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Editorial Board

PHILLIP J. BRYSON
DIETER CASSEL

The New Economy Revisited: Toward the Information Economy Introduction to this Issue

1. Introduction

References to the New Economy have become rather rare in recent years. The general belief that the New Economy is now dead is a reflection of the misperceptions that surrounded it in its prime and of those that have persisted since its rumoured demise. To some, the New Economy was nothing more than the new information and communications technologies (ICT) sectors of the economy. The crash of the NASDAQ and the closing of the *Neuer Markt*, a specific segment of the stock market in Germany, were interpreted by some to mean that the New Economy had passed from the scene.

The New Economy, as originally perceived, generally included the following elements: 1) the productivity revival in the United States from the second half of the 1990s; 2) the belief that the business cycle had been overcome and that recessions were a thing of the past; 3) the ascension of information as the most important productive factor in the economy as information and communications technologies (ICT) were applied to make all sectors of the economy more productive; 4) the institutional restructuring that was necessary for the corporate accommodation to the digital economy, which proved an important part of the transformation of commerce, the economy, and society.

The belief that the business cycle had been replaced by continuous growth proved illusory with the onset of the 2001-2003 recession. Economists had not generally accepted this conception of the New Economy (Bryson, 2001) as valid. None of the other propositions about the New Economy were really changed by the recession. Those who tend to believe that these phenomena are neither chimerical nor transitory, nor restricted to a small number of select industries, would still subscribe to the notion of a New Economy. Since it is no longer so new, however, it would be more appropriate to conceive henceforth of the relevant characteristics as descriptive of an "information economy."

On August 11 and 12, 2004, a group of American and German economists met in Provo, Utah, for a workshop on the New Economy sponsored by the Marriott School of Brigham Young University. The participants presented papers that addressed the characteristics and status of the Information Economy, which can be said to have been inaugurated by the upward shift in pro-

ductivity and growth experienced in the US economy from 1995 onwards. These papers, now in their final form, demonstrate that the application of the computer based ICT sector products and skills have had and will continue to have, significant and durable impacts on contemporary life.

Information and communications technologies have irrevocably changed the US economy and a growing number of others. In time it will doubtless impact more or less all economies. The macro economy must of course still deal with the decisions and actions of the aggregate of micro agents and we have all seen the evidence that despite new information age technologies, this cannot yet be done in a manner that eliminates the cycle. But the key element of the information economy, the increased productivity of the past decade, remains the foundation of the phenomenon of interest here. Moreover, it continues to motivate further analysis of its prospective economic, social and ethical consequences.

Section II of this introductory essay will consider the fundamental characteristics of the information economy. It will review the findings that caused analysts in the late nineties to begin to speak of a New Economy. Section III will discuss the developments of the post-recession period beginning approximately with 2000. It had been expected in some quarters that the productivity surge would end when the boom it fuelled came to the end not everyone had anticipated. That was, of course, not to be the case. Having established that the core of the New Economy did not end when the poorly informed saw some of their unfounded expectations shattered, Section IV will introduce the individual papers that make up this collection. This will provide several different perspectives of the information economy.

2. The Productivity Surge before the Clinton Recession

A rapid and widely underestimated decline in computer prices (Pakes, 2003) and the spectacular development of information and communications equipment in recent years permitted a dramatic diffusion of computer-based technologies across industrial and service sectors. This resulted not only in technical change that enabled the production of greater outputs from the same inputs but it also promoted a massive substitution of computers in home use and in the business sector for other types of equipment and for labour (Jorgenson and Stiroh, 1999). Econometric studies treat capital equipment as productive of "spillovers" which appear in analysis as "residual" economic growth after that attributable to labour and capital is evaluated.

From 1948-1973, output in the US economy grew at the rate of 3.4 per cent per year. Of that growth, capital and consumers' durables produced 43 per cent, while labour produced 32 per cent. Total factor productivity accounted for the remaining 25 per cent. But output growth slowed dramatically after the first oil crisis in 1973, then again somewhat after 1990. The rate of output

growth declined a full percentage point, or to 2.4 per cent per year, from 1990 to 1996. Jorgenson and Stiroh indicate that computers have contributed to growth, not only as an investment good, but also through a "service flow" to households.

Since 1990 computers have contributed nearly a sixth of the annual 2.4 per cent output growth, representing c. 20 per cent of the contribution of capital inputs to growth and 14 per cent of the consumers' durables services contribution. As computers produce growth spillover effects through all sectors of the economy, fundamental changes have been occurring. Returns to investments in ICT equipment have been captured by both producers and users through the substitution of computational equipment for other inputs.

After a protracted period of stagnant productivity growth, the arrival of the "New Economy" signalled an increase in labour productivity. After the mid-seventies, productivity had clearly slowed down, prohibiting a growth of incomes. Economists expected that the introduction of new technologies, especially in information processing and telecommunications, would ultimately reverse this trend and overcome the lag between the implementation of new technologies and the appearance of productivity effects. Heileman *et.al.* (2000, p. 36) show U.S. quarterly productivity rates trending upwards after about 1995. Because the time period in question is brief, New Economy sceptics doubted whether the dramatic productivity increases from 1995 could be sustained beyond the boom with which they were associated. Especially in the last phases of cyclical upturns, some periods of increasing productivity in the past had proved to be ephemeral. Sceptics withheld final judgment, although they did not fail to express their doubts about whether the New Economy productivity increase was legitimate, until sufficient time had passed to look carefully at the period of shifting productivity and beyond it.

The remarkable investments of U.S. firms in information and communications technologies, increased more than four-fold between 1995 and 1999 (Oliner and Sichel, 2000). In that same period, output per labour hour increased at approximately 2.5 per cent per annum. The contribution of ICT capital to output growth also increased impressively, nearly doubling to 1.1 percentage points as the real stocks of computer hardware and communications equipment expanded.

The mid-nineties' productivity resurgence was attributed to the remarkable development of semiconductor technology (Jorgenson, 2001). The resultant declining prices of computers brought about a significant, ongoing decline in ICT prices. Jorgenson and others have cited projections that semiconductor prices will continue to fall for at least another decade.

Jorgenson also indicates that capital input has been the most important source of U.S. economic growth throughout the post-war period. But that factor's contribution accelerated economic growth by nearly a full percentage

point after 1995. Of that increased growth, ICT was responsible for over half. Concurrent with this semiconductor development, structural (rather than cyclical) changes have reflected the impacts of diverse technological achievements. Jorgenson was unwilling to extrapolate the productivity growth of ICT technologies over the early period of the upward productivity shift into the future. That could be done if one could guarantee the persistence of a two-year product cycle for semiconductors. The growth of ICT capital services has been the product of that cycle; from 1990-95 such growth increased from 11.51 per cent annually to 19.41 in the second half of the decade. Over that same period, the non-ICT capital services grew from 1.72 per cent in the first half of the nineties to 2.94 per cent thereafter (Jorgenson, 2001, p. 12).

Robert Gordon (2000) was the major spokesman, respected and cited in the literature, for ICT sceptics. But his views were rejected by other analysts. Baily (2002), like most of his colleagues, rejected Gordon's findings and attributed a large increase in labour productivity to the rapid adoption of information technology capital and to more rapid multifactor productivity growth within the ICT sectors.

Gordon agreed that there had been faster labour productivity growth, even when adjusted for cyclical effects. But he saw this merely as the result of faster multifactor productivity growth limited to the ICT sector itself and to durable manufacturing. Those two sectors together constitute no more than about 12 per cent of the private economy. Gordon observed that during the boom of 1995-2000, even the New Economy optimists generally admitted that output growth was running at a faster pace than the sustainable long-term growth trend. His conclusion was that productivity growth was largely a cyclical phenomenon. He was inclined to doubt that ICT industries really represented fundamental technological change that could fully transform industrial processes and drive basic change in the organisation of the firm and its labour relations (Rheinisch-Westfaelisches Institut fuer Wirtschaftsforschung and Gordon, 2001; Dehio *et al*., 2003).

This interpretation of the productivity surge in the last half of the nineties was rejected by Baily and Lawrence (2001), who sided with the research results of a number of colleagues such as Sharpe (2000). Their contention was that substantial structural acceleration of total factor productivity had also occurred *outside* the ICT sector. They cited clear evidence of productivity acceleration in service industries where heavy reliance on ICT equipment verified the impact of the computer on the economy in general, rather than in the ICT sector alone. After all, labour productivity accelerated by 1.6 percentage points in the second half of the nineties and their estimates suggested there had been no significant cyclical impact on productivity growth. Their interpretation was that we had experienced a structural acceleration of productivity. The question, however, if and to what extent ICT has been the driving factor behind the structural change, remained an open one for some observers.

Baily (2002) offered a decisive refutation of Gordon's observation that the principal gains computers had to offer had already been exploited since they became available around 50 years ago. This betrayed a lack of sensitivity for the changes computers are yet capable of promoting, as users continually discover over time, new applications for computation. It also takes time to perceive the possibilities and then make adaptations in the organisation of firms that will permit the effects of the information revolution to be exploited. Most of these go far beyond numerical computation. A growth accounting framework that made use of both income and product data was employed by Baily to document a significant increase in multifactor productivity growth after 1995 outside the ICT hardware sector. In reviewing individual industries, he also cited evidence that innovative business practices not always related to the deployment of information technologies also helped to promote increased productivity. Finally, he related productivity growth to the competitive intensity of particular industries that were able to increase efficiency by eliminating inappropriate management practices. This effect encouraged highly productive enterprises to enter and low productivity firms to exit industries and promoted innovation on the part of survivors.

3. The Productivity Surge after the Clinton Recession

When the recession finally arrived, Oliner and Sichel (2001, p. 21) still anticipated a growth contribution from ICT investments "for at least the next few years." Baily and Lawrence (2001, p. 311) argued that the collapse of many dot.coms should not be interpreted as the demise of the new economy. They held that the commercial application of the internet had only recently become important and had not been the principal driver of the revival of productivity growth. The internet would surely prove even more important in the future, reducing communications and transactions costs, especially benefiting small companies. Litan and Rivlin (2001) estimated that the Internet would continue to add between a quarter and a half percentage point to future growth each year.

Well into the recession, periodical reports confirmed that productivity growth had held on. Even as the recession was ending, it was noticed that high productivity performance seemed to be keeping firms from hiring new workers; they were able to meet the early increase of orders with workers still on the payrolls. The end of the recession did not change the picture; the new economy persisted.

It was interesting that by this time, Hilsenrath (2003) reported in the *Wall Street Journal* that Gordon had experienced a change of heart. That seemed only reasonable, given the temporary productivity bubble that prompted Hilsenrath's report. From the beginning of the economic recovery in the fourth quarter of 2001 through the two following years, productivity had expanded at an annual rate in excess of 5 per cent, the fastest growth in a two-

year period in more than 50 years and over double the rate most economists had believed sustainable during the boom in the late nineties. Gordon attributed this brief productivity burst to unusually heavy corporate cost-cutting and some low-profile, intangible investments in the late nineties that generated the surge after 2000.

Hilsenrath also wrote of Robert Gordon's own conclusion that productivity would likely grow at a 3 per cent rate in the next few years and could grow 2.5 per cent annually during the next 20 years.

"The trend is so incredibly high," Gordon is reported as saying. "All of a sudden I turn out to be the optimist and not the pessimist." In a recent NBER paper (2003) he also tied the productivity surge to the issue of the so-called "jobless recovery." In the current recovery, the share of output growth attributable to productivity growth far exceeded the average of previous post-war recoveries, which implies that productivity growth may be responsible for the absence of job creation. At some stage in the recovery, orders would exceed the level that could be supplied with current (highly productive) employment, but not until that time would jobs be created. Despite its contribution to the jobless recovery, Gordon reminded the non-specialist that "productivity-led growth is nothing but good news."

By 2004, after the bubble growth of 2002-2003, Hilsenrath again reported that the rate of productivity growth had slowed to 1.9 per cent for the third quarter. But he remarked that "many economists still believe that relatively robust productivity improvements will remain a fixture of the economy in the coming years." For months, economists had been warning that productivity growth would slow as companies gradually hired additional workers and extended the duration of their workweeks to fill the growing number of post-recession orders. Nevertheless, the productivity slowdown was "surprisingly mild." That third quarter increase was the 14th straight quarterly increase in productivity, a record stretch of such productivity performance in the post-war era.

An important question addressed by the papers in this collection and one that has troubled many analysts, relates to the generally weak appearance of the New Economy in Europe. Temple (2002) and Daveri (2002) have speculated that it could be that heavy investment in the ICT sectors came somewhat later there and that it is still too early for the results to have been experienced. Daveri (2002), van Ark (2003) and the contributors to Schaefer (2003) also mention the possibility that reduced productivity benefits from ICT adoption in Europe were hampered by some "policy-induced impediments" and by "anti-competitive forces affecting labour and product market regulation."

A recent paper by Gordon (2004) offers some additional possible answers to this conundrum. He writes of an emerging consensus that U.S. institutions encourage creative destruction and that their financial markets welcome innovation. European corporatist institutions inhibit competitive forces and

discourage new entry. While these observations are important, another trend has been cited in recent literature.

Black and Lynch (2004) have produced research results demonstrative of significant changes in the organisation of workplaces where the increased labour productivity of the information economy has been experienced. These gains in labour productivity are associated with, but not identical to, productivity growth stemming from ICT investments. There is still uncertainty, however, as to whether they are sustainable. They suggest that productivity growth is a function of the extent to which workplace innovation has been integrated into the daily operations of a firm. They find that as workers are more involved in problem solving, productivity improves. If firms continue to reorganise to learn from their employees, productivity gains could persist into the future.

This view builds on earlier work (Brynjolfsson and Hitt, 2000) showing that the value added by computers is scarcely limited to tasks of numerical calculation. The symbol processing capacity of computation, as opposed to simple number crunching, will cause computer use to generate innovations into the foreseeable future. ICT investments are only the beginning of a process of restructuring of business processes to achieve cost reductions and enhanced output quality, including new products and improvements in product characteristics that are difficult to measure, e.g. amelioration of the variety, convenience, quality and timeliness of products.

Brynjolfsson and Hitt address the difficulty of measuring the full impact of the ICT revolution with econometric methods, which probably results in an understatement of the ICT contribution to economic and social restructuring. Litan and Rivlin (2001) also demonstrate that various aspects of the ICT revolution are not easily captured by the traditional growth accounting techniques. The usual quantitative analysis fails to capture intangible characteristics that improve product quality, enhance their characteristics and embody quality in new services and products. Nor is the speed of transactions and changed ownership captured quantitatively. Similarly, traditional measurement captures only the measurable aspects of investment, e.g. the prices and quantities of ICT products. Such measurement generally fails to capture the even more significant impacts of investments that develop essential labour and management skills, while developing complementary new services and products, new markets, organisational adaptations and business processes.

A forthcoming study published by the University of Chicago Press will report on a conference on "Measuring Capital in the New Economy," papers of which clarified and extended the findings reported above. Detailed information is analysed for individual industries, not merely those involved in producing ICT equipment and software. This research links the original econometric studies showing the productivity impacts of ICT investments and more recent ones showing the significance of the organisation of firms and the employment of college-educated workers in the information economy. Well-educat-

ed labour or human capital, respectively, is complementary to information technology capital; declining prices of information technology have driven up the demand for both ICT capital and college-educated workers. New stocks of information capital and the organisational forms that are required to take advantage of their possibilities have called for a highly educated labour force to staff and manage information economy firms.

4. Introduction to the Papers of this Special Issue

This set of papers provides important information and analysis about the ways the information and communications economy have been changing the world and our lives. They investigate ICT's impacts on the labour force, government and central bank policy, the way firms are financed and regulated and much more. This final section of our introduction briefly reviews these individual contributions.

The paper by Ullrich Heilemann (University of Leipzig) and Heinz Josef Münch (Rheinisch-Westfaelisches Institut fuer Wirtschaftsforschung – RWI), "The Clinton Era and the U.S. Business Cycle: What Changed?" reviews the performance of the U.S. economy from 1970, with emphasis on the "fabulous decade" of the 1990s. The latter represented the longest upswing in U.S. history. Their paper reviews the impacts of 19 classifying variables on the "New Economy's" performance. They find that the money supply had much less importance in macroeconomic policy outcomes in the "fabulous decade," than did net exports and unemployment. In the meantime, other variables, *viz*. the increase of real GNP, inflation, government expenditures and unit labour costs, were playing a much stronger role than in the period after 1970 generally. Their data are interpreted as a confirmation of the fabulous decade. The expansive performance was made possible by a deficit-targeting fiscal policy, low inflation, and a surge in productivity. But all of these were seen as the result of a monetary policy which can be described as "forbearing." Clearly, a lot of things were happening in this period and all cannot be attributed to the productivity increase cited by Heilemann and Münch. The New Economy also prospered on the basis of a fruitful environment and effective policy.

"The Destabilising Impact of Reduced Transaction Costs on Economic Activity" by Sampson and Bryson analyses the implications of one of the more remarkable phenomena associated with the advent of the New Economy, i.e. the sharp reduction in business transaction costs, resulting from the very widespread adoption by businesses and consumers of information technologies surrounding the personal computer and the internet. These authors find that the dramatic increase in the availability of information generated by ICT equipment necessitates a reconsideration of the application of economic theories of perfect and imperfect competition to prevailing economic realities. Even more significantly, they attempt to show how the reduction in transaction costs, impacting commercial processes the way friction impacts physical

processes, results in destabilising business practices and outcomes that were traditional before the onset of the New Economy. The specific effects of reduced transactions costs on Michael Porter's "Five Forces" demonstrate how destabilising influences emanate from the reduction in those costs.

In an article entitled "The New Economy and its Implications for Monetary and Fiscal Policy," Albrecht F. Michler of Duesseldorf University notes that the adoption of information and communications technologies drove an acceleration of productivity growth as globalisation fostered increased integration of international goods and financial markets. He asks whether a traditional macroeconomic policy can still function in the environment of the New Economy. Michler reviews macroeconomic developments in the major industrial countries in the 1990s and evidence suggesting the existence of new macroeconomic interdependencies. He also considers the business cycle implications of the ICT revolution. Michler is agnostic as to whether the productivity surge experienced in the U.S. after 1995 can continue into the future since the number of years since the phenomenon has been observable has been insufficient to demonstrate that a long-term trend has been established.

An interest in the consequences of internet technology for the banking industry and for current payment systems motivated the research of Uwe Vollmer of the University of Leipzig. His article, "Internet Banking and E-Money: Implications for Commercial Banks and the Payment System," concludes that although the ICT revolution will result in some consolidation of the banking sector, the form and functions of contemporary financial institutions will not likely undergo complete transformation. Banks will continue to perform the same functions and money will serve largely the same purposes. Money users might enjoy less privacy if the system opts for more transparency in an age of extensive money-laundering institutions, especially if e-money becomes legal tender. E-money leaves a much more distinct paper trail than cash.

Thomas Apolte of the University of Muenster addresses the impacts of the information economy on labour markets. His paper, "Labour Markets in the New Economy: A Comparative View of Germany and the United States," provides an important analysis of some of the reasons why economic growth in Germany has lagged behind that of the U.S. As employment and productivity grew in the United States during the 1990s, unemployment grew in Germany and real growth in the economy was low. Rigidities in labour markets prevented the realisation of a contribution by the ICT sectors to growth and unemployment in Germany. Investments in ITC capital and skilled German manpower are such that one should be able to expect strong performance benefiting from the development of a New Economy there. Only the lack of restructuring of industries to enable an effective adaptation of the new technologies has kept this from happening. The same can be said of several other major European economies.

Dirk Wentzel of Pforzheim University contributes an article entitled "European Legislation on the New Media: An Appropriate Framework for the Information Economy?"

He describes the regulatory and legal framework in which the telecommunications industries of the European Union have developed in the New Economy and compares that experience with the situation in the United States. He considers the varying regulatory institutions of the Union, the individual countries, and the regions of Europe, considering the institutional interaction of the respective governments and agencies. As compared to the United States, the European media markets are comparably equipped with human resources and technical infrastructure. In the field of digital media, the European Union's regulatory philosophy is less "market-friendly," but Wentzel indicates that the legal framework has permitted satisfactory performance. ICT investments have had a less significant impact on economic growth than in the United States, however, because the institutions of the surrounding business environment are less market-oriented and because of the stronger regulatory restrictions in EU labour markets.

