

Contents

<i>List of Tables</i>	ix
<i>List of Figures</i>	xii
<i>Acknowledgments</i>	xiii
<i>Notes on Contributors</i>	xiv
Introduction	1
Part I ICT and Productivity	
1 Information Technology, Complementary Capital, and the Transatlantic Productivity Divergence	13
<i>Marco Vincenzi</i>	
Introduction	13
Literature review	15
Theoretical model	18
Data and caveats	21
Empirical evidence on the role of ICT	22
U.S. TFP growth in the early 2000s: a case study	25
Conclusion	32
2 Technical Efficiency and the Role of Information Technology: A Stochastic Production Frontier Study across OECD Countries	43
<i>Sophia P. Dimelis and Sotiris K. Papaioannou</i>	
Introduction	43
A survey of empirical literature	45
Econometric specification	48
Empirical results	51
Conclusion	62
3 Analyzing ICT Adoption across European Regions	66
<i>María Rosalía Vicent and Ana Jesús López</i>	
Introduction	66
Framework	67
Data	68
Analysis of ICT adoption	69
Conclusion	76

Part II Determinants of Demand for ICT

4	Determinants of Usages and Access to the Internet Services in Côte d'Ivoire <i>Auguste K. Kouakou</i>	87
	Introduction	87
	Literature review	89
	Methodological framework	91
	Conclusion	101
5	Difference between Adoption and Access Frequency to Internet and Consumer Surplus <i>Walid Hadhri, Mohamed Ayadi, and Adel Ben Youssef</i>	107
	Introduction	107
	Econometric specification of the Internet demand function	108
	Internet adoption and access frequency differentiation for Internet usage analyses	111
	Internet demand function with censored sample	114
	Data and variables definitions	116
	Econometric results	119
	Internet consumers surplus	126
	Conclusion	127
6	Valuing Time-Intensive Goods: An Application to Wireless and Wired Internet <i>Ergin Bayrak</i>	130
	Introduction	130
	Model	133
	Data and estimation	135
	Welfare	138
	Conclusion	141
7	Contingent Valuation of Digital Identification Card and Electronic Signature Service in Luxembourg <i>Alex Durand</i>	142
	Introduction	142
	Theoretical model	143
	Empirical estimate of interest	146
	Interest profile	148
	Estimate of willingness to pay	150
	Conclusion	150

8	Blogs and the Economics of Reciprocal Attention	167
	<i>Alexia Gaudeul, Chiara Peroni, and Laurence Mathieu</i>	
	Introduction	167
	Context	167
	Related Literature	170
	A model of reciprocal (in)attention	172
	Choice of effort	173
	Mutual attention	174
	The data	177
	Empirical analysis	179
	Instrumental variable estimation	184
	The effect of imbalances	185
	Conclusion	186

Part III New Organizational Frontiers

9	File Sharing and Its Impact on Business Models in Music	197
	<i>Joost Poort and Paul Rutten</i>	
	Introduction	197
	Developments in the entertainment industry	199
	File sharing: key funding of a Dutch survey	213
	Effects on industry turnover and welfare	219
	Conclusions and policy recommendation	227
10	The Make-or-Buy Decision in ICT Services: Empirical Evidence from Luxembourg	234
	<i>Ludivine Martin</i>	
	Introduction	234
	Research hypotheses	237
	Data	239
	Econometric methodology	242
	Econometric analysis	244
	Conclusion	251
11	An Empirical Analysis of Organizational Innovation Generated by ICT in Japanese SMEs	259
	<i>Hiroki Idota, Masaru Ogawa, Teruyuki Bunno, and Masatsugu Tsuji</i>	
	Introduction	259
	Case study: a supply chain system that facilitates Japanese SME exports	261
	ICT use in two groups of SMEs	264

	Index of ICT adoption	266
	Statistical analysis	272
	Obstacles to ICT adoption: implications for policy	278
	Conclusion	284
12	Determinants of Intra-firm Diffusion Process of ICT: Theoretical Sources and Empirical Evidence from Catalan Firms	288
	<i>Adel Ben Youssef, David Castillo Merino, and Walid Hadhri</i>	
	Introduction	288
	The intra-firm diffusion of ICT literature review	289
	Hypothesis	295
	Sample, data description, and econometric models	296
	The variables	298
	Determinants of intra-firm ICT diffusion in Catalan firms	300
	Conclusion	308
13	Does ICT Enable Innovation in Luxembourg? An Empirical Study	313
	<i>Leila Ben Aoun and Anne Dubrocard</i>	
	Introduction	313
	Literature review	314
	Model	318
	Data and variables	320
	Results	327
	Conclusion	329
	<i>Index</i>	337

Introduction

The information and communication technologies (ICT) development that allowed Internet-based communication is often referred to as the fourth technological revolution. Just like steam and electricity, the diffusion of those ‘general-purpose technologies’ in all sectors of activity modifies not only the products, but also the organization of production and the way of life. Nevertheless, their ‘added value is based on the manipulation and diffusion of ideas’, which attribute radically different characteristics and properties. ICT and the Internet can be thought of in the context of network economy as they are characterized by constant fixed costs and small/negligible marginal costs; the wide use of these technologies impacts on markets’ structure. Varian (2000) analyzed the relation between technology and market structure and concluded that the value creation process must be reconsidered. Indeed, the diffusion of ICT and network technologies changes the sharing of profits along the value chain, redesigns the physical firm’s borders, as well as the way firms compete in the market. Brynjolfsson and Hitt (2000) give examples of those transformations and show how technical and organizational changes made possible by ICT cause vertical integration and/or redefinition of capabilities within companies. Many of these aspects are considered using the quantitative approaches collected in this volume.

