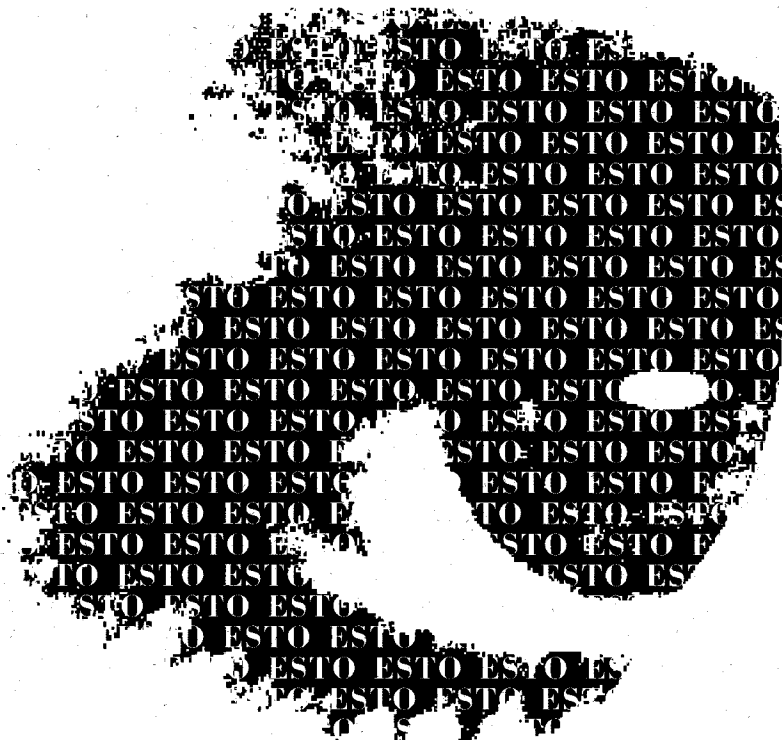


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2 Editorial. Technology and "Star" Economies**Information and Communication Technology****4 A New Paradigm for eGovernment Services**

In order to meet pressure to reduce costs while improving services governments are turning to ICTs. Today they are seeking cost-cutting, efficiency and organizational reform. Tomorrow they will need to look more at demand factors and societal change as drivers of a new paradigm of eGovernment services, one that will support the flexible life- and work-styles of the future.

Innovation and Technology Policy**11 Making New Capital and Innovation Explicit in Growth Modelling**

Existing economic models make no distinction between capital invested in new and old technologies. Disaggregating these parameters allows models to be developed which enhance insight into the impact of the spread of technology on the economy.

Innovation and Technology Policy**17 Economic Indicators and the New Economy**

The main economic indicators have not reflected the changes brought about by information and communications technologies in recent decades. New approaches and methodologies need to be developed to bring the indicators back into line with today's economic reality.

Environment**25 Sustainable Land Management and Soil Use: Economic Factors**

Soil is an essential part of the environment and its degradation can have impacts that are potentially as serious as better known environmental issues. Overall awareness of the issues is still lacking, and developing a community of stakeholders is an essential part of encouraging a proactive approach.

Transport**33 Consumer Choices that Drive the Car Market**

Consumer choices regarding car ownership depend on a number of economic, technological and subjective factors. An analysis of the patterns of purchasing, replacing and scrapping cars can provide useful clues for technology policy.

ERRATUM

In issue 77 there was a typographical error in the name of the author of the preface. His name and title should read Habil. Dr. Antanas Čenys. [Our apologies to Dr. Čenys for the error.]

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This can clearly have positive implications in that by removing the obstacle of distance it expands consumer choice by making transactions possible with a wider range of potential suppliers. It can also however have other implications, whose outcome is not so clear cut.

First, it is likely to widen gaps in income distribution: within the same profession, fees (and hence incomes) will vary widely, often for the same type of service. Second, although less obviously, though not necessarily less a matter of concern, it may divert attention and valuable resources towards marketing and promotional exercises. This is quite likely in activities in which it is very hard for purchasers to determine the quality of the service or product before they buy it. This is typically the case where asymmetric information is involved, i.e. the seller, or someone similarly trained is inherently better positioned to know more about the product than the layman purchaser.

If the fees a professional is able to command can vary hugely, depending on how many people have a high regard for his or her services, then it may pay to devote time and resources to marketing or promotion. By way of example, most medical operations will be performed equally well and with the desired results by most accredited surgeons; nevertheless a few 'well-known' ones will com-

mand very high fees, even for operations that are run-of-the-mill, and which most of their colleagues would perform equally well.