"The Eastern Expansion of the Digital EU," by Paul J.J. Welfens and Jarosław K. Ponder, surveys the development of the ICT sectors, especially telecommunications, in both the former EU and in the newly acceded, former centrally planned economies of East and Central Europe. A very important part of the transition of these countries to market orientation is the development of the information and telecommunications industries and the incorporation of the products and processes of those industries across their entire economies. That development will enhance economic growth and promote increased labour productivity; it will also permit economic integration with the more developed economies of the European Union.

Welfens and Ponder ask whether the new Central and Eastern European member nations can overtake the original members as all EU nations endeavour to exploit the productivity and growth potential inherent in the information economy. The reader gains an idea as to the path new members must follow in pursuit of the original members who started down the path earlier.

The original members of the EU have mostly succeeded in implementing the new information and communications technologies; in mobile telephone technologies they have led the world. The use of ICT has led in some cases, especially along the continent's northern tier of countries (including most of Scandinavia, the British Isles and the Netherlands), to the productivity and growth benefits associated with the "new economy." In other cases, such as Germany and France, the use of the ICT technologies has not generated the desired productivity enhancements and economic growth. As will be made clear by the papers of this collection, developing the information economy requires not only incorporation of the new technologies, but also the reorganisation of business firms and the employment of the skilled labour that

can make it possible more fully to exploit the potential benefits of those technologies.

The paper by Montgomery and Pinegar, "Valuing Global Depositary Receipts: the Case of Telekomunikacja Polska," illustrates a number of the elements of the New Economy. It reminds us, first of all, that the New Economy is an integral part of a global economy. Globalisation is, to some extent, a result of the information revolution; both phenomena are products of similar sets of technological and social forces functioning in recent decades. It is apparent that an economy such as Poland's must be concerned that it becomes a part of the New Economy as well as a part of the global economy. To fail to participate in the welfare gains made possible by global specialisation, division of labour and trade is to fail to share in the growing prosperity of participant nations.

It is also important to recognise the significance of international finance questions in the information and global economies. In this paper, we are able to observe how the government of Poland has been able to tap resources of the international (especially the US) financial community while privatising its monopoly telecommunications firm. It does so, joining other European telecommunications firms, via Global Depositary Receipts (GDRs) traded *inter alia* on the New York Stock Exchange. This paper describes both telecommunications and other developments within Poland and the international financial institutions involved in this important Polish effort as a part of developing an information economy in a global context.

Montgomery and Pinegar consider the risks involved for investors stemming both from the type of telecommunications company and the country of issue (defined as "developing"). They conclude that the price of the GDRs issued by Telekomunikacja Polska were too high at the time of the initial public offering. The price may have been fair in a relative sense, but it is likely that these prices were too high for many telecommunications firms in Europe and the US at the time of TPSA's initial public offering. To the extent that was true, the pricing of TPSA may have inflated expectations about the investment's future worth.

In reviewing the events and analysis offered, the uninitiated reader is introduced to some of the important institutions, instruments and considerations of international finance. The technical analysis, very clearly explained, is demonstrative of the significant and sometimes intricate financial arrangements associated with the development of the information and global economies.

Robert Crawford of Brigham Young University writes on "The Ethics of Productivity in the Information Economy." His efforts demonstrate an effort to supplement professional economics skills with those derived from numerous years of formal study of and research in philosophy, especially on the writings of Emmanuel Levinas. He conveys important information about the issues of morality associated with processes of economic change such as those as-

sociated with the New Economy. When new technologies, new services and new firms are introduced and prosper, they generally render others non-competitive. Assets are rendered unprofitable and workers in old industries are rendered superfluous. Western societies struggle with the claims of displaced labour and of defunct firms, sensing some sort of obligation to respond to their losses. Crawford considers similar ethical questions related to the loss of jobs in the domestic economy resulting from the process of outsourcing productive tasks. Whereas we should be obligated to those who suffer loss in the wake of technical progress, we must also remain cognisant of an important truth. Crawford writes: "As the literature on regulation has shown, regulatory protection seldom performs as it is intended. In many instances, protectionist social policies have amounted to 'rent' appropriation by the politically well connected." But the challenge that motivated the development of a *sozialmarktwirtschaft,* a "social market economy" in Germany – to obtain the benefits of a functioning market economy, while attempting to secure a future for those less capable of adequate performance in that environment – remains a challenge for market advocates of the present.

These papers demonstrate that the impacts of information and communications technologies continue to change the world in profound ways. There is no question that where the new technologies have had a significant impact on the organization and conduct of commerce, labour productivity has been stimulated dramatically. It is difficult to say how long the increased productivity will continue, but it is clear that the past decade has been a watershed in global economic development.

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The Clinton Era and the U.S. Business Cycle: What Changed?*

Abstract

The 1990s was the most prosperous decade in U.S. economic history. This paper analyses to what extent this period fits into preceding cyclical experiences and has been done by classifying the period 1991-12 to 2000-12 with the help of a 4-phase classification scheme based on multivariate discriminant analysis. It is shown that in relation to the post 1970 experience, the "fabulous decade" saw considerable shifts of influence amongst the 19 classifying variables employed. Most noteworthy is the much reduced influence of M2, net exports and unemployment on the one side and the increase of real GNP, inflation, government expenditure and of unit labour cost on the other. This confirms interpretations of the fabulous decade as the result of a forbearing monetary policy made possible by a deficit-targeting fiscal policy, low inflation and a productivity jump. However, the era loses some of its uniqueness when it is seen in the entire post-WW II cycle history.

1. Introduction

The 1990s was probably the most prosperous decade in the history of the United States. At a rate of 4.2 per cent per annum, economic growth was more than 0.5 percentage points higher than in the period 1960 to 1992, despite a 0.5 per cent lower rate of population growth (on this and the following: Heilemann, 2003). Employment rose by only 1.7 per cent vs. 1.9 per cent, but inflation increased by a mere 2.5 per cent compared with the 5.0 of the previous 30 years. Real income per capita rose by 3.2 per cent – 1 percentage point more than in the reference period. As a consequence, the Federal deficit/GDP ratio decreased from -1.6 per cent to -1.2 per cent. The balance is even more favourable if the "fabulous decade" (Blinder, Yellen 2001) is compared with the preceding decade and, most of all, if the dynamics within the era i.e. the spurt in the second half of the 1990s is taken into account.

In the age of "diminished expectations," the new prosperity in the 1990s came as a surprise, not only to the general public and to political actors, but also to

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economists. One reason for this may have been the fact that the long duration of the expansion was the result of many causes and their interaction, with good luck not being an insignificant factor. To be more specific, the fabulous decade seems to have been the result of at least three, more or less related factors:[1] Firstly, the Clinton presidency had inherited considerable budget deficits that, as regards monetary policy, required reduction. The new administration, backed by the electorate, followed a firm, deficit-targeted fiscal policy and was, in a sense, rewarded by the Fed with low real interest rates for an unusually long time; this, of course, provided a substantial stimulus for the economy. Secondly, the deregulation and liberalisation of the 1980s and only gradually tightening markets helped to keep the inflation rate down. This was assisted by a credible monetary policy and a surge in productivity as a (late) consequence of the high tech revolution. Finally, the 1998 currency crises in South America, South East Asia and Russia required (and received) assistance from the U.S. monetary policy, *i.e.* low interest rates. The currency crises led to a revaluation of the U.S. dollar, which helped to keep U.S. inflation under control. This in return made it easier for monetary policy to keep interest rates down.

Students of the era might differ today about the relative contribution of each of these factors – although the list of factors can hardly be debated. But, in the late 1990s there were also other, less event – and policy-focussed views of the causes of the Clinton expansion and their consequences. Pointing out a number of reasons, such as the IT-economy and the concomitant reduction in transaction costs, Weber (1997) and others were quick to declare the "end of the business cycle." The proclamation was not new – it usually comes up in the later phases of long upswings and the end of the cycle had been proclaimed in the late 1920s and in the 1960s. Weber's and others' diagnosis found much opposition, emphasising that only a few factors, notably its length, distinguished the present expansion from its predecessors (Zarnowitz 1999).

It appears more in line with the facts, principally because of the onset and the overcoming of the 2001 recession, that the policy conclusions from the fabulous decade should celebrate the renaissance of macroeconomic policy, in particular of monetary policy (Blinder, Yellen 2001, 83ff.). This is a view that finds much support when the economic record of the Clinton administration is analysed in terms of the partisan theory of political business cycles (Alesina, Roubini, Cohen 1997). In this view, the Democratic administration was very successful with respect to the goals of growth, employment and inflation, but less successful than previous Democratic administrations (in the 1960s!). As to the government deficit, the performance considerably

[1] On this and the following see Blinder, Yellen 2001, Frankel, Orszag 2002, Heilemann 2002, 2003, Krueger, Solow (eds.) 2002

surpassed this reference and those of Republican administrations (Heilemann 2003; for more detailed analyses of the macroeconomic performance and policy of the Clinton era – see for example, Krueger, Solow (eds.) 2002 and Frankel, Orszag (eds.) 2002).

Despite the necessity of analysing the 1990s from a current perspective, it seems equally essential to also take a longer-term perspective. How different is the longest upswing in U.S. history from its predecessors? What were, next to the long duration, the characteristics of the "fabulous decade"? Were there new elements shaping this cycle or can they already be detected in earlier ones? To answer these questions, this paper analyses U.S. business/growth cycles within the framework of a four-phase classification scheme based on multivariate discriminant analysis (MVDA). This will allow statements about dominant influences on the cycle and its phases from a long run, quantitative perspective. The scheme to be used has been developed by Meyer/Weinberg (M/W) in the mid 1970s (M/W 1975a, b) and updated and revised by the present authors (Heilemann, Münch 2002).

These are rather limited interests. The paper will *not* address questions around which much of the past discussions on the topic have centred, such as reduced volatility (see e. g., McConnell, Perez-Quiros 2000, Romer 1999). Nor will we discuss the dating and duration of U.S. cycles (Hamilton 1989, Watson 1994). The reasons for this omission are that the focus of these questions is limited to GNP and that it is much more closely linked to forecasting interests – did "leads" change? – whilst we are searching in this paper for more substantive, "structural" answers.

The paper proceeds as follows: The next section presents the M/W scheme and its results so far. Based on this scheme, section III examines the Clinton era. Section IV summarises the findings and draws some conclusions as to economic policy and further analysis of the U.S. cycle.

2. The reference scheme

Classification of business cycles has a long tradition (Zarnowitz 1992, 20ff.). Of the divergent motives for this, the still dominant one appears to be the identification of indicators for forecasting purposes (Moore 1992). The broadening of the cognitive base of business cycle analysis and the uncovering of "stylised facts" (Mitchell, 1951) lost much of their previous interest with the advent of macroeconomic analysis. For the U.S. the Burns/Mitchell's (1947) 9 (5) stage schemes or the NBER's two-stage-scheme (Zarnowitz 1992, 217ff.) were, for a long time, the only schemes in use. In the early 1980s Eckstein/Sinai (1986) introduced a 5-phase cycle that emphasised the role of credit crunches. Not long ago, Sichel (1994) presented a 3-phase scheme of the U. S.

business cycle, driven mainly by the inventory cycle. Neither of the two latter schemes seems to be widely used.

2.1. The original M/W business cycle scheme

In the mid 1970s John Meyer and Daniel Weinberg (M/W) (1975a, b, 1976) presented a new scheme to classify U.S. business cycles. The starting point was the NBER's business cycle dating, a 2-stage cycle scheme. With the help of 20 variables, they split it into a 4-phase scheme, entailing "Recovery", "Demand-pull", "Stagflation", and "Recession".[2] The variables and their weights used to separate the stages were selected by LMDA.[3] The resulting scheme (stages and variables) was successfully tested, not only for the then existing five U.S. post-WWII cycles, but also for pre-WW II cycles. In various updates and extensions by M/W and the present authors (for the U.S.: Heilemann 1982; for Germany: Heilemann, Münch [H/M] 1999, 2002), the scheme proved to be rather successful, even though in the German case the sample period had almost doubled.

M/W had suggested a 4-phase scheme, defined as follows (M/W 1975a, 172f.): (1) *Recession*. A period of some duration in which total aggregate activity actually declines somewhat from previous peak levels and is reasonably widely diffused throughout the economy. (2) *Recovery*. The early expansion out of a recession and a state of economic affairs in which everything is "going well" – unemployment is declining, prices are relatively stable, productivity is rising and total output is expanding. (3) *Demand-Pull-Inflation*. The classic inflationary situation in which "too much money chases too few goods". The forces of recovery are somehow allowed to achieve too much force or pull, with production up to capacity constraints, prices rising and rates of productivity improvement declining, etc. (4) *Stagflation*. A situation of stagnation at a high level of activity mixed with price inflation. The strains of Demand-Pull-Inflation perhaps recede and total monetary expansion diminishes. However, prices and wages continue to increase; perhaps because of catch-up effects due to sectoral imbalances created during the preceding Demand-Pull-Inflation, or because productivity does not improve enough to stabilise wage cost.

M/W had started with the NBER classification for the period February 1947 to September 1973. Their new stages, "Demand-Pull" and "Stagflation", were separated – from "Upswing" and "Recession" respectively – by "common economic sense" augmented by general knowledge of "recent business cycle his-

[2] It is not difficult to develop a formal model based on the 20 (19) classifying variables of the M/W scheme to explain the four-cycle stages; for an exercise with the BEA' s index of leading indicators see de Leeuw 1992.

[3] For a detailed description see, for example, Brosius, 1989. For a short outline see Heilemann, Münch, 2002.

Table 1. – CLASSIFICATION OF US BUSINESS CYCLES INTO A 4-STAGE SCHEME 1948-5 TO 2000-12

Cycle[1]		Starting month of …			
		Recovery	Demand-Pull	Stagflation	Recession
1	1948-5 to 1949-10 (18)	…	…	1948-5 (7)	1948-12 (11)
2	1949-11 to 1954-7 (57)	1949-11 (8)	1950-7 (6)	1951-1 (34)	1953-11 (9)
3	1954-8 to 1958-4 (45)	1954-8 (7)	1955-3 (30)	-	1957-9 (8)
4	1958-5 to 1961-1 (33)	1958-5 (25)	-	-	1960-6 (8)
5	1961-2 to 1970-11 (118)	1961-2 (51)	1965-5 (31)	1967-12 (25)	1970-1 (11)
6	1970-12 to 1975-3 (52)	1970-12 (25)	1973-1 (21)	-	1974-10 (6)
7	1975-4 to 1980-9 (66)	1975-4 (39)	1978-7 (12)	-	1979-7 (15)
8	1980-10 to 1982-12 (27)	1980-10 (6)	1981-4 (6)	-	1981-10 (15)
9	1983-1 to 1991-12 (107)	1983-1 (15)	1984-4 (43)	1987-11 (36)	1990-11 (13)
10	1991-12 to … [2012]	1991-12 (73)	…	…	…
	1948-5 to 2000-12 (632, Ø63)	285 (Ø 32)	149 (Ø 21)	102 (Ø 26)	96 (Ø 10)

Sources: Meyer/Weinberg (1948-5 to 1973-9), and authors' computations (1973-10 to 2000-12).
– 1) Length of cycle/phase in parentheses.

tory" (M/W 1975a, p. 175)[4]. Following an *a priori* classification of the sample period, this period was then classified with the help of Bayesian multivariate discriminant functions containing 20 variables. Boundary months between cyclical stages were re-assigned, in an iterative way, according to the classifications of the LMDA. The resulting dating of the first 6 post-WW II cycles and their stages are shown in Table 1. The variables used in the initial discriminant analysis were those (1) used by the NBER in its cycle chronic, (2) variables suggested by policy analysis and historical considerations, (3) variables that figured prominently in macroeconomic models or (4) that had been singled out as particularly sensitive cyclical indicators (M/W 1975a, p. 176). However, while the NBER business cycle dating is based on the levels of variables (see e.g., Zarnowitz 1992, p. 284), classification procedures, such as the present one, have to be based on more or less stationary data to deliver reasonable results.[5] Hence, all variables with an underlying trend have to be transformed into changes or differences. The average values of the classifying variables in the 4 stages "more or less confirm prior expectations in different cyclical stages" (M/W 1975a, p. 178, see also Table 2, line a).

[4] For good overviews over the various cycles, see e. g., Glasner (ed.) 1997, Zarnowitz 1992, 20ff.
[5] Data sources are reported in M/W 1975a.

Table 2. – AVERAGE VALUES OF CLASSIFYING VARIABLES 1948-5 TO 2000-12

Variable		Stage[1]				
		Recovery	Demand-Pull	Stagflation	Recession	All
Real GNP[2]	a	4,09	4,51	4,39	-0,32	3,46
	b	3,84	4,51	4,39	-0,32	3,45
	c	3,96	4,05	3,37	-0,52	3,03
	d	3,66	4,05	3,37	-0,52	3,15
	e	3,47	-	-	-	-
Unemployment rate	a	6,49	5,33	4,04	6,56	5,70
	b	6,10	5,33	4,04	6,56	5,66
	c	7,28	6,35	5,43	7,60	6,78
	d	6,27	6,35	5,43	7,60	6,38
	e	5.21	-	-	-	-
Index of unit labour cost, private economy[2]	a	1,09	2,49	4,04	5,42	2,86
	b	0,70	2,49	4,04	5,42	2,38
	c	2,97	2,91	2,32	6,75	3,60
	d	1,35	2,91	2,32	6,75	2,54
	e	-0,02	-	-	-	-
Govt. surplus or deficit as per cent of GNP[2]	a	-1,29	-1,34	-0,73	-1,58	-1,25
	b	-1,26	-1,34	-0,73	-1,58	-1,24
	c	-2,94	-2,37	-2,36	-2,83	-2,65
	d	-1,96	-2,37	-2,36	-2,83	-2,21
	e	-0,77	-	-	-	-
GNP price deflator[2]	a	3,56	4,13	3,89	4,58	3,98
	b	2,96	4,13	3,89	4,58	3,63
	c	5,98	5,05	3,66	6,86	5,52
	d	3,73	5,05	3,66	6,86	4,45
	e	1,94	-	-	-	-
Prime rate[3]	a	0,34	1,19	0,88	-1,60	0,33
	b	0,30	1,19	0,88	-1,60	0,32
	c	0,38	1,22	0,30	-2,17	0,15
	d	0,30	1,22	0,30	-2,17	0,17
	e	0,50	-	-	-	-
Gross govt. expenditures[2]	a	4,68	7,16	16,30	6,94	8,07
	b	3,20	7,16	16,30	6,94	6,82
	c	7,56	7,63	3,28	10,34	7,51
	d	3,77	7,63	3,28	10,34	5,49
	e	0,81	-	-	-	-
Money supply M2[2]	a	9,03	7,05	5,45	5,31	7,08
	b	7,16	7,05	5,45	5,31	6,58
	c	11,48	8,09	5,02	6,95	8,57
	d	7,36	8,09	5,02	6,95	7,24
	e	4,43	-	-	-	-

Table 2, continued

Variable		Stage[1]				
		Recovery	Demand-Pull	Stagflation	Recession	All
Money supply M1[2]	a	4,93	6,35	4,05	3,40	4,88
	b	4,20	6,35	4,05	3,40	4,56
	c	7,35	9,00	3,00	5,94	6,99
	d	4,92	9,00	3,00	5,94	5,80
	e	1,80	-	-	-	-
Net exports as per cent of GNP	a	0,12	-0,01	0,17	0,41	0,15
	b	-0,30	-0,01	0,17	0,41	-0,05
	c	-0,08	-0,38	-0,50	0,01	-0,22
	d	-0,59	-0,38	-0,50	0,01	-0,45
	e	-1,09	-	-	-	-
Wholesale price index, industrial[2]	a	2,70	4,42	3,73	5,43	3,89
commodities only	b	2,29	4,42	3,73	5,43	3,50
	c	5,44	5,43	4,03	9,71	6,06
	d	3,30	5,43	4,03	9,71	4,72
	e	1,77	-	-	-	-
Compensation per man-hour[2]	a	4,71	5,42	5,46	3,89	4,91
	b	4,99	5,42	5,46	3,89	5,00
	c	4,88	4,84	5,09	4,90	4,90
	d	5,19	4,84	5,09	4,90	5,06
	e	5,42	-	-	-	-
Average yields on corporate bonds (Moody's)[3]	a	0,18	0,68	0,34	-0,45	0,24
	b	0,07	0,68	0,34	-0,45	0,18
	c	0,07	0,40	-0,25	-0,31	0,06
	d	-0,04	0,40	-0,25	-0,31	0,00
	e	-0,08-	-	-	-	-
Consumer price index[2]	a	3,23	4,21	4,64	5,59	4,22
	b	3,04	4,21	4,64	5,59	3,96
	c	5,69	5,90	4,67	8,79	6,21
	d	4,02	5,90	4,67	8,79	5,16
	e	2,67	-	-	-	-
Consumer price index, food only[2]	a	2,52	5,15	5,12	3,92	4,04
	b	2,45	5,15	5,12	3,92	3,74
	c	5,07	7,82	5,15	6,19	6,19
	d	3,53	7,82	5,15	6,19	5,03
	e	2,48	-	-	-	-
Output per man-hour[2]	a	3,53	1,99	1,77	0,73	2,23
	b	3,00	1,99	1,77	0,73	2,22
	c	3,11	1,39	1,09	-0,14	1,63
	d	2,57	1,39	1,09	-0,14	1,78
	e	1,95	-	-	-	-

Table 2, continued

Variable		Stage[1]				
		Recovery	Demand-Pull	Stagflation	Recession	All
N.Y. Stock Exchange composite price index[2]	a	1,04	0,24	1,05	0,24	0,66
	b	1,05	0,24	0,20	1,11	0,73
	c	0,89	-0,04	0,25	1,85	0,69
	d	0,98	-0,04	0,25	1,85	0,80
	e	1,08	-	-	-	-
Consumer price index, all commodities[2] Except food	a	3,48	3,91	4,54	6,13	4,30
	b	3,18	3,91	4,54	6,13	4,02
	c	5,92	5,33	4,57	9,36	6,20
	d	4,11	5,33	4,57	9,36	5,15
	e	2,67	-	-	-	-
Wholesale price index[2]	a	2,36	4,61	3,68	4,20	3,60
	b	2,02	4,61	3,68	4,20	3,23
	c	5,04	6,07	4,12	7,85	5,79
	d	3,02	6,07	4,12	7,85	4,48
	e	1,60	-	-	-	-

Authors' computations. – 1) a: Results for period a: 1948-5 to 1991-11, b: 1948-5 to 2000-12, c: 1970-12 to 1991-11, d: 1970-12 to 2000-12, e: 1991-12 to 2000-12. – 2) Per cent changes are against previous year. – 3) Per cent changes against previous month.