Organization of the book

The chapters in this book consist of a selection of contributions submitted to the 98th International Conference of the Applied Econometric Association, entitled “Internet Uses and Impacts: Quantitative Analysis,” organized in Marseille on 5–6 November 2009. Their aim

is to explore and deploy tools and methodology in order to measure phenomena embracing the different nature of ICT impacts. These approaches are grouped together in three parts. Part I makes an international comparison of ICT diffusion and impact on productivity at macro level. Part II examines determinants of household demand and adoption for ICT at micro level. Part III examines the supply side at micro level and highlight the impact of ICT on organization of production and products. The Parts II and III also emphasize the international comparison by using samples, collected in several geographical areas.

Part I: ICT and productivity

Data and methodology

At the macro level, standard growth accounting framework, as well as a technical inefficiency measurement based on a stochastic frontier, are used to compare and explain the gap between US and EU total factor productivity (TFP) growth. ICT is one of the possible answers explored across the first chapters. Vincenzi, in Chapter 1, proposes a measure of the impact of ICT on TFP and technical progress (looking at information technology, complementary capital and the transatlantic productivity divergence). Here, he re-examines the gap in productivity between the USA and Europe using US, French and Belgian data regarding investments in ICT. The notion of organizational capital is introduced into the production function estimated for three countries and 30 sectors of activity between 1993 and 2005. In Chapter 2, Dimelis and Papaioannou seek to find factors explaining how ICT is correlated with labor productivity growth, but not so clearly with the TFP growth. Using a selection of 17 countries providing data on ICT capital from 1990–2005, they analyze possible ICT effects in reducing aggregate technical inefficiency, paying particular attention to the ubiquity (the professional along with the private use) of ICT generating further externalities. Thus, ICT diffusion among firms and households seems to be a determinant for the competitiveness of nations. In order to have a clear picture of what is going on in Europe, therefore, in Chapter 3 Vicente and López present measures of diffusion of ICT and their usage in European households, comparing several ICT measurements obtained at regional level. Regional statistics on the information society provided by Eurostat are analyzed, applying principal components and cluster techniques to 216 regions belonging to 30 European countries.

Summary of main results

ICT had a significant impact on labor productivity growth in the USA and EU and accounts, in part, for the faster productivity growth witnessed in the USA during the late 1990s. However, its impact on technical progress and TFP growth has not been so clearly demonstrated. The fact that there are high levels of US investment in ICT, as well as, most significantly, the ability of industries and firms to derive greater output boosts from their investment explain how some of the divergence in TFP can be attributed to ICT. Theory suggests that TFP growth should be negatively correlated with contemporaneous investments in ICT capital because firms are diverting resources to install the new capital, whereas it should be positively associated with lagged investments in ICT capital. In Chapter 1, Vincenzi establishes that while the United States started to invest in ICT and in complementary capital in the late 1980s and continued throughout the 1990s, evidence has been found that France and Belgium delayed their wave of ICT investments until the late 1990. In addition, Vincenzi suggests a different conceptualization of 'complementary capital', suggesting that constrained supplies of skilled labor are a determining factor in the impact of ICT investment on productivity. In particular, he finds that complementary investments are necessary to fully exploit these technologies.

In Chapter 2, Dimelis and Papaioannou use a method that allows them to quantify the ICT impact in the reduction of cross-country inefficiencies. They show that, on average, ICT contributed by more than 5 percent to the increase in technical efficiency across countries and over time. The efficiency estimates indicate that the most efficient countries are Belgium and the Netherlands, followed by the USA. However, it seems that several south European countries are less efficient and have not yet reached the efficiency levels of the most developed OECD countries. Finally, there is evidence to suggest that ICT acts as an enabler of productivity growth, including its TFP component – thus, economic growth and competitiveness. Appropriate indicators and measures of such phenomena are needed in order to support and inform policy-making. Vicente and López, in Chapter 3, analyze the range of Eurostat ICT indicators and conclude that the leaders in ICT adoption are Nordic territories, together with some British regions. In contrast, Eastern and Southern European countries lag behind. Furthermore, five ICT clusters are identified across Europe, with 15 low-performing regions and 68 high-performing territories. In order to identify factors underlying the regions and countries gap, the matter is studied at micro level. Data describing characteristics and behaviors of individuals and households,

as well as firms and the business sector, are, respectively, mobilized in the two following parts.

Part II: Determinant of demand for ICT

Data and methodology

Because ICTs 'are reformulating the equation of aggregate productivity' (Faucheux et al., 2010), the measurement of their effects and the identification of spillover factors matter. A first approach consists in indentifying factors enhancing or hampering speed and spread of adoption and usage of ICT among people and households. A second range of studies aims to describe the demand function and measure the advantages of consumption and usage of Internet. Thus, in Chapter 4, Kouado considers the Côte d'Ivoire, and in Chapter 5, Walid Hadhri, Mohamed Ayadi and Adel Ben Youssef *consider* France, aiming to identify characteristics of users and non-users. *With regard to the Côte d'Ivoire*, data come from a survey conducted on behalf of the Telecommunications Agency of Côte d'Ivoire (ATCI) by the Ivorian Centre for Economic and Social Research (CIRES) with 1,500 households drawn under a two-stage sample selection with stratification. Hadhri et al. use different sources of statistics provided by French National Statistics (INSEE), the French postal and electronic communications regulatory authority (ARCEP) and l'Institut de l'Audiovisuel et des Télécommunications en Europe (IDATE). *Both chapters* base their estimates on the distinction between access and intensity of utilization. Kouakou estimates a simple logit model in order to discern factors behind the decision to adopt the Internet; then he considers the frequency of usage after having access to the network.

