

Research Report 0009/E  
**Making sense of the new economy**

Joris Meijaard

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Address:	Italiëlaan 33
Mailing address:	P.O. Box 7001 2701 AA Zoetermeer
Telephone:	+ 31 79 341 36 34
Fax:	+ 31 79 341 50 24
Website:	<a href="http://www.eim.nl">www.eim.nl</a>

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## Nederlandse samenvatting

Dit rapport presenteert een overzicht van de mogelijke definiërende, stuwende factoren achter de zogenaamde 'nieuwe economie'. Het bescheiden doel van deze studie is het bieden van een kader voor beleidsmakers, adviseurs en wellicht ook ondernemers, dat theorie en implicaties van de 'nieuwe economie' in een zinvol en bruikbaar perspectief plaatst. Dit rapport is uiteraard niet het laatste oordeel over de al dan niet relevante aspecten van 'de nieuwe economie'. Op basis van een aantal recente bijdragen in de bedrijfskundige en economische literatuur, herleiden wij een vijftal causale redematies ('logica's'), welke de essentie lijken te vatten van wat er gaande is, dan wel binnenkort zal gebeuren, met name in relatie tot de strategie, structuur en prestaties van bedrijven.

De vijf causale 'kettingen' beschrijven een aantal verbanden tussen informatie- en communicatietechnologieën en economische groei. De veranderingen in organisatie en de gevolgen daarvan voor bedrijven zijn cruciaal. De vijfde en laatste logica is het belangrijkste en heeft betrekking op structurele veranderingen in de leer- en innovatieprocessen. De complexiteit, de kloksnelheid en de schaal van innovatie als systeem nemen toe. In potentie zou dit tot permanent hogere economische groei kunnen leiden.

Op basis van het gepresenteerde overzicht van mogelijke effecten van de ICT-(r)evolutie sluiten wij af met een aantal prioriteiten voor toegepast onderzoek over ondernemerschap en ondernemingsgedrag. De ontwikkelingen in de interne en externe organisatie van bedrijven vragen om onderzoeksinspanningen op dit terrein, opdat er ook op termijn voldoende goede informatie is voor strategievorming (ondernemingen) en beleid (overheid).



## Summary

This report presents an overview of possible defining, driving factors behind the so-called 'new economy'. The humble goal of this study is to provide a framework for policy makers, policy advisors and perhaps also entrepreneurs, which places theory and implications of 'the new economy' into a meaningful and practical perspective. This report is obviously not the final verdict on what is relevant or not. Based on several recent contributions to the managerial and economic literature, we derive five causal chains ('logics'), which seem to capture the essence of what is - or may soon be - going on, specifically in relation to the strategy, structure and performance of firms.

The five logical chains cover various relationships between information and communication technologies and economic growth. Especially the changes in organization and the consequences (thereof) for firms are crucial. The fifth logic, which concerns the changes in processes of innovation and learning, is most important. The complexity, the clock-speed and the scale of innovation as a system are increasing. In potency, latter changes may have a permanent effect on economic growth.

Based on the presented overview of effects of the ICT (r)evolution, we wrap up with several priorities for applied research on entrepreneurship and the behaviour of firms. The developments in the internal and external organization of firms require these efforts, in order to have sufficient good information for making strategy (firms) and policy (government).

### **Keywords**

ICTs, business dynamics, 'new economy', entrepreneurship, innovation, organizational behaviour, economic growth



# 1 What is the new economy?

According to many academics and politicians (including, for instance, Alan Greenspan and Bill Clinton), we are living through one of the select eras in history where advancing technologies and changing organizations are transforming economics, society and life. The new 'tools' of information processing, data handling and communication may (soon) boost productivity across all sectors, and this would indeed distinguish the developments from other relatively 'normal' radical innovations, which typically only reshape one or a few (sub-)sectors of the economy (see e.g. Bresnahan and Trajtenberg (1995), Helpman and Trajtenberg (1998), Rosenberg (1998)).

The ICT (r)evolution is - arguably, as discussed below - the most important 'feature' of the 'new economy'. This concerns the rapid technological progress in the (new) industries of semiconductors and telecommunication, and, more importantly, its potential consequences throughout the economy. The rapid and repeated innovation in 'regular' business organization and practice is only just beginning to take shape (Cohen *et al.* (2000)). The latter compounding impact of innovation and renovation of business processes should eventually outpace the developments in the core technologies (semiconductor, server and telecommunication industries). At present, though, the 'core' developments still dominate, especially in relation to measurable economic growth (Gordon (2000), but also in Jorgenson and Stiroh (2000a and 2000b) and Nordhaus (2001)<sup>1</sup>).

There is considerable debate which economic developments are the autonomous causes for 'new' economic growth. The changing economic system seems to include increasingly prominent roles for globalization (promoting trade and cooperation), monetary policies (controlling macroeconomic dynamics), venture capital (aiding innovation and entrepreneurship) and human resource management innovations (promoting intrapreneurship and performance) (e.g., Black and Lynch (2000), Kortum and Lerner (1998) and Cohen *et al.* (2000)).

In this report, we will support the thesis that irrespective of the possible autonomy of these other developments, ICTs hold the key position in relation to innovation, industry dynamics and economic growth. Of course, we fully realize that current technological, economic and social developments are very diverse and complex. Causes, consequences and side effects are hard to distinguish and, therefore, it is almost impossible to judge whether ICT progress is

<sup>1</sup> Contrary to Gordon (2000), Jorgenson and Stiroh (2000a and 2000b) and Nordhaus (2001) do find productivity effects throughout the U.S. economy in the second half of the 1990s, but growth in the ICT sectors is still dominant.

really as beneficial to economic efficiency and growth as one might expect it to become from a theoretical stance.