Eigenvalues and cumulative proportions of "explained" dispersion led M/W to find two canonical discriminant functions as sufficient and allowing them a straightforward interpretation of results. The first discriminant function differentiates by unemployment, changes in the interest rate, productivity and various price deflators, thus separating recessions and recoveries from the two "inflation" periods. "Specifically, high unemployment rates, good productivity gains, negative changes in corporate bond rates and small to negative price changes will yield a high negative score on this index; opposite conditions will register positively" (M/W 1975a, p. 178). The second function apparently adds only a little to this differentiation. Principally, the course of interest rates helps somewhat in separating the "growth" stages (Recovery, Demand-Pull) from the two "no-growth" periods.

From the perspective of M/W, classification results within and outside the sample were satisfying and promising (M/W 1975a, 187ff.). The error rate amounted to 9.4 per cent within the sample period and to 40 per cent outside the sample period 1973-10 to 1974-12: But for more conventional analyses, the latter time span also presented a rather ambivalent episode, oscillating between "slumpflation" and "inflationary recession (M/W 1975b, p. 12), later to be labelled as stagflation.

2.2. Updating and modifying the M/W scheme to 2000

Before updating the 30 year-old scheme we tried to reproduce M/W's results. The details and results of this and of the following update have been described elsewhere (H/M 2002), so we can be brief on this issue here. All in all, the modifications made were moderate. The most important changes made were: first, the conversion of the variables employed (listed in Table 2) into change rates against the previous year; second, the extension of the number of discriminant functions to three, although this makes interpretation of their parameters more difficult and third, GDP prices were dropped from the set of classifying variables.

The classification procedure for the period 1973 to 2000 followed the iterative technique utilised by M/W (1975a).[6] It started, again, with NBER's 2-phase classification of the 1973/2000 period, split into Recovery/Demand-Pull-Inflation and Stagflation/Recession. For data reasons, extremely short *a priori* demand-pull and stagflation phases, but also because we were primarily interested in the Clinton era, the analysis did not include the 2001 recession and the following recovery.

The *a priori* classification of the new sample period was modified according to the classification results of LMDA for the various sample periods. Dating and classifications of the 4 cycles after 1973 are also displayed in Table 1. Even after modification, they still meet the classification dates by the NBER and also those by Hamilton (1989, Sichel 1994). As can already be guessed from previous results and from history, since 1973, stagflation is identified only in *one* of the five new cycles.

The average values for the classifying variables (Table 2, line b) are in line with the current understanding of the stylised facts of the U.S. cycle. When compared with averages of the M/W-sample (1948-5 to 1973-9), the levels (of rates of change!) of some variables are different, but their inter-phase relationships are very similar to those of M/W.

The newly estimated parameters and their influence differ considerably from those for the earlier periods (see Table 3). This is particularly the case for unemployment and real GNP. More or less unchanged parameters and weights (F-value to enter) are revealed only for gross government expenditure, M1, compensation per man-hour and output per man-hour. But, most of these are only of minor importance within the functions.

The cyclical characters became more evenly distributed and the weight of the majority of variables has been reduced. This is particularly the case for the various measures of inflation. Only the importance of real GNP and of net exports – indicators of economic activity – has strengthened. Although economic interpretation of these results must be careful (see also e.g., Weihs,

[6] The computations were performed with the discriminant analysis routine of SPSS, Version 10.

Sondhaus 2000) – the results seem to underline that, with the exception of the unemployment rate, inflation lost much of its discriminating power.

The "explained variance" (Table 3) for the first discriminant function – discriminating between recovery and demand-pull – is reduced to 50 per cent (from nearly 70 per cent), corresponding with a doubling of this ratio in the second function from 20 to more than 35 per cent, which confirms the picture rendered by the F-values.

Table 3. – ESTIMATION RESULTS FOR THE STANDARDISED CANONICAL DISCRIMINANT FUNCTIONS[1] 1948-5 TO 2000-12

Variable		Coefficients of function1			F-Value to enter
		1	2	3	
Real GNP[2]	a	-0,08	0,68	0,34	108,0
	b	-0,51	0,50	0,13	123,8
	c	0,32	0,34	-0,22	70,4
	d	-0,74	-0,04	0,04	92,7
Unemployment rate	a	1,36	-0,12	0,42	88,9
	b	1,21	0,66	0,38	75,9
	c	0,20	-0,60	-0,27	34,2
	d	0,85	0,91	1,84	20,6
Index of unit labour cost. private economy[2]	a	0,16	-0,18	0,63	34,6
	b	-0,03	-0,14	0,30	52,5
	C	0,06	-0,66	-0,49	14,7
	d	0,20	0,08	0,03	27,9
Govt. surplus or deficit as per cent of GNP[2]	a	0,89	-0,05	-0,04	4,7
	b	0,78	0,20	0,30	4,1
	c	-0,77	-0,57	0,15	3,7
	d	0,96	0,92	2,10	3,6
GNP price deflator[2]	a	0,14	0,56	-0,27	3,6
	b	-0,08	0,41	0,17	15,4
	c	-1,07	1,93	0,76	19,1
	d	-1,14	0,81	-1,10	27,9
Prime rate[3]	a	0,03	0,14	-0,10	11,1
	b	-0,02	0,16	-0,10	12,7
	c	-0,14	0,15	0,12	4,8
	d	-0,09	0,22	0,04	6,4
Gross govt. expenditures[2]	a	-0,31	-0,10	-0,69	20,9
	b	-0,06	-0,22	-0,38	34,8
	c	0,03	-0,05	-0,08	25,6
	d	0,10	-0,80	0,10	44,9
Money supply M2[2]	a	0,52	0,54	-0,49	63,3
	b	-0,17	0,18	0,09	15,2
	c	-0,06	0,58	0,57	139,2
	d	0,13	-0,06	-0,01	7,1
Money supply M1[2]	a	-0,04	-0,16	1,39	19,4
	b	-0,22	-0,09	0,72	15,3
	c	1,45	-0,27	-0,84	52,9
	d	0,03	-0,44	0,82	25,5

Table 3, continued

Variable		Coefficients of function1			F-Value to enter
		1	2	3	
Net exports as per cent of GNP	a	0,30	-0,05	0,68	9,0
	b	-0,14	-0,37	0,45	21,2
	c	2,09	-0,73	0,18	40,8
	d	0,48	0,28	0,53	8,1
Wholesale price index, industrial[2] commodities only	a	0,32	1,29	0,35	6,1
	b	-0,48	0,91	0,57	12,2
	c	1,28	1,47	-0,93	8,0
	d	-1,38	0,43	1,47	19,1
Compensation per man-hour[2]	a	0,32	1,29	0,35	19,4
	b	-0,30	0,0	-0,02	21,1
	c	-0,95	0,09	1,17	9,8
	d	-0,07	0,14	0,01	16,2
Average yields on corporate bonds (Moody's)[2]	a	-0,02	0,16	0,06	5,2
	b	-0,07	0,12	0,06	5,5
	c	-0,11	0,04	-0,04	0,9
	d	-0,06	0,10	-0,01	1,0
Consumer price index[2]	a	2,23	0,54	2,97	11,3
	b	0,62	0,90	0,16	20,2
	c	0,91	-2,24	-3,55	17,3
	d	0,03	-0,22	0,59	43,4
Consumer price index. food only[2]	a	-1,25	0,58	-1,29	12,7
	b	-0,88	-0,06	-0,17	20,8
	c	-0,70	1,69	0,00	8,3
	d	-0,87	-1,13	0,37	33,4
Output per man-hour[2]	a	0,37	0,01	-0,54	60,8
	b	0,32	0,18	-0,59	48,1
	c	-0,60	0,57	0,05	59,3
	d	-0,19	0,46	0,31	58,7
N.Y. Stock Exchange composite price index[2]	a	0,01	0,02	-0,12	2,6
	b	0,04	0,02	-0,06	3,3
	c	0,00	-0,01	0,10	2,8
	d	0,12	0,14	0,11	3,5
Consumer price index, all commodities[2] Except food	a	-2,10	-1,44	-3,44	15,6
	b	-0,16	-1,76	-1,38	26,0
	c	-0,69	0,93	3,49	24,5
	d	1,03	-0,21	-1,06	47,3
Wholesale price index[2]	a	0,27	-1,62	0,81	5,8
	b	0,94	-0,69	-0,46	11,9
	c	-0,95	-1,96	1,21	4,1
	d	1,78	0,18	-0,70	16,2

Table 3, continued. Eigenvalues

Function		Eigen-value	% of variance	cumu-lative %	Canonical corre-lation	after function	Wilks' λ	χ^2	df	Signifi-cance
	1	2.05	58.2	58.2	0.8	1	0.1	1107.2	57	0.00
a	2	1.13	32.0	90.2	0.7	2	0.3	537.2	36	0.00
	3	0.35	9.8	100.0	0.5		0.7	151.3	17	0.00
	1	1.3	56.0	56.0	0.8	1	0.2	1018.3	57	0.00
b	2	0.9	36.0	92.0	0.7	2	0.5	492.5	36	0.00
	3	0.2	8.0	100.0	0.4		0.8	108.0	17	0.00
	1	3.6	44.6	44.6	0.9	1	0.0	914.9	57	0.00
c	2	2.8	35.0	79.7	0.9	2	0.1	550.9	36	0.00
	3	1.6	20.3	100.0	0.8		0.4	231.2	17	0.00
	1	1.6	48.3	48.3	0.8	1	0.1	747.1	57	0.00
d	2	1.3	38.1	86.3	0.7	2	0.3	414.3	36	0.00
	3	0.5	13.7	100.0	0.6		0.7	130.0	17	0.00

Authors' computations. Eigenvalue: eigenvalues of the discriminant functions in declining order. % of variance: per cent importance of the discriminant functions. cum per cent: cumulative importance in relative terms. df: degrees of freedom. For a detailed description of the statistics see Brosius 1989. – 1) a: Results for period 1948-5 to 1991-11, b: 1948-5 to 2000-12, c: 1970-12 to 1991-11, d: 1970-12 to 2000-12. – 2) Per cent changes against previous year. – 3) Per cent changes against previous month.

The total error rate of classifications increases for the new sample period to nearly 15 per cent and this is somewhat better than what has been recorded here for the two old M/W-samples – 18.8 per cent and 25 per cent, respectively.

The lengths of cycles and phases have been rather stable, compared to the old sample and to the NBER cycle dating. The average duration of full cycles is still 62 months (NBER: 63), that of *Recoveries* 22 months (M/W: 23), Demand-Pull-Inflation 21 (22) months, Stagflations 32 (30) months and of Recessions 9 (11) months.

3. The Clinton expansion

As previously mentioned, the cyclical characteristics of the Clinton expansion deserve interest for many reasons. This paper concentrates on three questions. First, it asks in which way the importance of the classifying variables changed between cycles or within their 4 phases; second, how well do the new results explain the pre-1991-12 experience. Based on these results, we briefly examine the cyclical homogeneity of the Clinton expansion. The size and direction of these changes depend, of course, on the cyclical experience or the sample with which they are compared. The tables report comparisons with a longer sample (1948-5/1991-11) and with a shorter one (1970-12/1991-11); most of the text refers only to the latter.

According to the "F-values to enter", the most important new characteristic of the Clinton expansion was the reduction of the previous overwhelming

importance of M2 from rank (1) to rank (15). It was "replaced" by Real GNP, which had held rank (2) before. This may reflect the fact that in the 1980s the Fed had given up targeting the rate of growth of money and returned to its former policy of controlling interest rates. Considerable gains in importance were to register for the various measures of inflation,[7] for government expenditure ((4) vs. (7)) and for unit labour cost ((7) vs. (11)). Sizeable reductions of importance are also found for M1 ((9) vs. (4)), net exports ((14) vs. (5)), unemployment ((10) vs. (6)). The importance of the Prime Rate remained rather low, but this may be due to the fact that it is the nominal rate. More difficult to explain is why the cyclical meaning of compensation per man hour, the GNP/government deficit Ratio and the role of average yields on corporate bonds (Moody's) and of the New York Stock Exchange index did not change. But, again, the latter two variables are the two least important classifiers anyway.

Despite the fact that the new sample consists only of data *a priori* classified as recovery, of course, coefficients of all three functions were affected. While those of function 1 (separating periods of upswing from those of downswing) may reflect the changes signalled by the F-values, the changes in functions 2 and 3 are more difficult to understand. Interpretations of changing significance of variables are, however, risky not only for the methodological reasons mentioned above, but also because of the different explanatory power of the three functions in the various samples.

Table 4. – CLASSIFICATION RESULTS FOR DIFFERENT SAMPLES 1970-12 TO 2000-12

		Predicted group membership			
Actual group	No. of cases	Recovery	Demand-Pull	Stagflation	Recession
		1970-12 to 1991-11			
Recovery	85	68	14	0	3
		80.0%	16.5%	.0%	3.5%
Demand-Pull	82	8	68	3	3
		9.8%	82.9%	3.7%	3.7%
Stagflation	36	0	0	35	1
		.0%	.0%	97.2%	2.8%
Recession	49	0	0	0	49
		.0%	.0%	.0%	100.0%
Total error rate: 12.7%					
		1970-12 to 2000-12			
Recovery	194	160	18	8	8
		82.5%	9.3%	4.1%	4.1%
Demand-Pull	82	7	67	6	2
		8.5%	81.7%	7.3%	2.4%
Stagflation	36	0	0	36	0
		.0%	.0%	100.0%	.0%
Recession	49	2	0	1	46
		4.1%	.0%	2.0%	93.9%
Total error rate: 14.4%					
Authors' computations					

[7] It should, however, be borne in mind that the measurement of inflation (and of real GDP) underwent considerable changes. Revisions in the official statistics, however, did go back until the beginnings of the 1990s.

As to the overall perspective, including the Clinton expansion, it improves considerably the explanatory power of the first and of the second discriminant functions (Table 3). The classification results for the new sample do not reflect this improvement since the total error rate increases from 12.7 to 14.4 per cent (Table 4). In a relative perspective, most of these errors occur by classifying the recovery as demand-pull Inflation; effects on previous classifications are small and equally distributed upon all phases. The cyclical innovation resulting from the Clinton expansion is much more remarkable when seen in the light of the explanatory power *outside* sample periods. The longer sample classifies about 25 per cent of the period 1991-2 to 2000-12 as demand-pull, about 68 per cent as stagflation, 4 per cent as recession and only 3 per cent correctly (recovery). The results for the shorter sample are even more "disappointing" (0/0/73/27 per cent) and thus signal even more strongly structural shifts in the cycle picture. (Table 5, Appendix, presents a detailed picture of the classification record for each period of the Clinton expansion. Noteworthy is not only the surprisingly high correspondence between the two samples, including the Clinton era, but also the considerable discrepancy between the two long samples.) However, for more than logical reasons the corroborative role of this test should not be overrated: the classificatory power of the scheme outside the sample period is usually not very high. This had already been the experience of M/W (1975a, b) and also in a number of systematic "leave one cycle out" tests by H/M (2002).

But these misclassifications also bear more pleasant lessons. Within the sample period, they reflect very well the difficult time span around 1994/95 for the economy and for monetary policy, difficulties that the other three samples also encounter (Table 5, Appendix). Monetary policy felt that it had to respond to rising inflation and, "as usual" would have sent the economy into recession (Blinder, Yellen 2001, 25-33, Heilemann 2003). The classifications with the two longer samples also illustrate these difficulties very well (Table 4).

4. Summary and conclusions

This paper finds that the long expansion of the Clinton era changed the major characteristics of post-1970 U.S. business cycles. More modestly expressed, it reveals some substantive attributes that distinguish it from preceding upswings or recoveries. With the help of linear multivariate discriminant analysis (LMDA) using 19 macroeconomic and financial variables to define recovery, demand-pull inflation, stagflation and recessions developed by Meyer/Weinberg in the early 1970s, it is shown that in the Clinton expansion M2, net exports and unemployment lost much of their classificationary power, whilst that of real GNP, various measures of inflation, government expenditures and unit labour cost increased. This confirms those interpretations of the Clinton era that see low inflation, forbearing monetary policy, deficit-targeted fiscal policy and a productivity jump as its keystones. Surprisingly, the results do

not see a changed role for other classifying variables such as compensation per man hour, the government deficit/GNP ratio, bond yields, or the stock market. The results throw some doubt on seeing the Clinton era as being a uniform recovery. Around 1995 there may have been a very short recession.

While re-estimations and updates of the M/W scheme generally confirmed it, the results clearly reveal that, first, for the post-1973 period a 3-phase scheme might deliver a better description than the 4-phase scheme. This fits the proposal of a 3-phase scheme based on real GDP changes presented by Sichel (1994), but contradicts the idea of a multivariate-based 5-phase cycle suggested by Eckstein/Sinai (1986); second, the results for the longer and the shorter samples once again make it clear that the question of changes of cyclical characteristics depends in large measure on the standard with which a new experience is compared. In the present case, the innovation brought about by the Clinton expansion seems to be outstanding in comparison with the 1970s and, probably even more with the 1980s. When compared with the experience of the 1950s and 1960s, the innovation is much smaller. From a methodological perspective, the results, or at least the classification approach in general, offers a promising complement to the studies of changes of the business cycle mentioned above. Even though such a structural approach is not new, it is actually the starting point of the Burns/Mitchell approach, but it has seldom found application in the recent past.

Will the changes in cycle characteristics detected here be of a transitional or of permanent nature? To answer this question, LMDA would require at least another full cycle that is, alas, the start of another recession. So far, important characteristics of the 1990s, such as the forbearing monetary/interest rate policy, productivity, compensation and low inflation seem to have played similar roles as in the "fabulous decade", whilst the roles of the government deficit/GDP ratio, the growth of government expenditure and of net exports differed considerably. Certainly, some of these characteristics demand considerable correction in the near future. It is clear that this will substantially affect the economy. Whether this also means a repeal of the changes of the characteristics of the U. S. portrayed here, is more difficult to envisage. The results presented in this paper would suggest that these changes are of a transitory nature.