Frequency of use of the web, wherever it occurs, is estimated using the ordered logit model. Hadhri et al. estimate the decision of the Internet adoption using a simple probit model in which the dependant variable is the probability of deciding to adopt Internet. Second, Internet use estimation is based on the time that the individual spends online. The dependant variable represents the number of hours per week that individuals spend connected to the Internet. The two-step Heckman's method deployed allows differentiation between Internet adoption and access to frequency patterns and ability to solve the selection problem. In Chapter 6, Bayrak proposes also to measure benefits for the consumer. He focuses on consumers with home networks and highlights the different demand characteristics and welfare attainments of consumers who connect to the Internet through wireless networks from those who connect through other (wired) types of networks; the incremental consumer surplus from using wireless networks is measured. For

highly time-intensive goods, the true cost of consumption includes the opportunity cost of time, in addition to very small market expenditures. Using the variation in time use and wage data is likely to give more accurate estimates of elasticities and welfare than using market price and consumption data. The data consist of a sample of 4,865 respondents who report to have some type of home network and are online at least monthly. This sample is selected from North American Consumer Technographics data from Forrester Research. Finally, a fourth demand function is estimated in order to measure the willingness of consumers to pay for a new service. In Chapter 7, Durand analyses the adoption of a service of electronic signature and digital identification card aimed at securing online transactions by Luxembourg inhabitants. He uses a survey conducted with 1,509 individuals from 16 to 74 years old.

The estimation of demand function and the elaboration of the models to capture the modalities of diffusion of ICT do not offer an exhaustive picture of uses and associated transformations. In particular, social networks play a new and crucial role in the process of innovation. To fully understand the social and economic changes, one needs to consider also new forms of social interactions based on Internet communities (for a complete overview of the economic characteristic of social network, see Gensollen, 2007). Quantitative analysis, proposed by Gaudeul, Peroni, and Mathieu in Chapter 8, explores the role of reciprocal attention in Internet communications. Properties of blogging networks are derived from a model where bloggers devote attention to others, produce content for others and exchange attention for content within their network of relations; as Gaudeul et al. put it: 'in a network, an agent that offers little content compared to others will need to compensate for this by devoting more attention to others in order to maintain her place in the network. Conversely, an agent that offers a lot of content compared to others will devote less attention to others.' The aim of the analysis is to demonstrate, first, that bloggers who display higher levels of content production and general blogging activity have more readers and, second, that bloggers with relatively more friends than readers produce less content than other bloggers. The predictions from the model are tested with a novel dataset from LiveJournal, a major blogging community. The database contains a number of measures of activity and involvement in social relations from data gathered on the activity of 2,767 bloggers drawn randomly from LiveJournal.

Summary of main results

The measurement of ICT effects and the identification of spillover factors give a better understanding of factors behind the spread of

the service in the population. Age, location, type of employment, education and social capital are important factors in the decision to adopt the Internet network, in the Côte d'Ivoire as well as in France. Moreover, for France, findings confirm the fact that a higher education level, computer and Internet skills and lifestyle have a positive effect on Internet adoption. Those with higher levels of income and younger people are more willing to use Internet. Lifestyle, which indicates ICT and electronic tool use, positively correlate with Internet use. Indeed, using an ICT or electronic tool, such as a mobile phone, laptop, DVD player or digital camera influences positively the probability of adoption of the Internet. Finally, high-income people were more able to adopt Internet, but they spend less time online than low-income ones. This relies on time opportunity cost. Evaluating consumer surplus shows that French time opportunity cost is three times more important than connection cost. French households have found the Internet to be a valuable addition to their welfare levels. In 2005, the French consumer surplus ranged between \$1,240 and \$3,126, depending on the methodology applied (between \$2,107 and \$2,651 with the two-stage estimation method). Following Bayrak's estimation for USA, the consumer surplus from the Internet is around \$7,000. With the most conservative estimate, consumers with wireless networks are found to be realizing, on average, \$824 more consumer surplus from the use of the Internet, compared to wired network owners. Finally, measuring utility throughout non-monetary variables, blogger's activity has been found to be related to the size of that blogger's relational network and to the level of aggregate reciprocity within that network. Bloggers who do not adhere to reciprocity norms are found to have fewer readers than their activity might otherwise have predicted. Posting activity and intensity of interaction are positive determinants of network size; departures from aggregate reciprocity can be accounted for by content production; failure to reciprocate attention is sanctioned with a lower popularity than other measures of activity might normally warrant. These results suggest that bloggers who produce more content devote less attention to others. Furthermore, bloggers sanction deviations from the norm of reciprocity, which occur when a blogger does not return friendship as expected.

Beyond blogs, social networks, peer-to-peer and file sharing, new tools generate new individual behavior, redesigning business models. Thus, the last part of the book focuses on a piece of work analyzing Internet impact on specific businesses and markets.