This report tries to synthesize current insight into the key processes behind a 'new economy'. Given the pace of actual developments, and given the pace at which theoretical and practical insight is accumulating, a summary of this kind is outdated the moment it is sent to the printer. The fact that the high anticipations on 'new' and ICT-based firms are tempering makes it even more important to understand the lasting effects on ('old') business processes. Obviously, this report does not claim to be the last word on economic and organizational change due to 'a new economy'. The complexity of the developments and the uncertainty involved with them make this impossible. What this report should make clear is that (1) there is an order in the sometimes seemingly chaotic changes in the economy, and (2) in order to understand the economy of tomorrow, the key fields to further develop are organization science and the study of innovations.

The rest of this section gives a brief overview of some recent discussion relating to the 'new economy' in the popular and scholarly literature. Section 2 offers an overview of the key change mechanisms in relation to economic growth. Finally, section 3 concludes with a discussion of the research agenda that should help improve the basic knowledge on Dutch SMEs and entrepreneurship.

### ***The macroeconomic debate***

The performance of the U.S. economy over the last decade has astonished economists. OECD (2000) and other recent studies (as noted, Jorgenson and Stiroh (2000a and 2000b) and Nordhaus (2001)) show that labour productivity growth is rising, which could explain why the economy did *not* overheat (as yet), by way of higher inflation. Equally impressive annual growth figures have only occurred for brief periods of American economic history (typically after recessions). For most European countries, growth figures have been far less impressive to date. Therefore, we primarily focus on the American debate. This should get us the main overview of what might be going on, including the implications for a country like the Netherlands.

In the American Economic Review, Jorgenson and Stiroh (2000a) observe that '*a consensus is emerging that something fundamental has changed [in the economic system]*'. Most scholars within 'the consensus' see the progress of information and communication technologies (ICT) as the critical cause for changes in the economy, particularly for a *potential* rise in productivity across sectors. As explained, through more efficient information processing and communication, specific 'normal' mechanisms (processes) in the economic system can gain importance and effectiveness. This then may boost the economic performance, the GDP and possibly even annual GDP growth.

To understand the essence of the macroeconomic debate between 'new economy' enthusiasts and sceptics, we follow Stiroh (1999) and, firstly, ask what the backbone models of the 'old economy' are.

The conventional view on economic growth is due to Solow (1957). In the Solow model, capital accumulation, labour force growth and technical progress are the fundamental sources of economic growth. Economic growth can occur through growth in *levels* of capital or labour inputs ('stock'), and through the growth in *productivity rates* of the aforementioned inputs. Technical progress typically deals with the latter (growth in productivity). Short-run fluctuations ('business cycles') are considered less relevant for growth.

Romer (1989) provides an important extension by stressing that some factor inputs for the production process can create growth by increasing returns to scale and spillover effects (e.g. knowledge accumulation, network externalities, R&D). Aghion and Howitt (1992) further extend this argument, stressing that breakthroughs in technology ('drastic innovations') create significant discontinuities in industry evolution and growth. These discontinuities can create 'spurts of growth'.

To understand the macroeconomic debate, two 'laws' about short-term effects are important. Firstly, Okun's law correlates short-run GDP growth with decreasing unemployment (and vice versa). In the long run, such effects cancel out. Secondly, the Phillips curve links unemployment with short-run inflation. If unemployment is below a 'natural' rate, inflation will be higher, tempering economic growth. Overall, GDP growth can only be systematically higher while unemployment remains constant (a 'spurt of growth'), if productivity growth rises autonomously, e.g. through breakthrough-technological progress.

Conceptually, a special case of the historic 'spurts of growth' has been identified as the so-called 'general purpose technologies' (*GPTs*, Bresnahan and Trajtenberg (1995)). By definition, these GPTs have the potential for pervasive use in a wide range of sectors. GPTs drastically change the modes of business operation, and, therefore, create a potential for widespread sectoral growth and prolonged growth in GDP. Throughout history, GPTs typically have been so-called 'enabling technologies', for instance, the electromotor. These 'enabling' technologies trigger complementary innovations throughout the economy and, therefore, can, theoretically, be convincingly related to permanent shifts in economic growth (see also Aghion and Howitt (1992), Helpman and Trajtenberg (1998) and Rosenberg (1998)).

Another theory about 'spurts of growth' is due to biologist Kauffman (Santa Fé Institute) and economist Weitzman (Harvard University). There is a particular type of innovations, which can be the source of '*recombinant growth*'. Taken apart into their components, these innovations can be recombined into whole sets of new innovations. The aeroplane is a good example. The components of the first plane can be (and have been throughout this century) recombined into a range of innovations (for other applications). It is straight-

forward to argue that the Internet (URL, HTTP protocols and HTML) is such an innovation, since its components can also be recombined into new innovations (Varian (2000)).

It seems tenable that these two types of growth strongly reinforce each other once a particular 'GPT' produces a set of 'recombinant' innovations. Semiconductors, digital information and wireless communication seem to have found each other, creating opportunities for miniaturization, incorporation of technologies in many products and processes, optimization of communication and so forth (see section 2).

### ***Sceptics***

The sceptics of the new economy reject the claim that GDP growth has experienced a significant positive upswing due to the progress in ICT. Most prominently, Gordon (2000) argues that a confluence of temporary shocks to the global economic system has benefited the U.S. (in particular). This confluence coincides with the continued growth over the last decade. Current technological innovations are considered 'normal' technological progress that do not 'measure up to the great inventions of the past'. Although overall labour productivity growth was higher in 1995-1999, Gordon (2000) only finds a measurable productivity growth of 12% of the private economy. Similarly, Jorgenson and Stiroh (2000) find that - to date - multi-factor productivity growth has only *really* shifted in the computer, semiconductor and a few other high-tech industries. Computer-using service industries like finance, insurance and real estate have mostly shown a *slowdown* in productivity (Gordon (2000)). The argument that innovations to date have only been 'normal' may, therefore, be hard to disprove.

