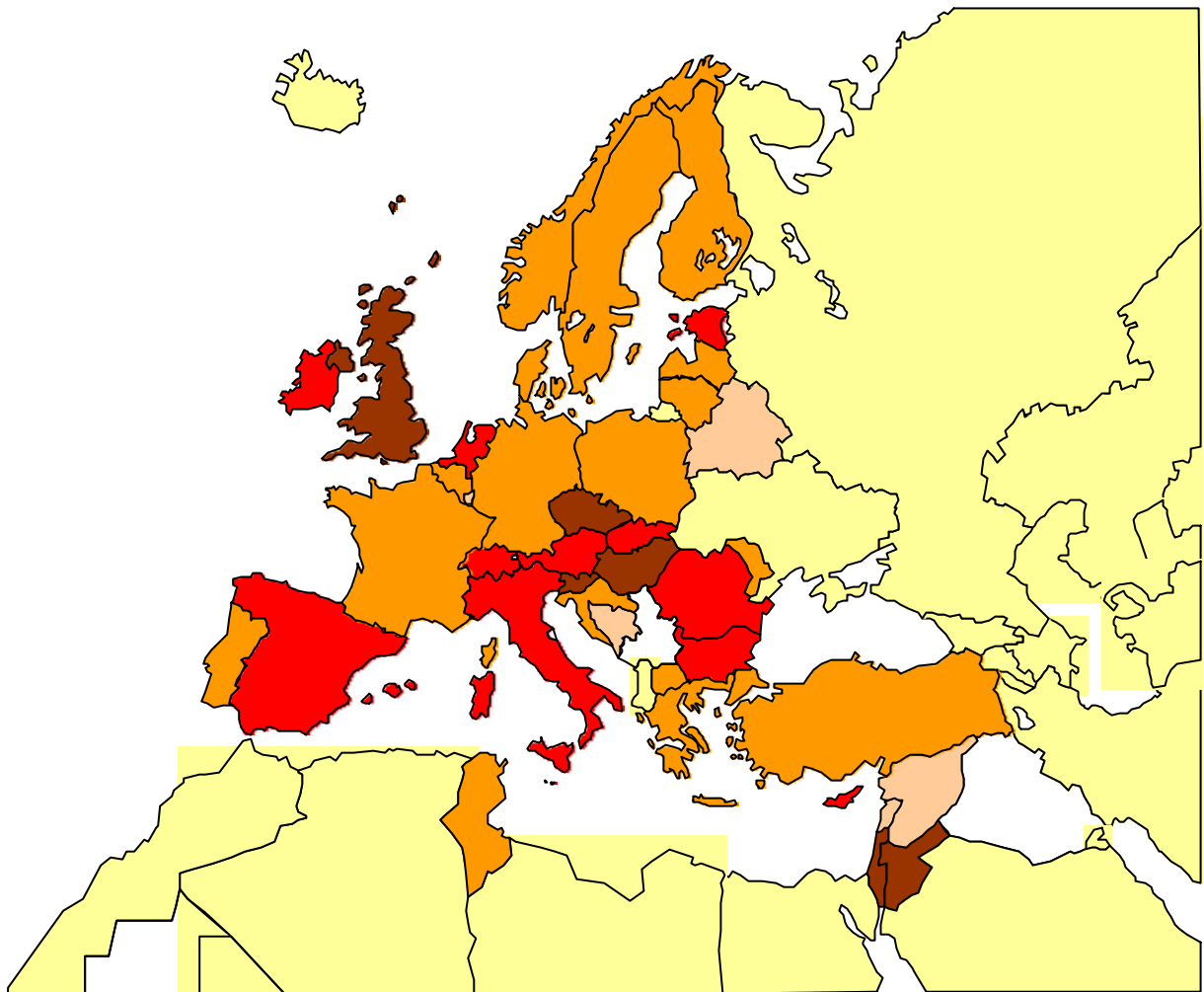


Index of diffusion (number of ISO firms per million of inhabitants):







Georgia		< 10	Macedonian Republic		< 40
Croatia		< 100	Latvia		< 200
Cyprus		< 500	Netherlands		> 500

Source: Authors' calculus using ISO survey 2001

Map2: Diffusion of ISO 9000 norms in Europe, North Africa and West-Asia (December 2000)



Index of diffusion (number of ISO firms per billions \$ GDP):

Albania		< 2	Georgia		< 5
Luxembourg		< 10	Macedonian Republic		< 20
Cyprus		< 40	Hungary		> 40

Source: Authors' calculus using ISO survey 2001

An index of the diffusion of ISO norms normalized by the GDP shows similar figures (Map 2). The geographic connections are also clear. Central European countries – Czech Republic, Slovenia, and Hungary – are close to the European Union market are strongly certified. The case of Jordan and Israel is interesting. Israel is heavily certified on both criteria. The relatively high level of certification in Jordan derives from the commercial agreement signed by Israel and Jordan after the peace treaty of 1994 to foster the development of six joint industrial zones and which benefit from free access to the U.S. market and from favourable tax treatment. Since 2001,

this free access has been extended to Jordan as a whole; thus, Israel and Jordan have free-trade with both U.S. and the European Union.

Firms can thus outsource and relocate in countries where they can benefit from low labour costs and/or a skilled workforce. This extended range of relocation possibilities suggests that the potential for e-integration may well be much more important for European firms than for their American counterparts. European geography, coupled with the single European market and the various trade agreements established with accessing or neighbouring countries are factors that should incite firms to deeply modify their internal structures. This process should have macroeconomic consequences too. If this process is put in practice deep enough, one may expect significant structural and geographical change to accompany the currently diffusion of ICT in Continental Europe. These changes may be facilitated or hindered by other structural factors characteristic of the European economies: labour market features, product market competition, training and education systems... In order to be effective, e-integration will probably call for transformations in these areas too. Thus, the diffusion of internet requires a double unity of the supply chain, affecting quality and proximity. Certification ensures that the quality of the supply chain is homogeneous enough, and this unity is also expressed geographically in the distance between different elements of the chain.

IV. THE THIRD DIGITAL DIVIDE

In principle, the internet⁴² can give poor countries and poor people access to markets, information, and other resources that would otherwise have been inaccessible. It may also allow for the reduction in the number of intermediaries between developing country producers and developed country buyers (whether firms or final consumers), perhaps allowing the former to retain a larger share of total value added. Spirited statements about new opportunities for “leapfrogging” abound, such as this by one of the world’s largest investment banks:

The Internet makes it possible for (1) lower income countries to integrate into the global supply chain and (2) to disseminate knowledge at a greater speed. Greater transparency over the supply chain makes vertical integration less necessary. The world is about to be unbundled, which would create massive new outsourcing opportunities. If a developing country can latch onto this trend, its income growth should surely accelerate.⁴³

The new technologies do not, however, negate all pre-existing sources of comparative and competitive advantage. Access to technology may not be enough if capacity to use it productively demands a certain level of education and skills. Infrastructural bottlenecks in telecommunications, transport, and logistics also remain formidable in many developing countries. Furthermore, underdevelopment is importantly a function of the lack of functioning institutions and non-OECD countries are very likely to fall behind in solving those governance issues – pertaining for instance to consumer protection, security of transactions, privacy of records, and intellectual property – that are crucial to achieve e-business readiness. And finally, while new technologies may make it easier and less expensive to trade *information*, it remains to be seen how it may affect the process of *knowledge* creation and diffusion. For all these reasons, there is a risk that a “digital divide” will simply reinforce existing income and wealth inequalities between countries.

The focus here is not on putting in place the preconditions for low-cost internet access and effective use, but rather on how – assuming these are already in place – developing country entrepreneurs stand to gain (or lose) from the broad diffusion of internet-based e-commerce in different economic sectors. It is too early to conduct any *ex post* assessment of the impact on developing countries of the internet *per se*, though macroeconomic studies of telecommunications point to a significant growth effect (e.g. Pohjola 2001). Our orientation is decidedly micro, drawing on theoretical analysis of trade and industrial organisation, new economic geography, and “value chain analysis” to inform a series of sector studies of how the internet is affecting global supply chains and the place therein of developing country entrepreneurs. Inevitably, the analysis remains exploratory at this stage.

The sectors studied are coffee, flowers, garments, software development, and tourism services. The first three share two important characteristics, namely that developing countries account for a large and growing share of world production and trade and that, in addition, these products are key sources of income for a significant proportion of the population in such countries. Tourism is also an important source of revenue for certain developing countries, and it is an industry heavily influenced by the advent of the internet. The software sector employs a much smaller percentage

⁴² The internet is used here as a shorthand for the full complement of information and communications technologies that are diffusing at varying rates through different economies.

⁴³ See Morgan Stanley Global Economic Forum, “Leapfrogging.com”, 4 September 2000, at <http://www.morganstanley.com/GEFdata/digests/20000904-mon.html#anchor5>.

of the workforce, but it produces the quintessential digitisable product for which traditional transport costs are negligible. In each case we attempt to answer the following questions:

- How has global industrial structure evolved over the past few decades? What role do developing country producers play in the industry?
- What is happening to prices, profit margins and the distribution of value added along the supply chain from input suppliers to producers to customers?
- What impact has recent ICT advance, including the internet, had on global production organisation? Has it contributed to greater “fragmentation” of production and outsourcing of specific processes? If so, to what extent has the technology itself (and the ease of access in different locations) affected the geographic distribution of those processes?
- What implications has the diffusion of the technology had for the global distribution of revenues and profits along major supply chains, and has this worked in general to the advantage or detriment of developing country entrepreneurs? Are there any general rules or patterns that emerge?

Two crucial concepts in analysing the impacts of the internet are transaction costs and co-ordination costs. How are these affected by networks and other non-market aspects of the trading environment, and what types of firms – in terms of market(s) of activity, size, and ownership – are more likely to benefit from their reduction?

IV.a. Supply Chains, Market Access and the Internet: A View from the South

From the vantage point of the developing country entrepreneur looking beyond the domestic market, what has ICT generally – and the internet specifically – changed? If we were to venture a guess, it would be that, for the vast majority of them, the answer would be: “very little”. The daunting policy and institutional constraints on profitable business alluded to above would almost certainly dominate whatever modest benefits adoption of the technology may have to offer them. In this view, addressing obstacles to growth would be the surest way to promote greater global integration of developing economies. To lend some perspective, a recent study of the determinants of rising intra-OECD trade from the 1950s to the late 1980s finds that economic growth *per se* explains two-thirds of the increase, while tariff reductions explain another quarter and falling transport costs (measured by the c.i.f./f.o.b. import value ratio) 8 per cent of trade growth (Baier and Bergstrand 2001).⁴⁴ This suggests, for developing countries, that strong economic growth is likely to be the dominant driver of trade growth, while further global trade liberalisation could have a significantly greater impact on trade opportunities than any technology-induced lowering of transport and transactions costs. That having been said, for specific entrepreneurs and sectors, technology’s impact could be relatively important. Moreover, as trade and other policy distortions are gradually diminished, firm-level entrepreneurial decisions are given freer play in shaping competitive outcomes.

The existing configuration of market participants in the major importing countries is for the most part a given. Only a handful of developing country enterprises (e.g., Cemex, Embraer, Posco) are

⁴⁴ In terms of the increase in the trade to GDP ratio over this period, tariff reductions explain three-fourths and transport cost reductions only one-fourth. The contribution of income convergence, meanwhile, was trivial, largely because the degree of convergence was so small. The magnitude of the coefficient on the income similarity variable was close to one as Helpman’s model predicts, so this variable could prove more significant in explaining trade growth between OECD countries and the rapidly industrialising countries for example.

currently in a position to unseat incumbents in their home market and/or in important third-country markets. For the vast majority of developing country enterprises operating in reasonably competitive sectors, the calculus comes down to one of finding the market penetration strategy that maximises the discounted present value of the expected future profit stream. In some cases, there may be few options: e.g., an automotive component supplier can choose, in theory, among a handful of world-scale OEM car manufacturer-customers, can try to sell to more than one OEM, or can go it alone as a supplier to the replacement parts market. Entry as an OEM car manufacturer in one's own right is unlikely to be a viable option. In clothing, the options may be somewhat less restricted but not drastically so. For instance, the firm can choose among major designer labels (or more likely, they will decide whether or not to do business with it), it can produce for the non-label lower end of the market, or it can try to establish its own world-class or regional brand. Clearly, a firm's strategy may evolve over time, depending on its degree of market success.

In the case of primary commodities, geography will undoubtedly remain a major shaper of comparative advantage in the production phase at least of the supply chain. . Even here, however, comparative advantage is not always a matter simply of geography and natural endowments and some degree of locational competition exists. Access to technology and the capacity to put it to effective use can differentiate locations, giving one country or region a comparative advantage over others with comparable natural endowments (climate, topography, soil type, etc.). This includes not only production technologies in the narrow sense but also transaction-cost-reducing technologies like the internet. Intense price competition and periodic price shocks are common features of these markets. The bargaining power of primary commodity producers *vis-à-vis* buyers is threatened by new entrants, with little if any protection still provided by international commodity agreements.

Possible responses to such price pressures – beyond efficiency improvements and cost cutting – are of two principal sorts:

- (i) horizontal product differentiation, where incumbents enjoy an advantage – *inter alia*, by virtue of accumulated know-how – in producing higher quality products (say, coffee beans), and are able to sell them at a premium, and
- (ii) vertical integration downstream into commodity processing.

Taking coffee again, whether higher quality beans can command a premium (and, if so, how large a one) in world markets depends in part on technological innovations. Before the beginning of internet coffee auctions a few years ago (see discussion below), premium grade coffees commanded a very small premium on the New York market. Whether downstream integration into processing is *feasible* depends in large part on product characteristics: does processing have to take place close to the market? Whether it makes economic sense depends on the expected rate of return to processing investment in a particular location compared with the alternatives. In short, is the coffee producing country better off investing in downstream processing, or allocating scarce investment capital elsewhere – e.g., to diversification into other sectors?

How does the internet affect the economics of downstream integration in primary commodity producing sectors? This may well vary by sector and by type of downstream activity under consideration. For instance, in the case of coffee, the locational advantage of roasting close to the market may dominate other considerations. In the case of cut flowers, where the downstream activities are essentially logistical – i.e., getting the flowers to the market as quickly as possible – it may be advantageous to transfer some activities from distributors located in major markets to

producers/exporters in growing countries. To the extent, however, that the buyer side of the flower market is highly concentrated, there may be strong resistance to the prospect of technology-induced rent dissipation.

Where does the internet fit into the entrepreneurial calculations just described? First, the developing country entrepreneur would do well to understand how the technologies are affecting sectoral economics, the configuration of the relevant supply chain, and the distribution of revenues and profits along it. The nature and extent of internet adoption within a given sector or supply chain depends in part on pre-existing market and other governance structures. Dominant market incumbents are likely to be in a strong position to shape technology use to their own advantage, though it is also possible that technology diffusion would bring about radical shifts in market power. Better understanding of these dynamics can have a bearing on firm strategy. Second, the entrepreneur would like to know how the technologies may be able to contribute to its day-to-day operations, cutting costs, streamlining management, and otherwise giving it a competitive edge over rivals as well perhaps as enhanced bargaining power *vis-à-vis* suppliers and customers. It is principally with the first of these that the current discussion is concerned. While the second is also broached, it is a topic better left to detailed business-school case studies.

One can conceptualise the decision set of the developing country entrepreneur as in a sense the mirror reflection of that of the OECD corporation. Whereas the latter must decide whether to “make or buy”, the latter must decide whether to “sell or integrate”⁴⁵. This may involve a decision to integrate into downstream processing of a primary commodity, or it may involve a decision to assume – individually or collectively, e.g., through a cooperative or industry association – some or all of the logistical and marketing functions traditionally performed by a middleman. It is particularly with reference to the latter that the internet may open up new possibilities. From the perspective of the developing country entrepreneur, the relevant consideration is not whether the internet makes *possible* the elimination of the middleman, but whether it makes it *profitable*. If the ultimate consumer in the final market captures all the benefits of reduced intermediation costs, this would not be the case.

Thus far, we have focused primarily on existing products and sectors, and how ICT and the internet may affect the position of developing country entrepreneurs therein. There is still another possibility, viz. that the technologies under discussion open up new commercial opportunities for developing country entrepreneurs. These may be in the production of new goods that make up the hardware of electronic networks, or they may be in the provision of various software and services that knit together networks and are enabled by the technologies. Some developing country entrepreneurs – and perhaps whole economies – could stand to benefit as much (or more) from the growth of new goods and service sectors as from the changing economics wrought by the internet in more traditional sectors.

⁴⁵ It is not an exact mirror reflection of the first decision set, which involved four possibilities, since we are assuming that the developing country entrepreneur has already opted to export (the converse of the OECD firm’s decision to import).