This rush into promotion and marketing by the service-seller can have two problematic corollaries: first, it will divert limited resources (e.g. time) away from activities that can actually enhance the quality of the service but may be more demanding and have a slower and less spectacular payoff (e.g. further study, training research, etc.). Second, as more and more of those service-sellers make this calculation and adopt this strategy, demand will rise for the services of intermediaries (i.e. promoters, marketers, publicists, etc.), making these jobs highly lucrative and attracting talent to them (and away from more "productive" activities). We may end up at an equilibrium in which quality is stagnant, the incomes of the service sellers do not change drastically, as the efforts of the intermediaries involved in promotion wars, cancel each other out, and the only true beneficiaries are the intermediaries themselves (whose services become indispensable, for defensive reasons if for no other reason, i.e. to counter the effect of competitors using them).

Whereas the first consequence was of a distributional nature, this last one affects not simply the distribution of income/welfare, but also the overall levels of income/welfare achieved.

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not so clear. It is for this reason that much of the research in this area supported by EU RTD programmes has focused on encouraging cultural change in public administrations; research projects typically centre on training and new working methods as ways of preparing the ground for reform. These programmes can help the process, but they rely on strong commitment and political leadership on the part of governments for their success.

Government-specific factors

If organizational rationalization and efficiency is only part of the story, the other part relates to themes which are the essence of government, and for which eGovernment provides a golden opportunity for their reinforcement. A conference on eGovernment organized in 2001 by the then Belgian Presidency of the EU identified five fundamental criteria for good government: transparency, participation, responsibility, effectiveness and coherence.² These and other aspects have been reaffirmed more recently.³

Transparency is perhaps the most sensitive criterion, due to its different treatment in each of the Member States according to their traditional cultural views with respect to the openness and availability of information. In some Scandinavian countries, for example, citizens have far greater rights of access and inspection than in most countries. But transparency is a necessity which could make public administration more **responsible** and accountable, and new technologies can facilitate this. For example, the publication of public procurement tender conditions on the Internet ensures open procedures which give equal opportunities for suppliers and diminish the possibilities of fraud or corruption. Such processes can also have a positive influence on industrial policy. One of the recent initiatives regarding transparency has been the proposal for a Directive on the re-use and exploitation of public sector documents. This was driven partly by a need to ensure a level playing

field between public and private players in new digital content markets, but also to put to use the enormous amount of information in the public domain in order to kick-start those markets.

Access and participation. Electronic public services have to be available for all citizens – this in turn implies equality of access for all – unlike the private sector, which can (within certain limits) choose its customers. Equal access to eGovernment services is an aspect of social inclusion. Technologically, this involves the use of all kinds of technical infrastructure, maximizing convergence between platforms (in simple terms, this means the use of the Internet through fixed, and mobile networks, and even digital television platforms).

Coherence and interconnection criteria are as much organizational as they are technological. Currently, emphasis is given to the need for a single access point for citizens to all eGovernment services. This implies a high degree of coherence between the different parts of public organizations and as well as an interconnection and fluid interoperability between them.

The question of interoperability has become as essential for the future of eGovernment as it has for the future of the Information Society as a whole. Full interoperability is facilitated by open systems with open interfaces, something in which the public sector can play an important role – yet another example pointing to a relationship with industrial policy. The European Commission is working towards a European interoperability framework to tackle the technical aspect of cross-border collaboration. This work has shown that open systems are important, but they must be complemented with agreements at the level of specific implementation. Interoperability is not simply a technical matter, it relates also to the ability of different branches of government to work together – ‘joined-up’ government as the British call it.⁴

The five fundamental criteria for good government have been identified as transparency, participation, responsibility, effectiveness and coherence

Interoperability has become as essential for the future of eGovernment as it has for the future of the Information Society as a whole

ations), it may be necessary to extend these to a wider range of government services.

eGovernment Services over open technology platforms

There are good arguments for a technology policy approach that favours the use of open platforms as the vehicle for eGovernment service delivery. The provision of eGovernment services is by nature very costly since deployment has to be massive to be effective - most public services need to reach as many users as possible in an undifferentiated way. Establishing and applying formal standards in this area would be very difficult in view of the diversity and fragmentation both within and across Member States, combined with the constant stream innovation involved.