A different sceptical argument may be that the Internet and other ICT-induced innovations have substituted existing activities from one medium to another, without increasing overall efficiency (as yet). This may be due to unproductive 'old capital' that is still accounted for, or, due to the mismeasurement of productivity in services (especially the failure to measure quality improvements (Bosworth and Tripplet (2000))). Another source of mismeasurement may be the increased proportion of work time that is being spent on private 'consumption' (as suggested by Gordon (2000)).

Then again, over the last decade, the hours worked per individual have surged in the U.S. (annual growth in hours worked per person has almost doubled (Jorgenson and Stiroh (2000a))). Therefore, a distinction between capital accumulations, TFP growth and labour quality may be critical, yet hard to make correctly. Extended business hours, for instance, may raise (unmeasured) consumer surplus, but at the expense of less productive labour input (less sales per hour of labour). Quality of service must somehow be included to make an appropriate judgment.

At present, *the bottom line seems to be* that measured economic growth still depends strongly on the continued acceleration in technological progress in the 'core' industries (i.e. hardware). Spillover productivity effects are hard to find, but, nevertheless, they may already exist (Nordhaus (2001)). Until such effects are 'substantial', though, short-run continued growth would have to come from the network and semiconductor industries directly (Jorgenson and Stiroh (2000a)). In due time, the improved productivity growth will find its way to the rest of the economy, but current changes in most sectors cannot be distinguished from a neutral redistribution of production factors, power and wealth. Many features of the economic system may be changing already, but, apparently, the benefits are not higher than investment cost. We should take into account that we are unable to appropriately measure the quality of products and services.

***But what's more important ...***

The strategic opportunities for firms to organize and structure their businesses are changing, and so are the processes by which the firms decide. This should be reason enough to get behind the logical mechanisms at the micro level.

Firstly, information and communication products (new and old) carry specific features that change the conditions for their creation, processing and consumption. More and more services and products carry some of these features. The two main features are: (1) high initial investment, but low marginal cost of (re)production (e.g. information products), and (2) network externalities in distribution and consumption (e.g. telecom and Napster).

Shapiro and Varian (1998) wrote the probably most influential 'guide' to the (microeconomic) basics of the new economy. Their book is primarily aimed at managers and entrepreneurs, and their strategic decision-making. Seven key features of the information and network-based products are discussed.

Firstly, the high first copy cost of an information-based product make differentiation the key strategy in product development. In this context, mass-customization, differential pricing and versioning are critical strategies. Secondly, rights management is crucial. Growing a market and becoming 'the standard' is increasingly often more important than protecting intellectual property rights.

Next, 'lock-in' concerns are very important. On the one hand (3) as a strategic opportunity and goal, on the other hand (4) as a strategic threat. Many new products work within a system or platform of technology. Switch cost can bring about huge competitive advantages to firms that effectively manage the options and the compatibility of their products. Contrarily, switch cost can be a huge disadvantage in terms of flexibility and strategic leeway for the 'dependent' user firms.

Fifth, network externalities are an important source of profits and consumer surplus in the 'new' economy. The intense competition in many of the 'net-

worked' industries could result in a monopoly, which is optimal in purely technical terms. This monopolist would only behave in a socially efficient way if the threat of potential competition were sufficiently present.

Next, usually in the same context, firms must enter into alliances around common standards in order to be competitive in the (international) market place. This requires a change in attitude for many firms. Finally, Shapiro and Varian argue that policy makers and political leaders should pay explicit attention to competition policy, trying to build a framework that promotes innovation and efficiency without compromising on anti-trust issues. Managers and entrepreneurs are obviously better off taking this into account, specifically the fact that (limited) collusion probably is increasingly acceptable.

Kelly (1998) - another much referenced work on the features of the new economy - stresses the importance of the management of opportunities (instead of efficiency), and the importance of 'soft' relationships (instead of adversarial ones). The selection processes (in the market and by the individual decision maker) are at the centre of progress and change.

Management gurus and consulting firms derive many applied 'rules' for the new economy, similar to the arguments by Kelly (1998) and Shapiro and Varian (1998)<sup>1</sup>. Over the last year, much has been hypothesized and proposed as final strategies that 'should' win. By now, it has become clear that it is better to learn to know the key processes of the increasingly turbulent economy and interpret context-dependent strategies than to draw early strategic conclusions, which are typically too early or too late given the uncertainty of (local) developments.

### **So ...**

'New economy' is often applied as a summary term for changes in the economic system that possibly create new rules for productivity, employment and economic growth. Rapid advances in information and communication technologies (ICT) could function as a platform for a wave of applied innovations across industries. In the end, for many economic activities, these innovations may substantially impact the cost of interaction, transaction, information processing and returns to scale, and this in such a way that the economic system could fundamentally change. New optimal solutions to the efficiency of organizations and markets could have a complex, compound and potentially radical effect on the structure and dynamics of industries.

<sup>1</sup> For example, Andersen Consulting and EIM (HBD (2000)) stress: (1) low interaction cost lead to vertical disintegration, (2) knowledge of customers and relations is more important than capital, (3) increasing returns to scale are ubiquitous, (4) market penetration can be quick, and (5) markets will be transparent.

Our motivation for further reference is that:

*There is a reasonable and relevant chance that key features of the economic system will change, due to the widespread adoption and incorporation of new information and communication technologies.*

In summary, (potential) economic transaction and interaction cost are changing, and - more specifically - the rules and opportunities for cost-effective solutions to communication and management are undergoing change. New products and services are showing new allocations of value between producers, and new allocations of cost between clients and suppliers.