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Appendix

Table 5. – CLASSIFICATIONS FOR THE CLINTON ERA 1991-11 TO 2000-12, VARIOUS SAMPLES

			Classification			
Year	Month	Phase	a: 1948-5 to 1991-11	b: 1948-5 to 2000-12	c: 1970-12 to 1991-11	d: 1970-12 to 2000-12
1991	Nov.	Recession	-	-	-	Recovery
	Dec.	Recovery	Recession	-	Recession	-
1992	Jan.	Recovery	Recession	-	Recession	-
	Febr.	Recovery	Dem. Pull	-	Recession	-
	March	Recovery	Dem. Pull	-	Recession	-
	April	Recovery	Dem. Pull	-	Recession	-
	May	Recovery	Dem. Pull	-	Recession	-
	June	Recovery	Recession	-	Recession	-
	July	Recovery	Recession	-	Recession	-
	August	Recovery	Dem. Pull	-	Recession	-
	Sept.	Recovery	Dem. Pull	Dem. Pull	Recession	-
	Oct.	Recovery	Dem. Pull	-	Recession	-
	Nov.	Recovery	Dem. Pull	-	Recession	-
	Dec.	Recovery	Dem. Pull	-	Recession	-
1993	Jan.	Recovery	Dem. Pull	Dem. Pull	Recession	-
	Febr.	Recovery	Dem. Pull	Dem. Pull	Recession	-
	March	Recovery	Dem. Pull	Dem. Pull	Recession	-
	April	Recovery	Dem. Pull	Dem. Pull	Recession	-
	May	Recovery	Dem. Pull	Dem. Pull	Recession	-
	June	Recovery	Dem. Pull	Dem. Pull	Recession	-
	July	Recovery	Dem. Pull	Dem. Pull	Recession	-
	August	Recovery	Dem. Pull	Dem. Pull	Recession	-
	Sept.	Recovery	Dem. Pull	Dem. Pull	Recession	-
	Oct.	Recovery	Dem. Pull	Dem. Pull	Recession	-
	Nov.	Recovery	Dem. Pull	Dem. Pull	Recession	-
	Dec.	Recovery	Dem. Pull	Dem. Pull	Recession	-
1994	Jan.	Recovery	Dem. Pull	-	Recession	-
	Febr.	Recovery	Dem. Pull	-	Recession	-
	March	Recovery	Dem. Pull	Dem. Pull	Recession	-
	April	Recovery	Dem. Pull	-	Recession	-
	May	Recovery	Dem. Pull	-	Stagflation	-

Table 5. – continued

			Classification			
Year	Month	Phase	a: 1948-5 to 1991-11	b: 1948-5 to 2000-12	c: 1970-12 to 1991-11	d: 1970-12 to 2000-12
	June	Recovery	Dem. Pull	-	Stagflation	-
	July	Recovery	Dem. Pull	-	Stagflation	-
	August	Recovery	Stagflation	-	Stagflation	-
	Sept.	Recovery	Stagflation	-	Stagflation	-
	Oct.	Recovery	Stagflation	-	Stagflation	Stagflation
	Nov.	Recovery	Stagflation	-	Stagflation	-
	Dec.	Recovery	Stagflation	-	Stagflation	Stagflation
1995	Jan.	Recovery	Stagflation	-	Stagflation	Stagflation
	Febr.	Recovery	Stagflation	-	Stagflation	Stagflation
	March	Recovery	Stagflation	-	Stagflation	Stagflation
	April	Recovery	Stagflation	-	Stagflation	-
	May	Recovery	Stagflation	-	Stagflation	-
	June	Recovery	Stagflation	-	Stagflation	-
	July	Recovery	Stagflation	-	Stagflation	-
	August	Recovery	Stagflation	-	Stagflation	-
	Sept.	Recovery	Stagflation	-	Stagflation	-
	Oct.	Recovery	Stagflation	-	Stagflation	-
	Nov.	Recovery	Stagflation	-	Stagflation	-
	Dec.	Recovery	Stagflation	-	Stagflation	-
1996	Jan.	Recovery	Stagflation	-	Stagflation	-
	Febr.	Recovery	Stagflation	-	Stagflation	-
	March	Recovery	Stagflation	-	Stagflation	-
	April	Recovery	Stagflation	-	Stagflation	-
	May	Recovery	Stagflation	-	Stagflation	-
	June	Recovery	Stagflation	-	Stagflation	-
	July	Recovery	Stagflation	-	Stagflation	-
	August	Recovery	Stagflation	-	Stagflation	-
	Sept.	Recovery	Stagflation	-	Stagflation	-
	Oct.	Recovery	Stagflation	-	Stagflation	-
	Nov.	Recovery	Stagflation	-	Stagflation	-
	Dec.	Recovery	Stagflation	-	Stagflation	-
1997	Jan.	Recovery	Stagflation	-	Stagflation	-
	Febr.	Recovery	Stagflation	-	Stagflation	-
	March	Recovery	Stagflation	-	Stagflation	-
	April	Recovery	Stagflation	-	Stagflation	-
	May	Recovery	Stagflation	-	Stagflation	-
	June	Recovery	Stagflation	-	Stagflation	-
	July	Recovery	Stagflation	-	Stagflation	-
	August	Recovery	Stagflation	-	Stagflation	-
	Sept.	Recovery	Stagflation	-	Stagflation	-
	Oct.	Recovery	Stagflation	-	Stagflation	-

Table 5. – continued

			Classification			
Year	Month	Phase	a: 1948-5 to 1991-11	b: 1948-5 to 2000-12	c: 1970-12 to 1991-11	d: 1970-12 to 2000-12
	Nov.	Recovery	Stagflation	-	Stagflation	-
	Dec.	Recovery	-	-	Stagflation	-
1998	Jan.	Recovery	Stagflation	-	Stagflation	-
	Febr.	Recovery	Stagflation	-	Stagflation	-
	March	Recovery	-	-	Stagflation	-
	April	Recovery	Stagflation	-	Stagflation	-
	May	Recovery	Stagflation	-	Stagflation	-
	June	Recovery	Stagflation	-	Stagflation	-
	July	Recovery	Stagflation	-	Stagflation	-
	August	Recovery	Stagflation	-	Stagflation	-
	Sept.	Recovery	Stagflation	-	Stagflation	-
	Oct.	Recovery	Stagflation	-	Stagflation	-
	Nov.	Recovery	Stagflation	-	Stagflation	-
	Dec.	Recovery	Stagflation	-	Stagflation	-
1999	Jan.	Recovery	Stagflation	-	Stagflation	-
	Febr.	Recovery	-	-	Stagflation	-
	March	Recovery	Stagflation	-	Stagflation	-
	April	Recovery	Stagflation	-	Stagflation	-
	May	Recovery	Stagflation	-	Stagflation	-
	June	Recovery	Stagflation	-	Stagflation	-
	July	Recovery	Stagflation	-	Stagflation	-
	August	Recovery	Stagflation	-	Stagflation	-
	Sept.	Recovery	Stagflation	-	Stagflation	-
	Oct.	Recovery	Stagflation	-	Stagflation	-
	Nov.	Recovery	Stagflation	-	Stagflation	-
	Dec.	Recovery	Stagflation	-	Stagflation	-
2000	Jan.	Recovery	Stagflation	-	Stagflation	-
	Febr.	Recovery	Stagflation	-	Stagflation	-
	March	Recovery	Stagflation	-	Stagflation	-
	April	Recovery	Stagflation	-	Stagflation	-
	May	Recovery	Stagflation	-	Stagflation	-
	June	Recovery	Stagflation	-	Stagflation	-
	July	Recovery	Stagflation	-	Stagflation	-
	August	Recovery	Stagflation	-	Stagflation	-
	Sept.	Recovery	Stagflation	-	Stagflation	-
	Oct.	Recovery	Stagflation	-	Stagflation	-
	Nov.	Recovery	Stagflation	-	Stagflation	-
	Dec.	Recovery	Stagflation	-	Stagflation	-

Authors' computations. (-): predicted and prior classification are the same.

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The Destabilising Impact of Reduced Transaction Costs on Economic Activity

Abstract

Many authors, particularly in the popular press of the second half of the 1990s, supposed that the Internet had fundamentally altered the principles defining good business management. Even academic publications claimed that the old business management and economic principles had been supplanted in the New Economy. This paper suggests that although the principles of economic activity have not changed in any significant way, economic environments have been destabilised by a significant reduction of transaction costs. We consider the impact of reduced transaction costs on Michael Porter's "Five Forces" to show these destabilising effects. Their reduction is shown to be the destabilising element on economic activity. A "friction" metaphor is employed both to aid our understanding of this phenomenon and to help derive reasonable information economy strategies.

1. Introduction

The Internet has been characterised as a disruptive technology (Useem 1999), since it disrupts the strategic position of firms. There is no doubt that the Internet has shaken up various companies and industries. New competitors spring almost out of nowhere, as Amazon has in various retail markets. Companies enter into competition with themselves, as Merrill Lynch did in allowing securities trades online. Companies also go into competition with their distributors, as Oakley glasses did in selling directly to consumers. Disruption of traditional ways of doing business has occurred in many sectors of the economy.

Some have argued not only that companies and industries are being shaken up, but that the very principles which define effective businesses management are being obliterated and redefined. Previously, articles in the popular press proclaimed that the Internet was going to change the principles of good management. In some cases, the prescription was to throw out conventional management wisdom in favour of "new" management paradigms. For example, one article described new principles such as "forget synergy," "stop listening to customers...," and "throw out those ROI spreadsheets" (Useem, 1999: 128).

The contrarian impression that there were new economic rules and a "new management" even bled over into academics for a time. The three counter-

intuitive principles cited from the Useem article are attributed to marketing professors at respectable universities. The same viewpoint also found its way into textbooks, e.g. the popular one by Turban, *et al*, (2000) including a section declaring "everything will be changed." It even found its way into research publications, e.g. the Oliver (2000) *Journal of Business Strategy* article which insisted, "Like it or not, the rules have changed, and you must learn to live by them in order to thrive and grow in the new century."

A lot has happened in the short period since those articles and books were written. In particular, the "Internet bubble" burst, leaving the preachers of "everything will change" with fewer listeners. There has been a resurgence of attention to tried and true business practices, revenue models, methods for company valuation and more traditional corporate strategies, etc. Nevertheless, uncertainty about the future continues to prevail in many e-business industries. There continues to be great speculation about which business strategies will lead to e-business dominance and which will lead to company demise.

Further, we believe the definitive theory for describing the bases for successful e-commerce is still in the formative stage. The only thing that remains certain is that uncertainty and speculation continue. Somehow, the Internet has brought instability to industries and economic activities that were previously quite stable. That high level of instability may not seem justified, if in fact, traditional business and economics principles still apply in the era of the New Economy or, better, the information economy (Bryson, 2003).

This paper questions whether the new businesses management is truly new, or simply an altered manifestation of things studied and taught in business schools for decades. A hypothesis is presented which describes a fundamental characteristic of Internet-based businesses that has produced some important business transformations commonly attributed to the Internet. That hypothesis is founded in the concept of reduced "friction," or the transaction and switching costs associated with traditional business activities.

In the next section we will consider a few different views of Internet-based services and businesses ("e-businesses") from the literature. We will conclude that there may be less that is truly "new" about new economy businesses management than would meet the eye. The third section will address the general impact of reduced transaction costs on the traditional market situation, noting the changes implied when transaction costs are combined with and function so as to offset (in whole or in part) the normal production costs. The fourth section presents the hypothesis mentioned above describing the basic characteristic of *e-commerce* that led to the Internet transformation. On the basis of that hypothesis, the destabilising impact of the Internet will be explained in Section 5. A discussion of how to deal with a destabilised business

environment is undertaken in Section 6 and a final section suggests some worthwhile research directions for the topic.

2. Published views of a "New" Economy

Prior to the "dot-com bubble burst," it was popular to publish assertions that the rules of business had changed completely. After the burst it became popular to disavow those pre-burst authors. Perhaps neither position is justified. The purpose of this section is to show that even though prior authors claimed a "new" set of e-business principles, they are not really so "new," but are in fact simply adaptations of traditional business principles. They should neither have been proclaimed as "new" nor rejected as unfounded. The following are a few examples.

Huff, *et al.* (2000: 450-461) identify nine "Critical Success Factors for Electronic Commerce," which are listed in Table 1.

Table 1. – E-CRITICAL SUCCESS FACTORS OF (HUFF, ET AL. 2000)

1. Add Value
2. Focus on a Niche… then Expand
3. Maintain Flexibility
4. Segment Geographically
5. Get the Technology Right
6. Manage Critical Perceptions
7. Provide Exceptional Customer Service
8. Create Effective Connectedness
9. Understand Internet Culture

This is a very helpful list, but were we to reword item 9 as "Understand the Business Culture" it would be without elements that could be described as *unique* to Internet commerce. What we see instead is that the prescription is simply to apply recommended management concepts that have been studied and taught for decades.

Two other lists which emphasise differences in Internet business are by Oliver (2000) and Afauh and Tucci (2001), shown in Tables 2 and 3. From those lists we see that some "traditional" business phenomena occur in Internet commerce, but manifest themselves in different ways. Even more striking are a few of the ideas that contradict conventional wisdom. Examples of significant departures from conventional management wisdom include "no sustainable advantages" and "no secrets on the Internet." Traditional management strategy focuses on the ability to secure a sustainable competitive position. Some

suggested Internet strategies, such as "infinite virtual capacity" are strikingly different from what we see in traditional management, where capacity planning is a difficult challenge presenting strict constraints and extensive costs.

Table 2. – OLIVER'S SEVEN LAWS OF E-COMMERCE (OLIVER 2000)

1. There is no such thing as sustainable advantage.
2. There are no secrets on the Internet.
3. Everything is global.
4. Companies must now deal with customers in "space" instead of "place."
5. Scalability is key, and speed and innovation rule.
6. Flexibility is all important.
7. The new markets are unforgiving.

Table 3. – AFAUH AND TUCCI'S TEN "PROPERTIES OF THE INTERNET" (AFUAH AND TUCCI 2001)

1. The Internet is a *mediating technology*, meaning that it interconnects parties.
2. The Internet provides *universality*, or the ability to both enlarge and shrink the world.
3. The Internet promotes *network externalities*, which is that the network becomes more valuable as more people use it ("Metcalfe's Law").
4. The Internet acts as a *distribution channel* for information products.
5. The Internet exhibits *time moderation*, or the ability to shrink and enlarge time.
6. The Internet reduces *information asymmetry*, so that buyers and sellers can act on more similar information.
7. The Internet effectively has an *infinite virtual capacity*.
8. the Internet provides *standards* which produce *low-cost* transactions.
9. The Internet is a "*creative destroyer*" in many industries. (Others call this a "disruptive technology," meaning that the Internet disrupts the strategic industry positions of incumbent service providers.)
10. The Internet is a *transaction-cost reducer*.

Although we see merit in some of the observations of this literature, the lists seem somewhat *ad hoc* and arbitrary. They generally present little that is really new from the ascent of Internet-commerce and tend to confuse what might be really new with what has been traditional. The next section seeks to rectify this confusion with the hypothesis that a single defining characteristic of the Internet is responsible for most of the other characteristics of the New Economy.

3. Internet pricing as a source of instability

In this section we wish to consider the effect of the Internet on *e-commerce* pricing, and we will draw from some of the analyses of Bryson (2005). Because of the impact of the information economy on transaction costs, pricing decisions in the information economy can have destabilising impacts on industry performance.

The Internet has had the effect of reducing the variable costs of production, increasing the importance of fixed costs. As noted above, this has resulted in substantially reduced transaction costs. Neo-classical economic theory has long neglected transaction costs, which have largely been a focus of neo-institutional economics. The advent of the Internet has caused us to reconsider the significance of transaction costs. Porter (2001) writes that "Internet technologies tend to reduce variable costs and tilt cost structures toward fixed cost, creating significantly greater pressure for companies to engage in destructive price competition…The great paradox of the Internet is that its very benefits – making information widely available; reducing the difficulty of purchasing, marketing, and distribution; allowing buyers and sellers to find and transact business with one another more easily – also make it more difficult for companies to capture those benefits as profits."

Porter sees this change in the structure of the costs of the firm as a paradox, because he assumes lower costs should enhance the profits of the firms whose strategies are to find a competitive *niche* with their cost advantage. This view assumes that the characteristic of product differentiation applicable to oligopolistic and monopolistically competitive markets, i.e. product differentiation, remains applicable. If differentiation makes it possible to retain imperfectly competitive price levels, the cost reduction would indeed enhance profits.

The fact that Internet firms failed to enjoy greater profits is actually not paradoxical at all. In the basic theory of competitive markets, entry can well occur with declining costs, and the result is the omnipresent long-run outcome of competitive markets, a failure to enjoy net revenues. In the long term, price is driven by competition down to the level of costs. We remember, of course, that failure to achieve pure (as opposed to normal) profits is not a problem in competitive environments, since normal profits include an opportunity cost return to all factors of production, including shareholders and management. The reduced friction of the Internet economy did not immediately transform all markets to pure competition. But it is obvious that the prevalent degree of competition increased substantially.

We consider now the assumptions of perfect competition. Note at the outset the way many ITC service providing firms, which would normally be a monopolistically competitive product group, fit rather neatly into those perfect competition assumptions in the information economy. First, perfect competition features a large number of small buyers and sellers. The internet makes

many monopolistically competitive firms in global markets very small relative to the whole market.

In perfect competition, entry and exit are achieved with facility, reflecting an absence of barriers such as government licenses, patent restrictions, scale economies, etc. In the *e*-commerce environment, the reorganisational adaptability of the market is substantial. Firms appear and disappear, merge and combine, splinter and break off quickly as the market absorbs and allocates resources. New ideas and information can be diffused readily and are more significant than accumulated resources; responsive venture capital supports quick and productive change.

Perfectly competitive markets feature homogeneous products. In the rapidity of ITC sector changes, with information exchange often almost instantaneous and with many creative participants, information products may not be nearly as differentiable as a good cologne or breakfast cereal. Differentiation is, moreover, often based on subjective impressions consumers have of product or service characteristics. With far greater information available on the Internet, differentiation today does and in the future will do far less, to permit differentiated products to maintain diversity in pricing.

Finally, the characteristic that makes *purely* competitive markets become *perfectly* competitive is that buyers and sellers have equal access to complete information about prevailing prices, technology, qualities of goods, and other market-related data. In the absence of uninformed buyers, entrepreneurs cannot charge more than the prevailing price. Under the monopolistic competition of *e*-commerce, where the buyer may find divergent prices for similar goods in a product group, the buyer also finds online detailed characteristics of the divergent products, as well as consumer evaluation of those products. The result is that divergent prices will tend to be driven down competitively to the opportunity cost covering level of the divergent commodities, an important characteristic of the purely competitive model resulting from the extensive availability of information to buyers.

One of the standard conclusions relating to imperfect competition in the traditional analysis is that there will be a tendency to revert to non-price competition in such markets. The rise of the Internet economy was remarkable in that no such tendency appeared in this new world, characterised by substantially reduced friction and more readily available information. At one time, systems economists could make the claim that the prevalence of non-price competition was a reflection of the inadequacy of the assumption that perfect information could largely be acquired through information about prices (Neuberger and Duffy, 1976: 149).

The assumption about perfect information was a standard part of neoclassical theory, but economists seemed less and less inclined to take it seriously. Its main purpose was to show that everyone knew enough about prices so that a single price would prevail in a purely competitive industry. Nobody would

be willing to pay a higher price for a homogeneous product. Much other relevant information could not realistically be thought of as available.

In recent decades, economists have written a lot more about imperfect information in markets, noting the asymmetry of information between buyers and sellers of products. Opportunistic behaviour on the part of economic agents is based on incomplete information of another kind, the inability adequately to monitor the behaviour of other agents, etc. Stiglitz (2002) has made a Nobel career of addressing information questions to demonstrate that the competitive price is "not the equilibrium." The economics of information shows that Pareto-efficient resource allocation achieved through competitive mechanisms is "not particularly relevant to real economies." He cites a paper by Diamond (1971) on search costs and uses the following principle to illustrate the lack of robustness of the competitive equilibrium theory.