IV.b. The Internet and the Dynamics of Global Supply Chains: Some Case Studies

The evidence of real benefits and costs from the adoption of the internet is still scattered and anecdotal. At the same time, economic models lead to open-ended predictions: as Varian (2002) puts it, “the Internet certainly affects transaction costs, but determining whether that means companies will be bigger or smaller requires careful analysis of competing forces”. Other ambiguities include internet’s effect on pricing behaviour and on the profitability of different enterprises arrayed along a supply chain. Macro-level data on production, income, trade, and investment can provide a rough idea about the volume and location of economic activity, but not the detailed contours of the world economy, the role of personal and firm-to-firm relationships, the influence of power and politics, and the differential impact – across firms, sectors, and economies – of technologies like the internet (Sturgeon 2001). To do this we have to rely more on micro data and qualitative information, interpreted with the help of the analytical framework that has been laid out in the previous sections.

In each of the case studies, we first set out the main features of industry structure and dynamics, before trying to explain how new information technologies are affecting them. We then attempt to assess qualitatively the main opportunities the internet offers to developing country entrepreneurs in the sector as well as the main conditions for and constraints to seizing those opportunities. Finally, where possible, we bring quantitative evidence to bear to shed light on how the various changes described are affecting the distribution of value added along specific supply chains and, in particular, whether developing country entrepreneurs are retaining an expanding or shrinking share. In some – perhaps most – cases, changing value added distribution is attributable to market forces that have until now been only marginally impacted by the internet. The question we seek to answer is whether, as the internet diffuses further, it is likely to reinforce or attenuate the underlying trends.

Case studies have been used in varied investigations, particularly in sociological studies, but much less frequently in economics. In our view, this is an ideal methodology when a holistic, in-depth investigation is needed. By taking a system of interrelated activities as the unit of analysis and focusing on one or two issues that are fundamental to understanding the system being examined, case studies permit multi-perspective analyses. We take inspiration from Ronald Dore’s comment that “back in the old Marshallian days [...] economists took their concepts from everyday life rather than trying to take everyday life from their concepts” (Dore 1987, p. 170). There is, however, a risk of sample bias – cases must be selected so as to maximise what can be learned in the period of time available for the study – and limitations must be borne in mind – especially that this method is sometime seen as less rigorous than quantitative analysis insofar as the results are not easily generalisable. We think that the descriptive theory presented above provides an appropriate framework for the cases and allows us to derive certain analytic generalisations, some of which would no doubt benefit from further empirical testing as quantitative data becomes available (Yin 1994).

Software Development

Unlike many areas of electronic equipment and component manufacturing, software development – at least in the case of customised software – is not subject to significant scale economies. This provides opportunities for prospective small-scale entrants. A schematic representation of software development (known as the Waterfall Model) divides the process into five sequential steps: high-level design, low-level design, coding, testing, and post-production support. Not only do skill requirements vary cross steps, but so also do other determinants of competitiveness like the need for “relational capital”, since the front-end processes can involve the sharing of commercially-sensitive information that assumes a relationship of trust between software designers and customer. The fact that software products and services can be delivered electronically means that, given an acceptable electricity supply and international data link, location is not a significant entry barrier, at least into certain stages of the development cycle.

Different segments of the software market are not all equally contestable. By far the least contestable is that for packaged software (notably operating systems but also standard applications like word processing, spreadsheets, and database managers) for personal computers. The economies of scale in this product area are very large, as the fixed R&D and marketing costs are huge while the marginal cost of producing an additional unit of shrink-wrapped product is vanishingly small. Also, there are strong network externalities (mostly through ease of file sharing) tending to lock users in to the dominant product in a class. In the case of operating systems, for example, the enormous jointly-sunk costs make mass migration to a new environment an extremely unlikely event.

Worldwide, the packaged software market is valued at approximately US\$ 150b, with the United States taking a 70 per cent share.⁴⁶ The United States is by some distance the leading software exporter, while India has been by far the most successful developing country exporter. As of 2000-01, India’s software exports totalled US\$ 6.2b, or more than 10 per cent of total exports. Over the previous five years, they grew by 62.3 per cent per annum. Most (almost two-thirds) of those exports are destined for the United States, with the United Kingdom another major customer and the remainder of exports spread across some 100 other countries. Currently, more than 185 of the *Fortune 500* companies outsource some of their software requirements to Indian software houses.⁴⁷ The Indian software and services industry also serves a domestic market worth roughly US\$ 2b in 2000-01. As of end-2000, total IT professional employment in India amounted to 410,000 people⁴⁸, with a few of the largest firms employing upwards of 10,000 people each.⁴⁹ Software firms are clustered in Bangalore, Chennai, Hyderabad, Mumbai, and New Delhi. Several of the biggest (e.g., Infosys, Wipro) started life as joint-venture partners of foreign computer manufacturers – developing local applications – before the latter withdrew from India in the 1970s; the largest, Tata Consultancy Services, is part of India’s largest private conglomerate.

There is a marked difference in market structure between the Indian domestic and export markets (see Figure 12). Whereas software products and packages make up a negligible portion of the latter, they account for over half of domestic industry sales.

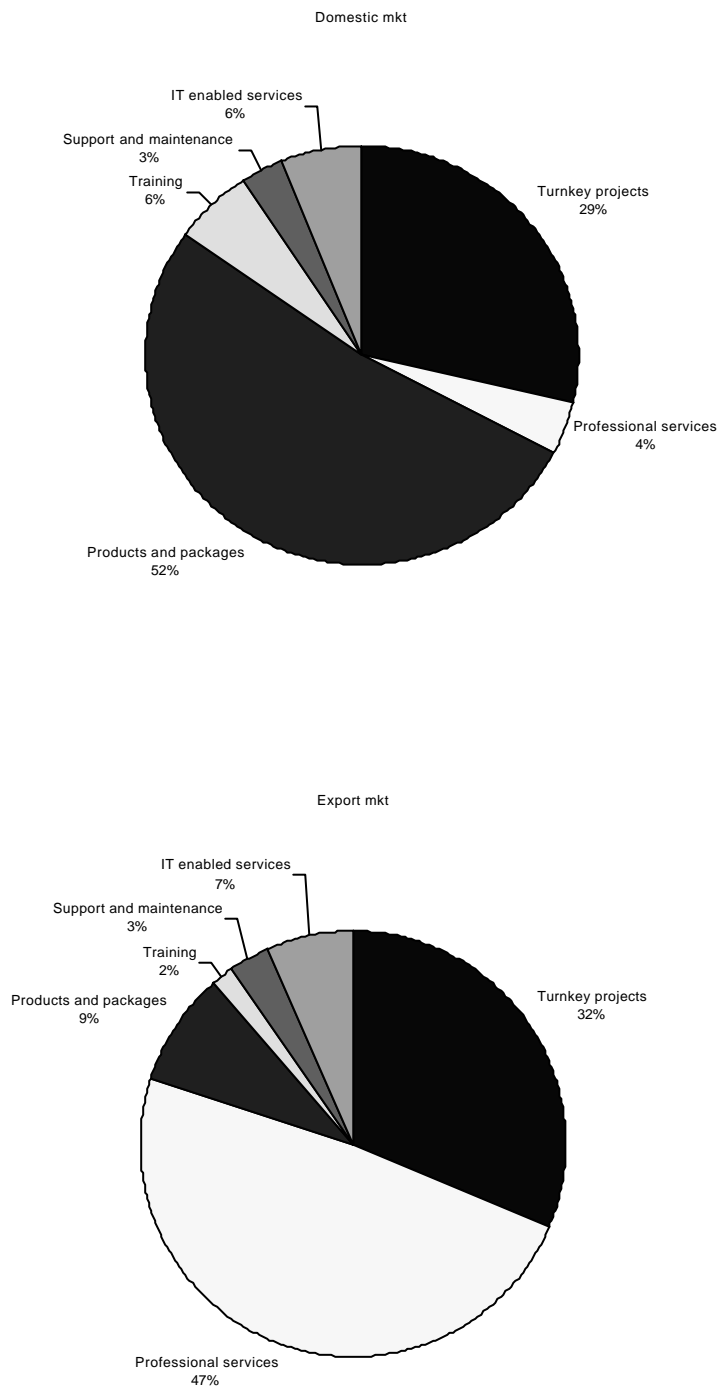
⁴⁶ It is difficult to find precise estimates of the custom software market, but the global market for all types of software has been put in the range of US\$ 300-500b.

⁴⁷ See NASSCOM website: www.nasscom.org.

⁴⁸ This is roughly 4 per cent of total industrial employment, as reported in the 1997-98 *Annual Survey of Industries*, published by the Central Statistical Office.

⁴⁹ *Dataquest India*, 11 March 2002.

Figure 12. Indian Software Industry Market Segments



Source: NASSCOM, cited in Table 4 of Arora *et al.* (1999).

Offshore data entry, programming and software development began around the early 1980s. India has emerged over the past decade as runaway leader in the software arena, while the Philippines has carved out a niche in data entry and, together with India and a few other locations, has an

important market presence in so-called “information-technology-enabled⁵⁰ services”.⁵¹ The latter include performing back-office functions⁵² for major international corporations, operating call centres, providing customer technical support for IT and other companies, maintaining and updating customers’ websites, rendering engineering drawings, and transcribing medical records for hospitals and other health-care facilities in the industrialised world.⁵³ In the case of IT-enabled services, time zone differences can be an important factor in making India (and other similar locations) attractive. For example, medical doctors in the U.S. can have transcribed records of their notes at the start of the next day by sending them electronically to Indian transcription services that start work at the close of the U.S. working day. As of 2000-01, Indian revenues from these various IT-enabled services amounted to approximately US\$ 1b and the sector employed some 70,000 people.⁵⁴

The Indian software industry has developed thanks to the production fragmentation alluded to above. The discovery of India’s software capabilities by overseas customers (the U.S. semiconductor maker, Texas Instruments, being among the first) owed something to the strong complement of Indian engineers working in their home operations. A key boost to India’s software export ambitions came with the partial liberalisation, via the 1984 Computer Policy, of hardware imports. A major portion of India’s software work has involved migration of software applications across different vendors’ hardware and different system configurations (e.g., from minicomputers to PC-based networks) and the maintenance and upgrading of legacy systems.

Towards the end of the 1990s a further boost to India’s software exports was provided by code repair for the Y2K rollover, a niche which Indian software companies exploited effectively. For Indian firms facing the prospect of a post-Y2K drought, the dot.com inundation arrived just in time. Having established a strong reputation in managing the millennium transition, Indian firms have increasingly been entrusted by overseas customers with work on development of e-commerce applications.⁵⁵ The growth of domestic internet use in India has provided an additional, if modest, boost to this business. Thus far, the bulk of outsourced work has consisted of the mid-portion of the Waterfall, from low-level design through testing. Rarely is high-level design outsourced, though the ambition of leading offshore software developers is to integrate towards such “front-end” operations. Ultimately, though, this requires direct involvement in business process re-engineering in client firms, and some have questioned whether this represents a viable strategy for most offshore suppliers (see Arora *et al.* 1999).

A distinctive feature of Indian software developers has been the adoption of quality practices early in the development cycle, with pursuit of ISO9001 certification almost standard industry practice and achievement of more demanding quality benchmarks (e.g., the Software Engineering Institute’s Capability Maturity Model Level 5) not uncommon.⁵⁶ Commenting on Indian software

⁵⁰ Defined as “ business processes and services performed or provided from a location different to that of their users or beneficiaries and delivered over telecom networks and the Internet” (NASSCOM).

⁵¹ By dramatically lowering international telecommunications rates, technological advance and regulatory reform have combined to make this sort of business economical.

⁵² E.g., bookkeeping, accounting, forms processing, payroll and benefits administration, inventory, and internal auditing.

⁵³ Numerous players are operating along the entire spectrum in India: data entry (CitiBank), accounting (American Express, British Airways), call centres (Lufthansa), and technical help desks (Microsoft). GE is particularly bullish about India’s potential in all these areas, and is active in every one of them.

⁵⁴ See http://www.nasscom.org/it_industry/it_services_home.asp

⁵⁵ *Computerworld*, 2 April 2001.

⁵⁶ As of October 2001, 31 Indian firms had been assessed at SEI CMM Level 5, out of a reported worldwide total of 58 such organisations; NASSCOM website: http://www.nasscom.org/business_in_india/quality.asp.

developers, K. Bhaumik of McKinsey & Co. observes: “Not only have they been able to reduce the number of bugs per thousand lines of code and increase the percentage of first-pass user acceptance testing, they are able to do it consistently from project to project”.⁵⁷ Arora and Asundi (1999) suggest that this may be too generous an interpretation of ISO9001 certification, concluding from an analysis of survey responses from 95 Indian software companies that most use such certification as a signalling device for market entry purposes. While it does enable firms to grow faster than otherwise, they charge only a slight premium for their services.⁵⁸ Some firms do proceed to institute better-defined software development processes, as suggested by the fact that a large proportion of firms that have obtained CMM certification started out with ISO9001. To the extent that they do so, this may itself reduce the costs of firm growth, e.g., by facilitating the integration of new and less experienced staff into project teams (Arora and Asundi 1999).

As India’s software and services (including ICT-enabled services) industry has grown rapidly in recent years, Indian industry leaders have begun to expand abroad, through direct investment and subcontracting. While routinely maintaining a technical support office close to major customers,⁵⁹ recent investments have included offshore expansion to other developing countries, mostly with a view to securing sources of low-cost skilled labour as India’s own software labour costs have risen steeply. For example, Aptech, a leading software and ICT-enabled service provider, not only has extensive ICT training facilities within India but has also expanded throughout the Asian region and beyond, with a network of training centres spread across dozens of countries. Indian companies Wipro and MindTree Consulting have set up Asia-Pacific headquarters in Singapore. From a Singapore base, some Indian companies are investing in software zones in China. The industry view of China is an ambivalent one, with fear of low-cost competition at least as strong as the perception of collaboration opportunities.⁶⁰

A major deterrent to expansion of domestic e-commerce in India has been the traditional twin constraint on Indian business – poor physical infrastructure and excessive government regulation. The software export industry has been largely insulated from both of these. For example, since 1993, the Software Technology Parks of India (STPI) have offered the only alternative international connectivity to the state telecoms monopoly, VSNL, *via* earth-to-satellite links to Intelsat; as of 1999, STPI had earth stations in 13 cities, catering mainly to software exporters and a few other corporations⁶¹ (Wolcott 1999). The telecommunications and internet industries are now also benefiting from deregulation, which should provide a strong boost to their development. In the next few years, at least the major cities of India should be linked by high-speed fibre optic networks that will stimulate internet applications and demand. More widespread internet use depends critically, however, on continued telecoms liberalisation at the state level to encourage more competitive pricing of local telephone services (Miller 2001). Improvements in the electricity grid are also crucial to expanded internet use and depend also on state-level reforms, *viz.*, of the electricity boards. Here again, the software industry has been insulated to some degree

⁵⁷ *Computerworld*, 2 April 2001.

⁵⁸ The finding of only a small quality premium associated with ISO certification is consistent with the view, expressed in Arora *et al.* (2001), that follower industries like India and Ireland’s software sectors are characterised by rather narrow sources of competitive advantage, hence intense competition among firms that transfers the bulk of benefits to overseas customers.

⁵⁹ Tata Consultancy Services (TCS), India’s largest software company, pioneered the establishment of such technical support centres within major markets; it currently has some 15 centres in the United States and Europe, with the latest addition an Asia-Pacific centre set up in Melbourne, Australia, in early 2002 (website: www.tcs.com).

⁶⁰ See *Dataquest India*, 11 March 2002 for a view on the China challenge to the Indian “software elephant”.

⁶¹ To sustain its software industry’s international competitiveness, India also needs to upgrade international bandwidth; by one recent comparison, China’s is five to seven times greater than India’s (*Dataquest India*, 11 March 2002).

from grid-linked power problems *via* a 5-year tax exemption for electricity generated for self-consumption (Canavan 2001).

Opinion differs on how large and what sort of an impact India's software industry has had on the domestic economy. The industry employs overwhelmingly highly-educated workers, often graduates of the country's network of elite technology and management institutes (Indian Institutes of Technology – IIT – and of Management – IIM). It directly creates little unskilled employment but, while the size of the multiplier on employment and income in construction, personal services, and other less-skilled areas is unknown, it is no doubt sizeable in certain localities. The increased relative demand for skilled programmers has probably served to widen skilled-unskilled wage differentials somewhat. The positive side of this is that skilled workers are almost certainly employed more productively than they would otherwise have been, say, in the government bureaucracy or heavily protected domestic-market-oriented enterprises. Consistent with the O-ring theory of development, the emergence of high-skilled software clusters could thereby raise the overall productivity of India's economy. Whether those skilled software workers capture themselves all the productivity benefits of agglomeration or they spill over to other Indian workers is an area for further empirical investigation.⁶² Another difficult-to-measure effect of software industry growth that could be significant in the long run is the reputational capital that it helps India accumulate, as the country becomes known as one capable of supplying high-quality, low-cost technology-intensive goods and services. Many leading world ICT companies are investing in R&D facilities in India (Table 10).