As such, the opportunities and threats of these developments directly impact the strategic context for firms, and, irrespective of the real effects at a macroeconomic level, the decision-making, organization and behaviour of firms. For microeconomic relevance, it is sufficient that the *potential* basis for competitive advantages is affected. This seems to be the case in most economic sectors.

The outcome of the restructure in production processes and value chains depends on the way in which information and communication technologies evolve, and on the way in which the innovations are (eventually) adopted throughout the economy. History has taught us that these 'complementary' technological developments strongly depend on their evolutionary path (e.g. Rosenberg (1998)). Sub-optimal solutions can persist for long times, especially if better alternatives fail (*for whatever reason*): the selection process is potentially costly, and possibly inefficient if improvements are not that large. For now, it seems that most firms can hardly afford to act like ostriches.



## 2 Making sense: five logics of change

In this second section, we treat five causal sequences ('logics'), which together seem to capture the essence of the micro- and meso-economics of the 'new economy'. These causal sequences deal with the various aspects of the (potential) relationship between information and communication technologies and economic growth.

The first logic stars the changing opportunities and corresponding conditions for the effective organization of economic processes. Relative cost of various forms of interaction are changing, which affects the optimal governance and structure of value chains and organizations.

The second logic stars the potential implications of changes in the market mechanism. Information processing and communication tools alleviate market imperfections, transaction cost and inertia in the responsiveness of firms. This may obviously induce changes in consumer and producer behaviour, and changes in the way in which markets clear.

The third logic stars the specific economic features of 'new' products. Information and network products tend to have low marginal cost and substantial increasing returns to scale. These features create a special rationale for inter-temporal output and production decisions, which is different from the common practice for most managers, and different for policy makers as well.

The fourth logic stars new conditions for social and cultural processes. These new conditions may benefit economic growth as well. Globalization and consumer empowerment seem to be helped by ICT developments, further breaking down barriers to international trade and the efficient allocation of goods.

Finally, logic five highlights that the processes of learning, innovation and entrepreneurship may be changing, most importantly due to the combined effect from the first four logics. The incentives to, the speed of and the efficiency in innovation and learning are positively affected. Firstly, processes of learning and innovation have the specific features of increasing returns to scale and low marginal cost of reproduction themselves. Secondly, the improved market mechanisms directly benefit the allocation of entrepreneurial and innovative incentives and the corresponding returns. Thirdly, the potential efficiencies of new organization create smaller and more competence-driven units of operation, fostering innovation and positive entrepreneurial dynamics. Finally, and probably most importantly, globalization and the empowerment of consumers strengthen the processes of knowledge accumulation and information sharing, which both improve the efficiency of the (increasingly universal) innovation process.

It should be noted that the realized speed of innovation and growth is determined by the ability to find and adapt *the weakest links*. These 'bottlenecks'

might be the human capital of the working population, the socio-cultural (work) practices, or the work-related values. In this and all respects, policy-making is critical: (1) to anticipate and clear bottlenecks, and (2) to avoid interfering in a negative way.

The five 'logics' explain some of the high expectations that are still associated with the impact of ICTs on the economic system in the long run. Feedback within and between the causal sequences seems to be an important factor in the excitement, producing, as mentioned, the feeling that '*something fundamental has changed*' (Jorgenson and Stiroh (2000a)).

We now turn to discuss the sequences in more detail.

### **Logic 1 (organizational processes):**

*ICT developments → organizational innovation and restructuring → efficiency and productivity → economic growth*

The first causal sequence by which way ICTs could be raising economic growth, relates to the internal and external processes of business, that is, the chains (systems) of activities that create economic value.

The opportunities to use improved information processing and communication tools affect the critical conditions for the key business processes, both the primary and the support processes. In particular the alternatives and efficiencies in relation to *strategy formation, coordination and communication* are under change. The (potential) cost of interaction within and across the organizational boundaries are changing, which creates new opportunities for efficiency. The reduction of interaction and coordination cost may change the conditions and optimal solutions for flexibility and responsiveness in the market place.

Organizational boundaries must be reconsidered if the alternative opportunity cost of interaction change. This may create new conditions for strategic positioning of firms, and, perhaps in the end, new conditions for the general economic order. Organizations can pursue *efficiency and flexibility* by: (1) outsourcing activities, (2) creating modules of activities, (3) adopting new types of linkages (with employees and partners) and (4) adopt new cost and performance allocation mechanisms.

In the evaluation and implementation of new organizational forms (networks, alliances, intermediaries), the governance of costly and specific assets (material and immaterial) is a key issue. This concerns decision-making on individual and collective investment, decision-making on knowledge and learning, and decision-making on the management of opportunities. Much of this may require a different mindset in the face of uncertainty (e.g. 'options thinking' (Kulatilaka and Venkatraman (1999))), especially since systematic uncertainty seems to be an important side effect of the recent spurts of economic growth.

For one thing, changing boundaries of the firm pose new challenges for R&D, innovation management and knowledge management of the firm (see also logic 5, below). Learning and innovation need to be organized differently, more often between organizations. This amplifies the incentive problems relating to appropriability and governance (e.g. Nooteboom (2000), Audretsch and Thurik (2000)). The cost effectiveness and especially the dynamic efficiency of learning and innovation (with or without such inter-firm alliances) are a point of serious concern.