Part III: New organizational business frontier

Data and methodology

Going back to the behavioral attitude seen throughout Internet worlds, in Chapter 9 Poort and Rutten analyze the impact of file sharing on business models in the music industry, providing a comprehensive overview. The production of recorded music, as well as that of films and games, is characterized by relatively high fixed costs and low marginal costs. As a result of digitization, the costs of reproduction and distribution of content have decreased dramatically, as well as the possibilities for copyright holders to control this process. The fact that file sharing gives free access to content is just one of the various reasons to engage in this activity, while interactions between file sharing and buying can be either positive, neutral or negative. A lot of source of information has been mobilized in order to draw a detailed picture of facts and trends. The study reviews relevant literature and draws on a range of secondary – particularly statistical – sources, as well as interviews of active uploaders and downloaders and a survey of a representative group of 1,500 Internet users, conducted by research agency Synovate in the Netherlands. Analyzing characteristics of and trends in the film, games and music industries and their respective markets related to file sharing highlights developments in the business models of the sectors and offers hints for identifying the possible implications of file sharing for consumer behavior in other markets in which this content is sold (and also the short- and longer-terms implications of these changes). As it can be seen throughout the analysis of the music industry, ICT impacts business models through the modification of consumption behaviors. It also impacts directly the internal and external organization of firms by allowing multiple shifting of the frontier of their activities. Indeed, to manage their activities effectively, firms choose to resort increasingly to outsourcing and/or offshoring of activities, both for the manufacture of products and for the inputs included in the production process. Moreover, technological changes favor the compatibility and tradability of many services across the world. In Chapter 10, Martin attempts to modelize the choice of whether to buy in ICT services and characterizes Luxembourgish firms which outsource some of their IT functions. A primary consideration, as firms are trying to minimizing costs, rests on the relative costs of producing in-house or purchasing services on the market. Second, the firm has to choose between sourcing from a foreign subsidiary or an independent outside firm. The dataset comes from the Luxembourg part of the 'ICT Usage and e-Commerce in Enterprises' survey (2007). Models tend to analyze the two contrasting effects that could

be expected: either the firm's investment in ICT can reduce the cost of outsourcing and, thus, can favor it; or conversely, if the firm has skilled workers, the cost of managing in-house ICT services will be lower.

For Japan, Idota, Ogawa, Bunno, and Tsuji propose, in Chapter 11, to analyze the choice of outsourcing and/or offshoring implementing a bivariate probit. In order to improve performance and efficiency in all aspects of business activities, SMEs need to increasingly rely on ICT as a basis for organizational restructuring. The chapter is based on data collected from field surveys, a mail survey and in-depth interviews in two of Japan's most prominent SME clusters, located in Higashi-Osaka city in Osaka prefecture, and Ohta ward in the Tokyo metropolitan area. In 2004, questionnaires were sent to more than 6,000 SMEs in the two clusters, yielding nearly 1,200 responses mail surveys of selected high-ICT-adopting SMEs. In order to identify factors that promote ICT use among Japanese SMEs, an index of ICT usage using an analytic hierarchy process (AHP) is calculated. Ordinary least squares (OLS), logit and probit regression are implemented in order to predict ICT use and identify factors that promote ICT use, based on survey responses. For Catalan firms, Ben Youssef, Merino and Walid Hadhri propose to modelize, in Chapter 12, the intra-firm diffusion process, combining the well-established models of technological diffusion with an organizational and networking complementarities view and epidemic evolutionary approaches. Three econometric models are then tested. The first one is an ordered probit model estimating the probability of ICT adoption by firms. Second, a general model is built in order to explain intra-firm diffusion of ICT according to some specific tools, as well as to different business uses of these digital technologies. The database comes from a survey conducted in 2003 by the Catalan government of 2,038 enterprises. Thus, in order to promote ICT use and impact, better understanding of adoption of ICT by firms and their internal diffusion, as well as their link with innovation capacity, is needed in order to help their promotion. The generalized diffusion of ICTs, including their convergence with the Internet network and capabilities, increases the value of innovations and R&D investments of firms; furthermore, competitive pressure on the market of products in turn imposes more reactive organizational forms. In Chapter 13, Ben Aoun and Dubrocard highlight the complexity of this relationship between ICT and innovation at firm level, using an original sample of Luxembourgish firms.

Summary of main results

Chapter 9 establishes that music is steadily acquiring the characteristics of a public good, while live concerts constitute an ever-growing source of income for industry. Thus, new artists are gaining access to

novel and accessible channels through which to market their wares, such as MySpace and YouTube, responding to the democratization of talent development. In order to survive, the industry must redesign its business model and is increasingly focusing on sponsorship contracts, 360-degree contracts and merchandising. These new value creation drivers include such initiatives as alliances between the mobile phone and music industries. At the same time one can see that file sharing impacts on the rest of the economy through spin-off revenues.

From the point of view of intra- and inter-firm reorganizations, Chapter 10 establishes that, for Luxembourg, firms' resources positively influence the probability of choosing the option of outsourcing and offshoring ICT activities. Concerning ICT investment, after the control of its potential endogeneity, one can observe that firms with the highest specific ICT needs choose to find these services from external suppliers or firms located abroad, especially when their ICT competencies measured by the presence of ICT/IT specialists is low. Conversely, other firms that have high ICT needs but that are associated with the employment of IT specialists don't seem to resort to external services providers. Finally, it appears that high trust in data transfer favors the choice of outsourcing ICT services. These results find echoes in Japanese studies (see Chapter 11), showing that information security is a major concern for large firms that want subcontractors to use the firms' ICT systems, with associated costs for complying with ICT demands. Finally, the lack of human resources to handle ICT and concern about security and privacy of data related to customers and business transactions are the main factors hampering ICT adoption. Moreover, the latest study emphasizes that the best way to promote ICT use among SMEs is to encourage top management to better understand, value and proactively pursue ICT. Once management adopts a positive perception of ICT, they can determine the exact ways in which they will implement ICT to meet their specific goals. Therefore, in Chapter 12, Ben Youssef et al. show that boosting ICT diffusion depth inside the firms does not depend only of the top management state of mind and willingness. Their results confirm the well-established literature. Thus, the main conclusion is that inter-firms ICT diffusion (i.e., investment in digital equipment) and depth of ICT adoption (i.e., spread of efficient digital uses) have different determinants, although they share some common traits based on the existence of complementary effects between digital technologies, innovation, organizational structure and workers' skills within a firm. Linking ICT adoption to innovation ability in Luxembourgish firms, it can be established that the probability of being innovative increases significantly with the size of firm, regardless of the type of innovation. This link between size and innovation ability is concave. R&D ratio expressed as R&D expenses over