⁶² Evidence from elsewhere strongly suggests, however, that spillovers can be significant (see Rauch 1993 for the case of U.S. cities).

Table10. Major R&D Facilities in India by Foreign Companies

Company	Date established	Place(s)	Description
Oracle	1994	Bangalore and Hyderabad	The Indian R&D centers work on a range of products covering Oracle's core database, development tools, Web technologies, and e-business application products. The company also has a global consulting group in Bangalore and global product-support centers in Bangalore and Hyderabad.
Sony	February 1998	Bangalore	The two divisions – Architecture lab (Engaged in Embedded software Development for products like AIBO) and systems design – engage in assistance with systems applications.
IBM	April 1998	Delhi (inside the campus of the Indian Institute of Technology)	India Research Laboratory is the most recent of IBM eight research laboratories worldwide. IRL employs 75 researchers, of whom approximately have a Doctorate degree. About a dozen projects in areas such as bio-informatics, intelligent infrastructure, and electronic commerce are currently implemented, some of which are being conducted in collaboration with other IBM research laboratories.
Intel	Bangalore (Multimedia Lab), Delhi (Technology Lab), and Mumbai (Technology Lab; Visual Computing Lab; Microelectronics lab)		
Microsoft	September 2000	Hyderabad	The two main projects at the India Development Centre are “Visual J#.NET” (to integrate the java language into the Visual Studio.NET shell, and enable the java language to integrate with the other programming languages supported by the .NET Framework) and “Services for Unix” (to make Windows NT® operating system and established UNIX environments inter-operable).
Hewlett-Packard	February 2002	Bangalore	HP Labs India is dedicated to generating usable, economically sustainable technology solutions for the country through understanding the relevant social, cultural, economic and technological drivers. The research conducted will also help HP's e-Inclusion efforts – a business initiative with a social mission to bridge the digital divide and broaden access to social and economic opportunities in traditionally underserved markets.

Source: Companies' web-sites.

India's software industry may still have considerable growth prospects following the tried-and-true model of implementing in code concepts largely developed elsewhere. Yet, it is under growing cost pressure from other locations, notably China but also other countries in South and Southeast Asia, and in any case the major firms would like to be able to break out of relatively low margin work into more profitable areas. The question then is one of choosing a viable upgrading strategy. The advent of e-commerce has provided it with one possible entry point. Whereas before the e-commerce boom the export and domestic markets were largely segmented (as Figure 1 makes plain), the two are arguably becoming increasingly complementary. In particular, the development of e-commerce applications – some for the domestic market, some for overseas clients – is giving Indian firms greater scope to move into high-level design and conceptualisation activities.⁶³ While the dot.com bubble has burst, it did position the e-commerce survivors – and the developers of e-commerce software applications – to benefit from a more rapid expansion of internet access. As Ajit Balakrishnan, CEO of leading Indian portal Rediff, notes, India now has a good pool of software project managers and business development managers who will be ready for the next innovative wave in areas like wireless services⁶⁴. Indian software developers have sought to exploit synergies between local e-commerce software development and export markets (Canavan 2001). In 1999-2000, Indian e-commerce software exports were valued at US\$ 500m; perhaps the most successful product thus far has been the Infosys-developed BankAway software for WAP-enabled remote banking (Chandrasekhar 2000). The e-commerce software market may offer unique opportunities for entrants to develop new products from initial concept, since the dot.com customers are less likely than *Fortune 500* companies to be locked into a long-term relationship with a large U.S. or European IT consulting firm.

Despite their outstanding success in export markets, there is still a risk that, on grounds of supporting industry upgrading, Indian software firms may sue for protection of the domestic market (see Desai 2000). While the “learning-by-doing” argument might prove persuasive to some policy makers, the cost to the broader competitiveness of Indian industry could be high indeed, as the Brazilian computer policy of yore suggests. A more attractive strategy for Indian software companies might be to establish partnerships with key U.S. and European companies interested in supplying the Indian and regional markets, combining the former's strong software project management skills with the latter's business process and/or vertical market knowledge. This may involve partnerships with leading IT consultancies: e.g., Mumbai-based software developer Mastek recently joined forces with Deloitte Haskins Consulting with a view to competing not just in local but in global IT consulting.⁶⁵ It may involve collaboration with industry leaders in areas like banking and financial services. Bangalore-based i-flex provides one example of how such a partnership might evolve. Like Infosys,⁶⁶ this company has been successful in designing and making complete software products as opposed to simply providing services. It was set up by Citibank in the early 1990s largely to develop software products for the US bank. With generous parental financial backing, it was able to take the long view and develop financial sector products for clients initially in test-bed areas such as Southeast Asia before turning to Europe and the United States.⁶⁷ While riskier and requiring deeper pockets than providing project-by-project customised services (not just for R&D but for marketing and

⁶³ It has been suggested, however, that customers for e-commerce applications were interested primarily in India's guarantee of fast turnaround and were willing to trade that for less quality assurance.

⁶⁴ www.inomy.com.

⁶⁵ Leading IT consultancies, Accenture and EDS, have established “back-end” operations in India.

⁶⁶ Infosys remains, however, heavily dependent on service contracts; products provide a minor share of revenue.

⁶⁷ *Financial Times*, India IT Survey 2002.

distribution (i-flex spends about 12 per cent of revenue on marketing compared with 1 per cent for Infosys), the development of products also holds the prospect of a sustainable long-term revenue stream from patents and copyrights. A sensible upgrading strategy for Indian software companies would be to allow products to emerge naturally from the reusable components that frequently form the basis of project solutions. “Companies are moving towards this approach inexorably,” says Rajendra Pawar, chairman of NIIT, the Delhi-based IT training and software services group. For example, TCS has developed niche software products from the knowledge it has built up working for financial services customers – notably Quartz in wholesale banking and NCS in custody and settlement.⁶⁸

A question frequently posed by developing country policy makers and their advisors is whether India’s software success is replicable. There can be no doubt that India enjoys a considerable market lead in software exports over other developing countries. Yet, in some areas like remote IT-enabled services, it is by no means the only supplier. Besides the Philippines, several other countries have a significant presence in this sector: Ireland, Singapore, several Caribbean countries, and, more modestly so far, Bangladesh. There, Technosoft Transcription transcribes audio patient record files for medical practitioners in the United States. The two-year-old company employs 21 people with a knowledge of medical terminology, computer and typing skills and an understanding of American culture and practices. It uses a marketing organisation in the U.S. to secure its contracts and is currently the only company in Bangladesh to contract directly with U.S. clients; other companies obtain subcontracts from India. Clients send their voice files, containing dictation of patient records, to a server in the U.S., which Technosoft then downloads, promising a 24-hour turnaround time (UNCTAD 2001a).

The examples mentioned are all English-speaking countries serving what is by far the largest market for software and services, viz., the United States, UK and the rest of the English-speaking world. Yet, there are other significant markets (e.g., the French-speaking and Spanish-speaking worlds) where similar sorts of services are required and in which low-wage developing countries with large numbers of speakers may enjoy a significant cost advantage, either over a European country or a high-wage Latin American one. Furthermore, it is not yet known how far China will be able to overcome its language barrier to provide competitive software products to overseas (non-Chinese-speaking) markets.⁶⁹ The government has identified software as a strategic sector for promotion, announcing a long list of promotional policies in July, 2000. For the moment, the size of China’s domestic market has absorbed the attention of most local software developers, and the industry is still several years behind India’s in terms of quality control.

In summary, the software industry is not a monolith. While Microsoft may have the packaged PC software market largely tied up, there remains a large international market for software development work and programming, some of it one-off (as with Y2K and the digitisation of print records), some of it repeat business. ICT-enabled services are also a growth industry. Indian software firms have captured a large portion of the offshore software business, with ICT-enabled services – heavily dependent on language skills but with a more varied complement of technical skills – more widely spread. The prospects for continued growth in both types of business look good. The Indian industry faces the challenge of upgrading to the most skill-intensive process (high-level design), which is in turn integral to product development capabilities, while many

⁶⁸ According to TCS’s promotional information, NCS achieves scale economies through automated handling of trade settlement, corporate action administration, registration of securities, billing and comprehensive client reporting (www.tcs.com/products/ncs/htdocs/ncs_index.htm).

⁶⁹ Though hardware does not face the same language barrier as software, the rapidity with which China has emerged as one of the largest IT hardware producers in the world should give the sceptics pause.

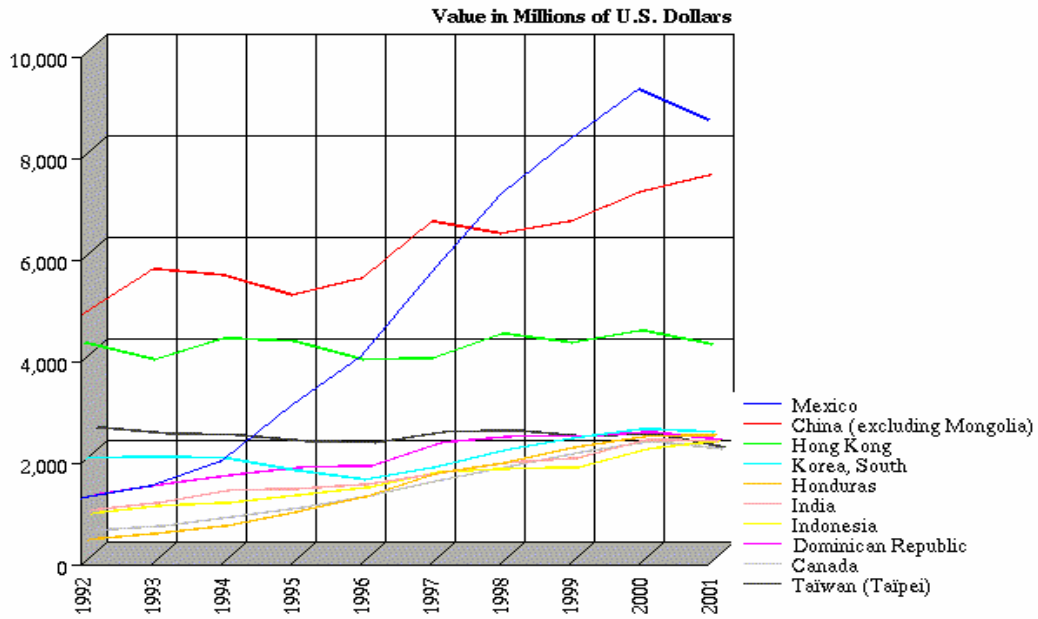
other countries would no doubt like to capture a larger share of the less skill-intensive work. In the Indian case, it may make sense for all but the leading-edge software companies – whether alone or in alliance with leading OECD-based vertical software specialists and systems integrators – to hone their high-level skills by seeking “front-end” business in a rapidly expanding (and preferably unprotected) domestic market – as well perhaps as in other fast-growing developing countries. The industry leaders may in time be able to specialise in value-added services, including the coordination of the software development supply chain, while subcontracting out much of the routine software production. Likewise, for all but the leading developing country would-be imitators of the Indian model, it may make sense to seek entry into the software and services business via partnerships forged with leading Indian software companies looking for lower-cost locations to perform the “grunt work”. For a country like the Philippines that already has more than a toehold in the market and a fairly strong entrepreneurial class, an independent strategy may be viable, but without the benefit of anything like India’s endowment of human capital.

Clothing

Increasing levels of import penetration in domestic markets and growing separation of the production process between pre-assembly and assembly activities are the main features of globalisation in the textile and, especially, clothing industries. Since the 1960s, in a trend that gained momentum following the imposition of the Multifibre Arrangement, large parts of the production processes have been relocated to non-OECD countries – Eastern Europe and the non-EU Mediterranean region in the case of Europe; Mexico, Central America, the Caribbean, and Asia in the case of the United States.⁷⁰ Figure 13 reports US clothing imports over the past decade from the 10 top suppliers, showing the dramatic rise of Mexico and only slightly less dramatic one of China. Among OECD countries, only Canada ranks among the top ten. The source of U.S. apparel imports has changed significantly in the past two decades. Substantially less apparel now comes from the Asian Big Three: Hong Kong, Taiwan, and Korea. During this period, there has been an increase in the number of imports from Mexico and Central America and the Caribbean Basin (CB), which are closer to the United States, but also from ASEAN and China. Today, imports from these regions exceed those from the Asian Big Three in terms of both volume and value. Imports from Mexico are now greater in value than those from China. The relative shift of production for the U.S. market from Asia towards Mexico and the CB no doubt reflects in part preferential trading arrangements of the latter with the United States, but it is likely driven in part by lean manufacturing considerations.

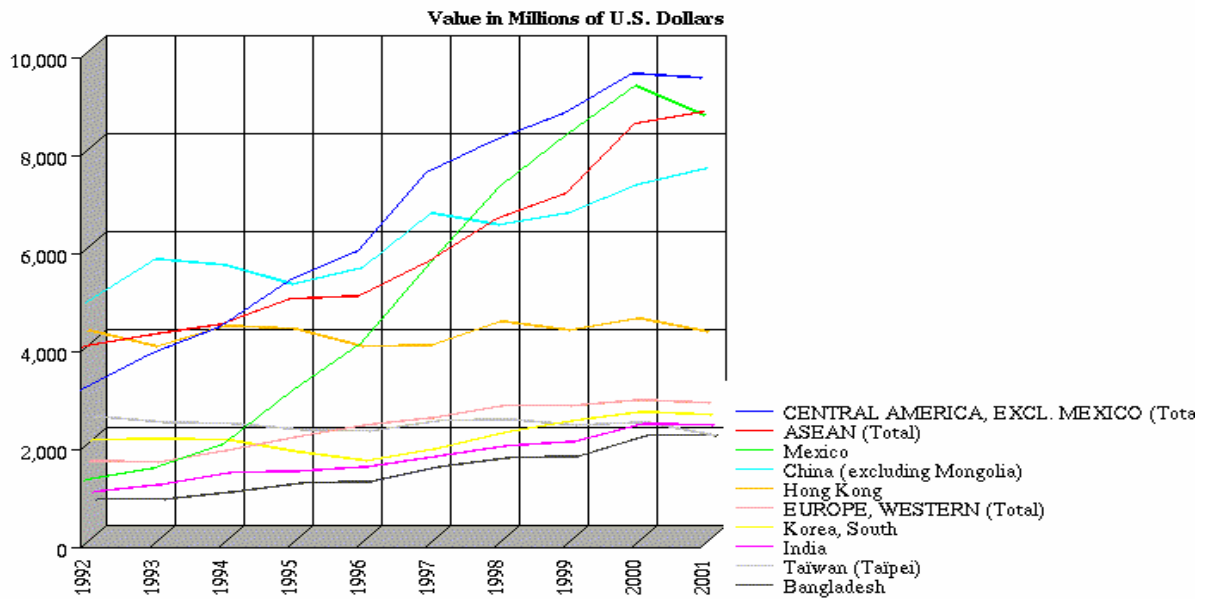
⁷⁰ Other international agreements that affect “North-South” apparel trade include various Association Agreements between the EU and Southern Mediterranean countries, the Caribbean Basin Initiative, NAFTA, and the WTO Agreement on Textile and Clothing which phases out quotas and limits on tariffs.