The dark sides of organizational innovation and restructuring are often forgotten in strategic advice on new economy issues. Adjustment cost, the unpredictability of contexts, the hidden cost of change and the uncertain quality of crucial information for decision-making may create inefficiencies that make old mechanisms more appropriate than new ICT-based opportunities for a considerable time to come. The risks involved with a more dynamic and 'fluid' economic system are *substantial* for firms that are capital-intensive. Both the specificity of assets and the utilization of those assets are problematic if demand is (temporarily) low. New market mechanisms may relieve some of these issues, but some are also reinforced (see logic 2, below).

The new technologies make many new mechanisms and solutions possible in the organization of inputs, capital and labour in the creation of value. It is not at all certain that productivity, efficiency or economic performance improve at this point in time. Of course, the set of opportunities improves and, as well, the abilities to handle information improve. This aids the rationality of decisions, but performance only benefits if the right information is included in the decision-making process, and if the new alternatives actually are a step ahead. If mistakes are made and some of the 'soft' efficiencies are forgotten, performance may well repeatedly deteriorate.

All in all, in relation to the organization of economic processes, the effects of improving information and communication technologies are complex. The quantity and quality of relevant information increase, the complexity of decision-making increases, the ability to handle complex information increases, but, as well, the risks to lose rather efficient 'old' tools that limit information overload are substantial. It is becoming increasingly crucial that people make calculated decisions on using new technologies, and only adopt them when they are actually better. Increasingly, optimal decision-making involves the incorporation of an enormous variety of arguments, including the valuation of 'soft' factors like trust and culture. Especially when shifting operations outside organizational boundaries, new mechanisms may try to 'fix things that cannot break'.

For SMEs and entrepreneurs in particular, the traditional trade-off between markets and hierarchies may seem to become less and less relevant, but it is probably more critical than ever. If groups of organizational units manage to meet the institutional challenge of effective learning and information sharing

within and between themselves, a truly entrepreneurial economy may grow, where temporary constellations of competencies succeed in efficiently producing the direct goods and services, as well as efficiently accumulating the (collective) reputation, experience and knowledge.

### **Logic 2 (market processes):**

*ICT developments → improved market transaction and allocation mechanisms  
→ efficiency and productivity → economic growth*

The second causal sequence in which way ICTs could be raising economic growth is through changes in market processes. This relates to the impact of new and improved tools of information processing and communication on the mechanisms of allocating goods and services from 'business to consumer' and from 'business to business'. More specifically, ICTs may alleviate a range of existing market imperfections.

Much inertia in the responsiveness of firms may disappear, due to the changing organization of value chains (see logic 1, above), and due to changes in the operation of markets. In principle, demand and supply should be able to meet each other better, faster and cheaper, which may be true for markets for inputs (materials, labour, energy, etc.), markets for investment goods (ICT, machinery, buildings, etc.), and for markets for final goods.

Regrettably, new problems arise, most importantly on the quality of products and on the quality of information about the products. A number of issues (e.g. transparency, price dispersion and asymmetric information) that were previously possibly less relevant, now form a source of new and potentially detrimental transaction cost. Particularly, one should think about the cost of monitoring transactions, and the cost of credibly signalling quality and integrity.

Next to this, firms will increasingly prefer (and be able) to discriminate their pricing from client to client. As a result, customers and suppliers will be tempted to spend (waste?) more efforts in search processes that were previously considered irrelevant and unfeasible. Given the immense opportunities for intermediaries (opportunities with non-transparent pay-offs), new inertia will arise, definitely temporarily. Once again, transition is costly and path-dependent.

Closely related to the developments sketched in logic 1, the integration of activities in the creation of value is changing its attractiveness. Only value-adding activities for which appropriability can be organized effectively through secrecy appear to be attractive to arrange within the boundaries of a firm in the long run. Efficiency will be a less and less relevant argument to organize diversified activities within the same organizations, that is, unless the information asymmetry and quality issues remain unresolved. In the latter case, only a very limited set of transactions can really be aided by digitization (depending on the goods and the existing reputations).

The alleviation of market imperfections may take shape in many ways, and a rather extensive literature has grown on the topic over the last few years (internet auctions; market-making intermediaries; various forms of brokering; destination-less shipping). Theory has not settled on most likely scenarios, but the (aforementioned) issues of moral hazard and adverse selection are obviously crucial.

The adoption of ICT applications can widen ('blur') the relevant boundaries of competition for a range of products. This can greatly improve the efficiency of market allocation. Next to the information and quality issues, the risks relating to market power also increase. Potential uncertainty and the number of relevant competitors are growing; the opportunities to abuse (and obscure) market power are growing as well.

The definition of many markets is now often largely geographic. It seems rather likely that the definition of markets be increasingly based on product and service features instead of these geographical borders. This means that value and supply chains will seek to organize on a more global basis. In relation to this, the outsourcing of organizational functions (support functions) (cf. logic 1) can become more attractive. The organization of activities in a more modular structure may be part of this, as well as some of the new consumer services (e.g. Hulshoff *et al.* (1999)). The edges between markets will become more vague and debatable at first. Soon (though,) consumers should become more 'picky', reducing substitutability and the cross-elasticity of demand. Probably not before some sectors will have drastically restructured.

Once more, few authors mentioned the potential dark side of changing market mechanisms, specifically the potential miscalculations by suppliers, customers and new intermediaries of search cost, adjustment cost, cost of trust-building and the cost of signalling the quality of information. All of these are rather traditional topics in industrial organization and microeconomics (e.g. Tirole (1988)).

The new opportunities to organize markets create great opportunities for start-ups and entrepreneurship. There are many opportunities to be the new information and product intermediaries and/or (content) supplier thereof. Management capabilities and reputation will be critical. Conglomerates of specialized SMEs supplying a major intermediary with a strong brand name may be an efficient outcome (e.g. pictured by Ba *et al.* (2000)). On the other hand, in some industries, the more innovative larger firms seem to be able to organize these things at least as well.