> *Assume for example, as in the standard theory, that all firms were charging the competitive price, but there is an epsilon cost of searching, of going to another store. Then any firm which charged half an epsilon more would lose no customers and thus would choose to increase its price. Similarly, it would pay all other firms to increase their prices. But at the higher price, it would again pay each to increase price and so on, until the price charged at every firm is the monopoly price, even though search costs are small. (Stigler, all quotes from p. 477)*

This certainly did fit the world for some time, but with the dramatic reduction of search costs (ceasing to "go to another store") in the information economy we would not expect *e*-commerce sellers to be able to price their product higher because of the cost in epsilons of another click with a mouse. In the information economy the tendency is not, as Stigler could once contend, to mark prices up toward the monopoly level because of search costs.

We would not argue that the model of perfect competition fits the contemporary, real world as a well-chosen glove fits the hand. If one supposes in the application of the model of perfect competition to see precision like the works of a fine wristwatch, one may be disappointed. Likewise, if one seeks to perceive the mechanical achievement of market equilibria at cost-covering levels with Pareto efficiency, one might be disappointed. If equilibria are achieved only with some delay, or if they seem rarely to be achieved at all, the forces that move markets *toward* equilibrium grind slowly but with compelling energy. Classic discussions (Henderson and Quandt, 1971) of the existence, uniqueness and stability of equilibrium may be in need of some modernisation. But if one looks at markets more as natural, elemental forces, like the movement of the tides, one can see the significance of the interaction of a few pertinent and powerful variables. The functioning of the information economy toward the end of the last millennium showed that competition could produce results very reminiscent of the model of perfect competition.

4. Adding Transaction Costs to the Analysis

Porter was not alone in his observation that the information economy resulted in reduced variable costs of production relative to fixed costs. The pricing analysis related to that situation will be more effective when we add transaction costs to production costs, observing in doing so that the U-shaped average and marginal cost curves that are so familiar in neoclassical analysis tend to flatten out rather dramatically as the law of diminishing returns plays a less distinct role. The information advantages responsible for reduced production and transaction costs imply larger outputs from a plant of given size. The effect of diminishing returns is to cause increases in short-run costs in a plant of given scale, but adding declining transaction costs to the equation will have the effect of *offsetting* increasing costs. The important types of transaction costs, including the negotiations between transactions partners, the reduced search processes that precede contracts, the communications between prospective transacting partners and other such costs, do not grow as rapidly as the levels of output. It may ultimately transpire that the observations and impressions common in the literature cannot be verified by empirical research, but it seems that transaction costs are not as subject to nature's laws of parsimony as are production costs. Since electronic technologies have such widely recognised impacts on information processes and their resultant transactions, short-run cost curves reflecting transactions, as well as production costs, may be only gradually upward-sloping, nearly horizontal lines rather than U shaped curves.

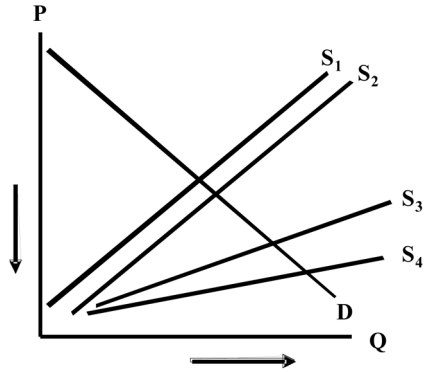
If this is actually the case for costs, we would experience flat or nearly flat supply curves, since the sum of horizontal marginal production and transaction costs would be a horizontal line. In that instance, market equilibria would naturally seek lower prices and therefore also produce sales of larger quantities. Bryson (2005) shows that this effect holds, not only in the case of pure competition, as we will demonstrate below, but that lower prices and larger sales quantities will also be observed in oligopoly models which, since the publication of the Sweezy model decades ago, have attempted to explain market instabilities. We see such instability being generated by the information economy's impact on transaction costs.

A *ceteris paribus* reduction of variable costs causes the market supply curve to flatten, producing a reduction in the equilibrium price and an increase in the quantity sold. Under the kinds of costs described above for the new economy, including reduced transaction costs, the supply curve would be horizontal or nearly horizontal, dramatically increasing the normal cost reduction effects. One could therefore expect larger price reductions and quantity increases in market sales.

This is shown in Figure 1 where we would observe that with normal costs, an increase in the supply would shift the supply curve from S_1 to S_2. That would result in the small price reduction and quantity increase shown. For informa-

tion-intensive products, with variable costs composed largely of transaction costs, reduction or elimination of transaction costs causes the supply curve to flatten like S3 and S4, resulting in significantly lower prices and larger output and sales quantities. In neophyte industries characterised by destabilising competition, it becomes essential to produce at high volumes, inspiring price cutting that can lead to price wars. The effects of information economy costs could enhance this proclivity and the characteristic instability we address in the sections below.

Figure 1. – SUPPLY CURVE IMPACT IMPACT OF REDUCED FRICTION



5. The fundamental principle: "friction"

We propose that the fundamental characteristic of the information economy is the *dramatic reduction of transaction costs in the exchange and processing of information*. Transaction costs include expenditures of time, money and effort to execute a transaction. They include the "switching costs" of changing to a new service provider as well as the costs of establishing new transactions systems, which might be considered costs of entry into an industry.

We are certainly not the first to note the role of the Internet in reducing transaction costs; it is well documented in the literature (*e.g.*, Litan and Rivlin 2001; Porter 2001). Although the literature indicates that transaction costs are reduced by the Internet, the significance of the proposition has not been fully appreciated. Nor has it been recognised as *the* central effect of the Internet on business processes. We suggest that the reduction of transaction costs is foundational, and provide an analogy to clarify its central significance to the information economy.

Perhaps the concept of transaction costs can be best described by an analogy.

Transaction costs may be equated with the physics concepts of *friction* or electrical resistance.

In physics, "friction originates from forces between atoms and molecules when surfaces are in contact," … occurring "when a body moves on a rough surface or through a fluid medium." (*Friction,* http://theory.uwinnipeg.ca/physics/force/node6.html*, 1997)*

Friction serves many useful purposes; it makes motion possible, it hinders motion, and it generates heat. There are situations in which overcoming friction yields great benefits, as in the area of superconductors. A superconductor is a substance in a state where there is virtually no resistance to the flow of electric current (Geim*, et al.* 1998). In other words, superconductors provide virtually no *friction* in the transfer of electrons, enabling products and processes that might otherwise be unattainable (Browne 1998).

In the analogy, transaction costs represent the friction between parties to a business transaction. They are a limiting force in the otherwise free flow of transactions. But they do a lot more than to assist in controlling business processes. The following are only a few examples of functions that transaction costs serve in business processes:

1. Friction helps sustain competitive advantages (Porter 1979). Porter's view of barriers to entry is that they basically reflect the friction of transaction costs.
2. Friction allows asymmetric information to exist between sellers and buyers. Customers generally have limited information because of the high cost (in time and money) of obtaining the same information producers have. This information asymmetry allows inefficient producers to charge customers for their ignorance and thus be profitable despite inefficiencies and poor management.
3. Friction promotes loyalty, or at least discourages disloyalty, since friction includes the switching costs of selecting another service provider, even when superior service alternatives are available.
4. Friction discourages the "service theft" that upsets salespeople and marketers. It occurs when potential customers solicit gratis (but costly) sales information from a company, only to take their business to a lower-priced seller. Such behaviour is discouraged by the transaction cost of going to another store.
5. Friction helps maintain general stability in contractual relationships. Were every case of contract violation litigated, the system would sink into chaos. Transaction costs prevent industrial regulatory agencies from pursuing all potential cases, buyers from pursuing supplier violations, etc. all through the system. Contracts are not consistently enforced because of the impossibility of acquiring from the contracts themselves, as from many other sources of information, the necessary evidence to initiate litigation.

Continuing the analogy, *the Internet may be considered the "superconductor" of information-intensive business processes*. The Internet eliminates a large

amount of the friction of transaction costs in the design and operation of businesses. This builds on the concept (Brynjolfsson 2000) that Internet-based businesses differ from traditional businesses because the Internet allows for dramatically reduced transaction costs.

Hypothesis: *The fundamental distinguishing principle underlying e-businesses is the dramatic reduction of transaction costs in the exchange and processing of information.*

- This principle has a sweeping impact on the traditional concepts of businesses management. For example, consider the four business uses for friction listed above:

  The frictionless Internet reduces "barriers to entry" to minute proportions–an outcome of the absence of transactions and switching costs (Porter 2001). (See Menor, Tatikonda and Sampson 2002) The result is that far more firms can enter into many competitive industries with very little difficulty, transforming traditional oligopolies into the "product groups" of monopolistic competition and transforming those groups into nearly purely competitive markets. In the process, almost any conceivable service idea, good or bad, can be given a try, the implications of which situation will be discussed in the next section.

  The frictionless Internet allows customers to have access to almost as much information as is available to producers. The abundance of available information arms consumers with increased bargaining power. They can find quite readily, for example, current prices for all available competitors. Companies cannot hide poor management or inefficiencies behind higher prices and consumers are much less tolerant of poor service.

  The frictionless Internet allows customers to be as disloyal as they care to be with minimal switching costs. Customers, freer to be fickle, become loyal to *standards* more than to *companies*. Standards reduce switching costs even further by making service companies "modular," or easily substituted. When standards rule, it is because customers rule. Companies must comply with the standards in order to be players in the market.

1. The frictionless Internet permits "service theft" to become the rule rather than the exception. Consumers can access all of the free information from a company's website and without inconvenience or embarrassment, take their paying business elsewhere. This is one reason for the prevalence of advertising-based revenue models on the Internet. The advertising is a way to levy a "charge" on consumers for just browsing.

2. Internet B2B *e-commerce* takes advantage of process improvements and marketplace benefits that reduce coordination costs (Garicano and Kaplan, 2001). This, too, promotes reduced consumer prices by allowing reduced transaction costs along the supply chain.

3. Malcomson (1997) reminds us that the limitations of contracting (as part of what makes for the "bounded rationality" of consumers) are closely tied to the transaction costs of processing information. It will generally be too time consuming and costly to write all important details into contracts, and even if they were all written, it could not generally be done in a manner that would permit a court to enforce the intentions of the contracting parties. The necessary information cannot always be documented by the court. With the technical possibilities of the information revolution, information can be processed much more effectively by computer, so that the transaction costs have sunk immensely.

In fact, the hypothesis implies that individual items on the lists of "implications of the Internet for businesses management" are *all* implications of dramatically reduced friction. Tables 4 and 5 are reproductions of Tables 2 and 3, but with a column which highlights how each of the concepts is a direct result of reduced friction.

Table 4. – FRICTIONLESS JUSTIFICATION OF OLIVER'S SEVEN LAWS OF E-COMMERCE

Oliver's Law	Reduced Friction (Transaction Cost) Implications
1. There is no such thing as sustainable advantage.	Reduced friction means reduced barriers to entry, thus increased encroachment on advantages.
2. There are no secrets on the Internet.	Friction makes it difficult for competitors to obtain secrets. Reduced friction opens secrets.
3. Everything is global.	Traditional transaction costs increase with distance (*e.g.*, logistics to the location). Reduced friction means everyone can be a "global" player.
4. Companies must now deal with customers in "space" instead of "place."	Place is relevant because of friction (see 3. above). Reduced friction makes everyone "local" to a great degree.
5. Scalability is key and speed and innovation rule.	A key barrier to scalability is dealing with increased transaction costs. Reduced friction means reduced cost of increasing scale. Speed rules because reduced friction means reduced limits to speed (think how fast cars would go without wind resistance). Innovation rules largely because of 2. above and the corresponding difficulty of differentiating.
6. Flexibility is all important.	Friction causes stability and control. Reduced friction demands greater flexibility, in light of reduced stability and control.
7. The new markets are unforgiving.	Reduced friction means that consumers have much lower switching costs (less loyalty). Consumers are more likely to abandon poor service providers at the least provocation.

Our hypothesis is thus far supported: reduced friction is the underlying cause of service management principles unique to the Internet. It is interesting to note that the very last of Afauh and Tucci's Properties of the Internet is the property which enables all of the others – reduced friction.

Table 5. – FRICTIONLESS JUSTIFICATION AFAUH AND TUCCI'S TEN "PROPERTIES OF THE INTERNET"

"Property of the Internet"	Reduced Friction Implications
1. The Internet is a *mediating technology*, meaning that it interconnects parties.	Interconnecting parties traditionally came with a cost–an interconnection transaction cost. Reduced friction enables more interconnections without the corresponding cost.
2. The Internet provides *universality*, or the ability to both enlarge and shrink the world.	Friction causes our service "world" to be somewhat local around us. Reduced friction allows us to make anywhere in the world "local" for a transaction.
3. The Internet promotes *network externalities*, which is that the network becomes more valuable as more people use it ("Metcalfe's Law").	Friction makes extremely large networks cost prohibitive. Reduced friction makes networks infinitely scalable, brining benefits of increased network size without scaling costs.
4. The Internet acts as a *distribution channel* for information products.	Friction makes it costly to distribute information products. Reduced friction makes the Internet a way to distribute information products at greatly reduced costs.
5. The Internet exhibits *time moderation*, or the ability to shrink and enlarge time.	One of the major friction (*i.e.*, transaction) costs is the time to initiate the transaction. Reduced friction means reduced time costs. It also reduces the limits of time (such as hours of operation), thus allowing transaction opportunities to expand.
6. The Internet reduces *information asymmetry*, so that buyers and sellers can act on more similar information.	Friction makes it prohibitive for consumers to gather as much information as producers have. Reduced friction makes it easy for consumers to gather great amounts of information, reducing the asymmetry.
7. The Internet effectively has an *infinite virtual capacity*.	Friction represents costs which occur as capacity is increased (often as an increasing marginal cost). Reduced friction means that the service capacity can increase with reduced cost constraint.
8. The Internet provides *standards* which produce *low-cost* transactions.	Proprietary standards are a tool companies use to increase friction for customers desiring to switch to competing service providers. Reduced friction means consumers will not put up with those switching costs, but rather preserve the reduced friction by demanding standards.
9. The Internet is a "*creative destroyer*" in many industries.	Friction provides barriers to entry for incumbent service providers. Reduced friction allows creative new entrants to destroy the competitive advantage of those incumbents.
10. The Internet is a *transaction-cost reducer*.	That says it all! In other words, the Internet is a friction reducer.

Building further on the physical analogy of friction, we observe that the primary management challenge for e-businesses is control – controlling market position, competitive advantage, customer loyalty, information asymmetry, and so on. Thus, the key to managing e-businesses is twofold. First, as always, firms should practise good businesses management. Second, firms must learn how to compensate for the reduced friction characteristic of the information economy. This second point is no simple task, but it will be a key to effective e-businesses management.

6. The destabilising impact of reduced friction

Three of the four areas of friction listed in the prior section correspond to elements of Michael Porter's classic "Five Forces" (Porter 1980). We will focus on Porter's model for two reasons: first, it explains the forces that promote and inhibit economic activity, and second, it is widely accepted in academia and industry as foundational applied theory.

Porter (2001) emphasises that the Internet has primarily negative impacts on the five forces, i.e. it increases competitive forces and leads to greater instability in affected industries. Porter does not directly attribute the various specific impacts he describes to reduced transaction costs. Our premise is that the reduced-friction model of e-business activity provides a fundamental underlying explanation for each of the five forces.

A primary force inhibiting economic activity is informational friction. The main economic influence of the Internet is to reduce the informational costs of e-business transactions, leading to industry instability. We will show how each of the five forces contributes to instability and how reduced transaction costs increase that instability.

6.1. The threat of new entrants

Barriers to entry reduce the threat of new entrants. Industries with high barriers to entry are more stable, in that the set of players is relatively static over time. Consider the auto industry, with high barriers to entry and thus little change in industry members in any given decade or so. Contrast that with the food-service industry, where practically anyone who wishes to, can open a restaurant. As a result, the restaurant industry is relatively fragmented, with a large number starting up and going out of business each year.

We would argue that transaction costs represent the foundation of barriers to entry. Reducing or eliminating those costs will weaken the barrier. The following are barriers listed by Porter:

- Economies of scale. Larger established players enjoying economies of scale will be able to spread their fixed costs across larger volumes of products. To realise similar benefit, new entrants must increase sales volume, which often means sacrificing profitability. However, if reduced transaction costs can at least partially offset high fixed costs, established players have less of a cost advantage.
- Product differentiation. Product development life-cycles are frequently extended by transaction costs. If the latter can be reduced, product development becomes more rapid. When product development cycles are long, established players have the advantage of funding new development by revenues from current products. However, if development cycles are short, new players can more easily fund the development of new and innovative offerings.

- Capital requirements. Capital requirements represent the cost of setting up production and distribution systems. When the costs of setting up a production system (fixed cost) are minimal, new entrants enjoy greater probability of success. When variable costs are minimal, there is less need for working capital to fund production.
- Access to distribution channels. Accessing distribution channels is encumbered with transaction costs. As a result of their ties to already operative distribution channels, established players enjoy lower costs. However, with the Internet as a distribution channel, the cost of access approaches zero for both established and new players.
- Government policy. Government policy often serves to protect industries and/or their consumers, which favours established players already complying with the policies. The policy often includes friction in the form of taxes, tariffs, or other transaction costs. The Internet is much less subject to taxes, tariffs, or other transaction costs, and can thus provide less advantage to established players.
- Cost advantages independent of size. Advantages independent of size, as related to reduced transaction costs, reduce likewise the advantages accruing to established players.

In general, the conclusion is unavoidable that barriers to entry tend to be lower when transaction costs are lower. If barriers to entry decline sufficiently, entrepreneurial activity can increase dramatically, as we have seen both in the e-business boom after 1995 and in the recent resurgence.

6.2. The bargaining power of customers

When companies have power over customers, they have the luxury of stable operations and service offerings. When customers have more power, they have more opportunity to be dictatorial and demanding of companies, causing instability in company operations and offerings. Transaction costs limit the bargaining power of customers in different ways.

First, when customers experience high product search costs, the result is information asymmetry between customers and producers, with producers at the advantage. In that case, producers can enjoy stability while operating with less than optimal efficiency. When product search costs decrease or are eliminated, the asymmetry decreases, allowing customers to be more demanding of such companies. The result is increased pressure for them to monitor the prices and quality of competitive offerings in the market continually, so as to avoid becoming non-competitive (Sampson and Hulet, 2003).

Second, customers not only benefit from reduced search costs, but from reduced switching costs as well. Customers' defection opportunities are heightened, providing instability in the customer base.

Third, convenience cost is a type of the transaction costs consumers experience; they are time costs incurred when service providers are only available for certain hours and when they are also unable to provide immediate service. When such time costs are reduced, or even eliminated, customers come to expect immediate service around the clock. This heightened expectation leads to reduced tolerance for service providers experiencing delays.

It is quite evident that in most contexts, the Internet increases the bargaining power of customers (Koretz 2001).

6.3. The threat of substitute products or services

Traditional supply chains often have many players, some of which provide utility, primarily in the form of information. These "intermediaries" serve the useful function of assisting the transfer of goods and services from producers to consumers. They provide stability to supply chains by facilitating transactions in the chain. For this item we focus on the threat of substitution of intermediaries through "disintermediation."

Internet users observe that intermediaries represent a transaction cost. The question is whether the benefits pursued when the transaction costs are incurred can be replicated through Internet transactions devoid of those costs. This can lead to disintermediation, which is providing supply chain entities at one stage, more direct access to entities at another stage, by eliminating non-essential intermediate entities.

It may be argued that eliminating intermediaries is destabilising, since the intermediaries may facilitate transactions. Examples include real-estate agents, auto dealers, stock brokers and manufacturers' representatives. Employment in those professions has been overshadowed in recent years by threats of disintermediation.

The intermediaries *per se* represent transaction costs and their elimination is also enabled by reduced transaction costs. For example, open standards in purchasing EDI (electronic data interchange) allow customers to interact with producers at low cost over public networks, eliminating the need for costly VAN (value added network) service providers. Customers have come to realise that the "value added" is not necessarily commensurate with the high cost.

6.4. The bargaining power of suppliers

As has been apparent in almost everything discussed here, customers receive most of the benefits of reductions in transaction costs. Suppliers, however, can also experience increases in power, especially the suppliers of labour. Experience demonstrates that when labour has increased power, the potential for instability increases.

Reduced transaction costs have an impact on labour when job switching becomes easier and when the workforce is more dispersed. First, just as customers experience lower product switching costs for e-services, knowledgeable employees can experience reduced job switching costs. When employees are less tied to one employer, a more fluid workforce is the result.