Figure 13.a. US Clothing Imports: 10-years, Top 10 Suppliers



KavaChart Servlets from VE.com

Figure13.b. US Clothing Imports from Selected Countries/Regions, 1992-2001



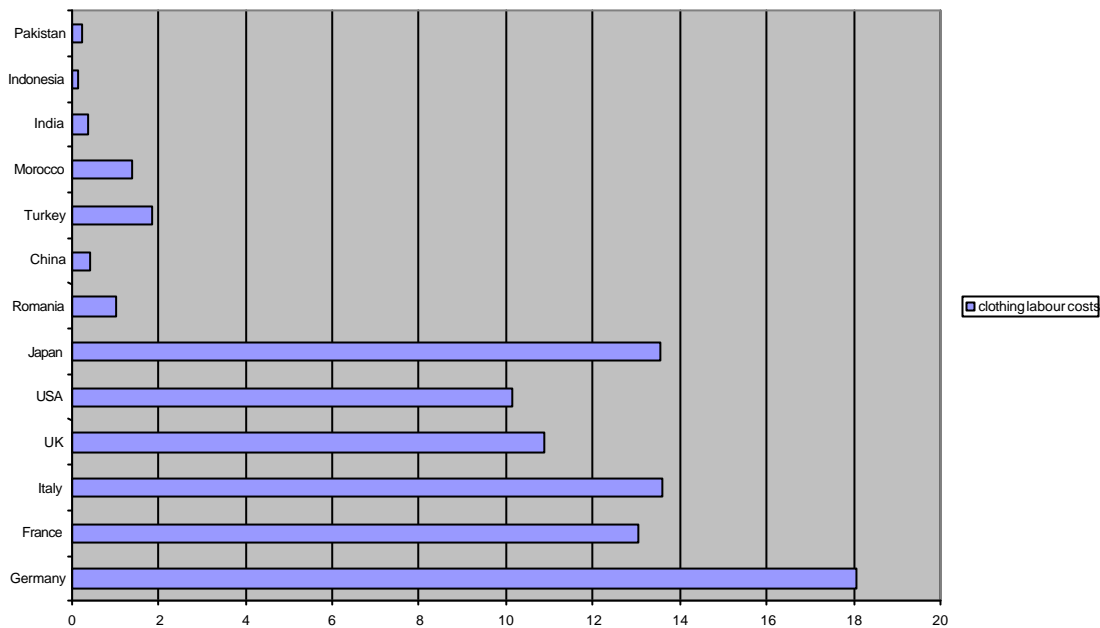
KavaChart Servlets from VE.com

The fragmentation framework for analysing the location of production appears particularly apt to the garments industry. Capital intensities differ in the four main stages of the value-added chain (Graziani 2001, p. 210).⁷¹ The first and the final stages – synthetic fibre production and distribution, respectively – are capital and technology intensive, while textile manufacturing is capital intensive in yarns and fabric and clothing production is very labour intensive.⁷² Labour cost differentials are impressive: in a representative sample of major clothing producing countries, hourly costs range from US\$ 18 in Germany and more than US\$ 13 in Italy and France to around US\$ 40 in China and India (Figure14).

⁷¹ Labour cost is equal to roughly 35-40 per cent of a final product's cost in clothing and to 12-16 per cent in weaving and spinning (Graziani 1998, p. 248).

⁷² The production of a final garment consists itself of five steps. First the garment is designed, and production scheduled and planned. Then, the fabric and designs are decided, the fabric is marked and cut to fit the pattern. The next step, which constitutes the bulk of the work, consists of stitching the pieces together. Finally, the garment is finished, pressed and packed for shipment.

Figure14. Clothing labour costs



For large clothing producers, subcontracting (including the resort to self-employed artisans and illegal workers to dodge tax and labour laws) has been a traditional feature of the industry even at the domestic level. Italy’s industrial districts – geographical clusters of a large number of small firms – are a case in point. In industrial districts the locus of competences and comparative advantage is not the individual firm, but rather the mechanisms of (economic, social, and cognitive) collaboration and co-operation that emerge among them. Despite labour costs well in excess of those in non-OECD countries, exploiting local knowledge – wool regeneration in the case of Prato, to give just one example – and the tangible and intangible advantages granted by proximity and territorial concentration, they have proved capable of surviving, and indeed of surging ahead. Nonetheless, although labour and capital are relatively mobile within the district, this is not a self-organising entity. Control over information allows intermediaries to govern the supply chain within the district and direct production as seen appropriate.⁷³

Since the 1970s, this process has increasingly taken an international dimension, throughout non-equity co-operation agreements (licensing, management contracts, subcontracting) and foreign direct investment (both greenfield, often in export processing zones, and, to a lesser degree,

⁷³ Analyzing Prato’s industrial district, Fioretti (2001) observes that “production is organised by a special class of agents, herein called the *middlemen*. A middleman can either be one of the larger woollen mills, or a single person who organises the activity of other firms. In this last case the Pratese jargon employs the specific word *impannatori*. Who wants to buy in Prato, he asks a middleman. If the middleman is a woollen mill, it attempts to fulfill the order with its own productive means. If the order exceeds its productive capacity, or if the middleman is an *impannatore*, it calls several small firms in order to carry out specific production phases. Wares do not need to pass physically through the middleman; on the contrary, they are generally transported directly from a firm to another. However, it is the middleman who decides which wares must be transported where. For a middleman, nothing is more crucial than that the identity of the final buyer remains secret to the firms that he contracts. Otherwise, contracted firms could sell directly to the final buyer” (p. 5). The main feature of a “leader firm” that comes to influence the whole district is the strong belief in innovation. The risk exists that such firms become “too large” and impose inflexible, hierarchical obligations on subcontractors that drain the latter’s ability to innovate.

acquisitions) (Graziani 1998, 2001). Insofar as the geographical reach of the supply chain has widened, it has also necessitated new governance forms. At an early stage trading companies and buyers' offices coordinated Western firms' demands and local suppliers' capabilities, especially in East Asia (Sturgeon and Lester 2002). Relations were at arms' length: large OECD retailers shifted sourcing at short notice between a multiplicity of potential factories and acted mostly on the basis of costs considerations. Business and social networks played a role in overcoming trade barriers and building trust among the numerous parties engaged along the various steps of the supply chain (Rauch 2001). In Asia, in particular, middlemen took advantage of buyers' lack of information concerning the quality and reliability of suppliers, the state of infrastructure, and more generally the formal and informal norms, values, and regulations governing business.

International vertical fragmentation has been accompanied by horizontal differentiation. While overall OECD consumption growth has started to show signs of stagnation, consumers have increasingly sought a better quality/price relation and price elasticity has also risen in the high end of the market. According to industry experts, "fashion is increasingly turning into a very individual statement [characterised by] the ability to bring together unique pieces of clothing that somehow, when [brought] together, make a much bolder statement".⁷⁴ In a fashion-oriented business with short production runs, smaller orders, and shorter production-delivery cycles, ICT has played a very important role in the strategic response of the apparel industry in many OECD countries to fight low-cost competition overseas (Abernathy *et al.* 1999). The use of new technologies makes it easier to implement "lean retailing" principles: move towards product proliferation and shorter lead times and product life cycles, while reducing inventory carrying costs, stockout costs, and markdown costs. Optoelectronics has permitted the key innovation, the bar code, which tracks demand at the cash register and the status of goods at every earlier stage. That system in turn required computers and software to monitor thousands of prices and millions of items. Retailers already use enterprise resource planning software for human resources, accounting, and inventory management. Developments in computer-aided design and manufacturing (CAD/CAM), layout, and cutting systems have permitted an integration of pre-assembly activities and substantial productivity gains. Production organization has accompanied this shift in demand: in high-wage industrial countries, modular manufacturing is commonly used for high value-added, high fashion, and time-sensitive products.⁷⁵

For brand manufacturers, the emphasis is increasingly on partnerships and long-term relationships with suppliers and on quality management concepts (Feindt 2001). This results not only from the implementation of lean retailing, but also and increasingly from the focus on environment and labour standards and the associated possibility of imposing a premium. As can be expected in a world of horizontal differentiation, certification has become key for sourcing. This process is complicated, lengthy, and expensive, and the cost of switching away from certified suppliers has increased (Thun 2000). OECD-based (wholesale and speciality) retailers and marketers have developed sophisticated logistics, performance, and trust indicators to interact with suppliers and to govern and coordinate global sourcing networks (Gereffi 2001). Only a few intermediaries,

⁷⁴ See "No Gap in the market", *Financial Times*, 2/3 March 2002. A telling indicator in this sense is that white shirts now make up less than 15 per cent of all shirts sold in the US, down from 72 per cent in the early 1960s (McKinsey Global Institute 2001, p. 17).

⁷⁵ Modular formation consists of grouping tasks, such as the assembly of a collar, and assigning them to a module (a team of 5-30 persons working together). These workers are cross-trained and can, therefore, easily move across tasks. Compensation is based on the module's output instead of that of the individual worker. The key benefit of this method is the reduction in throughput time. However, the costs of switching to this method are very high as extensive training is required.

such as Li & Fung described below, have proved able to upgrade their functions and hence to survive.⁷⁶

Internet developments remain at a very early stage, although some (very optimistic) forecasts are that by 2003 B2C online clothing sales in the United States will exceed US\$ 22.2bn and account for more than 10 per cent of the overall apparel market.⁷⁷ There are of course a number of obstacles to e-commerce, including the fact that “many of the characteristics of a garment that are pivotal in the consumer decision-making process – colour, touch and feel, and fit – are difficult, if not impossible, to communicate virtually” (Hammond and Kohler 2002). Some front-running companies in this industry are moving towards very sophisticated systems of seamless integration, providing the consumer with customised on-line catalogues and custom-fit clothing.⁷⁸ The use of industry standards to characterise colour and fabric and ensure quality requirements may allow B2B trade to increase rapidly its market share and accelerate the migration of production to the developing world.⁷⁹

Insofar as the internet is open, cheap, and accessible to a host of new and smaller suppliers, such firms may also use the new medium’s capabilities to switch from manufacturing apparel to developing their own brand names and opening their own retail stores. Although in clothing financial and technological entry barriers to assembly remain low at the same time as retail competition has increased, for most non-OECD countries upgrading possibilities are limited. The assembly business continues to be dominated by small, family-owned, under-capitalised firms within a very conservative industry culture. Key functions such as product design and sourcing are performed by other firms. These suppliers, in turn, suffer from poor visibility within the supply chain. Despite a tradition of long-term partnerships, many firms are reluctant to pass on information, so that middlemen and importers may tack up to 40 per cent onto the bill. In countries where apparel represents the single largest hard currency earner, like India for example, the industry is dominated by sweatshop suppliers who sell to local merchant exporters and, despite enjoying a flexibility advantage, it suffers from severe problems of quality fabrics, trimmings, and accessories (McKinsey Global Institute 2001; Ramaswamy and Gereffi 2000).⁸⁰

⁷⁶ To optimise its use of external resources, Fast Retailing, Japan’s largest apparel retailer with over 500 stores under the Uniqlo brand name, similarly entrusts materials procurement and production to trading companies such as Mitsubishi. See “Fast Retailing: Japan’s Biggest Apparel Retailer Goes Global”, *Textiles Outlook International*, Issue 97, January 2002.

⁷⁷ According to Forrester Research, a market research firm. Innovative attempts are made to fix the problems posed by the need to see how products fit. See “Finding a strong suit”.

⁷⁸ Conjoint analysis, for example, allows shoppers to view a series of pairs -- say, a plaid flannel shirt and a solid button-down -- and select the one they prefer. Based on their choices and some complex mathematical computations, the site generates product recommendations. See “Finding a strong suit”, *Red Herring*, 12 June 2001.

⁷⁹ But note that for top-quality fashion products standards are far less important. ItalianModa, an exchange portal, provides a 24-hour sample service, which allows buyers to request rapid delivery of samples of fabrics, leathers, or finished goods before placing a definitive order. See “European online portal cuts a dash in fashion world”, *Financial Times-IT Review*, 13 March 2002.

⁸⁰ One important factor are reservations for small-scale industry (SSI) preventing large domestic manufacturers from entering the market and restricting investment in fixed assets to about US\$ 200,000 for firms producing more than 50 per cent of their output for the domestic market. This regulation is constraining because setting up even a very basic 500-machine factory (the minimum size required to function effectively) requires a minimum investment of US\$ 700,000. As part of the SSI regulation, FDI is limited to 24 per cent in firms that produce over 50 per cent of their output for the domestic market. This results in a limited transfer of skills and knowledge from foreign best practice and reduces technology adoption (foreign investors often provide the cash and insist on adoption of high-tech machinery that the factory would not otherwise bother to invest in). In addition, firms with investments of less than US\$ 200,000 are exempt from paying excise duty, which improves their cost position vis-à-vis larger manufacturers. This provides further protection to small-scale plants despite very low productivity. Though SSI reservation in the woven segment of the industry was removed in November 2000, it remains in the knitted and hosiery segments.

The contrast could hardly be starker with growth-oriented industrial districts that are capable of producing all the inputs (goods and services) needed to compete on global markets. Similarly, in Brazil considerable investments in the 1990s and persistent cost advantages appear insufficient to make up for other structural problems, such as the lack of strategic alliances and partnerships, the low degree of automation and use of EDI and Efficient Consumer Reponse (ECR), the dearth of experienced salesmen, and the insufficient effort to increase production and design capabilities (Gorini 2000).

This does not mean, however, that non-OECD producers cannot aim at upgrading their production mix, as proven by the success of some (especially Asian) ones in building “full-package capabilities” to handle all aspects of production and deliver on time a quality finished product at the right price. Buyers can transmit to subcontractors the information and organisational know-how needed to become Original Equipment Manufacturers (OEMs) and Original Brand Name Manufacturers (OBNMs). They can also impose constraints that increase efficiency, for instance environmental standards (restrictions on the use of carcinogenic dyes and certain chemicals in finishing procedures) that lead to upgrading (see Dolan and Tewari 2001 in the case of the Tamil Nadu textiles industry). Integrating forward and gaining control over logistics are important strategies and ICT performs a key enabling function in this regard – some Indian manufacturers have indeed used domestically-developed systems to track and monitor operations of warehousing facilities established in Europe (*ibidem*). Smaller suppliers could use B2B platforms to bid on requests for proposals posted by OECD-based firms. Though the registration and bidding on RFPs (request for price) seems the most obvious methodology, an alternative is for member companies of business associations or industrial chambers, that often lack the bandwidth to access global platforms, to use an OECD-based logistics provider to post sales leads, create online stores, and access logistics.⁸¹

Information on such trends, let alone quantitative analysis, is still at a very early stage. In terms of the ability to master the potential of the internet, possibly the most successful strategy has been that of Li & Fung, an old Hong Kong firm which has been exporting traditional commodities (porcelain, silk, bamboo and rattan ware, jade, ivory, handicrafts, fireworks, garments, toys, electronics, and plastic flowers) from China and South East Asia to the West for almost 100 years.⁸² In the 1990s, Li & Fung moved from a traditional vertically integrated business model – owning specialist spinners, dyers, knitters, weavers, finishers, sewers, and printers, as well as wholesalers and retailers across Asia – to using internet technology to manage production sites, so that each linkage in the supply chain knows what to produce and when. Finding the best suppliers at any given time takes enormous research – criteria include labour and transport costs, quotas, proximity to market, and the ability to forecast, plan, track production, and manufacture apparel quickly and flexibly – and OECD-based companies are increasingly deciding that it no longer pays to do it in-house. Instead, they outsource the knowledge-gathering to Li & Fung, which has 61 offices in 37 countries employing 3,600 people roaming for the purpose. The company focuses entirely on optimising supply chains for other companies and capacity constraints—a ceiling in other industries—are not an issue since Li & Fung has access to 6,000 factories, but does not own any. The real value lies in the power that Li & Fung enjoys to influence factory owners, leaning on them to reserve capacity, monitoring quality, and so forth. The group has recently created a

⁸¹ Canacinttra, Mexico’s industrial chamber, for example, signed an agreement in October 2000 with 1hemisphere, a United States-based trade portal for the Americas, to provide services to its 33,000 member companies (Curry *et al.* 2001). The site will allow Canacinttra’s members to post sales leads, create online stores, and access logistics via 1hemisphere.

⁸² This paragraph is based on Sturgeon and Lester (2002) and “Link in the global chain”, *The Economist*, 31 May 2001.

private label division (StudioDirect) to manage the product development process for small- and medium-sized retailers. It uses Net-based applications, such as dynamic image processing and streamlined image production, to optimise supply chain management and reduce time-to-market.

Some case studies in Tamil Nadu presented by Ramachandran and Goebel (2002) also offer interesting insights. Quite a few firms reported using software in marketing to find buyers, place bids on orders that were posted, and interface with buyers by sending designs, colors and patterns electronically. Engineers then download this information into a sophisticated drawing machine that draws out the pattern with perfect precision into life size for the cutters to use.⁸³ Also, many firms mentioned the use of CAD/CAM for the purpose of cutting fabric.⁸⁴ In one firm the automated cutting of patterns has halved wastage of fabric. Related investments such as the use of voltage regulators have also helped to cut costs. One firm commented that CAD/CAM had enabled it to use 2 meters of fabric per shirt, rather than 2.5 meters.⁸⁵ A disquieting conclusion of this study, however, is the size matters a lot for the adoption of new technologies. For large-sized firms financing equipment upgrades was not a concern; they are so large that the banks are not squeamish about dealing with them and public incentives, such as the Technology Upgradation Fund, can be used for these investments. In the smaller firms interviewed, access to credit limited the use of ICT:

“Some firms used computerized accounting methods but many firms we surveyed in the textile and leather sectors did not report any use of IT at all. A senior official at the Cotton Textiles Export Promotion Council pointed out to us that in general, IT was not being adopted by smaller firms. Rather, these firms were focused on trying to purchase power looms, given their limited access to financing. While access to credit is better in Tamil Nadu than many other states, small firms are still very constrained. Small firms need more interaction with product developers, more access to product demonstrations of prototypes, and more investment in skill upgrading, according to the official we interviewed (pp. 10-11).”