turnover has also a positive impact on probability of innovation (for every type other than marketing innovation). The most frequently significant variable representing ICT is the number of automatic links. Indeed, it is the only ICT variable with a positive impact for technological innovations; the percentage of highly qualified employees also contributes significantly and positively to explaining the probability of innovation for a product. Finally, on the one hand, ICTs constitute an aggregate of major innovations which, in turn, accelerate the process of innovation through new applications and new processes. As ICTs favor innovation, they improve all inputs' productivity. On the other hand, the innovation process accelerates and modifies the way to implement ICT in a process of co-invention, which renders the ICT more effective. Therefore, ICTs are closely related to the firms' ability to innovate, that is to say to introduce new products and services, new processes and new applications. In addition, sharing and knowledge transfer, as well as the development of real-time networks, foster scientific and technological innovation and make new practices and organizational arrangements possible. For example, e-management, e-business or e-commerce are themselves organizational innovation, and enhance firms' performance. Indeed, data at firm level evidence the impact of intangible organizational investments and innovation of products and services related to computers. These are necessary to make organizational structures coherent with technological capabilities.

References

- ARCEP (Autorité de Régulation des Communications Electroniques et des Postes) (2005) 'Rapport d'activité de l'Autorité de Régulation des Communications Electroniques et Postales 2005'.
- Brynjolfsson, E. and L.M. Hitt (2000) 'Beyond Computation: Information Technology, Organizational Transformation and Business Performance', *Journal of Economic Perspectives*, Vol. 14, No. 4, pp. 23–48.
- Brousseau, E. and N. Curien (2007) *Internet and Digital Economics: Principles, Methods and Applications*, Cambridge: Cambridge University Press.
- Faucheux, S., C. Hue and I. Nicolai (2010) 'TIC et développement', Brussels: De Boeck.
- Gensollen, M. (2007) 'Échanger: Comment le numérique modifie en profondeur les conditions de socialisation de l'échange', mimeo, available at http://www.gensollen.net/Gensollen_echanger_2007_05_enligne.pdf
- IDATE (INSTITUT de l'AUDIOVISUEL et des TELECOMMUNICATIONS en EUROPE) (2005) 'Use-IT: qui consomme quoi en 2015?'
- REGULATION (EC) No 1006/2009 of the European Parliament and of the council official journal of the European Union.
- Regulation (EC) No 808/2004 concerning Community statistics on the information society.
- Varian, H.R. (2000) 'Market Structure in the Network Age', in E. Brynjolfsson and B. Kahin (eds), *Understanding the Digital Economy*, Cambridge, MA: MIT Press.

Index

- Abello, R., 317, 329, 333
 Abramovsky, L., 234, 235, 236, 237,
 238, 239, 242, 244, 247, 252, 255
 Access, 4, 7, 8, 29, 33, 34, 48, 67, 68,
 69, 77, 84, 85, 107, 133, 134, 149,
 153, 155, 159, 169, 178, 187, 188,
 197, 198, 200, 201, 204, 207, 209,
 210, 213, 214, 219, 228, 229, 237,
 266, 321, 325, 327
 Acemoglu, D., 293, 310
 Adkins, L., 45, 46, 63
 Ala-Risku, T., 286
 Alleman, J., 105
 Altinkemer, K., 235, 255
 Altomonte, C., 40
 Amiti, M., 235, 256
 Analytical Hierarchical Process, 260
 Anderson, P., 26, 40
 Anderson, R.E., 84
 Andes, S.M., 66, 84
 Ando, M., 237, 251, 257
 Angrist, J., 237, 242, 244, 252, 256
 Antonelli, C., 288, 310
 Antras, P., 234, 235, 256
 ARCEP, 4, 10, 127, 128
 Arnett, K.P., 234, 235, 236, 251, 256
 Asikainen, A.L., 315, 333
 Askenazy, P., 318, 333
 Astebro, T.B., 288, 290, 310
 Atkinson, R.D., 66, 84, 90, 105
 Audretsch, D.B., 41

 Bachnik, W., 171, 174, 193
 Backstrom, L., 171, 193
 Baker, G., 234, 257
 Ballon, P., 213, 232
 Bals, L., 234, 257
 Bar-Ilan, J., 171, 193
 Barney, J.B., 286
 Barthélemy, J., 234, 235, 256
 Barua, A., 43, 46, 47, 62, 64
 Basu, S., 15, 17, 22, 23, 25, 26, 28, 30,
 32, 33, 34, 40, 41