Second, with reduced employment transaction costs, knowledge and information workers can often work whenever and wherever desired. This leads to a so-called "bathrobe workforce," or working from home. Advantages of a bathrobe workforce include flexible work hours, reduced costs of physical facilities, a larger potential labour pool and a decreased propensity for "physical presence" to be equated with productivity.

There are also, of course, disadvantages associated with a bathrobe workforce: reduced interaction with fellow employees, reduced ability to establish corporate culture, reduced ability to provide social benefits of employment and possibly reduced employee identification with the company. The result of reducing transaction costs and establishing a bathrobe workforce is the loss of stability in the workforce and the work environment.

6.5. Jockeying for position among current competitors

Current players in any industry can define themselves relative to other players in the industry. Porter described three generic ways companies might position themselves *vis-a-vis* their competitors: by cost advantage, by differentiation, or by market focus. Friction (transaction costs) provides stability by allowing the positioning of the industry players to be relatively well-defined. Players become known for their positioning and changes in positioning are somewhat slow and infrequent. By reducing transaction costs, the players can reposition more rapidly, causing instability in the positioning of firms within the industry structure. Online consumer auctions is a prime example – when they became popular with auction companies such as eBay, web portals and retailers suddenly added auctions to their service offerings, making a peculiar combination of auction players.

The Internet promotes this instability because the cost of shifting service offerings and market entry are relatively minimal. Competitive intelligence (learning the workings and strategies of competitors) is much easier with the Internet. The result is a "copy-cat" mentality, where successful innovation by one player is quickly disseminated to other players in the industry.

Further, the Internet can make industries more competitive (Brown 2000). One way this occurs is by redefining the relevant realm of competition (Porter 2001). For example, grocery stores may consider that their only competition is grocery stores within a reasonable distance from the target consumer

base. However, if the transaction cost of shopping from a given store were reduced or eliminated, that same customer base might select from stores at locations of substantially greater distance.

7. Reaction to reduced friction

Without reflection, costs are usually perceived as undesirable. Transaction costs, however, do serve the useful purpose of promoting stability in various information-intensive industries. The business environment on the Internet is definitely more chaotic than traditional business environments. How might companies affected by Internet chaos effectively react to this challenging environment? The following are three generic response strategies.

Option 1: *Avoid businesses where friction is reduced*. Firms seeking a more trouble-free existence might simply stay out of business areas where transaction costs are diminished. This may include seeking to excel at the brick-and-mortar elements of the business. Or it may include targeting market segments where customers still value face-to-face interaction, and are willing to pay for it. This may include *inter alia* luxury services, consulting and gerontology services.

Of course, option 1 is not reasonable in most industries due to the presence of competition and the growing expectations of customers for low transaction costs, low search costs, etc. Even highly customised services, such as consulting, rely heavily on transaction cost reducing technologies such as email. Also, industries that seem exempt from reduced transaction costs may also possess high barriers to entry (such as branding), that will make it difficult or impossible for companies to reposition to those markets.

Option 2: *Capitalise on the lack of friction*. If the pitfalls of reduced friction cannot be avoided, an alternative is to benefit from the lack of friction. There are various ways companies can benefit from reduced transaction costs. One is to create self-perpetuating systems, such as communities of customers that interact among themselves, which leverages the "network effect." For example, some software companies provide discussion groups for customers, allowing the customers to provide technical support to each other. Another opportunity of reduced friction can be viral marketing, or allowing customers to recruit other customers. Another possible strategy is to give away the service but have advertisers pay for it - – reduced friction can increase the number of ad views and thus increase potential advertising revenue.

Note that capitalising on the lack of friction is the central point of various articles and books about succeeding in an Internet-driven business environment, including the previously cited works of Oliver (2002) and Afauh and Tucci (2001). This second option seems to be the most commonly considered approach to Internet businesses. However, in recent years companies seem to be actively pursuing a third option.

Option 3: *Seek an infusion of friction.* If all else fails, companies can seek to reintroduce friction into the business process, which is to introduce costs that may not otherwise occur. Companies may try to avoid open standards, such as by building proprietary technology then patenting it. Some companies have been successful at seeking government intervention, such as by regulating the exchange of information (*e.g.*, the Digital Millennium Copyright Act of 1998). Others can provide valuable proprietary content that can only be accessed with a fee. The challenge with all of these approaches is providing high value in the minds of consumers. As customer power increases, customers will not tolerate mediocre proprietary content.

This leads to an issue of determining if there is an "optimal" amount of friction for a given business or industry. In a metaphorical sense, one would have a very difficult time driving a car on an icy road due to lack of friction between the tires and the road. Road friction is good; however, too much friction, such as an extremely rocky road, might be difficult to traverse efficiently. There may be an ideal amount of road friction and in parallel an ideal amount of transaction cost for any given industry. This is a potential topic for future research.

8. Researching a frictionless Internet

This paper outlines a basis for analysing the impacts of the Internet on businesses management in a way that is much simpler than other published approaches. Again, the hypothesis is that the fundamental impact that the Internet has on businesses management is reducing the friction of transaction costs. The various other major implications of e-businesses are antecedents to this fundamental hypothesis. The lack of significant transaction costs can lead to increased stability in the business environment, encouraging strategies for dealing with these instabilities.

This paper is clearly theory-building research. An obvious next step is research to test the hypothesis with more general data. One technique would be to formulate a structured model which describes the theoretical relationship between friction and other major e-business management issues. Empirical data and confirmatory factor analysis could then be used to test the centrality of the frictionless concept. We recognise that confirmatory factor analysis does not inherently test causality. However, causality could be tested by introducing friction to specific or hypothetical e-business situations, then seeing if the various attributes unique to e-businesses are perceived subsequently to deteriorate.

What might other upcoming research look like? Certainly, it should help address the following types of questions:

- How might the breadth of e-business frameworks be mapped into the frictionless hypotheses framework?

- Besides pure transaction costs, what other "frictions" are reduced through the Internet? We initially described switching costs and new transaction system costs as being manifestations of transaction costs. This needs further study and formulation.
- What ways can companies increase management control by compensating for missing friction in e-businesses? This may include ways of increasing friction artificially.
- What ways can companies reduce the need for and reliance on friction in management processes?
- In what ways does reduced friction impact the stability of national economies? For example, if we suppose that reduced friction leads to reduced barriers to entry, we might suppose reduced friction also leads to reduced barriers to exit. An empirical test would be whether business bankruptcies occur more frequently and with greater speed under conditions of reduced friction.

The present paper formulates the basic hypotheses. Subsequent research can model the frictionless hypothesis according to its constructs, provide empirical tests of the models and outline managerial implications.

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The New Economy and Its Implications for Monetary and Fiscal Policy

Abstract

In recent years, the US economy has witnessed a significant change in the behaviour of macroeconomic variables. This paper analyses the potential sources of this development, both for the USA and other major industrial countries and their sustainability for the current decade. The focus is mostly on the implications for fiscal and monetary policy in the short and medium term. The prospects for a short-run active stabilisation policy become less promising, but in the medium term, policy makers have enough time to correct potential misjudgements of the new economic conditions.

1. Introduction

Macroeconomic evidence, such as rising output growth coupled with falling inflation, historic growth in real wages and lows in unemployment suggests that the traditional behaviour of macroeconomic variables, especially in the USA, changed in the 1990s and led to a "New Economy." Central to this concept was the consideration that information and communication technologies (ICT) were driving an acceleration of productivity growth in combination with strengthened worldwide competition, arising from the increased integration of international goods and financial markets. In such a new environment, it must be questioned whether traditional macroeconomic policy continues to be adequate or whether adjustments are necessary.

If the New Economy permanently changed previous macroeconomic relationships, an adjustment of fiscal and monetary policy is required. A new orientation may be necessary for the long-term level of fiscal and monetary activities, as well as for the intensity, timing and frequency of short-term interventions. The long-term level of money supply, for example, is influenced according to the quantity equation if there are sustainable changes in the growth potential of the economy or changes on the financial markets, especially on the money market. First, in the case of financial market changes, modified behaviour in the banking sector can decrease or increase the money multiplier and, second, changes in the demand for money can influence the long-term velocity of circulation.

The nature of short-term intervention is questioned if one can identify sustainable changes in the pattern of business cycles; such changes could include,

for example, modifications in output volatility, in the composition of price and quantity reactions or in the speed of adjustment to systematic and unsystematic impulses, changes in the transmission channels used and, finally, in the frequency of business cycles, i.e. in the frequency of demand and supply shocks.

This paper is structured as follows. Section 2 describes macroeconomic development in the major industrial countries since the 1990s and enquires to what extent available evidence supports the existence of new macroeconomic interdependencies. Section 3 discusses some alternative explanations for macroeconomic performance in the 1990s and its implications for the future. Section 4 concentrates on the business cycle implications of the ICT revolution and Section 5 examines the necessity for a new orientation of fiscal and monetary policy in this context. Conclusions are provided in the last section.

2. The anatomy of the New Economy in the major industrial countries

The empirical evidence that a significant structural change in macroeconomic relationships had occurred in the USA was not conclusive in the mid-1990s. Productivity growth was not exceptionally strong. The low inflation rate was not surprising, at least until 1997, because unemployment was still at levels that were consistent with the traditional "Non-Accelerating-Inflation Rate of Unemployment" (NAIRU) analysis (Krugman, 1997). A comparison of economic growth in the USA, from a longer perspective, reveals that real GDP growth over the 1990s was not actually very strong. The average annual growth of GDP was only slightly higher than in the 1970s and 1980s and significantly lower than in the 1960s. Other real economic indicators confirm this empirical evidence (Zarnowitz, 2000). So, it was understandable that most economists were sceptical about the claim of an increased growth rate of potential output.

Nevertheless, the expansion of the 1990s differed from its predecessors in three important points: (a) productivity development, (b) inflationary performance and (c) cyclical volatility. Labour productivity in the 1990s broke its downward trend and rose much faster than in previous decades. Most unusual was the pattern of productivity growth within the business cycle: typically productivity rises fastest in the early years of a recovery when existing capacities are increasingly utilised and decelerates towards the end of a boom, when more inputs with lower productivity enter the production process. In the 1990s, productivity growth accelerated with the duration of the expansion phase and, in contrast to the past, it remained at a remarkable level during the 2001 recession. Beyond all methodological differences and differences in argumentation, a large part of the acceleration in annual productivity growth

after 1995 was due to rapid productivity growth in the computer-producing industries themselves, even if their share in the total economy was still relatively small (International Monetary Fund, 2001; Gordon, 2000; Oliner and Sichel, 2000).

The strong rise in labour productivity was not anticipated and did not lead to a corresponding increase in wages. While wage inflation did pick up in the second half of the 1990s, wage growth remained moderate when measured against productivity growth. Unit labour costs did not rise with the consequence that inflation remained subdued from the supply side. By contrast, in each of the similar situations of high capacity utilisation in the 1960s and 1980s, consumer price inflation rose markedly. It did so, however, in a more unstable monetary and fiscal policy environment.

One postulated feature of the New Economy in macroeconomic relationships was reduced output volatility over time. The importance of inventory cycles was expected to be reduced by the application of information technologies. In addition, the increased amount of information was expected to result in greater price flexibility, with the consequences of smaller output fluctuations caused by nominal rigidities. The development in the USA seemed to support this view; the standard deviation of real GDP growth was significantly reduced in the 1990s. But in the light of the 2001 recession, this evidence must again be modified.

When comparing per capita economic growth in the USA with development in the other G7 countries, growth in the 1990s was highest in the USA. While there has been no significant slowdown in growth discernible in the United States in recent decades, expansion rates in the other major industrial countries have tended to decline over time. Only in Great Britain has per capita income growth accelerated in the last two decades, but the UK started from a low level compared with the other countries. In the second half of the last decade there was no significantly higher growth than in the first half of the 1990s, e.g. in Germany, Italy and Japan (Gern *et al*, 2003; OECD, 2002; Scarpetta *et al*, 2000;). The recognisable improvement in France and Great Britain would only be attributable to ICT if it were combined with an increase in productivity growth. While an upward shift in labour productivity can be identified for the USA in recent years, in the other G7 countries the trend line points upwards only slightly at best. The improved development in the above countries was due, not to an increase in labour productivity, but rather almost entirely to increased employment growth (Gern *et al*, 2003).

The slower productivity development casts some doubt on the existence of general ICT effects in the other major industrial countries, but it is still possible that the productivity-enhancing effects of the new technologies are at work worldwide. In the 1970s and 1980s output per person rose faster in Europe and in Japan than in the USA. In the former countries, labour market

rigidities contributed to high real capital investments, which caused high productivity growth and led to reduced labour intensity (Scarpetta *et al*, 2000). In the second half of the 1990s the situation obviously changed: in European countries employment increased faster and unemployment decreased more strongly than could have been expected according to past experience. More flexible labour markets, deregulation of product markets, and moderate wage policies, however, led to a decline in structural unemployment. That tended to reduce labour productivity overall and complicated the identification of positive ICT effects on productivity.

In addition, differences in the development of productivity between the USA and other countries can be explained in part by different statistical methodologies, when it comes to splitting the value of ICT production into price and volume components. While some countries do not take into account changes in product quality, other countries, such as the USA, make adjustments from time to time. As a result, countries without quality adjustments underestimate productivity growth. Moreover, the share of ICT in value added is higher in the USA than in other industrial countries. The rapid productivity growth in these sectors is therefore less important for overall productivity growth in the European countries.

Another consideration is that the USA enjoys technological leadership in ICT implementation. One factor that complicates the diffusion of new technologies in other industrial countries is the lack of qualified workers in this sector. A lower level of ICT implementation may not only imply reduced benefits in the form of rising productivity. It may be possible that productivity effects are absent altogether, or even negative, as long as that critical level of diffusion is not realised which allows network effects (Greenwood, 1999). If this factor is relevant, one can expect that positive productivity effects will also be increasingly visible in other industrial countries in the future.

Finally, the implementation of new technologies is associated with significant changes in a country's economic structure. To benefit from the potential productivity gains associated with new technologies, it is especially important to have flexible product and labour markets, a precondition which is currently less evident in Europe or Japan than in the USA.

Reduced output volatility, as observed in the USA since the mid-1990s – which would be taken as another indication of a New Economy – cannot be found in the other countries. But the output volatility in Europe has always been small compared with that of the USA. This suggests that factors other than ICT development might be more important in explaining the reduction in fluctuations of output in the USA. For example, monetary policy and also fiscal policy were less volatile in the 1990s than in the 1980s. In Japan, where fiscal policy in the previous decade was characterised by repeated phases of expansion and restriction, the output volatility even increased significantly in the 1990s compared with other decades.

3. An alternative explanation of economic performance in the 1990s

Why was price inflation so flat despite the increase in wage inflation during the mid-to-late 1990s? A number of factors may be responsible (Gordon, 1998). First, the benefits firms paid to workers (e.g. health care), which had increased rapidly in previous years, slowed down to roughly the same rate as the rest of the economy and grew more slowly than wages thereafter. This led to a smaller rate of increase in total labour costs to firms than the rate of increase in wages. Second, prices for raw materials and energy also decreased, leading to a fall in non-labour costs. Part of the decline in prices can be traced to the Asian crisis, since weaker aggregate demand in this region, especially for oil, reduced the worldwide demand for raw materials and put downward pressure on prices. Furthermore, the Asian crises benefited the USA in two other ways. The collapse of domestic demand in the Asian countries forced US exporters to cut their prices in order to sell more of their products on the domestic market; moreover, much of the capital that flowed outwards from Asia came to the USA, depressing the foreign exchange rates of Asian countries and financing the increasing deficits in the US current account. Third: the most important supply shock was the nominal appreciation of the US dollar against the currencies of relevant trading partners, which also caused a significant improvement in the terms of trade, i.e. in the reduction of relative prices of imported goods. Fourth, the role of computer prices as a beneficial supply shock in the late 1990s does not reflect the increase in the share of computer spending in the economy. Rather, it reveals a sharp acceleration in the annual rate of price reduction for computers. Fifth, it has long been suspected that price indices overstate the US inflation rate. Gradual steps were taken from the early 1990s to improve the accuracy of price measurement. As a result, consumer price inflation as well as the growth rate of the GDP deflator were reduced significantly at the end of the decade. Such measurement changes have the macroeconomic impact of a supply shock in that they reduce the measured inflation rate and boost the measured growth rate of real GDP.

Why has the unemployment rate been so low for reasons other than robust aggregate demand, i.e. why has the natural rate of unemployment fallen? These explanations focus on factors that have changed supply and demand conditions in the labour market for particular groups (Katz and Krueger, 1999; Gordon, 1998). First, teenagers and young adults always have higher unemployment rates than older workers because they spend a large fraction of their time in the labour force looking for jobs. The fraction of teenagers in the total population rose in the 1970s and then fell in the following decades. This factor may explain one-third of the decline in the natural rate of unemployment since the late 1980s. Second, in 1998 2.3 per cent of the US male labour force was in prison, double the fraction in prison in 1985. Some of them would otherwise have been unemployed. Third, the natural rate of unemployment

depends partly on the speed with which unemployed workers can find a job. In the 1990s there was substantial growth in the role of temporary help agencies. These institutions may help firms to fill vacancies and workers to locate the available jobs faster. In sum, it is reasonable to forecast that the natural rate will not remain as low as it appears to be in the late 1990s.

A key question is whether the elevated pace of productivity growth can be sustained, especially in a slowdown phase. There are several reasons to believe that the additional pickup in productivity growth in recent years is due primarily to cyclical factors. First, the recession in 2001, by dramatically reducing profit, focused attention on restructuring and cost-cutting rather than on business expansion. It is likely that it also induced some temporary gains in efficiency. That firms could realise such advances in productivity was perhaps due to their substantial, but underexploited, investments in high-tech equipment in the late 1990s: at some point, however, additional efficiencies from these older investments will be more difficult to achieve. Second, geopolitical risks and corporate governance scandals led many firms to question the durability of the current recovery and thus made them hesitant to hire new employees. To meet increases in their orders, firms used their existing workforces more intensively, and measured productivity increases coupled with the phenomenon of "jobless growth." Recent recovery in the US labour market appears to signal that employers are more confident about the economy and are attempting to return workloads to a more sustainable level. As a result, the modest short-term reduction in productivity growth observable in the USA in the second half of 2004 was not unexpected.

A second important question is whether trend productivity growth will also significantly slow down in the medium and long-run. The impact of the ICT revolution may be much more limited than past technological revolutions for a number of reasons (Gordon, 2000). First, as Gordon once argued, most of the increases in productivity that have taken place during the 1990s were in computer hardware, which directly influenced only 12 percent of the U. S. economy. In the greater part of the economy, productivity growth actually decelerated. One can argue that this is because jobs that could be automated by computers were automated long ago. As a result, future advances in productivity from ICT appear limited within most industries. Second, because computer hardware is a relatively minor part of any production process, diminishing returns to new computer technologies set in very quickly. The primary constraints, especially in the tertiary sector, are human ones and better technologies cannot eliminate these restrictions. Finally, it can be argued that many technologies associated with the ICT revolution have not significantly altered production as, for example, the combustion engine did. Many of the markets created by ICT, such as the Internet, for example, are duplicative. They exist in similar forms elsewhere, such as Web services provided by previously-extant retailers. Their main advantage is not one of productive efficiency but of convenience for the consumers.

In contrast, more optimistic economists argue that the ICT revolution will continue to generate higher productivity for the foreseeable future. The share of GDP based on ICT will rapidly increase (DeLong, 2002). Despite the high investment rates of the late 1990s, a wide gap remains between the technology embodied in state-of-the-art capital equipment and the technology embodied in the existing capital stock across a broad set of industries. That gap implies continued incentives for capital investment and the most reliable estimates indicate that the US economy should experience strong productivity growth for at least the next decade before diminishing returns to ICT begin to slow growth (Stiroh, 2002). The biggest dangers for an untimely slowdown of trend productivity growth are adverse changes in the economic, legal and financial environment (Baily, 2002). As long as the administration opens markets to international trade, increases the competitive environment, improves education, provides prudent government regulation and maintains budgetary and monetary restraint, all evidence points to strong productivity growth in the foreseeable future. But of course these preconditions can explain a better growth potential without any technical progress (Eucken, 1952).