Independently of the location of the production site(s) of the contracting companies, suppliers and subcontractors are likely to be located in close proximity to each other to ensure that quality standards are met and flexibility is achieved in responding to changes in the market. Relocated production facilities are likely to be clustered in a particular region as companies seek to take advantage of local skills that are often geographically concentrated. The above-mentioned Italian industrial districts are the best known-example, but even in developing countries there is empirical evidence that in the garment industry small clustered firms perform better than dispersed producers. As shown by Visser (1999) in the case of Peru, cost reductions and information spillovers are the dominant type of clustering advantages. They appear to arise mostly at the level of transactions in goods and services and to a lesser extent in the transformation of inputs into output. Participation in global, internet-mediated networks may increase and diversify the nature of information spillovers and let inter-firm co-operation cross local borders.

⁸³ The General Sewing Data (GSD) software allows buyers to send a pattern via e-mail for suppliers to analyze and study the garment and identify all stages of production.

⁸⁴ One project currently underway in one factory attempts to link all the machinery together in an internal network that is tied into the firm's computer system. This producer anticipated greater monitoring of production as a result of this project.

⁸⁵ This firm has an electronic time card system; workers are equipped with magnetized ID cards which they swipe when they clock in and out of their jobs. Also, within each major work station there is a computer with internet access. If a buyer makes a call regarding the status of an order, the director can call up the area supervisor who signs on to the system, and gives real-time feedback to the buyer regarding the status of the order.

Ornamental Horticulture

According to UN Tradestats data, global trade in cut flowers, foliage, and plants in 2000 was equal to US\$ 7.7bn.⁸⁶ Roses (on special occasions) and carnations (which last longer) are the main traded cut flowers. Although the United States recently became the world's largest cut flower importer, the EU as a whole represents the largest market, accounting for three-quarters of world total trade. Some two-thirds of the world's flowers, in particular, are either grown or traded in the Netherlands, generating a total of US\$ 5bn a year. In 2000, the United States imported more than 3,700 million stems, mostly from Colombia and Ecuador. The EU mostly sources from Africa – Kenya, Morocco, and Southern Africa, in particular – and Israel. Competition has been keen and as volumes of rose exports have increased, prices have been falling on a worldwide basis. French rose imports, for instance, increased 23 per cent in volumes in 1996-2000, but in current value they dropped by 12 per cent. Part of this decline in value of imports is only apparent and is due to the exchange shift between European currencies and the dollar. But the similar increase in volume and drop in value phenomena happened in the United States, where imports in rose stems went up 99 per cent over five years, but the value of total rose imports rose only 65 per cent. There are two ways rose-growing costs are being held in check: first, breeders have developed more productive roses, particularly in the 40cm and 50cm lengths destined for the mass markets; and second, growers have lowered costs per stem by increased volume and better management. But, interestingly, there is a floor and a ceiling price at which consumers will buy. If the price is too low, they suspect the rose is old. Thus, consumption of roses has risen not only because of declining pricing, but also because of perceived longer vase life, a wider choice of lengths, and an abundant choice of colours.

Labour represents slightly half of the total cost, interest/depreciation account for a fourth, and other inputs such as seeds, energy, and transport for the remainder (Elshof 1998). Nonetheless, while manual labour and land costs, daylight availability, and climatic conditions are important factors that benefit non-OECD growers, barriers to entry, such as the need for capital, know-how, and infrastructure, remain considerable. Quality has several dimensions (van Liemt 1999). Flowers should be free from plagues and diseases and they should be undamaged. These elements can be judged on visual inspection. Other quality aspects, however, are more difficult to judge. For instance, it is hard to see whether flowers have been correctly handled once cut. Yet this is an important determinant of vase life and whether or not the bud will open. It is the reason why reputation is so important and why growers who have consistently delivered high-quality produce fetch higher prices than little known or irregular suppliers. Strict control of humidity, temperature and air quality are essential for delivering an attractive product to the market. Even in tropical regions, an increasing number of exporters are now producing “under plastic” or “under glass” because this allows them better control over daily (night-day) temperature fluctuations. Growers also rely heavily on an efficient post-harvest chain of handlers, storage and transport. All this demands investments – about US\$ 50,000 per hectare.⁸⁷ In Kenya only the three largest companies have their own transport and storage facilities, and other producers are dependent on them. Sulmac, in particular, is the largest grower: it was taken over by Unilever, which then sold it to the Commonwealth Development Corporation in 1998, and it sends most of its flowers to Europe through a distributor.

There are also economies of scale in the purchase and distribution of flowers, including financial liquidity which is an important element for wholesale chain stores that advertise products months

⁸⁶ See “World commerce in cut flowers and roses”, *FloraCulture International*, April 2002.

⁸⁷ See “Kenya's flower farms flourish”, *BBC News Online*, 14 February 2002.

in advance and use futures to hedge against climatic and other risks. Before supermarkets entered the picture, importers sold almost exclusively to wholesalers, with very definite lines as to how the chain of distribution was laid out. Recent demand trends in the industry towards low inventory levels, quality control, and strict respect of environment and labour standards also put a premium on the concentration of production (Hughes 2000). Supermarkets want to buy large quantities of cut flowers through long-term contracts, directly from known producers, and reduce delay (and thus lengthen vase life). Table 11 depicts the distribution of costs and profits in the cut flower chain. Growers and retailers each receive around 40 per cent of the final price,⁸⁸ a tenth goes to wholesalers, and the auctions get a very small share – but of course trading volumes are huge (see below).

Table 11. The Distribution of Costs and Profits in the Cut Flower Chain

	Cost contribution (per cent)	Gross profit margin (per cent)
Growers	42	n.a.
Auctions	3	55
Wholesale trade	12	22
Retail trade	43	43

Source: Rabobank (1992), “A view of international competitiveness in the floristry industry”, cited in Elshof (1998).

The Dutch have dominated world trade in ornamental horticulture since the 16th century. Flower auctions date from about a century ago, when the Aalsmeer growers banded together and formed a co-operative auction. Until then, buyers would play one off against another, driving down prices. Members must sell all of their production through the auction. In turn, the auction is obliged to sell 100 per cent of its members' products. Of the seven flower auctions in the Netherlands, BVA in Aalsmeer (near Schiphol Airport, one of Europe's largest air cargo hubs) and BVH in Naaldwijk account for 83.7 per cent of sales. The VBA alone handles 19 million flowers and 2 million potted plants a day for a yearly turnover of nearly 1.5bn Euros.⁸⁹ The Aalsmeer indices provide price trends for “baskets” of the most popular flower and plant groups. Using their daily volumes as a benchmark, short- and long-term futures indices allow traders to secure their positions. Nowadays the auctions trade 85 per cent of production through the clock, the rest goes through brokerage firms and cash & carry shops that select, buy, and take away the goods immediately. The brokerage firms are part of the auction and mediate mainly for big companies and for the sale of potted plants. About 50 per cent of potted plants are traded through mediation. The brokered products are not traded at auction, but through contracts. The auction does monitor the sales, however. The brokerage firms provide growers with information on market trends and assist in the sales process. Traders are supplied customised work at the level of product and service in the form of active assistance with the purchasing process.

Markets for all types of perishable goods are highly fragmented, seemingly waiting to be improved by the internet. A weak point of the auction system is that producers have comparatively little contact with buyers, making it difficult for market signals to pass easily to producers. Jets fly the flowers from Africa to Amsterdam, where they are auctioned to an exporter that repackages and ships them by truck to a wholesaler, who finally sells the blooms to a florist.⁹⁰

⁸⁸ According to other estimates, however, growers receive a much smaller share: van Roozendaal (1994), for instance, reports that “Kenyan producers pay around US\$ 2 per kilo from Nairobi to Amsterdam (around 50 per cent of the wholesale price)”.

⁸⁹ “Dutch flower auction blooms”, *Financial Times*, 11 October 2001.

⁹⁰ All markets within a circle of 800-900 kilometres from Aalsmeer (northern Italy, Austria, Switzerland, Germany, Poland, France, Belgium) are served by trucks. Destinations further afield are served by air.

The process may take a quarter of their month-long lifespan, and middlemen and mark-ups triple the price of a blossom before it reaches the final customer. African producers are capable of producing large volumes and willing to sell directly at an agreed price, making them attractive to supermarkets. However, buying directly and regularly through long-term contracts makes it difficult to source from the Netherlands where growers are obliged to sell their produce through the auctions.

Until the early 1990s BVA used computers in a very traditional way, in the auction hall only.⁹¹ Quality inspectors graded flowers as they arrived in the auction hall and entered information on the flower type, quality, inventory, and grower into the computer. The same information was cross-indexed with bar-code numbers and affixed to each flower lot and flower cart to enable tracking through the auction hall. The computer system was also linked to the buyers' keypad and the clock. It consolidated purchases for payment purposes, and generated summary reports and transaction reports for buyers and sellers. It was also used to schedule and coordinate the many functions of this complex auction, making it run efficiently. With the growth of volume, buyer power, foreign competition, and the need for space, in 1992 EDI was introduced to allow growers and auctions to communicate product, order, and transaction information to each other.

In 1994, BVA began a sample-based auction for trading potted plants. In this auction, growers sent only a sample to the auction house, with the usual data about the product. During the auction, buyers saw only the sample, but were bidding for the entire available quantity. Buyers could specify how to package the product and when to ship it. Growers followed the packaging instructions and shipped the next day to the buyers in the auction house or to buyer warehouses. For the most part, the expectations of the parties involved were not met. Buyers and auctions expected the number of transactions to increase by separating pricing from product location. Instead, the number of transactions per hour decreased because buyers had to specify the terms of delivery. While the auction had hoped to transact 45 per cent of the supply of potted plants, they transacted only 10 per cent. Thus, the sample-based auction did not effectively reduce storage requirements at the auction house. Furthermore, the buyers perceived that the sample was of better quality than the rest of the lot, so they bid more for the sample and less for the remaining lot, even though it could have been the same type and quality. In addition, incentives to buyers and growers did not materialize. Growers received no extra compensation for modifying packaging and deliveries to accommodate the buyers. Growers also perceived that they got lower prices in a slower auction. In an effort to get higher prices, more and more growers would break a large lot into different sample lots so that the same product would be priced multiple times. There were also no incentives for buyers to transact large lots. Rather the auction maintained rules to favor small lots. In general, there were no significant benefits for buyers or growers to participate in this market and the experiment failed.

A second way of separating logistics from delivery was tested at Naaldwijk through video auctioning, known as the Videfleur experiment. One of three auction clocks in a room was modified with video screens for product display around the clock. The product was also on display under the clock in the usual manner, giving a second visual display. An auction room solely dedicated to this experiment was not available given the limited space of the auction facilities. Thus the traditional auction was combined with the Videfleur experiment. As product arrived at the auction, a picture was taken, digitized and stored in auction computers. These computers transferred the picture to the display screen in the auction hall. Buyers could also see

⁹¹ The following paragraphs draw on Kambil and van Heck (1996), van Heck and Ribbers (1999), Telematica Instituut (2000), and van Heck (2001).

and bid for the flowers on computer screens in their private auction offices. These computers had a representation of the clock. Auctioneers expected this remote video auctioning to provide buyers with better information as they could access their own office computers for purchasing, order, sales, and local inventory information. In addition, auction officials had noticed that buyers often tended to select goods from specific sets of growers rather than inspect the product in great detail. This suggested to them that reputation played a substantial role in shaping buyer purchases. Buyers reacted negatively to screen-based trading. First, they complained that the quality of the auction hall video display was poor. Second, they did not gain any new efficiencies. Buyers trading from their offices also perceived a major informational disadvantage. Buyers on the floor of the auction hall could observe each other and the reactions of large buyers (from supermarket chains, etc.). This non-price information was incorporated into the decision making of the buyers.

Non-Dutch growers are naturally disadvantaged in terms of the grade and prices they obtain at the auctions (Asea and Kaija 2000). Moreover, imports have to pay a commission of 21 per cent on gross sales; whereas payments are made in Dutch guilders, loans are given in US dollars, and with currency rates fluctuating, losses are common. Non-OECD farms that do not supply directly to individual wholesalers and/or retailers employ commission agents to sell flowers on their behalf at fees of 15-20 per cent of the turnover (Hatibu *et al.* 2000). In 1994 when the share of imports reached significant proportions the Dutch growers thought that they could slow them down by restricting access to their auctions. This action proved futile and was even seen as harmful. The restrictions did little to solve the growers' problems and in 1996, the auctions lifted the restriction on imports again.

In the mid-1990s East African Flowers (EAF) – one of the largest growers of roses, carnations, statice, and other flowers in Kenya – hired Mr. Pol, a Dutch businessman to develop a computerised system allowing buyers to see pictures of flowers and purchase them online.⁹² Pol was then running two companies – one supplying bidding systems to auction houses and another selling inventory software to flower buyers and wholesalers. The Tele Flower Auction (TFA) worked but the Aalsmeer authorities tried to ground it by imposing a 20 per cent handling fee. The Africans sued and the European Court of Justice in Luxembourg ruled in their favour. Today, EAF and TFA represent the European interests of nearly fifty top growers of cut flowers located in Kenya, Tanzania, Zimbabwe, Zambia, and Uganda. In 1999, TFA added various rose varieties grown by top Dutch growers to its range of African roses. The catch, however, is that the system is off the open Net and is limited to 100 or so top buyers hooked into Tele Flower's private system. Lacking the resources to expand, in 1999 Pol sold his companies for US\$ 5.5m to a Canadian company (Aucxis) and stayed on to run its Dutch flower operations. Aucxis already had developed internet auction software for food industries, cutting out middlemen, and facilitating sales of surplus inventory. Originally, Aucxis had envisioned a direct sales model for flowers still in the ground, but this proved infeasible. Flowers have to be cut when they are in bloom, not just when they are ordered, and shipping the millions of stems in bouquets directly to customers would be ridiculously expensive. The new business model uses the present distribution chain but takes advantage of the Net to streamline it. Instead of sending all their flowers to Dutch auction houses, growers post pictures on a Web site, and buyers can bid from their offices. Only after flowers have been sold do they move through the Netherlands.

While that is the theory, interest so far is scant. Even though about half of Dutch buyers already use Pol's software to manage their operations, few have signed up for online auctions. Arranging line of credit, foreign exchange, and insurance at various auctions – necessary for selling online –

⁹² See "A Flower Crusade That's Going Nowhere", *Business Week*, 23 April 2001.

has proven time-consuming and costly. Many also say the clubby atmosphere of Aalsmeer provides them with more security than an open-internet system could. Only one grower has signed up to sell directly online to wholesalers. Similarly, small florists still prefer the traditional system and very few end customers buy flowers online, preferring to see and feel bouquets in person. The business models related to the internet are not yet fully mature and it is still far too early to predict whether e-commerce will lead to greater openness and competition in the ornamental horticulture industry. As in other industries, in flowers too network externalities and liquidity needs mean that only few initiatives will survive. If the physical chain, with its interdependency, remains dominant and e-commerce only intensifies pre-existing developments in the industry, the barriers that producers in developing countries have to surmount to directly access consumers remain staggering.