 Battese, G., 44, 48, 56, 63
 Battisti, G., 289, 290, 291, 310
 Becchetti, L., 43, 46, 47, 62, 63
 Becker, G.S., 124, 128
 Bellon, B., 295, 310
 Belsley, D., 180, 193
 Ben Youssef, A., 4, 8, 9, 107, 288, 310
 Benavente, J.M., 316, 333, 334
 Benhabib, J., 49, 54, 63
 Bernard, A.B., 58, 63
 Bertschek, I., 310
 Bhagwati, J., 50, 64
 Bhatnagar, S., 235, 256
 Bialik, C., 167, 193
 Bignon, P.E., 65
 Billón, M., 66, 84
 Black, S.E., 314, 334
 Black, W.C., 84
 Blazic, B.J., 84
 Blog, 167, 168, 169, 171, 172, 173, 174,
 175, 177, 178, 179, 183, 186, 188,
 190, 191, 192, 193, 194
 Bloom, N., 28, 40, 41
 Blundell, R., 111, 128
 Bocquet, R., 289, 290, 291, 292, 310,
 314, 334
 Bolat, B.A., 84
 Bonus, S., 193
 Borgida, E., 105
 Bosworth, B.P., 17, 41
 Bramoullé, Y., 184, 193
 Bresnahan, T., 17, 28, 40, 41, 128,
 129, 141, 288, 292, 304, 307, 310,
 314, 334
 Broadband, 68, 69, 76, 77, 84, 104,
 116, 220, 229, 232, 253, 255, 317,
 323, 325, 327, 328
 Brossard, O., 289, 290, 291, 292, 310,
 314, 334
 Brousseau, E., 10, 310
 Brueckner, J., 171, 193
 Brynjolfsson, E., 1, 10, 26, 28, 33, 41,
 107, 128, 310, 311, 315, 317, 334

- Bugamelli, M., 315, 334
 Bunno, T., 8, 259, 260, 265, 266, 285, 286, 287
 Burn, J.M., 312
 Business Model, 6, 7, 9, 197, 282, 283, 284, 286

 Caffarelli, F., 171, 193
 Calabrese, A., 90, 104
 Caldeira, M.M., 261, 278, 286
 Calinski, T., 255, 256
 Capability, 1, 8, 10, 15, 88, 90, 239, 265, 288, 290, 291, 293, 306, 308, 315, 317
 Caroli, E., 311
 Carson, R.T., 142, 165
 Cassiman, B., 244, 256
 Castells, M., 89, 104
 Cavaye, A.L.M., 286
 Chalos, P., 235, 256
 Chanel, O., 142, 165
 Chaturvedi, A., 255
 Chaudhuri, A., 90, 104, 123, 129
 Chongvilaivan, A., 235, 256
 Çilan, Ç.A., 69, 84
 CIS Survey, 314, 318, 319, 320, 321, 322, 323, 324, 325, 328, 330
 Cluster, 2, 33, 34, 40, 44, 67, 69, 74, 76, 78, 80, 82, 237, 240, 241, 252, 256, 265, 286, 316
 Coase, R., 238, 256
 Cobb-Douglas function, 21, 109, 134
 Coelli, T., 44, 48, 50, 56, 63, 64
 Cohen, W., 41, 311
 Cohn, D.Y., 203, 206, 207, 211, 212, 233
 Colebourne, D., 312
 Colecchia, A., 54, 64
 Coleman, J.S., 33, 41
 Collier, P., 104
 Competition, 19, 50, 62, 87, 89, 111, 128, 129, 141, 176, 189, 221, 259, 260, 286, 306, 315, 317, 318, 333
 Competitiveness, 2, 3, 67, 68, 198, 234, 285
 Complementarities, 8, 17, 129, 292, 295, 300, 304, 308, 309, 315, 317
 Complementary Capital, 2, 3, 13, 15, 17, 19, 20, 21, 22, 28, 29, 31, 32, 33
 Consumer Surplus, 4, 6, 107, 108, 126, 127, 128, 129, 130, 131, 132, 133, 135, 138, 139, 140, 141, 223, 224, 225
 Conte, B., 89, 104
 Contingent Valuation Method, 142, 165
 Corrocher, N., 69, 84
 Covich, A., 165
 Cragg, P.B., 278, 286
 Crandall, R., 89, 104
 Cristini, A., 292, 307, 311
 Cross Section, 65, 335
 Currie, W.L., 235, 256
 Curzon Price, V., 237, 251, 256

 Davies, S., 311
 De Berranger, P., 312
 Delone, W., 261, 278, 286
 Dholakia, R.R., 244, 256
 Diaz-Mora, C., 235, 237, 251, 256
 Digital Divide, 68, 69, 84, 88, 89, 90, 98, 104, 105, 129
 Digital Technologies, 8, 9, 289, 290, 293, 294, 295, 300, 303, 305, 306, 308, 309, 310
 Dohmen, T., 172, 193
 Doms, M.E., 311
 Doukidis, G.I., 278, 286
 Drezner, D., 170, 193
 Droesbeke, J.J., 165
 Drucker, P., 234, 256
 Duan, W., 193
 Duda, R., 255, 256
 Dunne, T., 311
 Dupont, J., 65
 Dymond, A., 105

 E-Business, 10, 236, 251, 313, 334
 E-Commerce, 7, 10, 74, 76, 77, 210, 236, 240, 243, 251, 260, 267, 268, 299, 300, 310, 313, 321, 325, 333
 Eeckhoudt, L., 165
 Efficiency, 3, 8, 26, 40, 43, 44, 45, 46, 47, 49, 50, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 68, 112, 181, 193, 257, 259, 264, 273, 276, 277, 279, 284, 293, 303, 305, 307, 308, 309, 313, 315, 317