As an intermediate result, differentiating temporary factors (i.e. series of supply shocks) from structural changes is a difficult task that requires careful empirical analysis and, more importantly, a longer period series of data. Only by observing unemployment, inflation and productivity as impacted by a wide range of economic variables for a longer time period can one provide reliable conclusions on the extent to which a structural (permanent) change of macroeconomic relations has occurred. Although a large number of empirical studies – especially for the USA – confirm the stability of the new trend productivity growth, the possibility cannot be overlooked that changed measurement techniques, cyclical factors and single supply shocks explain the extraordinary productivity developments of the late nineties in the medium term. However, the number of New Economy sceptics among American economists has never been great and is now decreasing.

4. Business cycle implications of the ICT revolution

Over the last two decades, technology shocks and their impact on investment, aggregate demand and spending have often been acknowledged as one of the main driving forces of business cycles (e.g. the "Real Business Cycle" models). This contrasts with the widely-held traditional view that fiscal and monetary policies played a dominating role in stimulating or slowing economic activities. So the rapid growth of ICT production and its use may have important implications for the sources and propagation of business cycles. As ICT production provides a larger share of total output, shocks in this sector are playing a greater role in driving macroeconomic fluctuations, while the increasing use of ICT may be speeding up the pace of macroeconomic adjustment. An example of an accelerated adjustment is the latest economic slowdown in

the USA. After the growth of consumer demand for durable goods slowed by mid-2000, more advanced supply-chain management allowed firms to identify the initial backup in inventories quickly. More flexible manufacturing processes enabled firms to adjust their production rapidly. As a result, a round of inventory rebalancing quickly took hold and the economic slowdown was intensified, i.e. inventories lost their buffer stock feature.

At the same time, new technologies can strengthen the real and financial linkages across national markets, with the result that international trade and international capital flows in ICT-producing countries are vulnerable to shifts in international demand for ICT goods (International Monetary Fund, 2001). In several of the small, open East Asian countries, for example, the total share of electronic goods now exceeds 50 per cent of overall exports. In addition, ICT markets are driven by a cobweb-type mechanism with large swings in prices and real investments. Besides trade linkages, the cross-border correlations of stock prices since the mid-1990s have been higher for the ICT sector than for other economic sectors, reflecting greater exposure to common shocks and greater internationalisation of ICT firms. Moreover, the significant share of equity refinancing of ICT firms can open up an additional transmission channel of instability, if non-fundamental investment decisions generate an independent driving force in international ICT cycles.

One of the principal benefits of ICT may be improved inventory management through the reduction of time lags in the collection, transmission, and processing of information. Businesses can control their inventories more effectively, interest and storage costs are lower, stock-outs are less frequent and less costly (DeLong, 2000). In recent decades, as much as 40 per cent of the quarter-to-quarter volatility of US production growth rates about trend has been due to fluctuations in inventory investment. In the last few years there has been an economy-wide reduction in inventory-to-sales ratios of about 20 per cent and even greater reductions in the length of time goods spend in the inventory pipeline. International data from other major industrial countries are consistent with these experiences (International Monetary Fund, 2001). ICT can also help firms to absorb demand or supply shocks more effectively, but of course the new technologies cannot mitigate the size or the frequency of the underlying shocks.

If the reduction in inventories made possible by ICT is close to reaching its limit, it can be expected that one consequence of the New Economy is to moderate the inventory-driven portion of the business cycle. If the reduction in inventories has just begun – if improved information flow will truly make the New Economy a just-in-time economy – then it can be expected that the inventory-driven part of the business cycle will be severely reduced, or effectively eliminated. As a result, the total business cycle will be changed. But of course, this development can also be explained by the increased share of the service industry, which has to produce just-in-time because their products are not storable.

5. Implications for macroeconomic stabilisation policy

5.1. Monetary policy in the New Economy

The consensus from empirical tests on the long-run relationship between money, prices, and output is unambiguous. Money growth and inflation essentially display a very high correlation, whereas the correlation between money growth (or inflation) and real output growth is probably close to 0, although it may be slightly positive at low inflation rates and negative at high rates. Therefore it is a widely accepted proposition in economics that, in the long run, i.e. after all adjustments in the economy have worked through, a change in the quantity of money will be reflected in the price level and will not induce permanent changes in real variables, such as real output or unemployment (Walsh, 2003). Related to this is the assertion that inflation is a monetary phenomenon in the medium to long term. Indeed, prolonged periods of high inflation are typically associated with high monetary growth (European Central Bank, 2004).

The consensus from the empirical literature on the short-run effects of money is that exogenous monetary policy shocks produce hump-shaped movements in real economic activity. The peak effects occur after a lag of several quarters and then disappear successively. Whilst other factors, such as variations in aggregate demand, technological changes or commodity price shocks, can influence price developments over shorter horizons, over time their effects can be offset by some degree of adjustment of the money stock. In this sense, the longer-term trends of prices or inflation can be controlled by central banks.

The *Monetarist* theory of business cycles has been largely discredited by money supply effects during the 1980s and 1990s, especially in the USA (Friedman, 1996). Deterioration in the link between the M2 aggregate and GDP, together with large errors in predicting M2 growth, led the FED to downgrade the money aggregates as reliable indicators of monetary policy. Many economists today are not convinced that monetary cycles are the primary cause of business cycles and that a stable money growth rule would stabilise output growth. In recent years, a set of studies appeared which support a modified Monetarist approach and the efficiency of monetary policy for output as well as inflation (*e.g.*, for the USA Nelson, 2002; Carlson *et al*, 2000; Lown *et al*, 1999; for the Euro Zone Neumann and Greiber, 2004; Brand *et al*, 2003; Toedter, 2002). In a changed environment with significant portfolio shifts, it is apparent that mechanical use of a single monetary aggregate is unlikely to be a successful method of extracting the information in monetary developments relevant for monetary policy decisions and the overall effects on business cycles. But the *Monetarist* theory with its money aggregates has some important information advantages compared with the currently widespread *Neo-Keynesian Taylor*-type models and monetary policy rules without money. Monetary policy works by changing relative prices, but a wide range of marketable assets and interest rates must be taken into account. Under

these circumstances, the short-term interest rate could become less adequate as an indicator of monetary policy. From a modelling perspective, the dilemma is how to capture in small models the idea that many interest rates are relevant for aggregate demand. The money stock provides better information than single interest rates. The gap between desired and actual real balances can be seen as a measure of the relative price adjustment required to restore full equilibrium. As a result, the control of monetary aggregates is seen as the better strategy (Toedter, 2002) and with sophisticated empirical analysis, there is evidence of a strong causal chain between money aggregates and output, as well as inflation. The impact of the money growth rate on business cycles can be overlapped temporarily by other demand and supply shocks, but it still works. The latest recession in the USA and the Euro zone can be well explained by a very restrictive monetary policy preceding the economic slowdown and the monetary expansion after 2001 was responsible for the economic recovery in the major industrial countries.

Because of well-known long, variable and uncertain time lags in monetary policy and imperfect information about the stance of the real economy, an active countercyclical monetary policy could actually amplify business cycle fluctuations (a phenomenon characterised as the destabilising effects of stabilisation policy). If the ICT sector is speeding up the pace of macroeconomic adjustment, this problem is more and more crucial. Furthermore, as transmission lags make it impossible in the short-run for monetary policy to offset unanticipated shocks in the price level, some short-term volatility in inflation is unavoidable. For these reasons, a medium-term orientation for monetary policy is important: it is consistent with the objective of price stability to avoid excessive activism and the introduction of unnecessary, possibly self-sustaining volatility into the real economy. This position is, of course, in contrast to official monetary policy in the USA. In the view of Greenspan (2001) one implication of faster economic adjustment caused by ICT is that monetary policy may need to be adjusted more quickly than before.

The actual objective of most central banks worldwide is to stabilise inflation about some low level (e.g. < 2.0 per cent p.a.) while maintaining economic growth roughly at its steady-state rate (Clarida *et al*, 1998). One way of expressing this is that monetary policy seeks to minimise a loss function, i.e. a weighted average of inflation and output volatility. While the inflation objective is ordinarily non-ambiguous, problems exist with the identification of an adequate output target. The monetary authorities require a reliable estimate of the sustainable rate of growth or potential output.

In practical terms, the difficulty is that monetary authorities should react differently to transitory movements in productivity and to permanent ones. If productivity growth shifts permanently, then the appropriate policy response is to stabilise inflation while allowing output to move to its new, higher, long-run growth path. If there is no structural change in the money multipliers and in the velocity of money (money demand), the central banks have to ac-

commodate the growth rate of the monetary base according to the quantity equation. A continuous underestimation of the trend productivity growth, i.e. a permanent misinterpretation of the GDP growth rate, is accompanied by a series of overestimates of future inflation. A strict price stability-oriented strategy for monetary policy runs the risk that the growth rate of the money supply is too restrictive and will result in a dangerous deflation process. In contrast, failing to react to a decline in productivity growth can result in a longer period of undesired inflation. The challenge for monetary authorities is to identify as quickly and accurately as possible the trend productivity rate (Cecchetti, 2002). In practice, of course, a strategy oriented to strict price stability never existed and today most central banks have sufficient room for a rapid adjustment of monetary conditions if a permanent change in productivity growth is suspected.

The long-term impacts of the ICT revolution on the efficiency of monetary policy over the next few decades must be also studied and discussed (see Vollmer's contribution in this volume). The issue is whether technological advance will ultimately completely eliminate the private-sector demand for central liabilities. Currently, there is no evidence of an unambiguous fundamental change of money multipliers or the velocity of money in the major industrial countries. While money multipliers decreased in the USA and the income velocity of money increased in the second half of the 1990s, the Euro zone experienced the opposite trend direction, phenomena explained by a very low interest rate level and portfolio shifts (European Central Bank, 2004).

5.2. Fiscal policy in the New Economy

In recent decades, fiscal policy has been considered an important potential source of stimulus in the event of a general slowdown. A combination of higher government spending and lower taxes should reduce the overall amplitude of cyclical downturns and at the same time ensure that the burden of reaction is not concentrated on just a few people. Conversely, when other components of aggregate demand are abnormally high, the government should raise taxes or reduce spending.

Analysts have always perceived flaws in discretionary fiscal policy as a means of combating cyclical fluctuations. The main argument against it – regardless of the economic school of the proponent – emphasises the time lags involved in changing fiscal policy. In response to economic fluctuations, fiscal policy should be countercyclical, i.e. in order to smooth out fluctuations in income, budget balances should increase in booms and decrease in recessions. In practice, long, uncertain inside and outside lags mean that stabilisation policy may actually be destabilising and cause pro-cyclical effects (EU Commission, 2004; Walsh, 2002). Most recessions in industrial countries are short, lasting a year or less. Furthermore, because reliable data on the economic situation

are only available with a lag of several months, a recession is often half over before consensus is reached that it has started. The more flexible New Economy goods, labour and financial markets are, the more difficult the situation becomes for discretionary fiscal policy (Cecchetti, 2002; for a recent survey of the efficiency of fiscal polices see Capet, 2004).

The other complication in using fiscal policy is uncertainty regarding the impact of changes in taxes or of an increase in expenditure on private demand. There are three well-known channels through which attempts by the government to increase demand may be offset by the behaviour of the private sector: Ricardian equivalence, crowding out effects on government expenditures and the effects of consumer expectations on tax cuts.

Ricardian equivalence says that the impact of government expenditures on the economy does not depend on whether higher taxes or government debt is used to finance them. That means expansionary government expenditures have no effect on the economy. Ricardian equivalence relies, of course, on several strong assumptions and is unlikely to hold exactly. However, increases in the fiscal deficit sometimes have little effect on demand because of increases in private sector saving. Unless the multiplier effects of fiscal deficits are predictable, using fiscal policy to stabilise the economy can be destabilising.

Crowding-out effects can work in very different ways, but all have the same essential mechanism: increases in a fiscal deficit lead to higher interest rates (for recent empirical evidence see e.g. Laubach, 2003) and diminished private sector demand. If the demand is highly sensitive to interest rates, these crowding out effects can be substantial. The classic crowding out phenomenon appears when a larger deficit reduces the amount of funds available to other market participants. This leads to higher interest rates and induces lower investment and consumption, provided the central bank retains a tight monetary policy. For this to happen, of course, the fiscal deficit must be large, relative to the amount of funds available in the loan market. Given the size of international capital markets very few economies, other than that of the USA, are likely to have a fiscal deficit sufficiently large to crowd out private investments in this manner. Only if the solvency of an economy is questioned on international financial markets and foreign capital flight ensues, can interest rates increase dramatically (as in financial crises in emerging markets). There are, however, alternative ways for crowding out to work. Where monetary policy is determined primarily by independent central banks and governments run large fiscal deficits, central banks may be persuaded to raise interest rates in order to reduce the domestic demand pull. Higher interest rates would reduce the private domestic demand and, through an appreciation of the domestic currency, lead to lower net exports.

How consumers respond to tax cuts depends on whether they perceive them as transitory or not. If consumers believe tax cuts will be reversed as soon as the economy recovers from recession, consumption will respond only weakly

to a tax cut, if at all. Only if the cuts are perceived as being permanent will consumption respond decisively. If tax cuts are designed strictly to stabilise the economy and are only temporary, they will have only a small effect on the economy; moreover, they will add an additional element of uncertainty as to how fiscal policy will work.

Empirical studies for the United States suggest a number of conclusions regarding the recent role of discretionary fiscal policy (Auerbach, 2002). In the 1990s, discretionary fiscal policy became more active in response both to cyclical conditions and simple budget – balancing measures. But considerable uncertainty remains about how large discretionary fiscal impulses influence output. There is also little empirical evidence that discretionary fiscal policy has played an important role in economic stabilisation, both because of the potential weakness of its effects and because some of its effects have been poorly timed. Budgetary pressure can further weaken the impact of expansionary fiscal policy. By contrast, a restrictive fiscal policy might have a positive effect on output, as in the 1990s, where stabilisation policy was rather restrictive. Automatic stabilisers embedded in the fiscal system have experienced little net change in the last four decades and have contributed to damping output fluctuations. But the US tax system has many features that weaken its potential role as an automatic stabiliser. Moreover, the administration's reported fiscal position, to which fiscal policy appears responsive, represents a poor measure of underlying fiscal balance (Auerbach, 2002).

All of this means that discretionary fiscal policy is a very poor stabilisation tool. In the context of the New Economy, it seems best to let fiscal policy's principal countercyclical impact occur through automatic stabilisers. It is more important than ever for fiscal policy to be transparent and systematic. The automatic stabilisers represent just such a predictable and systematic response (Taylor, 2002); permitting them to take care of short-term stability, policymakers should focus their attention instead on building solid foundations for long-term growth. This means creating structural tax and spending policies that strengthen the automatic stabilisers and encourage investment, innovation and work in the sense of supply-side policy. Examples of such a longer-term focus include fiscal policy proposals to balance budgets of other than social programs, to reduce marginal tax rates, or even to reform the tax system and social security in the industrial countries. The ICT revolution has made discretionary fiscal policy an even worse stabilisation tool than it was a decade ago.

6. Conclusions

Although empirical studies – especially for the USA – confirm the stability of the new trend productivity growth, it cannot be excluded completely that new measurement techniques of statistical offices, cyclical factors and single supply shocks generate a significant upward bias in trend productivity devel-

opment in the medium term. With the experience of the latest recession, it can at least safely be said that the sometimes-quoted notion of new economy optimists, that the business cycle is dead, has been proven wrong. The destabilising effects of stabilisation policy, especially monetary policy, work well, so there is no room for a short-run active monetary or discretionary fiscal policy. Only by observing macroeconomic variables for a longer period can one provide reliable conclusions regarding the cause and extent of a structural (permanent) change of macroeconomic relations. If increased productivity causes a significant change in potential output growth in the current decade, the short-run strategy of stabilisation policy should not be changed. Monetary authorities have enough time to react to medium-term changes in productivity growth and to correct potential misjudgements.

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Internet Banking and E-Money: Implications for Commercial Banks and the Payment System

Abstract

This paper reviews some of the literature on Internet banking and e-money. It asks what the consequences of Internet technology are for the banking industry and for the payment system in the future. It concludes that the IT revolution will not completely change the financial world. Although the banking sector might experience some consolidation, banks will still have the same tasks to perform and money will not vanish from the face of the earth. Money users, however, may become more transparent and lose some of their privacy, especially if e-money is made legal tender.

1. Definitions and User Acceptances

Innovations are common in the financial sector. The 1970s and 1980s were characterised by a wave of new products. These innovations were stimulated either by regulatory pressure or by technical progress. More recently, new developments in information and communication technology (ICT) have induced an increase in banking business transacted electronically. Moreover, the technology allows non-banks to use electronic money for payments and with the progress of electronic commerce on the Internet, new uses of electronic money are emerging. These developments might have a lasting impact on the banking industry, on the future of fiat money and on the payment system as a whole. This paper addresses these questions and presents an overview of some of the answers given in the literature. It defines concepts (Section 1.), speculates about the consequences of e-commerce for the future of banks (Section 2.) and deals with the consequences of Internet banking and e-money for the payment system as a whole (Section 3). Part 4 concludes.

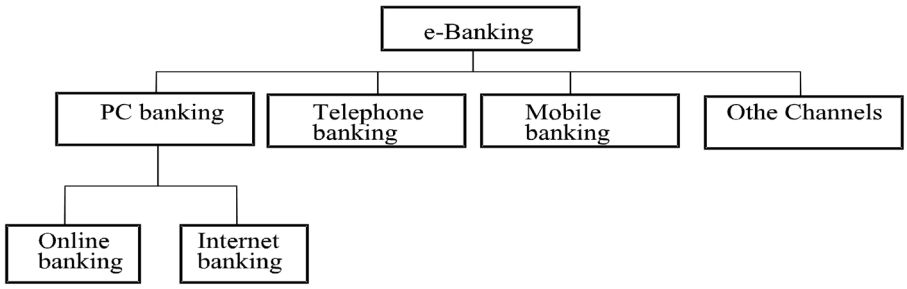
Electronic banking („e-banking“) is part of electronic commerce («e-commerce«) which encompasses all types of business transacted through electronic networks and is used for both business-to-business transactions and business-to customer transactions (Deutsche Bundesbank, 2000: 44-45). E-banking includes business transactions via electronic media with banks involved. Customers may have a multitude of ways to access their bank accounts without having to be physically present at a bank branch. The most important types of e-banking are „PC banking“, „telephone banking“, and

„mobile banking"; other types also exist, such as self-service terminals and ATMs (see figure 1; Deutsche Bundesbank, 2000: 46).

The term PC banking is used for banking services transacted from a customer's PC. Basically, there are two types of PC-banking available, "online banking" and "Internet banking" (Pennathur, 2001: 2106): Online banking includes bank transactions that are conducted within closed networks. For this, the customer needs specialised software provided by his bank. An example of such a closed system is a bank's website with access restricted to its members. Internet banking, on the other hand, is an open network. It has no membership restrictions and allows the customer to conduct transactions from any terminal with access to the Internet. Closed as well as open networks can also be viewed as "informational" or "transactional"; an informational site provides information only, and a transactional site allows for user interaction. Mobile banking represents a convergence of the Internet and the telecommunication sector. Due to new transmission technologies such as WAP ("wireless application protocol") or UMTS ("universal mobile telecommunication system") portable terminals (such as mobile phones, personal digital assistants or small hand-held PCs) can provide bank customers with access to the Internet.

In Germany, the number of online accounts grew rapidly during the second half of the 1990s from a little more than 1 million in 1995 to more than 10 million online bank accounts in 1999. Nevertheless, the number of online accounts relative to the total number of bank accounts is still relatively small. Its share was only 12 per cent in 1999. Most online accounts are provided by commercial banks which in 1999 supplied 49 per cent of all online accounts, followed by savings banks (31 per cent) and credit co-operatives (20 per cent).

Figure 1. – ELECTRONIC FORMS OF BANKING BUSINESS



Source: Deutsche Bundesbank (2000): 46

E-banking itself is not a banking product but describes a particular way in which transactions are conducted. The vast majority of products and services being offered electronically are still restricted to highly standardised areas,

like account-keeping/payments, securities transactions and information gathering (*Deutsche Bundesbank*, 2000: 48; *Pennathur*, 2001: 2107). More personnel-intensive services or transactions which require more personal consultation, like mortgage lending or asset management, will probably continue to be sold through bank branch networks even in the future.