Coffee

Coffee is a perennial tree that grows in the tropics only; on the other hand, OECD countries consume most of the world production of tropical beverages.⁹³ Five types of actors participate in the supply chain: producers, processors/stockists, exporters, importers, and grinders/roasters. Long lead time, resilience to weather disruption, and extreme price variability put a premium on the easy availability of financial capital, not least to invest in insurance protection. In the post-colonial period, state involvement eased the provision of financial and technical inputs to production and marketing, at least as far as export harbours, and led to a dramatic reduction in entry barriers to the cultivation of tropical crops (Gibbon 2001b). There are, moreover, few economies of scale in planting and harvesting, especially for the most prized coffee varieties that are grown in mountainous areas, such as Colombia's Andes, Jamaica's Blue Mountain, or Kenya's Kilimanjaro. Quality control is also key – coffee berries, for instance, ripen unevenly – and individual picking is therefore widespread. Nonetheless, be they cocoa pods, coffee cherries, or tea leaves, harvesting them does not demand a skilled workforce, which is often made up of uneducated women and children, usually hired on short-term seasonal contracts. The net result of these features is that production is performed by small self-employed farmers, very often near the subsistence frontier. About 70 per cent of the world's coffee is grown by as many as 20 million smallholders on farms of less than 5 hectares.⁹⁴

Most coffee is exported as green, decorticated, and graded bean. In threshing, warehousing, roasting, transporting, and marketing, there are huge economies of scale. Buyers can purchase tropical beverages either directly at the origin or on spot markets – futures markets do of course exist but they provide hedging against risk rather than being a supply source. What is required to co-ordinate the chain is not so much proprietary know-how in process and product technology – as in producer-driven chains – or product design, advertising and marketing capabilities, and computer-based supply management systems – as in buyer-driven ones – but rather the ability “to procure continuously specific volumes and quality mixes for a number of processors [...] Entry barriers to the trading function are very high levels of working capital, accumulated market knowledge, and intangibles like reputation [...] Chain governance by international traders tends to be loose and indirect. Prescriptions on commodity forms are much looser than in retailer/merchandise-driven ones and while prescriptive grading classifications exist in most cases, these often turn out to have been constructed by larger direct producers rather than having

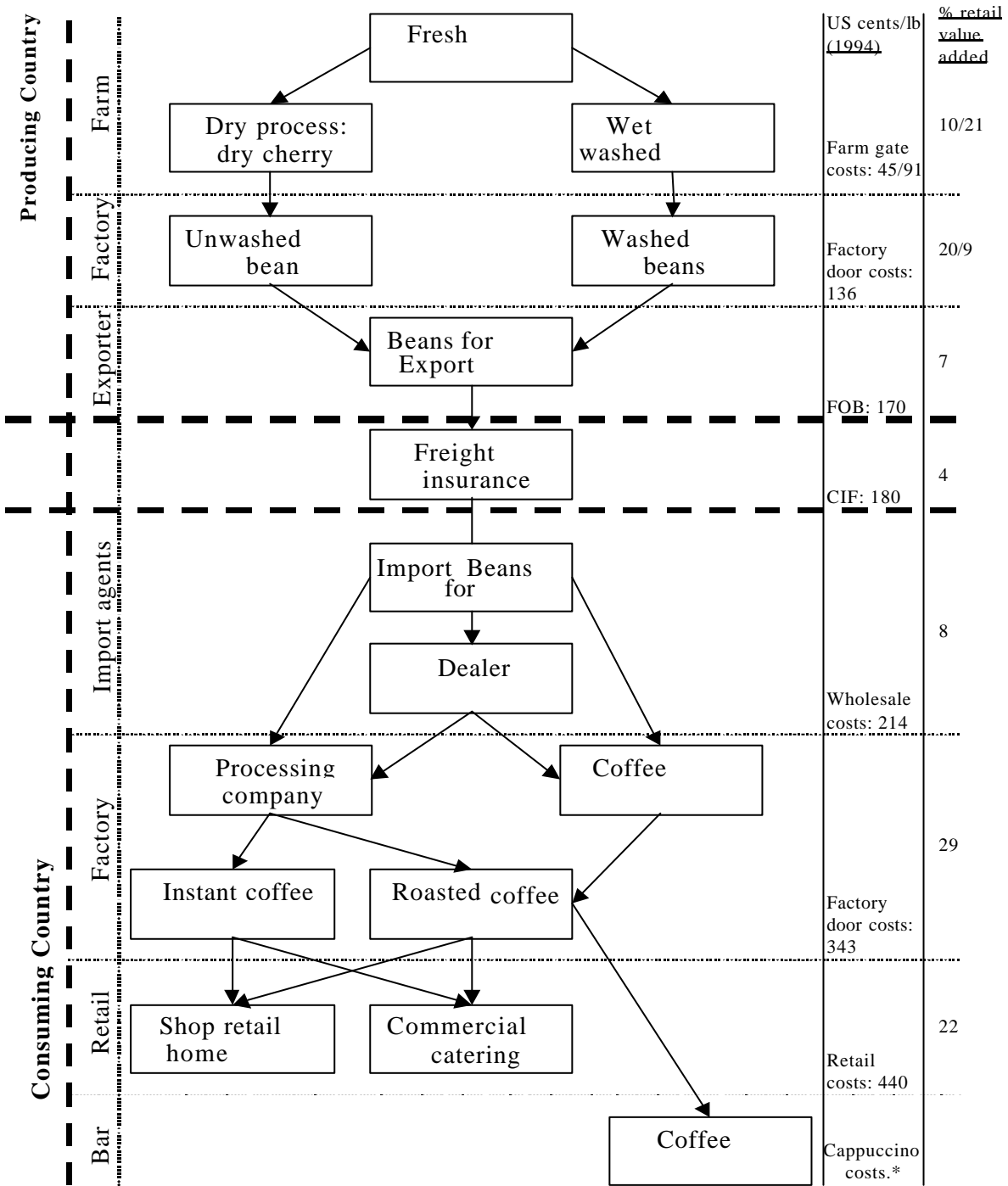
⁹³ Brazil, the world's largest coffee producer and cocoa's fifth largest, is also an important consumer of both products.

⁹⁴ “A crisis is brewing in your coffee cup”, *Financial Times*, 11 April 2001.

been imposed by traders” (Gibbon 2001a, pp. 351-2).⁹⁵ The incentives are therefore strong for concentration to rise in the trading node of the chain. In the mid-1990s five companies – Neumann, Volcafé, Cargill, Esteve, and ED&F MAN – accounted for almost 50 per cent of world coffee trading, while a third of world roasting was done by four firms – Nestlé, Philip Morris, Sara Lee, and Procter and Gamble. Cargill, Archer Daniels Midland, and Barry Callebaut dominate cocoa trading.

⁹⁵ “The major coordinating mechanisms linking suppliers with international traders were the simple and inclusive ‘quality conventions’ for the commodities in question, used to differentiate the product into various grades according to national origin and certain crude physical properties of the commodity itself” (Gibbon 2001b, p. 62).

Figure 15. The Coffee Value Chain



* Costs variable but very high. Include: overheads, advertising, other products (i.e., milk), and the 'experience' of the coffee bar. (see breakdown of the price of a cup of coffee)

Source: Kaplinsky and Fitter (2001)

Supply and demand curves are rather inelastic, at least in the short run, and international prices tend to follow a long-term “boom and bust” pattern linked to the crop cycle. In the second half of the 20th century, two separate sets of institutions – one country-specific, the other international – have linked up non-OECD producers and OECD consumers. In producing countries, post-independence governments set up marketing boards for individual commodities to provide a single trade channel, often coupled with an administrated price system to insulate producers from the vagaries of international markets. International agreements were also established to reduce the great variability of commodity prices that results from the fact that primary products have low supply and demand price elasticities. They worked (relatively) well as long as prices to farmers stood between the cost of growing the crops and the prices they fetched on world markets, but the fiscal crisis of the state in all producing countries made it impossible to fund international agreements. As could be expected, signatories also started cheating and non-ICA producers, for instance African ones in the case of coffee, increased production. A further problem was rising consumer resentment in periods of rising world prices. Spreads increased dramatically because of the asymmetric response of domestic consumer prices to movements in world prices (Morisset 1997). In all major consumer markets, the transmission of decreases in world commodity prices to domestic consumer prices have been systematically much less than for increases. This asymmetric response, which has been attributed to trade restrictions and bidding processing costs, appears rather to be largely caused by the behaviour of international trading companies.

Quantity demands for homogeneous food commodities show very flat income elasticities and per capita consumption of many agricultural products is approaching saturation levels (OECD 2001). On the other hand, the elasticities for other food attributes, such as nutrition and health, safety, convenience, and diversity, are quite high (Senauer 2001). Market developments are dominated by the growth of value-added products and highly refined/processed foods, reflecting the increasing importance that consumers give to health and lifestyle considerations. More efficient forms of delivery from farmers to consumers have resulted in a constant fall in the proportion of households’ annual expenditures going to food and, as more income becomes available for non-food spending and female labour participation rates increase, an increase in the share of food bought outside of traditional channels (Kinsey and Senauer 2001). Food marketing in industrial countries has undergone two profound changes over the last few decades that are having profound implications for agricultural producers, *a fortiori* in developing countries. First, concentration has been rising in food and tobacco processing markets and processors’ ability to obtain high margins is being eroded by the emergence of large and increasingly concentrated supermarket chains and big discounters à la WalMart specialising in large volumes and low prices. This is an important factor for coffee roasters that has significantly diminished brand loyalties, and hence margins, over the past decade (Gilbert and Ter Wengen 2000). Also noteworthy is the increasing adoption of supplier-managed inventory, which shifts power relations to the advantage of buyers. The rise in the consumption of quality (single origin, fair trade, and organic) products, often taking place out-of-home, is the second major trend of the last quarter of the 20th century as far as tropical beverages are concerned. Speciality retailers cover niches where convenience, ambience, service, or brand identity count more than price. Starbucks, for instance, is a globally recognised vertically integrated brand which purchases, roasts, and sells high quality whole bean coffee and handcrafted beverages. Eco-labelling has also expanded, partly due to a growing distrust of conventionally produced foodstuffs after a series of food scandals, environmental concerns and a public perception that organic foods may be fresher and have better taste characteristics.

A third major development has to do with the international governance setting. In the case of tropical beverages, the privatisation of marketing boards and the withering of international commodity agreements, when coupled with changes in consumers’ demand, have led to greater

integration along the entire supply chain. On the one hand, there has been increasing downstream integration and product differentiation⁹⁶ – in particular, traders have diversified into secondary processing and coffee roasters into direct retailing – while on the other traders and specialised retailers have integrated upstream, entering directly into crop production or tightening co-ordination with large-scale estates to ensure adherence to quality standards⁹⁷.

Despite far from negligible trade barriers, in recent years the production of agricultural products, fresh vegetables *in primis*, has been increasingly delocalised to non-OECD countries – African ones in the case of Europe, Latin American ones, including Mexico, for North America – with growing interaction between producers and exporters, on the one hand, and importers and retailers, on the other. Food exports from developing countries increased at a higher rate during the decade, or by 5.6 per cent per year on average, than those of developed countries (UNCTAD 2001b). The fastest food export growth occurred in the African region, almost doubling in value between 1990 and 1999. The control of the chain has been through demanding requirements in terms of cost, quality, safety, delivery, product variety, and innovation that have set the entry barriers for farmers, indeed bringing about a concentration of market structure in Southern trading partners (Dolan and Humphrey 2000). In this context, the last two decades have seen a spectacular rise in the resort to contract farming, i.e., the vertical coordination between growers of an agricultural product and buyers or processors of that product. Contracts may provide production inputs, credit, and extension services to the grower in return for market obligations on such considerations as the methods of production, the quantity that must be delivered, and the quality of the product.

Examples from agribusiness in other resource-dependent economies show that declining terms of trade can be fought through strategies of upgrading and differentiation that permit producers to appropriate a larger share of quality premia and rents. In the case of tropical beverages, these strategies can take various forms, including adding value in producing countries, facilitating producer-consumer communication (including through the use of the internet, analysed at greater length in the following section), and promoting fair trade and organic consumption (Ponte 2001c, p. 4416). The Australian wine industry is a very successful example in this sense.⁹⁸ In the case of poorer developing countries, however, there are several constraints to trade development. On the one hand, “contracting with smaller growers involves high transactions costs and, under most circumstances, agro-industrial firms prefer to contract with larger growers. Thus, contract-farming schemes tend to reinforce existing patterns of income stratification” (Warning and Soo Hoo 2000, p. 21). On the other hand, after the end of international commodity regimes and the weakening of public-sector institutions in production, marketing, and export, grower organisations and cooperatives have failed to substitute governments in such functions. In Jamaica, one of the few countries that still maintains a centralised system (the Coffee Industry Board, which is responsible

⁹⁶ In the case of cocoa, for instance, chocolate manufacturers have specialised in branding and commercialisation, “contracting out to cocoa grinders on a just-in-time basis the supply of dedicated intermediate chocolate products” (Gibbon 2001b, p. 65). It is not accidental that cocoa international trading is mostly done in undifferentiated form.

⁹⁷ As Kherallah and Kirsten (2001) observe, “the need for increased co-ordination can also be attributed to the failure of traditional (spot) agricultural markets to deal with this new scenario. Usually, bulk commodities flow through commodity markets to food processors that in turn market standardized products to consumers [who] now demand tailored foods and to ensure that they get them, food companies want more specific farm products. In addition, food safety concerns have brought increased scrutiny and regulation in developed countries. As a result processors/marketers have avoided traditional spot markets and have engaged in more direct market channels such as market and production contracts, full ownership, or vertical integration (pp. 20-1).

⁹⁸ Interestingly, “the degree of variety of coffee and the variation in taste is at least as great as that of wine” (Kaplinsky and Fitter 2001, p. 71). Starbucks sells 24 different varieties, including 10 single origin coffees from Colombia, Ethiopia, Guatemala, Kenya, Indonesia, and Papua New Guinea.

for exporting the high-quality Blue Mountain variety), big producers' calls for liberalisation are resisted, since laxity with quality control risks harming the reputation of the product.⁹⁹ Information incompleteness, moral hazard, enforcement problems, and missing markets are also key institutional features of agriculture worldwide (Cook and Chaddad 2000). In a particularly telling example of lack of information, "while [coffee] price is broadcast daily on Ethiopian radio, it is broadcast only in the national Amharic language, which [many farmers do] not speak. Even growers who speak Amharic are unlikely to know the price. Only about 2 per cent of coffee growers are estimated to have radios".¹⁰⁰

Since the 1970s, a variety of private and public supported electronic exchange mechanisms have emerged both in the United States – in particular TELCOM for cotton and the Egg Clearinghouse – and in Europe, but they generally failed to achieve a significant degree of market penetration (Wheatley *et al.* 2001). The development of a open architecture system with distributed computing features has opened the way for the establishment of unified electronic platforms which reach beyond business borders, link enterprises in virtual co-operations as well as along production chains and provide information, communication and transaction support for both, business and market management. In the United States, it is estimated that by 2000 one in 25 farms had already bought or sold agricultural products on the internet and that ecommerce accounted for 5 per cent of all sales (Mueller 2000). Some of the earliest farmer-targeted e-commerce Web sites in OECD countries sites functioned like electronic brochures ("content providers"), but they soon evolved into virtual "agribusiness-to-grower" catalogues where farmers and other customers could order pre- and post-harvest supplies and other goods. Many sites now aimed at OECD farmers offer customised soil and market data, weather forecasts, farm and field maps, cropping recommendations, and storage and sales tracking systems. "Chat" rooms and user fora are increasingly serving as high-tech substitutes for the Old Economy's rural lunch counter.

Despite the common cry by producers of tropical beverages and other so-called "soft" commodities that trading exchanges are exploitative, the truth is that profit margins in such markets are very thin. The transition of major exchanges such as London's LIFFE to on-screen trading has cut margins, as brokers still earn a fee for providing the screens, but not as much as they would from execution. In recent months the pressure to reduce costs and increase efficiency has led to the closing of numerous brokerage business by global trading houses, in particular in tropical beverages.¹⁰¹ In view of the saturated market and falling prices, international organisations and donors have urged producers to focus on new marketing initiatives that emphasise quality as a product advantage. In 1997 the International Trade Centre, a joint UNCTAD-WTO initiative, launched the three-year Gourmet Coffee Project, with the participation of Brazil, Burundi, Ethiopia, Papua New Guinea and Uganda. The project tested a range of activities from production methods to marketing tools. The objective was to try new methods of adding value to green coffee, enabling coffee producers to generate premiums. The internet auction of Brazilian coffees was one of the many activities of the project. Selling coffee via an internet auction was expected to foster the spirit of competition among growers and to by-pass the existing distribution system and create a closer link between growers and roasters, who could get access to excellent coffees otherwise difficult to find. In October 1999, 315 coffees from different regions in Brazil participated in the "Best of Brazil" coffee quality contest. In the final round with 24 coffees, a group of internationally recognised coffee experts, so-called "cuppers", selected ten

⁹⁹ See "Blue Mountain coffee at its peak", *Financial Times*, 18 October 2001.

¹⁰⁰ See "Times turn hard for Ethiopia's small-scale coffee growers", *Financial Times*, 30 March 2001.