- EU, 2, 3, 13, 14, 16, 17, 24, 27, 29, 35,
 36, 37, 41, 43, 50, 51, 63, 64, 84,
 235, 333
 EUKLEMS, 40
 Europe, 2, 3, 4, 10, 13, 14, 15,
 16, 17, 29, 34, 40, 65, 66, 76, 84,
 129, 258, 328
 European Commission, 13, 21,
 41, 42, 66, 84
 Eurostat, 2, 3, 29, 68, 76, 84, 240,
 314, 320, 333, 335
 Ezcurra, R., 84
- Fabiani, S., 292, 311
 Falk, A., 193
 Fare, R., 45, 46, 64
 Farrell, H., 170, 193, 335
 Fausch, K., 165
 Feenstra, R., 50, 64
 Fernald, J.G., 41
 Fichman, R.G., 311
 File Sharing, 6, 7, 9, 197
 Filippi, M., 311
 Fink, C., 89, 104
 Fitzgerald, G., 239, 258
 Fixed Cost, 1, 7, 109, 110, 133, 201,
 202, 222, 232, 317
 Flamm, A.K., 104, 129
 Flores-Lagaunes, A., 298, 312
 Fono, D., 169, 170, 194
 Foray, D., 311
 Forman, C., 243, 256
 Fortin, B., 193
 Foss, K., 293, 311
 Foss, N.J., 293, 311
 Freeman, C., 291, 311
 Frost, R.L., 211, 212, 232
 Fryges, H., 310
 Fu, V.K., 97, 105
 Fuchs, C., 89, 105
 Fuest, W.L., 286
 Furukawa, T., 171, 193
- Gaj, A., 311
 Galliano, D., 243, 257, 311
 Galliers, R.D., 286
 Garbacz, C., 43, 46, 47, 62, 65
 Gasco, J., 257
 Gentzkow, M., 107, 129
 Geyer, D., 234, 235, 256
 Gholami, R., 58, 64
 Giovannetti, E., 286, 287
 Glance, N., 171, 194
 Godfroid, P., 142, 165
 Goldfarb, A., 124, 129, 243, 256
 Gonzalez, R., 234, 257
 Goodman, B., 236, 257
 Goolsbee, A., 107, 108, 116, 124, 127,
 128, 129, 131, 133, 138, 141
 Gordon, R.J., 43, 64, 128, 129, 141
 Granovetter, M., 171, 193
 Greenan, N., 311, 314, 334
 Greene, W.H., 192, 193, 297, 311
 Greenstein, S., 243, 256
 Greenwood, J., 41, 107, 128, 129
 Griffith, R., 234, 235, 236, 237,
 238, 239, 242, 244, 247, 252, 255,
 316, 334
 Grosskopf, S., 43, 64
 Grossman, G.M., 234, 238, 257
 Gu, B., 172, 193, 194
 Gui, B., 171, 193
 Gulati, R., 255
 Gumbrecht, M., 194
 Gust, G., 14, 41
- Hair, J.F., 70, 84
 Hanemann, M.W., 165
 Hanley, A., 257
 Harabasz, J., 255, 256
 Hargittai, E., 68, 84
 Hart, P., 255, 256
 Hartmann, E., 234, 257
 Hausman, J., 25, 26, 107, 126, 129,
 132, 139, 141, 184, 190
 Hazlett, T., 132, 141
 Heckman, J.J., 4, 108, 112, 113, 114,
 115, 116, 121, 122, 123, 127, 129
 Helpman, E., 234, 235, 238, 256, 257
 Hempell, T., 316, 317, 334
 Henning, J., 167, 190, 193
 Henry, M., 46, 47, 63, 64
 Herring, S., 168, 169, 193
 Heshmati, A., 64, 235, 257, 315, 334
 Heston, A., 51, 64
 Hitt, L.M., 1, 10, 26, 28, 33, 41, 310,
 311, 315, 317, 334
 Ho, M.S., 311

- Hoffmann, M.P., 129
 Holger, G., 235, 257
 Hollenstein, H., 290, 310, 311, 314, 334
 Horak, E., 89, 105
 Horigan, J., 129
 Horrigan, J., 90, 104, 105
 Hu, Y.J., 128
 Huamao, B., 334
 Huang, J.B., 193, 235, 258
 Hubbard, T., 234, 257
 Huck, S., 170, 193
 Huergo, E., 334
 Huffman, D., 193
 Huggett, M., 311
 Hunter, W.R., 89, 105
 Hur, J., 235, 256
 Huttenlocher, D., 193
- ICT Adoption, 3, 8, 9, 66, 67, 71, 73, 243, 261, 266, 278, 280, 282, 284, 285, 289, 290, 292, 294, 296, 300, 302, 303, 304, 305, 306, 307, 308, 309, 311, 316, 317
 ICT Capital, 2, 3, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 43, 54, 63, 303, 308
 ICT Diffusion, 2, 9, 66, 67, 68, 242, 243, 244, 295, 300, 302, 309, 318
 ICT Investment, 3, 9, 15, 16, 17, 20, 21, 22, 24, 25, 26, 27, 28, 29, 31, 33, 34, 42, 46, 50, 51, 52, 53, 63, 64, 236, 237, 240, 241, 242, 243, 244, 246, 247, 252, 260, 261, 270, 273, 276, 277, 278, 279, 281, 282, 283, 284, 285, 292, 306, 307, 314, 315, 316, 317, 329, 334
 ICT Services, 7, 8, 9, 234
 ICT Survey, 314, 321, 326, 330
 ICT Usage, 7, 8, 67, 236, 237, 240, 241, 242, 246, 252, 260, 261, 266, 270, 272, 273, 275, 276, 280, 281, 282, 284, 291, 294, 298, 299, 300, 304, 307, 320
 ICT Use, 8, 9, 21, 67, 237, 240, 241, 244, 247, 252, 255, 259, 260, 261, 264, 265, 266, 267, 269, 270, 272, 273, 276, 277, 278, 280, 281, 282, 284, 285, 287, 290, 291, 292, 293, 294, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 313, 314, 316, 317, 318, 319, 321, 329, 331, 332, 334
- Idota, H., 8, 259
 Igbaria, M., 261, 278, 286
 IMF, 51, 64
 Incentive, 19, 104, 153, 260, 282, 303, 307
 Inklaar, R., 17, 41, 65
 Innovation, 5, 8, 9, 10, 41, 42, 84, 142, 152, 154, 194, 198, 212, 213, 229, 230, 232, 259, 281, 294, 295, 296, 301, 306, 307, 308, 309, 310, 311, 313, 314, 315, 316, 317, 318, 321, 322, 323, 324, 327, 328, 329, 331, 332, 333, 334
 Intangible, 10, 17, 33, 315
 Interaction, 6, 30, 31, 32, 34, 179, 182, 186, 192, 206, 253, 273, 280, 293, 307
 Intra-Firm Diffusion, 8, 288, 289, 290, 295, 308, 309, 310, 334
 Irani, Z., 312
 ITU, 87, 105
- Jackson, M.O., 105, 171, 193
 Jacobs, D., 213, 232
 Jahns, C., 234, 257
 Jain, S., 221, 232
 Jayasuriya, R., 45, 46, 64
 Jefferson, G., 316, 334
 Jones, C.I., 58, 63
 Jones, M.C., 234, 235, 236, 251, 256
 Jorgenson, D.W., 16, 41, 58, 64, 311
 JRC, 84
 Jung, D., 90, 104
 Junutumen, N., 105
- Kagami, M., 286, 287
 Kärkkäinen, M., 286
 Karlsson, C., 311
 Kauremaa, J., 278, 286
 Kaushalesh, L., 90, 105
 Kemerer, C.F., 311
 Kenny, C.J., 89, 104
 Kent, P., 81, 165
 Ketler, K., 235, 257
 Kiiski, S., 89, 105
 Kimura, F., 237, 251, 257
 Klein, P.G., 311