In any case, new industry structures are likely to arise in a range of product categories, such that new balances in terms of efficiency, marketing and service will have to evolve. Different economies of scale and scope are likely to arise. As said, this strongly relates to the developments in relation to logic 1. The path of developments is highly unpredictable, and it may all boil down to optimizing product customization, bundling and consumer feedback (which

strongly relates to logic 3 and logic 4, below). New markets may in many cases only really work in a more distant future (where organizations and people are far more flexible and 'intelligent'). It is quite likely that economic history will repeat itself: many firms too early in the market with concepts that will win in the end (as replicated by others).

### **Logic 3 (product features):**

*ICT developments → opportunities for increasing returns to scale and scope → new and improved final goods → growth*

The third causal sequence in which way ICTs may be raising economic growth relates to product innovations, the creation of 'new' customer value and the specific attributes of ICT-based innovations.

To understand the relevance of specific product features, two types of products should be distinguished: (1) new products from ICT sectors and (2) 'renewed' products from 'old' sectors. The 'new' products (e.g. hardware, software and flat e-commerce) can be seen as innovative intermediate goods or components. They are applied throughout the economy, mostly as investments in process innovation. The 'renewed' products (e.g. information products and 'enhanced' services) can be seen as product innovations that create new (niche) markets and close substitutes for 'adjacent' existing products.

Firstly, information-intensive products have very low marginal cost. This calls for relatively new arguments and considerations for most managers and decision makers. Most importantly, the inter-temporal evaluations of the returns on investment are critical. These are increasingly complex and uncertain. Firms must learn to price discriminate through image, quality and service ('versioning'), which requires specialized decision-making competencies.

Secondly, increasing returns to scale are a key aspect of the networked economy and its products (Arthur (1994)). The pay-offs to the marginal client are minimal for the first users of the network. They are relatively large for the marginal client once the network is already large. And, most importantly, the pay-offs to customers that paid in the past are increasing as the network grows, providing room for additional periodic fees once a critical mass is achieved.

Thirdly, knowledge, learning and information processing can have substantial increasing returns to scale in themselves (see logic 5, below). Effective knowledge management can cultivate so-called network externalities. The increased opportunity to process information and communicate over networks, therefore, has two efficiency bonuses: to the individual user of the network and to the network as a whole.

Disadvantage from a welfare perspective of all potential increasing returns to scale is the fact that the markets for most of the products with increasing returns to scale will probably turn out to be natural monopolies in the end. This

means that there will be fierce battles for dominance, with a lot of inefficient destruction of capital, with, finally, a price discriminating monopolist who will skim consumer surplus. Standards can be a good way to avoid unnecessary capital destruction. However, this may often mean active anti-competitive measures in order to fix the standard at an economically efficient point in time. Most governments do not think this way, and they will be reluctant to allow industry-wide agreements.

So, anti-trust issues are increasingly important, in paradox with the consideration of efficient production scales. Such issues are especially problematic in relation to the appropriate incentives to the initial investments into important radical innovations by firms that already have a specific dominant position.

The key feature of many adapted 'old' products concerns the added value generated by customized information content<sup>1</sup>. For the input factor 'information', the adapted 'old' products are subject to substantial economies of scale as well. In a fully-fledged new economy, new combinations of physical, functional and emotional product components create an almost infinite set of opportunities, basically as long as a significant group of customers can be identified and reached.

As explained in logic 1, cooperation between specialized functional units could be the most efficient solution in many industries, including a number of functions that are now still internal support functions. Companies will get the opportunity to spin-off many of the internal processes to the most efficient specialist in the market, if the governance, coordination and monitoring can be arranged.

At this point, it is important to stress once again that industrial reorganization and restructure (logic 1) only has a slow effect on economic growth. Adjustment cost are critical, especially when the efficient scale of activities is changing quickly. The uncertainty and volatility as created by the waves of new products are apparently acceptable to customers, although obviously costly. From the perspective of efficiency and social welfare, predictability and much less turbulence may well be preferable.

SMEs may have competitive advantages in the creation of both 'new' and 'renewed' products and services. Especially in cooperative networks, SMEs can be very efficient in supplying specific competencies. They can especially be flexible and efficient niche players and the providers of 'add-on' applications and service. Reputation will be increasingly critical, which may be a barrier to many SMEs. Overall, strategic cooperation appears to be critical. At first, aggressive marketing seems to be a winning strategy for new products, but in the end (as

<sup>1</sup> Many of the adapted 'old' products also concern shifting travel, search or other transaction cost either out of or into some product variations. These products mostly transfer activities into and out of the market economy. Like the so-called amusement and experience goods, they just add to the happiness of people.

the year 2000 has shown), 'old' firms with a large head start in reputation (and brand names) can easily and quickly catch up.

#### **Logic 4 (socio-cultural processes):**

*ICT developments → facilitation of social and cultural changes → efficiency and productivity → growth*

Information and communication technologies are an important facilitator ('catalyst') for a number of social and cultural trends, most importantly globalization and 'consumer empowerment'. Both processes are probably generic social and cultural desires. Increased communication and information-processing capacity generate all sorts of incentives for renewed social and cultural change. At a slower pace, similar change processes have been working for centuries (e.g. through colonial trade, immigration and air travel). The pace has just been boosted.

The past decade has shown a strong trend towards economic, social and cultural globalization. The examples of McDonald's and Coca-Cola are typical, but the European Union, EEA, NAFTA and the end of the Warsaw Pact are symbols as well. This trend can be seen as autonomous, but given the timing it is very hard to believe in independence from the developments in ICT. *At the least*, the opportunities created by ICT developments have facilitated internationalization and the breakdown of barriers.