But as a result a lot of money is being wasted reinventing systems, a situation compounded by the possibilities of costly failures. Code-sharing, the use of open source software, open interfaces and *de facto* standards could be built into the practice of e-governance as one way of overcoming the problem. Open source approaches would reduce the costs of deployment, and of adapting and repairing failures, as well as having some spin-off advantages in terms of ICT sectoral policy.

eGovernment and Security

Public service provision involving the exchange of large amounts of personal information requires strong security and privacy protection. Such exchanges may be between governments and citizens, businesses or other public sector organizations. In order to facilitate creating a climate of trust and confidence in the use of eGovernment applications, it will be necessary to incorporate at the design stage technology-based Identity Management Systems (IMS). Multi-purpose IMS which meet multilateral and multi-channel security require-

ments, and which protect the citizen's privacy, can provide the necessary functionality and accommodate law enforcement needs. Identity Management Systems can thus constitute a trusted platform for information exchange with public authorities.⁹ The potential role of Public Key Encryption (PKC) and Public Key Infrastructure (PKI) will need to be reassessed in the light of these emerging systems.¹⁰

Going beyond the present eGovernment paradigm

The discussion so far has shown that today's paradigm of eGovernment is based on bringing more efficiency to public services, either by delivering what exists more cheaply or by complementing existing services with added features.

That perspective sees the transformational possibilities of ICTs from a standpoint of the internal operations, front- or back-office, of governmental organizations. However, as we have hinted above, concentrating on the supply-side might make one oblivious to the potential influence of demand factors and societal change, and might also lead us to ignore the possibilities of new and emerging technologies as facilitators of change. Taken together, such factors could lead to a new paradigm of eGovernment based on citizens' needs as well of those of governments.

New demands for future eGovernment services

The picture of society we are likely to see developing over the next decade and beyond has been described by many observers and thinkers as one in which Europe will undergo some fundamental changes and deep transitions. The European Union will almost double in size, will be characterized by extreme cultural and religious diversity, will have a higher proportion of older people, and will battle with significant social and economic differences,

Information and
Communication
Technology

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government in the interests of citizens, but would also need to examine the risks, particularly with regard to security and control. In fact the security issues referred to earlier take on an entirely new

dimension in the Ambient Intelligence environment, with location-independent virtual indicators of identity replacing today's geographically-based equivalents.¹³

Box 1. A roadmap of future developments in eGovernment

	2003	2005	2010 --
Societal structure	Industrial	Post industrial	Knowledge based, mobile EU 28+++
Scope of eGovernment services		Mass customized me-government	
Underlying technology	Internet/portal-based approach	Multi-platform	Ambient Intelligence

Keywords

eGovernment, ICTs, public services

Notes

1. This paper is based on presentations made by Jean-Claude Burgelman to the meeting of the High-level Socio-economic Expert Group held in Brussels on 19 March 2003, and by Bernard Clements to the Conference on *eAdministración: Administración Pública y Tecnologías de la Información y la Comunicación*, 29-30 May 2003 at the Pompeu Fabra University, Barcelona. Conference on eGovernment.

2. EU Presidency Conference on eGovernment: "From Policy to Practice", Brussels, 29-30 November 2001, http://europa.eu.int/information_society/eeurope/egovconf/2001/index_en.htm

3. See for example, E. Liikanen, EC Commissioner for Enterprise and Information Society, *e-Government: An EU Perspective*, Journal of Political Marketing, Special Issue on e-Government (forthcoming), or by the same author: *eGovernment: Europe's Challenge*, presented at the EU Presidency Conference on eGovernment, 7-8 July 2003, Como, Italy,

http://europa.eu.int/information_society/eeurope/egovconf/index_en.htm

4. See *e-Government Interoperability Framework*, UK Cabinet Office, Office of the e-Envoy, Version 5.0, 25 April 2003,

[http://212.137.45.209/oeo/oeo.nsf/sections/frameworks-egif5/\\$file/e-GIF_v5_part1.pdf](http://212.137.45.209/oeo/oeo.nsf/sections/frameworks-egif5/$file/e-GIF_v5_part1.pdf)

5. The Prisma project is an accompanying measure within the 5th Framework IST EU RTD Programme. See <http://www.prisma-eu.net>

6. The eEurope Action Plan, http://europa.eu.int/information_society/eeurope/index_en.htm

7. See *Web-based Survey on Electronic Public Services, Results of the Third Measurement, October 2002*, prepared for DG Information Society of the European Commission by Cap Gemini, report published February 2003, <http://www.cgey.com/news/2003/0206egov.pdf>

8. See *The E-Government Imperative*, OECD 'Flagship' Report on eGovernment, 2003 (forthcoming), ISBN: 92-64-10117-9, <http://www.oecd.org/dataoecd/60/60/2502539.pdf>

Making New Capital and Innovation Explicit in Growth Modelling

Volodymyr Ryaboshlyk, *Institute for Reforms, Ukraine*

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Innovation and
Technology Policy

Issue: Scientific research can produce technological innovations which in turn lead to capital investment in new, more efficient technology. However, existing modelling approaches deal with average parameters based on the aggregate capital stock and so fail to capture the impact of the spread of new technology.