¹⁰¹ Even before entering in its well-known and terminal difficulties, Enron closed its London-based broker (Rudolf Wolff). Also in 2001, Swiss-based André & Cie SA sold its cocoa trading, warehousing, packaging, and distribution operations to Noble Group.

coffees to be offered at the auction. A total of 900 bags of 60 kg each were available for the auction. A Brazilian exporter was appointed to represent all ten farms. The auction was announced on a web site well-known within the coffee trade, that of the Specialty Coffee Association of America (SCAA). SCAA's staff and their webmaster helped prepare the live web-site that was to be used for the auction. Twenty three applicants qualified as bidders. They received samples of all the coffees, detailed instructions on the event and a password for on-line participation. In the days up to the auction, the bidders were given the opportunity to participate in a trial bidding just to get familiar with the system – sitting at their screens in the US, Brazil, Europe or Japan. The auction started on 15 December 1999 in the morning (in the US) and lasted for 48 hours. The ten coffees were introduced one by one, every five minutes. The auction also closed one by one every five minutes, 48 hours later. To no surprise, the real “fight” for each of the coffees took place during the last hour of the auction. The auction coffees were sold at an average price of US\$ 1.73 per lb. at a point in time where the New York C-price was approximately US\$ 1.00 per lb. Two coffees were sold at prices above US\$ 2.00 per lb. The second internet auction organised by the Brazilian Specialty Coffee Association and sister bodies in Europe and the United States took place in December 2001. Farmers originally submitted 477 samples to a panel of local experts. They were then narrowed down to 18 by an international panel of 16 tasters. Anacafé also designed a pilot programme that led to the selection of Guatemala's 15 best coffee, which in June 2001 was offered at an internet auction that achieved record prices. Beans from the Los Nubes farm fetched US\$ 11 a pound – a record for a coffee auction – and the average price was US\$ 3.94 – a far cry above the New York ones.¹⁰²

To make a profit with coffee, one cannot deal with small lots; a certain volume is necessary. This challenge becomes doubly difficult when looking for high-quality, gourmet coffee. In the case of this coffee auction, the lot size of the coffees posed a problem from the beginning. Coffees are typically sold by the container, which is 250-300 bags. The lots were on average just below 100 bags. This meant that an importer would either have to piggyback his lot with another Brazilian coffee or would have to pay the shipping on less than a container. Several importers decided not to participate for this very reason. Internet auctions in coffee are for exemplary quality only at the moment and that sometimes comes in very small packages. It is obvious that future auctions will have to address this problem and find cooperative shipping solutions that will be fair to companies of all sizes. The best coffee should not be overlooked simply because the logistics to get it to port are difficult. In the coffee auction, all parties took financial risks, in particular the farmers. Without putting pressure on the farmers and calling them every day, there would not have been enough coffee for an auction of this kind. The project was asking farmers to take a chance, to hold back selling their coffees in the hope that it would fetch better prices. Shortly before the auction, the farmers sold the coffee to the nominated exporter and a formula to split the premium was worked out. The opening prices were agreed upon and fixed two weeks before the auction. This was not an easy task, as the benchmark prices on the world market were heading up at that point in time.

Auctions of this kind make it possible to trace rare quality coffees directly among farmers (by conducting a competition) and inform roasters directly. In reality, however, the Brazilian auction could not have happened had the present distribution system not been solidly in place – and left in place for the transactions! Farmers and roasters are seldom equipped to handle intermediary export functions such as transportation, letters of credit, payments, documentation, shipping and so forth. For this reason, as part of the coffee auction process, a well-respected exporter was nominated to handle all ten coffees – with risks and potential gains from the transactions. Thus the

¹⁰² See “Guatemala takes drastic steps to save coffee trade”, *Financial Times*, 17 July 2001.

idea that coffee could be sold from a small farmer, directly to a small roaster, was not tested. Skipping the traditional export-import portion of the chain would not have been possible. So in the case of the auction, the coffee moved as it does for ordinary sales: Farmer → Exporter → Importer → Roaster.

The ultimate impact of e-commerce on the distribution of value added along the supply chain of tropical beverages will depend on the possibility of reducing the cost of operating through the market, increasing its efficiency, and eliminating the friction caused by intermediaries. Given the importance of culture, corporate reputation and relationships with customers, and the cost of establishing them, the internet does not signal the end of relationships nor level the playing field on which powerful buyers and traditionally weak sellers face off (O’Keeffe 2001).

Travel and Tourism

According to estimates produced by the World Tourism Organization, the travel and tourism (T&T) industry has contributed roughly US\$ 1.4 trillion to the world economy in 2001, or 4.2 per cent of gross world product. The biggest boost to the T&T industry over the past few decades has been the declining cost of air travel, which has been fuelled by a combination of airline industry deregulation, technological improvements in commercial aircraft, and improved “yield management” to ensure better capacity utilisation (the last greatly facilitated by ICT). On the demand side, rising prosperity across the world combined with expanded ranks of retirees – mostly though not only in OECD countries – have been major drivers.

The focus here is on the tourism part of the T&T, though reference is also made to the travel component as the two are closely intertwined. A useful way of decomposing the T&T industry is into retailers, or intermediaries (travel agents, whether traditional or online) and suppliers (airlines, hotels, car rental agencies, etc.). Also crucial are the technology-oriented (software, systems integration) firms that provide the platforms for automated (increasingly web-based) reservation systems. The retailer end of industry has traditionally been highly fragmented, with many small agents; so have portions of the supplier segment (e.g., hotels, restaurants, entertainers, handicraft and other merchandise vendors, local tour organisers, etc.). The age of “mass tourism” opened up by cheap air travel has caused major restructuring all along the supply chain. As a result of consolidation, large tour agencies now dominate the major sender markets, offering end-to-end integrated tour packages. Given the economic importance to airlines of filling seating capacity, these large tour operators can negotiate preferential tariffs. The hotel business has also seen extensive consolidation in the past decade, offering tourists comparable standards of accommodation in as many destinations as possible. While comprehensiveness (end-to-end, soup-to-nuts tour management) has become the hallmark of the mass tourism industry, it has fallen short in the provision of flexibility. Packages are still packages, even if there may be more of them from which to choose than ever before. The internet may change that.

Information and communications technology has long played a central role in the organisation of the T&T industry. Almost by definition, the tourism business depends on efficient long-distance communication. Along with telephones and fax machines, mainframe-based reservations systems of the global distribution systems (GDS) - Sabre, Amadeus, Galileo and Worldspan – remain the workhorses of the industry. Alternative, web-based channels of distribution such as Worldres are fast encroaching in leading markets like the United States and Europe, forcing the entrenched players in the airline, travel agent, car rental, and hotel businesses to adapt. One of the key advantages of web-based systems, from a B2C perspective, is to increase the flexibility of product design. Full customisation may at last be affordable. As UNCTAD (2001a) explains, “a tourist

may now book online any combination of tourism services with/through any combination of producers or inter/info-mediaries” (p. 9). According to the World Tourism Organisation, an estimated 15 per cent of all tourism sales are currently purchased over the internet. As a share of total online e-commerce, T&T is much larger: in the United States, for example, at its 2001 peak online travel is estimated to have accounted for more than 40 per cent of all online B2C sales (Table12).

Table 12. Online Consumer Sales at US Sites (US\$ m; excluding Auctions)

	1Q01	2Q01	3Q01	4Q01	FY01
Total	11 482	12 477	13 300	15 807	53 066
Non-Travel	7 755	7 585	7 565	10 804	33 709
Travel	3 727	4 892	5 735	5 003	19 357

Source: Comscore.com

The new travel info-mediaries are posing a significant challenge to the traditional travel and tourism industry. Travelocity, Expedia, Priceline, lastminute.com, ebookers, and Dégriftour have modelled themselves as the travel brands of the future, nudging the airline and hotel industries to respond with their own intermediary brands such as airline-backed Orbitz (U.S.) and Opodo (Europe), and World.Net, which powers the online content and booking technology for various international tourism bodies.¹⁰³

Dedicated online travel agencies – including budget airlines that operate solely via the web and online booking services like Expedia.com – are encroaching fast on the business of the traditional travel suppliers (airlines, hotels and car rental companies). In 2001 the former captured 45 per cent of total online bookings, a 22 per cent increase over the previous year, while the latter’s share fell by 25 per cent.¹⁰⁴ While, in the U.S. market, online bookings are still under 10 per cent of all leisure travel bookings, they amounted to US\$ 14.2bn in 2001. Projections are for an online leisure travel market of US\$ 25-35bn by 2003¹⁰⁵. There has been significant consolidation within the online travel industry, with the top five vendors now accounting for two-thirds of the market. They are using their market power to negotiate better deals from T&T service suppliers. Also, whereas most started out principally selling low-cost airline tickets, they have diversified into other products, with Priceline now earning more revenue from selling hotel rooms and car rentals than airline seats.

Acquisitions have been a key element of the airline industry’s strategic response to this challenge. For instance, GDS group member Sabre now owns 70 per cent of Travelocity and intends to acquire the rest, while Amadeus has acquired Boston-based eTravel. Meanwhile, Opodo is owned by the several European airlines that are also served by Amadeus, causing the European Commission to stipulate at the time of Opodo’s establishment that Amadeus charge Opodo market rates for access to its central reservation system services and provide access thereto on a non-exclusive basis. Many airlines have, however, given a less-than-enthusiastic embrace to web-based reservations, held back to varying degrees by legacy systems and problems of channel

¹⁰³ At the forefront of World.Net’s software developments is Travel.World.Net, a product that facilitates business-to-business-to-consumer communication between suppliers, intermediaries and end-users of travel and tourism products through the operation of internet-based technologies. The service employs technology developed by World.Net in Australia and offers the possibility of a significant increase in travel & tourism supplier access to local and international markets.

¹⁰⁴ According to Forrester Research, see *Financial Times*, 13 March 2002, Supplement.

¹⁰⁵ Source: http://www.emarketer.com/estatnews/estats/e-commerce_b2c/20020314_pho.html.

conflict. In particular, they have been reluctant to alienate the travel agents on which they depend so heavily.

Travel agents have had to transform themselves as well to meet the growing online competition, which has completely undermined traditional commission and transaction fee structures. The GDS groups and the new travel technology vendors are vying to equip travel agents with online tools. Even if between 80 and 90 per cent of an airline's seat inventory is still sold through traditional travel agents, the possibility for clients to compare prices with those offered via the web exerts considerable cost-cutting pressure. Moreover, under pressure from online agents, some airlines are beginning to shift business from traditional agents to their own websites: e.g., British Airways is planning to make its cheapest fares available only on its website. A key feature of a web-based system is its capacity for more effective customer profiling and responsiveness to revealed customer preferences. The operator of a full-service travel website can in principle assemble service bundles from a vast array of service providers, tailoring bundles to individual customer requirements. In short, the attraction of a customer-driven one-stop-travel-shop is likely to force even wider collaboration and web-based integration in the B2B realm than currently exists.

The major travel service providers just described are largely OECD based. The GDSs support developing country airline, hotel and car rental reservations as well, but the leading players in the T&T industry come mostly from the sending countries. They have the most immediate access to the customer base. An important if limited exception is the hotel business, where highly dynamic developing country enterprises have emerged as important regional players (e.g., Mandarin, Oberoi, Shangri-La, and Taj in Asia). Middle-income developing countries and some rapidly growing low-income countries like China and India are now producing growing numbers of international tourists, but so far their numbers are relatively small. So, from a developing country perspective, the principal interface with the global T&T industry in the near term will be one of destination management and marketing. The question then is how industry restructuring under technological innovation will affect the strategies of developing country destination management organisations (DMOs) like tourism promotion boards and tourism authorities, as well as the suppliers themselves – e.g., local hotels and chains, car rental agencies, airlines.

In principle, the relatively low costs of going live with a website make it possible for a small T&T operator in a developing country to establish a global market presence. This does not, however, eliminate all barriers to entry. First, to have a fully functional online reservation system requires a somewhat larger investment – e.g., in secure payments software at a minimum. Overcoming reputational barriers can also add to costs, e.g., through subscription to an online “trust sign” or other quality assurance scheme¹⁰⁶. Participation in an industry association sponsored website may be the lowest cost solution for small operators, in that secure payments software could be shared among multiple members and the association affiliation might also yield reputational benefits. Probably the most effective means of establishing a global presence would be to become integrated into the web-based reservation systems of the major online agents described above. A search on Travelocity for a hotel in Hanoi yields only 9 properties, all subsidiaries of foreign hotel chains and all serving the middle to high end of the market (lowest price: US\$ 45/night). A search on lastminute.com yields only one, also an international chain (price: US\$ 90/night). Evidently, local competitors have yet to penetrate this market, though admittedly few have the capacity to

¹⁰⁶ Another possibility would be membership in a local “better business bureau” that could be checked online for any customer reports/complaints filed. Such a solution is imperfect, however, insofar as the BBB may itself suffer from a trust deficit on the part of foreign customers with little or no understanding of how reliable and complete the information provided is.

meet the standards of service that would appeal to the average rich-country tourist. In other markets, where the local hotel industry is better developed, travel portal representation is not so heavily dominated by foreign chains (see Box).

Apart from getting online themselves, travel suppliers (notably of hotel properties) increasingly must ensure that their customers can stay connected. While some destinations are purely leisure destinations, others draw a combination of business and leisure travel. Whereas a beach resort may not need to have state-of-the-art onsite IT equipment, a business-oriented hotel in a major city must. Thus, depending on the market served, hotel operators may have to offer ready internet accessibility to at least a fraction of guests, and on-call computer technicians may even become an essential competitive feature (e.g., to assist guests in dialling up internet connections from their laptop PCs).

The average package tourist (including the greying baby-boomers) is probably looking as much for familiarity¹⁰⁷ as for novelty and “exoticism” in choosing a destination and accommodations. Yet, there is a not insignificant and perhaps growing proportion of tourists – e.g., second-generation baby boomers still in the “backpack” age bracket – who favour “authenticity of experience” and “cultural proximity”. It is to these tourists that community-based tourism enterprises in developing countries are likely to have the greatest appeal and the internet may prove an effective advertising medium for such enterprises and communities to reach this prospective client base.

In summary, the internet can be a valuable means of advertising the attractions of hitherto undiscovered tourist destinations and even of arranging the logistics of getting and staying there. The main competitive disruptions in the T&T industry, however, have been wrought by the emergence of powerful, flexible online travel portals as an alternative to traditional distribution channels. Rents are being redistributed to some extent (away from traditional travel agents) and competed away with the decreased reliance on offline intermediaries. To the extent that T&T are price elastic, this could have the beneficial effect of boosting volumes across the board, including for developing country destinations. It seems unlikely in the foreseeable future that developing country DMOs and intermediaries would be in a position to sell in volume direct to customers in OECD markets, bypassing traditional source-country travel agents and online info-mediaries. To the extent that they are able to penetrate the info-mediary market, the cost could be having to offer discounted prices, though this could well pay off in increased volumes and better inventory management (e.g., higher hotel occupancy and fleet utilisation rates).

Trust remains a strong competitive advantage in this business, especially since using the product may expose the consumer to a variety of risks not commonly associated with many other products. At the same time, T&T is preeminently an experience good, with the reputation of a particular destination and of local T&T service providers built up through repeated transmission of experience (often by word-of-mouth but also through trusted brand travel guides, most of which are now available in some form over the internet). Thus, assuming an obscure T&T service provider – e.g., a good value-for-money or unique hotel or restaurant – manages to get discovered – whether by accident or through effective local publicity – its reputation can spread more quickly and widely than ever before via the internet.

¹⁰⁷ See Wharton (2001). In the review of this book, *The Economist* describes the attraction of the Hilton chain of hotels as follows: “They had air-conditioning, shopping arcades where there was no haggling, and restaurants serving American food. Glass-walled lobbies opened on to historic cityscapes that allowed guests an anxiety-free feeling of participation in a foreign world” (29 November 2001).

IV.d. Main Findings and Policy Implications

The recent evolution of the global production and demand structure, prices, and the distribution of value added in a number of sectors that play a crucial role for the well-being of many emerging and developing economies shows that wider and cheaper access to faster and better-performing means for transmitting and processing information – coupled with the trend fall in trade tariffs and in physical transportation costs – have contributed to fragmenting production chains and led to outsourcing of specific processes to developing countries. Despite differences in structure and governance mechanisms, in all the industries analysed ICT and internet are affecting the forms of production and exchange, the nature of corporate behaviour, and the terms of competition (Table 13).

Nonetheless, it is too early to say whether the distribution of costs and profits is changing in a way that is unquestionably supportive of the development process. The relocation of high value-added activities to non-OECD countries is constrained by the differing amenability of processes to outsourcing, in particular remote sourcing from distant locations. The Indian example proves that, provided some basic requirements are met – such as a relatively abundant and well-educated workforce and reliable telecommunications and electricity supplies – the transmission in digital form of codifiable and storable information from remote locations via computer networks is straightforward. Remote outsourcing becomes feasible, although questions remain about its long-term development impact. The situation is different for production-supporting activities that make intensive use of information that requires complex, repeated face-to-face interaction for effective communication. It is not only functions such as R&D that are far from being routinised. The ability to manage efficiently a global supply chain requires skills whose sophistication is directly proportional to the complexity of those chains. Some companies have become specialists in supply chain coordination – recall the case of Li & Fung in textiles and clothing. It is not obvious that the internet has rendered obsolete the need for such a coordinating agent – at least not in most complex supply chains – though it would appear to render easier the separation of the coordination function from other functions constituting a given chain.