Globalization makes organizations more open to activities and partners across national borders and vice versa. As a result, globalization feeds back into the efficiency of organizations (logic 1), markets (logic 2) and learning (logic 5). *At the least*, the opportunities created by ICT developments have facilitated internationalization and the breakdown of barriers. ICTs have facilitated to make visible the latent cultural preferences towards a global society. ICTs may also have triggered some of the minor trends in globalization occurring.

In addition to this, the end of the 20<sup>th</sup> century has also shown a substantial trend towards increased empowerment of workers and consumers. ICTs have certainly facilitated the process behind this trend as well. Opportunities for the mass-customization of products and the mass-individualization of demand are facilitated by ICT developments.

The power distribution between customers and suppliers/producers changes, affecting the optimal organization of value chains (logic 1), the optimal market mechanism (logic 2) and the optimal process of learning and innovation (logic 5). Innovations in market-making and intermediation fuel consumer empowerment. And, in turn, consumer empowerment fuels innovation in market-making and intermediation.

At first sight, a trend towards globalization seems to be a trend towards larger firms. However, SMEs will remain crucial at a local level, especially in transactions where 'soft information' is crucial. Within large organizations, 'soft in-

formation' does not travel easily; therefore, specialized small businesses may be typically more effective (Stein (2000)). Furthermore, as explained, SMEs can be global niche players if they manage to create a strong reputation. They can operate in strategic alliances, either temporarily or on a regular basis, and SMEs can be critical in the empowerment of consumers by mediating in the collection of information about preferences and translating this information into product deals for the 'busy consumer'. The other way around, SMEs can also function as seller agents for other 'specialized' SMEs matching the products to the consumers. It is clear that the relational component of doing business as an SME remains crucial (Audretsch and Thurik (2000)).

### ***Logic 5 (innovation and learning):***

*ICT developments → opportunities for innovation in learning and knowledge management → improved processes of innovation → economic growth (and ICT progress)*

This is probably the most important mechanism in the potential of the 'new' economy. New tools to communicate and process information trigger and facilitate the incentives for innovators and entrepreneurs to communicate and share information (especially at the pre-competitive stage). This may fuel technological progress, in particular if the information can easily be found and exchanged. Partly due to the problems to protect information effectively, individual and 'collective' processes of innovation and learning appear to be under change, at first especially in the ICT sector.

Effective management of knowledge within and between organizations can improve by the application of ICT. Within and across the boundaries of the firm, the allocation of entrepreneurial and innovative capabilities *can* benefit, if information becomes cheaper. This means that entrepreneurial initiatives may, in principle, find their way more easily to the most productive use.

In a global, ICT-enhanced and co-operative world, the clock-speed of technological progress can improve greatly. This may even create opportunities for a rise in permanent economic growth. The changing efficiencies of value-chain structures mentioned may create a trend towards smaller and more competence-driven units of operation (e.g. HBD (2000)), which could foster innovation and positive entrepreneurial dynamics, improving opportunities and incentives for learning within and between organizations. Globalization and consumer empowerment could strengthen the incentives to share information. New forms of entrepreneurship and innovation as can be seen in ICT clusters anywhere illustrate the potential shake-up of the 'competitive' process of learning and innovation. Incentives to entrepreneurship may be gaining strength. The returns on innovations are increasingly hard to appropriate though secrecy or patents, but the opportunities to capitalize on innovations in a short lead-time are substantial.

Due to the direct and combined effects in the four causal sequences discussed above, individual and 'collective' processes of learning and innovation are probably undergoing change.

Firstly, as mentioned under logic 3, the processes of learning and innovation have specific features of increasing returns to scale and low marginal cost of reproduction. On the one hand, effective management of knowledge within organizations can improve organizational learning and innovation by 'channelling' spillover effects. On the other hand, the opportunities of the new information and communication tools trigger new incentives for researchers and entrepreneurs to communicate and share information (at the pre-competitive stage). Both effects may fuel technological progress as such, since barriers are being removed to learning in general (knowledge acquisition, information distribution, information interpretation and organizational memory (e.g. Huber (1996))<sup>1</sup>).

Secondly, as mentioned under logic 2, the improved market mechanisms will tend to directly benefit the efficient allocation of entrepreneurial and innovative incentives, and the efficient allocation of the corresponding returns. This in itself can improve the processes of innovation and technological progress, since, on average, entrepreneurial initiatives will find their way more easily to the most productive uses.

Thirdly, as mentioned under logic 1, the potential efficiencies of a new organization of many value chains seem to create a trend towards smaller and more competence-driven units of operation. This is bound to foster innovation and positive entrepreneurial dynamics, which, of course, interacts with the improved opportunities and incentives for intra- and inter-organizational learning. An entrepreneurial, networked economy ...

Finally (logic 4), globalization and consumer empowerment will strengthen the knowledge base of both product and process innovation (as processes), and the final quality of innovative processes and products (as results). A focus on the global context for inputs and output, and an improved involvement of consumers in product specification are crucial to this. The general mechanisms that lead to entrepreneurship and innovation in ICTs may, therefore, improve performance (and, in the end, economic growth).

### **Notes**

The causal sequences described above are an attempt to present a systematic picture of (potential) changes in the economy due to the opportunities created by the developments in information and communication technology. The

<sup>1</sup> It should probably be noted here that learning is an inherently cultural and social process, meaning that new ICTs may well destruct some of the most efficient mechanisms (things that go without saying). On the other hand, biases like groupthink (Janis (1982)) are likely to reduce as long as information circles are becoming larger and more flexible.

actual change that will be realized is path-dependent and, therefore, subject to substantial uncertainty.

There are a number of barriers to the described positive shocks and shifts to economic growth.