What is a new financial product, however, is electronic money ("e-money"). The European Central Bank (1998: 7) has defined electronic money "as an electronic store of monetary value on a technical device that may be widely used for making payments to undertakings other than the issuer without necessarily involving bank accounts in the transaction as a prepaid bearer instrument." According to this definition, single-purpose schemes, such as telephone cards, are not considered to be electronic money because the issuer and the acceptor are identical and the money units are an advance payment on certain goods or services. Furthermore, e-money should be distinguished from "access products" which provide electronic access to standard forms of money such as sight deposits. Therefore, Euro-cheque cards, widely used in Germany and other European countries, equipped with a debit card function, do not count as e-money (Deutsche Bundesbank, 1999: 42; Kabelac, 1999: 3-4).

The European Central Bank (1998) distinguishes between two types of electronic money: "Card-based products" and "software-based products". Card-based products are money units on a prepaid card, *i.e.*, a "plastic card which contains real purchasing power, for which the customer has paid in advance." The second type, software-based products ("network money"; "cyber cash"), transmit electronically stored money units through telecommunications networks such as the Internet. Electronic money stored on cards was originally designed for use in traditional over-the-counter (OTC) trade, also including vending machines. However, card-based products can also be used for payments over the internet with the help of card readers linked to the PC of a payer. Thus, electronic commerce can use both types of electronic money which together will be called "network money" or "cyber money" (Deutsche Bundesbank, 1999).

Although the use of e-banking and e-money is still in its infancy, estimates point to a large potential for future growth which is likely to ride atop the continued increase in internet usage (Deutsche Bundesbank, 2000: 47): In Germany, 39 per cent of Internet users are engaged in Internet banking or online banking; another 27 per cent indicated having seriously considered the possibility of e-banking on their PCs. This trend towards greater use of the Internet has also been confirmed by data on the amount of new information technology equipment found in German households. The share with Internet access has more than doubled between 1998-2000 and has reached 30 per cent in 2000.

2. Consequences for the Banking Industry: Will Banks Survive the IT-Revolution?

2.1. Technological Progress and Consolidation of the Banking Industry

What are the consequences of progress in Internet technology for the size and the structure of the banking sector? During the last decade, a substantial consolidation of the banking industry has taken place which in part has been due to technological progress. In the US, the number of banks dropped by almost 50 per cent. It fell from a little more than 14,000 in 1984 to a little more than 8,000 in 2001. This consolidation has primarily occurred through mergers and acquisitions and has mainly affected banks in the smallest size class (*i*.e., banks with gross total assets under USD 100 Million; Berger, 2003: 143).

The value of the gross total assets of banks expanded between 1984 and 2001 at a 3 per cent annual rate. This, however, was much slower than the growth rate of public financial markets which are substitutes for bank products (Berger, 2003: 144). Money market mutual funds, as an alternative to bank deposits, grew at an annual rate of 10.8 per cent. Corporate equity and corporate debt (bonds plus commercial papers), close substitutes for bank loans, grew at an annual rate of 10.0 per cent and 11.3 per cent, respectively, and mortgage pools and asset-backed securities grew at a rate of 13.7 per cent in the interval between 1984 and 2001. Nevertheless, the banking industry had sustained its good performance (as measured e.g. by the return on equity) over this period. This holds especially for banks in the largest size class (gross total assets more than USD 10 Billion); commercial banks in the smallest size class performed much worse (Berger, 2003: 146).

Berger (2003: 162) argues that these developments may have been caused by technological progress and dispersion of Internet technologies, which made it more efficient at the margin for banks to be larger, more geographically dispersed or to engage in merger and acquisition (M&A) activities. He identifies three kinds of reasons why progress in information and telecommunication technologies may foster the consolidation tendency in banking:

- ICT may create new banking services or new technologies for producing existing banking services that are subject to greater economies of scale, implying an increase in the optimal size of banking organisations.
- Technological progress may also facilitate the geographic expansion of banking organisations since the Internet allows existing banks to deliver their services with lower costs.
- Finally, technological progress may increase the technical efficiency of banks engaged in M&A activities and help them to move more closely to the best-practice frontier; for example, a bank that operates a transactional Internet web-side may bring this technology to the bank it acquires and reduce the X-inefficiency of this institution.

2.2. Will Banks Survive the IT-Revolution?

Given this tendency for consolidation, the next question is: what will the prospective role of banks and intermediaries be in the age of electronic money, *i.e.*, of computer money forms that represent liabilities of non-bank entities or of special segregated bank accounts that are substitutes for conventional money? Will banks disappear during the IT revolution and lose ground to direct finance when investors and fund users are less and less inhibited by time, space and information constraints to trade directly on e-markets?

Bossone (2001: 2240-2247) argues that due to the specific features that characterise banks as financial intermediaries, the demand for banking services will increase in the future. One of these special features of banks is their role as a delegated monitor of borrowers on behalf of the ultimate lenders (Diamond, 1984). The other important feature of banks is the provision of liquidity services to investors, *i.e.* banks finance their loans with liquid deposits which bear a nominal fixed value and are available to their holders on demand (Diamond, Dybvig, 1983).

Bossone (2001: 2262-2266) shows that these features will still be needed after the end of the IT revolution. Conventional banking would be replicated, because any non-bank entity aiming to take deposits, make loans and manage payments online would have to possess basically the same skills as a conventional banker. E-banks would still be banks and would create e-money by lending their own e-debt. Moreover, due to declining transaction costs as technological development proceeds, opportunities available to investors will grow. This might lead to increasing demand for banking (as well as non-banking) services.

3. Internet Banking and E-Money: Consequences for the Payment System

3.1. Trade on the Internet: E-Barter versus Fiat Money?

Recent and extremely rapid developments in computer technology allow people to carry "electronic purses". These are cards which are loaded with monetary units in electronic form from which funds can be transferred directly, not intermediated through the banking sector, onto another person's card or into a shopkeeper's till. While up to now these developments have been used only on a geographically limited and essentially experimental basis, some observers (Dowd, 1998; Friedman, 1999; King, 1999) conjecture that the development may go further. They speculate whether this further stage is one in which computer technology will replace money altogether. If so, society would return to electronic barter and goods would be exchanged directly for goods; computer technology would reduce costs of information storage and transmission such that barter is a cheaper form of exchange than exchange using fiat money.

Capie, Tsomocos and Wood (2003) analyse formally the conditions under which the replacement of money through barter trade could occur. It transpires that these conditions are special (they will be set out below), and as long as there are transaction costs, money will still be used because it will be more effective in reducing transaction costs than electronic barter. Transactions costs cover all costs emerging from the double coincidence of wants involved with barter; the buyer must want what the seller is selling (and vice versa). That could be eliminated by barter credit, *i.e.*, supplying goods now in exchange for a promise to deliver goods later (King, Plosser, 1986), but this is expensive because any credit, whether barter credit or not, requires the seller to know the buyer. The seller must be sure of the buyer's honesty and be aware of his income and all other factors contributing to his creditworthiness.

The use of money offers a superior, i.e. cheaper way of transacting with less information than would otherwise be necessary. If money is used, the personal attributes of the buyer become irrelevant and are substituted by the attributes of the media of exchange used as money. If widely accepted and recognised money is available, money trade is cheaper than barter trade. It also expands the possibilities for trade, so that both buyers and sellers gain. Moreover, society will tend to evolve towards the use of a limited number of commodities as media of exchange if the costs of acquiring information depend on the goods selected; one item will come to dominate if the marginal cost of acquiring information about that item falls with the frequency it is used.

While it is well known about the evolution of society from barter trade (or barter credit) to monetary trade, Capie, Tsomocos and Wood (2003) argue that the same will hold if society moves on to trade on the Internet. Electronic barter is dominated by the use of money because money reduces transactions costs; it shifts attention from the qualities of the prospective purchaser of a good to the good itself and what he is offering to pay for it. These authors use a cash-in-advance model with fiat money (in form of notes and coins) as the stipulated means of exchange. Money depreciates (i.e. wears out through deterioration) when used in exchange and its replacement is costly. Money supply is exogenously given and agents borrow fiat money to make their transactions, paying an interest rate r. The alternative to money trade is electronic barter, and this is assumed to be mediated as through a giant clearing house run by the government.

The clearing house acts as a Walrasian-type auctioneer that calculates the vector of equilibrium prices and matches demand and supply. Let N be the number of agents trading in the economy (plus the clearing house) and L be the number of tradable commodities. If the combined costs of gathering and processing information on each transaction are c, the total cost C of exchange with e-barter is:

$$C = c \cdot \frac{L(L-1)}{2}(N+1) \tag{1}$$

because there will be $\frac{L(L-1)}{2}$ markets and (N+1) participants (including the clearing house) on each market; it is assumed that each agent participates in each market. On the other hand, trade with fiat money does not require any cost of gathering and processing information; although the use of money incurs production and replacement costs for notes and coins. Exchange with fiat money as opposed to e-barter is advantageous if C is smaller than the costs of using money.

Because C rises both in the number L of tradable commodities and the number N of agents trading, the above condition is all the more likely to be fulfilled as the economy grows. On the other hand, if one imagines technical progress reducing C, the same process is likely to increase the number of commodities, L. In an economy with large N and L, money is a decoupling device that economises on transaction costs regardless of whence they emanate. E-barter, on the other hand, is a centralised accounting mechanism that requires detailed information of every transaction and inevitably entails higher aggregate costs in complicated market systems with multiple markets and goods.

3.2. Is Cash an Endangered Species?

Given the assumption that e-commerce will still use money as a means of payment and that trade on the Internet will not be conducted in the form of barter, the follow-up question is what kind of money will be used? Will cash (bank notes and coins) be replaced by e-money? Practitioners in e-business answer this question in the affirmative; in two surveys conducted in 1999 and 2000 among the participants of the International Advanced Card Exhibition and Conference ("Smart99Card"; "Smartcard2000") a vast majority of 82% (57%) of all respondents believed in the possibility of e-money replacing currency in circulation (Gormez, Capie, 2000: 11 and 33). More than half of the respondents in 1999 who felt that e-money has the potential to replace central bank money also felt that this will happen before 2010. Among the respondents of the 2000 surveyed, almost half of them expected that e-money technology would lead to a new, free-banking era, *i.e.*, the absence of central bank involvement in the financial system and competing currencies issued by different institutions.

Some academics, however, do not share this view because they think that e-money is not a perfect or even close substitute for paper money and coins (Drehmann, Goodhart, Krueger, 2002). The reasons for this are a desire for anonymity and a preference for security on the side of the money users. There are different degrees of anonymity involved with monetary transactions: The payer and the payee do not want anyone else to gain knowledge about their transaction or they prefer not to reveal their identities because they do not trust each other. An important reason for this demand for anonymity may be

that the transactions involved represent criminal activities. The desire for anonymity may also emanate, of course, from a preference for privacy because people do legal things but do not want to have to account for them later.

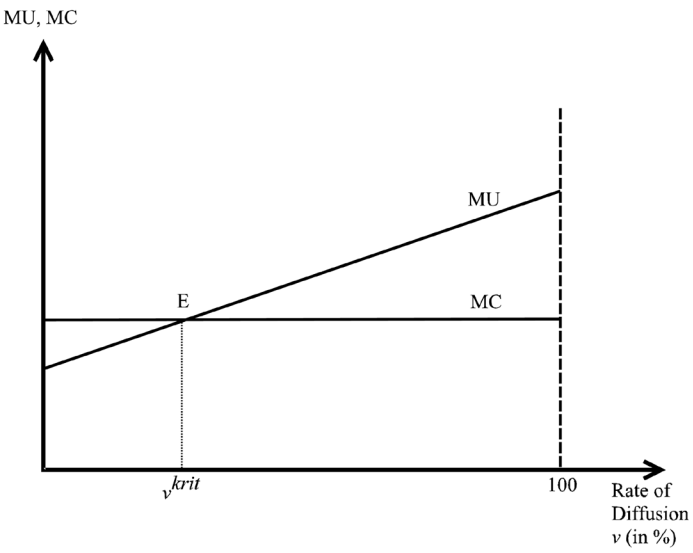
Coins and paper money are perfectly anonymous because as a bearer instrument, no-one has to know the identity of the payer or the payee. This is exactly the informational advantage of money trade against barter trade mentioned in the previous section. This perfect anonymity seems to be one reason why the demand for currency, especially for large value bank notes, remains strong in advanced economies (Drehmann, *et al.*, 2002: 196). Taking 1997 as an example, average cash holdings per capita were ECU 1464 in the US, ECU 1532 in Germany, ECU 2565 in Switzerland and ECU 3244 in Japan (assuming that all such cash was held domestically). Of course, a great part of this cash is held abroad, but foreign money holdings can also be attributed to international criminal activities, to dollarisation in high inflation countries or to unstable political environments, *i.e.*, to bad behaviour of governments. Compared to high actual cash holdings, estimates of the size of transaction balances maintained for everyday purposes suggest considerably smaller amounts; Loke (2001) estimates such balances between 1990 and 1999 to have averaged about USD 35 per person in the US and USD 40 in the UK. This indicates that factual cash holdings are motivated by other reasons than everyday transaction purposes and may be an indicator of "bad behaviour" on the part of agents.

In contrast to cash, e-money is a rather imperfectly anonymous means of payments (Drehmann, *et al*., 2002: 198). Most e-transfers immediately provide a record of what good was traded and reveals the identity of the buyer to two counter-parties, *i.e*., to the seller and to the underlying financial institution. Even when e-purses are developed, which do not necessitate (but may allow) such information transfer, they must involve electronic equipment. Neither party can be confident that the counter party will not leave an audit trail that can be subsequently followed. Currently available e-money products are not able to guarantee privacy and anonymity and are not able to encourage existing holders of low value notes to switch to them. While some observers conjecture that completely anonymous e-money is possible, others are more sceptical. They argue that a completely anonymous e-money, which does not leave an audit trail that can subsequently be followed, raises serious problems of fraud control (Drehmann, *et al.,* 2002). While the threat of counterfeiting is not large as far as cash is concerned, plastic card fraud causes much higher losses. According to the Fed in 1995, detected counterfeits of bank notes amounted to 0.0075 per cent of the currency in circulation; in Germany, the loss was even smaller (0.00079 per cent; Drehmann, *et al.*, 2002: 205). On the other hand, plastic card fraud caused losses of more than GBP 100 million in 1990. Unlike currency, prevention of counterfeiting may become a large problem, in particular for those types of e-purses that promise anonymity. The issuers of those e-purses have to upgrade their systems continuously in

order to protect themselves against the attempts of hackers; even then, the risk remains that hackers could successfully break the encryption. Moreover, fraud committed by insiders is a possible danger, too.

While a cash user can, by simple visual inspection, verify to some extent whether a bank note is a counterfeit or not, this is much more difficult for a user of e-money because it needs some expertise in encryption. Because the average e-purse user is unlikely to bear the risk of fraud, the issuers will have to carry this risk themselves. That will make the issuance of e-money expensive. The high marginal cost of using an additional unit of money could prevent e-purses from being widely used. This can be shown with the help of figure 2 (Vaubel, 1982) which shows the marginal and the marginal utility of holding an additional unit of money as a function of the rate of diffusion of a given monetary standard.

Figure 2. – Marginal Unility and Marginal Costs of the Use od Money



Due to the existence of positive network externalities, for a given agent the marginal utility of the use of money will be higher as more people use the same monetary unit as a means of payment (Van Hove, 1999). Hence, marginal utility *MU* in figure 2 rises with the rate v of diffusion, i.e. the percentage of agents using the same monetary unit as medium of exchange. The marginal costs of using the same medium, on the other hand, are independent of the rate of diffusion. These costs comprise lost interest incomes from money including a fee by the issuer to cover security outlays. Point *E* characterises a situation where the marginal cost and the marginal utility of holding an additional unit are just equal. However, *E* constitutes an unstable equilibrium: Should, coincidentally, another agent decide to use the money standard under consideration, the rate of diffusion of the medium of exchange rises above v^{crit}

and the marginal utility of the medium exceeds marginal cost. Consequently, more agents decide to switch to the monetary standard and the result would be a bandwagon effect until all agents use the standard under consideration.

If the marginal cost of holding e-money is high, due for instance to security problems, a relatively high critical mass v^{crit} is needed to trigger the bandwagon effect. In that case, e-money will hardly be able to drive out cash from the markets as a medium of exchange. Indeed, fears of an excessively high critical mass of customers needed was seen by the respondents of the survey mentioned above as one of the major obstacles for e-cash to replace central bank money; moreover, the lack of demand for e-money was regarded as a reason for the failure of alternative e-money proposals such as "Digicash" (Gormez, Capie, 2000:16 and 27). Therefore, some authors argue that the provision of e-money may fail to become viable unless the authorities provide a helping hand. Such help could be provided, e.g. by providing technological standards for competing private sector e-money, by issuing and guaranteeing such e-money schemes themselves, by making e-money legal tender, by mandating the use of all retail outlets of electronic payment devices or by abolishing the use of cash altogether.

Van Hove (2003) reports that monetary authorities in Finland and South Korea have already moved in this direction. The most interesting attempt has been initiated in Singapore, where the "Board of Commissioners of Currency, Singapore (BCCS)" decided to make electronic money legal tender by 2008. This decision was meant to assist Singapore's development to become one of the leading e-commerce and IT centres in the region. The plan called "Singapore Electronic Legal Tender (SELT)" envisions the issuance (rather than just the certification) of electronic money by monetary authorities themselves; for an undefined period e-money will circulate together with notes and coins, which will phase out only gradually. Merchants in Singapore will not be coerced into accepting electronic money but will remain free to set payment conditions (Van Hove, 2003).

If the government forces money users to hold e-money as a means of payments (declaring it to be legal tender for instance), this would have advantages and disadvantages from the point of view of society as a whole (Drehmann, *et al.* 2002: 216-217*;* Van Hove, 2003: 10). Several empirical estimates indicate that the social costs of using cash are substantial and amount to 0.35-0.75 per cent of GDP in several European countries. The corresponding figure for the use of card-based systems is only 0.11 per cent of GDP. Given these numbers, many economists expect that considerable cost savings could be achieved if cash was to be replaced by e-money. Naturally, these cost savings would be smaller if cash was not abolished completely, as will be the case in Singapore.

These cost savings, however, must be confronted with additional costs resulting from the fact that the technology of all operators will have to be made in-

teroperable; a standardisation of the technology chosen can entail substantial migration costs for the private schemes or for merchants participating in the schemes, if different e-money payment systems exist side by side. Moreover, the wide use of e-money could lead to social exclusion; while everyone can use cash, this is not the case for electronic money. E-purses are often linked to bank accounts, which not everyone has. Some people may also be unable to master the technology. All this could have the result that especially low-income consumers are excluded from mainstream society (Van Hove, 2003: 14). To prevent this development, governments would have to force banks to provide basic banking services gratis to everyone.

Another potential effect is that forced use of e-money schemes could be an instrument that helps to dry up the underground economy. As mentioned above, monetary statistics indicate clearly that a large share of cash holdings is used to conduct trade in the second economy because cash allows all involved parties to remain anonymous. In contrast, e-money payments are detectable. This increases transaction costs in the second economy and could induce some traders to switch over to the first economy. The case for this is not particularly strong, however, because traders in the underground economy could use other means of payment, such as foreign cash or gold. On top of this, the compulsory use of e-money as an "information revelation regime" (Kahn, *et al*., 2000: 21) would not abolish the causes of the second economy but would do damage to privacy and could be misused by an authoritarian government. Drehmann, *et al*. (2002: 212) mention a vivid analogy which makes clear why some people regard the use of e-money as an Orwellian nightmare: they imagine a world with "a comprehensive DNA register; plus a requirement that each individual carry an implemented chip, (which) could make everyone's exact whereabouts ascertainable on a continuous basis." Although making e-money legal tender might help to enhance efficiency and crime prevention, it would also mean the complete elimination of privacy and anonymity.

3. Conclusion

The literature reviewed in this paper indicates that the IT revolution will not completely change the financial world. Although the banking sector might experience some consolidation, banks will still have to perform most of their traditional tasks and money will not vanish from the face of the earth. Money users, however, might become more transparent and lose some of their privacy, especially if e-money should be made legal tender.

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Revenue, R is calculated as

$$R = P^*V \qquad (1)$$

where

– P is the selling price, and
– V is the volume of sales in units.

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