Relevance: Disaggregating capital-related parameters could enhance economic models and improve analysis of the impact of technological developments on the overall functioning of the economy, thus helping policy-makers understand and foster innovation.

The increased focus on technological innovation needs to be accompanied by closer attention to the role of 'innovations' in modelling the economy so as to link the creation and absorption of technological developments more consistently.

To date the influence of technological progress on the overall functioning of the economy has been evaluated using standard simulation models (Christidis, Ciscar et al, 2002), (IPTS, 2002). In this approach the modelling efforts are limited to selecting the most appropriate models from among those currently available (High Level Economists Group, 2000).

This article aims to highlight ways to improve modelling techniques based on the Cobb-Douglas function. The assumptions used in many models may be too simplistic; revisions and greater sophis-

tication could bring the resulting models significantly closer to reality. This could also lead to greater convergence between macro- and micro- analysis.

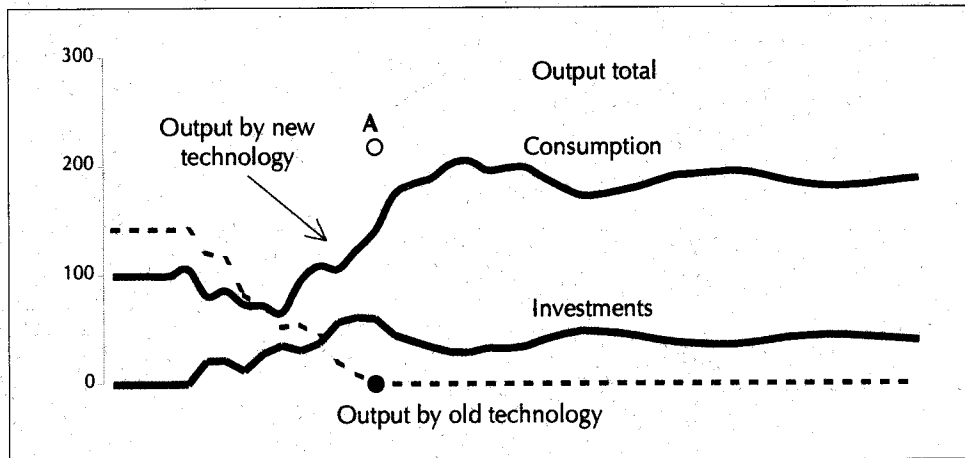
To start with, in its simplest form the Cobb-Douglas approach rests on an aggregation of both capital and labour, and consequently conveys technological progress in average terms, i.e. as average labour productivity and its growth.

However, it is the case that progress is primarily associated with capital embodying new technologies and with those sections of the labour force which are equipped with this new technology and adept at using it. As the new technology gradually displaces the old, through a process of diffusion of industrial transformation, the output of all sectors of the economy will include a mixture of products created by both new and old technologies simultaneously.

The Cobb-Douglas approach upon which many models are based rests on an aggregation of both capital and labour, and consequently conveys technological progress only in average terms

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Figure 1. Growth in a Two-Technology and Two-Sector Model with Explicit New Capital



- capital is 3.75 times higher than that of one using existing technology;
- creation of a technologically advanced workplace needs capital produced by 4 workers who will be engaged in producing investment goods;
- capital assets are assumed to operate over 10 years (in physical terms, capital goods are assumed to be equally productive throughout their lifetime until scrapped at the end of the period. This contrasts with depreciation in financial terms, whereby the value of capital goods is reduced by a fraction each year);
- investments are considered not as a direct physical channelling of some share of the output into capital stock, but in a more comprehensive way richer in microeconomic detail, in which apart from households' monetary savings, accrued depreciation, retained earnings and even creation of money by the central bank are all taken into account. The model assumes 15% of personal income is saved and can finance investments.