Firstly, *direct barriers* to changes can occur (1) due to the high investment cost, (2) due to the inherent investment risks, (3) due to misplaced sentiments, (4) due to failures to organize and maintain complex, efficient solutions, (5) due to misinformed decisions, and probably more. Most of these direct barriers have been touched upon in the discussion of the causal chains above.

Secondly, *scarcity* will remain to be very relevant at a local level for years to come. Labour and many inputs are still geographically bound. For many physical goods and non-physical goods, the transaction cost involved with 'utilizing' and 'managing' them over large distances remain to be considerable. Coordination cost, and the cost and risks to switch to the different organization of the value-creation process, are slow to decrease as well. The reluctance to change, especially from fairly successful (mature) solutions, is important. The evaluation of opportunity cost is increasingly complex for ambitious small and large firms alike.

Thirdly, in any system, *the weakest link* determines the feasible performance of the system. In our case, the realized speed of innovation and growth is determined by the ability to change by the slowest, most rigid links in the economic system. In case of economic change and growth, this might be the human capital of the working population, the average working practices, or the work-related values of managers and employees. It may also be our incapacity to keep on handling the stress of increased uncertainty for longer periods of time, or our psychological incapacity to abandon our routines unless forced by 'higher' elements.

In all respects, management and policy-making are critical. Entrepreneurs, managers and policy makers alike must attempt to anticipate and clear bottlenecks, and to avoid interfering in negative ways. Probably, ranges of problems cannot be handled at the organizational level that they first arise at. These require concerted action, clarification, facilitation and an economic system in which parties that have an interest in the same goals can find each other. The flip side of the coin is, obviously, that wrongly timed interference may do more harm than rightly timed facilitation may do good. Governments are likely to be important, though, since they are often the only credible 'director' of principally feasible win-win situations.



### 3 Summary, conclusions and further research

In summary, the potentially positive effects of the new economy include (1) improved organizational processes, (2) improved market mechanisms, (3) improved products with substantial economies of scale and scope, (4) improved trade and allocation of goods, and (5) improved processes of innovation and learning. These key processes mean that there are opportunities for firms and individuals to be more efficient, to be more flexible and to learn and improve more quickly. These effects could take shape (1) through reduced cost of information processing and reduced cost of communication, (2) through new products that improve customer satisfaction, and (3) through the further breakdown of barriers to learning, innovation and the dynamic efficiency of economic processes.

Not all is hallelujah. Hidden potentially negative effects, which are likely to result in a misallocation of resources, include adjustment cost, 'soft' transaction cost, increased overall dynamics and uncertainty, the asymmetric information on the quality of information and the possibly reduced incentives to learn once a favourable position is acquired.

For most SMEs, the sector structure is likely to undergo change in the near future. Alternatives to the present interaction with suppliers, partners and customers may become increasingly relevant. Alliances with other SMEs and appropriate larger partners are critical alternatives to current operations, in a number of sectors perhaps even the only way to survive. As such - overall -, it seems likely that smaller units of competence will gain competitiveness, as long as they are able to 'secure' advantages. The dependence on other parties within the value chain is likely to become increasingly often a relevant strategic consideration, but typically as an opportunity (and not a threat).

The opportunities for start-ups and entrepreneurship to intermediate information and/or products seem considerable, once again, though, definitely *not* without risks. Larger firms may well have a better starting position (reputation, customer base and capital). New balances in terms of efficiency, marketing and service will have to evolve. Product customization, bundling and consumer feedback may well be critical, and small firms are attractive for such functions.

Furthermore, SMEs can have a critical role in the production of new products. Intuitively different economies of scale and scope are arising, in which small firms can be global players. Especially in cooperative networks, SMEs can be efficient in supplying specific competencies. They can be flexible and efficient niche players. The trend for globalization seems to be a trend towards larger firms. However, SMEs seem to be crucial at a local level, especially in activities where 'soft information' is crucial. Within large organizations, 'soft information' does not travel easily; therefore, specialized SMEs are more effective.

Two types of research questions come up in relation to the developments synthesized in this paper. (1) How and why are specific subsystems of the economy changing, and (2) who, what and how many things are changing (in specific ways). The two types of questions require different methodologies. We should focus on the first type first. The first priority is to try to assess the microeconomic implications of ICTs on organizational processes and sector structures in the economy. The consequences for the strategies and behaviour of firms are critical in understanding the changing economic system. The second priority is to understand the changes in the learning and innovation processes. The 'face' of learning and innovation seems critical to the business dynamics in the next decade.

From a larger, more normative perspective, the most relevant questions are: (1) where are the barriers in relation to overall growth, and (2) how may (corporate) strategic decisions and (governmental) policy measures take away some of the barriers. The challenge is wide open.

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Economic and social conservatives put aside their differences. Freedom, they decided, was necessary for the exercise of virtue. The struggle against and ultimate defeat of the Soviet Union was more important than domestic politics or intramural disagreements. The debate over Trump's character and fitness for office opened, or poured salt on, wounds that have not and will not heal. Moreover, the varying opinions of Donald Trump the person became hard to disentangle from divergent assessments of his program. Fights over his rhetoric and behavior morphed into struggles over his economic and foreign policies, then changed back again. It became all too easy to score points by associating one's opponents with either Trump's most radical supporters or his most vociferous detractors. The new ways of producing and consuming of the collaborative economy bring with them regulatory and policy challenges with some positive moves in evidence to address those challenges and support the collaborative economy. The collaborative economy involves using internet technologies to connect distributed groups of people make better use of goods, skills and other useful things. It is going through a period of growth and experimentation and in order to gauge where the collaborative economy is headed, we need to start by getting a better grasp of its current state. The report identifies five d