Table 13. Synthesis of the Case Studies

	Software development	Clothing	Cut flowers	Coffee	Travel and tourism
Industry characteristics					
<i>Intensity of North-South trade</i>	Medium	Medium-high	High (OECD countries such as Netherlands and Italy remain important players)	Very high (no coffee grown outside of the Tropics)	Medium-high
<i>Governance structure</i>	Buyer-driven	Buyer-driven (retailers)	Buyer-driven (retailers)	Buyer-driven (traders)	Infomediaries-driven
<i>Degree of fragmentation</i>	High in customised segment of market	High, as retailers increasingly focus on design and marketing, subcontracting production to specialized suppliers	High	High	High
<i>Supply trends</i>		Horizontal differentiation and vertical fragmentation (e.g. The Gap)	Horizontal differentiation and vertical integration (e.g. British supermarkets)	Horizontal differentiation and vertical integration (e.g. Starbucks)	
Impact of ICT					
<i>Degree of digitalization</i>	High	Low	Low	Low	Medium
<i>Use in supply coordination</i>	High	High	Medium-high	Medium-high	
<i>Use of/in auctions</i>	Low	Low	High	High	
Impact on developing countries					
<i>Relocation</i>	Medium	High			High
<i>Rents transfer</i>	Medium	Low	Low	Low	Low
<i>Emergence of “lead firms”</i>	Low	Low	Low	Low	Low

Source: Text

In global supply chains involving agricultural and other commodities, although geography is always likely to be a dominant locational determinant, different capabilities in putting technology to effective use can generate some differentiation, giving one country or region a comparative advantage over others with comparable natural endowments (climate, topography, soil type, etc.). It is in the stages from production to final consumer that the greatest potential for ICT application exists, and to varying degrees the internet is already being used to coordinate distribution and to auction products to wholesalers and/or retailers in the major importing countries. The effect of these technologies on rent capture by developing country producers and traders is still hard to discern clearly. General trends in industry structure, e.g., in the coffee sector, would appear to be quite unfavourable to developing country producers/exporters, but other factors like the entry of major new primary producers would appear to dominate any contribution of technology *per se*. Indeed, the experience of the internet coffee auctions conducted so far points to the prospect for producers of quality beans to reap a higher premium than was possible in a pre-internet trading environment. In the case of cut flowers, the experience to date of internet's advantages for developing country producers has been less sanguine.

In the travel industry, informational rents are being redistributed away from traditional travel agents to the advantage of emerging online travel portals. For the moment, bypassing traditional source-country travel agents and online info-mediaries to sell in volume directly to tourism customers in OECD markets seems infeasible for most developing country T&T suppliers. If anything, the effect of enlarging the range of destinations on which information is available to prospective travellers may be to increase cost pressures on them. Directly proposing customised travel packages to online consumers in rich countries is unlikely to become a huge market: the very wealthy can afford and will probably continue to rely on "boutique" travel agents to arrange their T&T packages, while those interested in saving money by shopping on the internet for exotic destinations are unlikely to be big spenders. If, however, a heretofore "undiscovered" destination manages to market itself effectively on the internet, the returns to the local economy of a surge in tourism could be substantial, if possibly short-lived. Beyond the tried-and-true repeat destinations (that have uniquely attractive natural and/or cultural attributes and that have effective means of limiting the adverse effects of mass tourism), the tourism business tends to be rather fickle – with last year the year to "visit Viet Nam", this year the one to "visit Cuba", and next year ... well, anyone's guess.

Apart from those countries enjoying sizeable endowments of highly educated workers, what does the emergence of internet-based business and commerce imply for the rest of the developing world? The key point emerging from the case studies is that new technologies do not negate pre-existing sources of comparative and competitive advantage. At both the country and the firm level, access to technology may not be enough if capacity to use it productively demands a certain level of education and skills. Infrastructural bottlenecks in telecommunications, transport, and logistics also remain formidable in many developing countries. Furthermore, underdevelopment is primarily a function of the lack of functioning institutions and non-OECD countries are very likely to fall behind in solving those governance issues – pertaining for instance to consumer protection, security of transactions, privacy of records, and intellectual property – that are crucial to achieve e-business readiness (Goldstein and O'Connor 2000).

In the meantime, for those countries whose factor endowments consist primarily of natural resources and/or unskilled labour, the impact of the Internet is likely to be felt first and

foremost through its use in the management and coordination of global supply chains and in commodity market transactions. Even among non-OECD countries, there are wide variations in ICT performance that are not fully explained by per capita incomes and economic structure. Cross-national differences have to do with the legal system, the stability of institutional and political conditions, and levels of government distortions (Guillén and Suárez 2001). Simple claims about the links between equity, well-being and the unhindered development of ICTs are not correct, and may in some cases be dangerously wrong. When new technologies are introduced into a given environment, the diffusion patterns will tend to follow the patterns of the distribution of power, education, and wealth already prevalent in that society. In other words, policies and technologies are embedded in factors unique to each country and the relation between ICT on the one hand, and social inequality on the other, is highly contingent (Rodríguez and Wilson 2000).

The case material would tend to confirm at the sector level the economy-wide conclusion from econometric studies that declining transport and transaction costs appear to have played a minor role to date in expanding trade prospects of developing countries. Economic growth itself and evolving trade barriers have been more important. The significance of the trade regime is nowhere clearer than in the case of clothing, where patterns of trade have been strongly influenced by preferential trade arrangements between specific OECD countries and either individual developing countries or groupings. Despite its low labour costs, it is improbable that Bangladesh would have emerged as a leading clothing exporter had it not been for the MFA. That having been said, information-technology-induced organisational innovations in the OECD-based clothing retailing sector have forced changes all along the supply chain, favouring – between two locations with comparable production costs – the one closer to the market.

In conclusion, the internet is becoming a more important – eventually essential – tool for entrepreneurs in developing countries to link into global supply chains (whether or not they are already incumbents). The effect on their individual and collective market power remains ambiguous, and it is certain to be conditioned by various characteristics of the industry concerned, notably, whether it is producing homogeneous or differentiated products. In those many sectors where transaction and coordination costs are a small portion of total costs, the effect of the internet on cost level and structure is apt to be slight. In sectors where advertising and marketing costs loom large, its effects are potentially more significant, though there is scant evidence to date that internet advertising is providing a low-cost substitute for traditional media advertising. The internet does, however, offer the possibility for developing country entrepreneurs in many sectors to establish a direct relationship with prospective rich-country customers, but the advantages of doing so depend again on the nature of the industry – e.g., whether the product can be digitised and delivered electronically or must be physically shipped, in which case the individual entrepreneur remains hostage to the state of the country's infrastructure – roads, ports, logistics – to a greater extent than a “virtual” product supplier that requires only reliable, low-cost electricity and telecommunications.

The internet and ICT are often referred to as advanced technologies, the presumption being that only people with advanced education and high levels of skill can make effective use of them. This does not seem plausible, since they are designed to serve a mass market consisting mostly of people with only moderate levels of education. While it is true that average educational attainment in the OECD countries where the technologies are developed is still several years higher than in most developing countries, it is also the case that the highly skilled engineers who design digital products do so with a view to making each new generation easier to use than the last. Thus, beyond basic literacy, it is not obvious that

formally acquired skills are crucial to effective use of the technologies. The fact that young school children are often more adept at using computers and the internet than their doctorate-toting parents should give pause. In this there is some cause for optimism: the technology itself does not appear to be inherently skill-biased, so modest human capital endowments should not exclude a developing country from enjoying its potential benefits. On the down side, neither is the technology as powerful a leveller as some had originally believed if not hoped. While in many applications using the technologies may not pose insurmountable barriers, apart from the familiar one of affordability of infrastructure and capital equipment, producing the ideas that underlie the major innovations that make up ICT and the internet is what generates the truly big technological rents; likewise the use of the technologies to support other knowledge production. Moreover, even with widespread internet access and use, existing market structures and sources of competitive advantage cannot so easily be overturned. There may be welfare changes at the margin, some benefiting developing country entrepreneurs, probably many more benefiting online customers, but if a revolution is in the offing it is at best a gradual one, on the model of previous “general purpose technologies” whose economic and social impacts have unfolded over decades rather than years.

Appendix 1

The impact of this new emphasis on quality can be simply formalized using a O-ring production function à la Kremer and Maskin. Assume that a final good is a composite of an intermediary input and the production of the final plant. Let $0 < q_s < 1$ be the average quality of the input and q_f denote the quality of the organisation of the final producer. The value of the final production is equal to its average quality:

$$y = q_s q_f^m, \quad (1)$$

where m is the relative weight of the quality of the last production step in the quality of the final output. Because, the design, the package or the advertising are crucial to sell a good, we will assume that the quality of the final producer is more essential i.e. $m > 1$. Without loss of generality, we assume that $m = 2$.

A firm can be a low-quality one q_1 or high-quality one $q_1 < q_2$. The number of low-quality firm is larger than the number of high-quality ones. A firm j can choose to produce the input or the final good. It should be matched with a second firm k in order to produce the complete good. When a match between two firms is realized, they will split the value of the sells according to their outside options i.e. their other potential match. Four states are possible for a high quality firm:

- to be the final producer and 1) to work with a high-quality supplier or 2) to use low-quality inputs
- to be a supplier and 3) to work with a high-quality final producer or 4) to supply a low-quality final producer

Because $m > 1$, the last state 4) is always sub-optimal. Therefore, three types of production are possible:

$$y_{11} = q_1 \times q_1^2 = q_1^3,$$

$$y_{12} = q_1 \times q_2^2,$$

and

$$y_{22} = q_2 \times q_2^2 = q_2^3.$$

The couples of firms are thus homogenous (y_{11} and y_{22}) or mixed (y_{12}). At the equilibrium, the high quality firms (resp. the low-quality ones) will receive the same value. Let us take two low-quality firms and two high-quality firms, their optimal match is either homogenous or mixed according to the global value of the production; the match is mixed if and only if

$$2q_1 q_2^2 > q_1^3 + q_2^3, \quad (2)$$

i.e.

$$q_2 < \frac{1 + \sqrt{5}}{2} q_1. \quad (3)$$

Assume that it is the case. In that initial framework, the high-quality firm are final producers while the low-quality ones are suppliers. Now, let us introduce ICT. Their development implies that the customer is more sensible to the quality. The value of the final good becomes:

$$y' = (q_s q_f^a)^{\alpha}, \quad (4)$$

where $\mathbf{a} > 1$ represents the preference of the customers for quality. The parameter \mathbf{a} is increasing in the extend of ICT (Internet...). The necessary and sufficient condition for the preservation of the mixed equilibrium becomes:

$$q_2 < \left(\frac{1 + \sqrt{5}}{2}\right)^{\frac{1}{\mathbf{a}}} q_1. \quad (5)$$

Now, $\left(\frac{1 + \sqrt{5}}{2}\right)^{\frac{1}{\mathbf{a}}}$ is increasing in \mathbf{a} . Therefore, if \mathbf{a} is large enough, then the organization of the supplier-final-producer chain will change. The equilibrium becomes homogenous: there is a segregation by quality. The high-quality firms will be matched together to produce very-high-quality final goods while the low-quality firms will produce very-low-quality goods. Because of this segregation the difference of revenue between low-quality and high-quality firms should widen. Therefore, if the level of quality can be endogenous for the firm (costly investments, training...), then some low-quality firms should change their organization to reach the high-quality standard.

If this high-quality standard is interpreted as a quality certification (e.g. ISO certification), our simple model predicts that the emergence of the e-world should drive to the development of high-quality value-chain and the increase in the number of certified firms. The empirical evidences suggests that these mechanisms hold.

Appendix: Econometric Method

Estimating the pattern of Net use conditional on whether establishments is ISO certified raises serious selection problems. A “naive” estimation of the impact of ISO certification *ISO* on use of web-based technology indicator *Y* would consist in comparing the rates of technology use for establishments which are ISO certified ($p = 1$) and businesses that are not ($p = 0$). However, differences in technology can result from particular characteristics of companies. Standard methods allowing to correct for such heterogeneity biases have been developed by epidemiologists and labor economists (see Heckman et al., 1999). In this contribution, we implement the so-called Rubin’s method of “causal estimation”. This approach has been used and improved recently by Crépon and Iung (1999) to estimate the impact of innovation on establishments’ performance and Broadty et al. (2001) to estimate the impact of labor policy on employment.

The impact of implementing an ISO norm can be expressed in Rubin’s (1974) framework as follows. The use of web technology is described by two probabilities (y_0, y_1) conditional on the realization of the variable P (be or not ISO). Establishment i is thus characterized by the unobservable couple (y_{0i}, y_{1i}) where y_{1i} is the qualitative variable of using the web if the company is certified ($p_i = 1$) and y_{0i} is the variable if $p_i = 0$. We only observe y_i :

$$y_i = p_i \times y_{1i} + (1 - p_i) \times y_{0i} \quad (1)$$

The “causal effect” c_i of P on technology is defined as:

$$c_i = y_{1i} - y_{0i} \quad (2)$$

This parameter is not identifiable because we do not observe simultaneously a realization of y_{0i} and a realization of y_{1i} . With these notations, the “naive” estimator of c is:

$$\tilde{c} = E(y_i|p_i = 1) - E(y_i|p_i = 0) \quad (3)$$

Again, this estimator is biased because it does not take into account heterogeneity across establishments nor across industries. One way to correct for this bias is to estimate a probit or logit model including the P variable along with all the characteristics of establishments. However, if the “causal” effect of ISO norms is not homogenous across the sample¹, the coefficient associated to P is again biased (see Crépon and Iung, 1999).

The construction of an unbiased, robust estimator follows Rosenbaum and Rubin’s (1983) work. If we want to estimate $E(c_i) = E(y_{1i} - y_{0i})$, we can directly estimate $E(y_{1i}|p_i = 1)$ and $E(y_{0i}|p_i = 0)$ but not $E(y_{1i}|p_i = 0)$ nor $E(y_{0i}|p_i = 1)$. The idea is then to find satisfying empirical equivalents for $E(y_{1i}|p_i = 0)$ and $E(y_{0i}|p_i = 1)$. In order to get an empirical distribution for $y_{0i}|p_i = 1$ - resp. $y_{1i}|p_i = 0$ -, one looks for a establishment j who is not certified ($p_j = 0$) - resp. is ISO - and has similar characteristics to that of establishment i . Actually, it is sufficient to compare establishments which have similar propensity score of being ISO (according to their observable characteristics). Crépon and

¹E.g., intuitively, ISO norms might not have the same consequences for manufacturing and for services.

Iung (1999) exploit this principle and give a continuous estimator of the causal effect. This “weighted” estimator is defined as follows:

$$\hat{c}_w = E(c_i) = E\left[y_i \left\{ \frac{p_i}{\pi(x_i)} - \frac{1-p_i}{1-\pi(x_i)} \right\}\right] \quad (4)$$

where $\pi(X_i) = P(p_i = 1|X_i)$ is the propensity score of being certified given all the observable characteristics of the establishment (X). Intuitively, this estimator puts an higher weight on those companies that are not certified (respectively are ISO) while, because of their individual characteristics, they have to be certified (resp. should not). The crucial point is that this estimator is convergent and unbiased under assumption (H):

$$(y_{0i}, y_{1i}) \perp P \mid X \quad (H)$$

i.e. when knowing X , the realization of variable P does not provide any information about establishment characteristics but only about their organisation. This assumption is obviously never strictly verified; there is always some unobserved heterogeneity. However, given the very detailed nature of our data, the residual information revealed by the fact that a establishment be or not ISO certified should not be decisive, at least as far as its observable characteristics are concerned. We are thus left with the problem of unobserved heterogeneity which cannot be tackled at this point, due to the lack of adequate instruments and the lack of panel data.

In practice, the estimation method consists in two steps:

- first, we estimate the probability that a company i be assigned to the work practice P , conditional on its characteristics X_i : $\pi(X_i) = \Pr(p_i = 1|X_i)$ (using a properly specified logit model);

- second we use this estimate to compute \hat{c}_w . The estimator \hat{c}_w is asymptotically normal. Its asymptotic variance is the variance of ϕ_i defined as:

$$\phi_i = y_i \left\{ \frac{P_i}{\pi(x_i)} - \frac{1-P_i}{1-\pi(x_i)} \right\} - c_o \quad (5)$$

$$-E\left[\left\{ \frac{P_i(1-\pi(x_i))}{\pi(x_i)} - \frac{\pi(x_i)(1-P_i)}{1-\pi(x_i)} \right\} y_i x_i\right] E[\pi(x_i)(1-\pi(x_i))x_i'x_i]^{-1} [(P_i - \pi(x_i))x_i'].$$

Actually, because the principle of the method is to compare establishments that have similar probability of being certified according to their characteristics but different realization of P , the sample should be restricted to a common support i.e. we exclude certified (resp. non-certified) establishments i such that $\pi(X_i)$ while there is no non-certified (resp. ISO) business j with a $\pi(X_j)$ close to $\pi(X_i)$. Moreover, if the logit of the first step is not properly specified, the results can be jammed. Therefore, we also compute an estimator using a logit excluding variable with the lowest significativity (i.e. robustly nul at 50%).

Our logit of the first step includes the main characteristics of the establishments:

- industry (French classification NAF 16)
- sliced size of the establishment and its mother firm
- dynamic of the establishment (very high, high, stable, negative, very negative)

- detailed trade union representation
- composition of the workforce (percentages of production workers, managers, clericals, technicians)
- percentage of workers using computers
- frontiers of the market (local, regional, national, European, global)

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