Progress in the modelled economy is driven by the substitution of old technology by the new one via investments, accompanied by redistribution of the labour force. Labour leaving the contracting

sector is either employed producing new capital or working using it. The new equilibrium (also referred to as the steady state or saturation phase) is established at a higher level of output.

Unexpectedly the model generated endogenous cycles, giving quantitative backing to the Schumpeterian idea that cycles are an integral part of innovation-based growth (S. Campodall'Orto and N. Sandri, 2002).

At the same time this result does not match the alternative view of cycles as random "fluctuations that occur around a trend" and with the consequent contradictions between long- and short-term analyses which seek "to evaluate the long-term trend of economic activity and the extent to which current output diverges from it" (G. Fiorentini, 2002).

Among the features of the cycle shown by the model is the well-known fact that investment fluctuations lead to fluctuations in total output, so that a decline in investments prefigures the beginning of a recession, and an increase in investment – the beginning of recovery (see Figure 1).

One of the reasons for cycles emerging in the model is that in the early stages of adoption of new

Unexpectedly the model generated endogenous cycles, giving quantitative backing to the Schumpeterian idea that cycles are an integral part of innovation-based growth

Among the features of the cycle shown by the model is the well-known fact that investment fluctuations lead to fluctuations in total output

econometrics, and here we have sought to offer evidence for the view that this effort is justified. For example, comparing the "old" and "new" capital parameters gives a way of assessing an economy's position in the cycle.

In future research the closed economy model presented here could be extended to an open one. This would entail considering a 'closed set of open economies' i.e. it would mean taking into account the fact that all open economies are parts of an ultimately closed global economy and their indicators are subordinated to global constraints. This might encourage cooperative policy-making to elaborate mutually favourable scenarios of development, etc.; differential analysis of the country-specific and the common business cycle; analysis

of interactions between economies which are technology leaders and those which are followers, and so on. Issues of employment could be reflected in the model if we allow for inertia in the movement of labour between sectors, frictional unemployment, etc. A more complex network of input-output links between sectors also needs to be built.

All in all, the proposed explicit-new-capital approach to growth modelling can give a holistic explanation for issues which have to date been dispersed across various sub-disciplines of economics such as innovation, growth, business cycles and general equilibrium analyses. This approach could be put forward as a possible basis on which to build a framework in which policy-making can understand and ultimately foster innovation. ●

In future research the closed economy model presented here could be extended to an open economy

Economic Indicators and the New Economy

Asterios Hatziparadissis, *General Secretariat for Research and Technology, Ministry of Development, Greece*

17
Innovation and
Technology Policy

Issue: Although new technologies have developed and spread in radical and revolutionary ways, this fact has been not reflected in the economic indicators, giving rise to a so-called "productivity paradox". Part of the reason may lie in the fact that existing economic indicators assume a primarily manufacturing-based economy and do not easily assimilate rapid technological change, the emergence of new products and the importance of services characteristic of today's economies.

Relevance: The productivity paradox has created an urgent need to develop a valid theory able to explain the consequences of the development and spread of ICTs across the whole economic spectrum. Policy-makers need valid and accurate indicators in order to direct ICT-related policy appropriately. Consistent underestimation of the benefits of ICTs by existing indicators may lead to a tendency to provide inadequate support to their adoption, thus jeopardizing future growth and competitiveness.

Introduction

Over the last two decades awareness of the paradoxes affecting certain economic indicators has grown and economists have at times been at a loss to provide persuasive answers. There is a strong impression that although the development in new technologies is radical and revolutionary, this has been not reflected in the economic indicators. These indicators show Gross Domestic Product (GDP) to be increasing only slowly and the rate of productivity growth to be slowing. Information and Communication Technology (ICT) has penetrated all levels of the economy and may be expected to have caused a

number of changes that indicators do not appear to be able to reflect.

There is, therefore, an urgent need to develop a valid theory able to explain the consequences of the development and spread of ICTs across the whole economic spectrum. The European Commission, in cooperation with the OECD, has produced a publication as the outcome of a workshop, under the title "The Economics of the Information Society" (Dumort & Dryden, 1997). Another significant study was conducted by Michel Volle (Volle, 1999) in which the author sought to model a series of topics, such as electronic commerce, information systems, audiovisual industry projects,

Although new technologies have developed and spread in radical and revolutionary ways, this fact has been not reflected in the economic indicators, giving rise to a so-called "productivity paradox"

This paradox has created an urgent need to develop a valid theory able to explain the consequences of the development and spread of ICTs across the whole economic spectrum

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