- Kleinberg, J., 193
 Klenow, P.J., 107, 108, 124, 127, 128, 129, 131, 133, 138, 141
 Klepper, S., 41
 Kneller, R., 45, 46, 50, 64
 Koellinger, P., 316, 334
 Koop, G., 45, 46, 64
 Kopecky, K.A., 107, 128, 129
 Kridel, D.J., 105
 Krishnamurty, S., 168, 193
 Krueger, A.O., 50, 64
 Kshetri, N., 244, 256
 Kuchiki, M., 286
 Kumar, R., 171, 194
 Kurylo, L., 193

 Labor Productivity, 2, 3, 13, 14, 16, 17, 38, 43, 256
 Lacity, M., 239, 258
 Lal, K., 244, 257
 LAN, X., 193, 260, 266, 268, 295, 296, 299, 323, 325
 Lange, T., 312
 Lassica, J., 170, 194
 Le Gall-Ely, M., 165
 Le Guel, F., 90, 105
 Leduc, K., 312
 Lee, B., 43, 46, 47, 62, 64
 Lejeune, M., 165
 Lemann, N., 170, 194
 Lento, T., 171, 194
 Leonard, G., 129
 Leoni, R., 311
 Lera-López, F., 84
 Leszczynski, P., 193
 Lethiais, V., 90, 105
 Levine, D.I., 312
 Levinthal, D., 41, 311
 Levy, M., 278, 286
 Liebowitz, S.J., 221, 232
 Lin, C., 312
 Llopis, J., 257
 Logit, 4, 8, 95, 96, 97, 98, 99, 100, 101, 102, 103, 105, 106, 144, 245, 261, 276, 278, 279, 297
 Loh, L., 234, 257
 Londono Bedoya, D.A., 63
 Lööf, H., 315, 334
 Loomis, J., 142, 165
 López, A.J., 2, 3, 66

 Love, P., 312
 Lucchetti, R., 244, 257
 Luchini, S., 165
 Lünser, G., 193
 Lynch, L.M., 314, 334

 Maddala, G., 298, 312
 Madon, S., 235, 256
 Magnani, E., 239, 257
 Mairesse, J., 244, 257, 329, 334
 Mankiw, N.G., 49, 54, 65
 Mansfield, E., 288, 290, 291, 312, 314, 334
 Marchand, M., 165
 Margetta, J., 213, 232
 Marginal Cost, 1, 7, 109, 202, 222, 232, 317
 Marin, D., 234, 257
 Market, 1, 5, 7, 8, 9, 10, 28, 33, 34, 58, 67, 88, 109, 128, 130, 131, 134, 136, 141, 146, 154, 176, 198, 199, 200, 201, 202, 204, 205, 207, 208, 209, 210, 218, 219, 220, 224, 226, 227, 228, 230, 232, 234, 238, 239, 247, 251, 255, 265, 276, 285, 294, 310, 315, 316, 317, 318, 319, 322, 323, 324, 325, 326, 328, 330, 331, 332
 Market Structure, 1, 10, 315, 317
 Marketing Innovation, 10, 318, 319, 321, 323, 324, 327, 328
 Markusen, J.R., 64
 Marquez, J., 14, 41
 Martin, C.J., 261, 286
 Martin, L., 7, 234, 236, 238, 240, 242, 244, 246, 250, 252, 254, 256, 258, 329, 334
 Marwick, A., 170, 194
 Mata, F.J., 278, 286
 Matsuo, Y., 193
 Matsuzawa, T., 193
 McGrattan, E.R., 42
 McGuckin, R., 65
 McKeown, L., 90, 105
 Media, 106, 170, 200, 202, 208, 213, 220, 221, 222, 232, 233
 Melka, J., 42
 Meroño-Cerdan, A.L., 287
 Mhenni, H., 310
 Mihaly, K., 184, 194
 Milana, C., 43, 46, 47, 62, 65

- Milgrom, P., 33, 42, 293, 312
 Milner, C.R., 45, 46, 64, 65
 Mishne, G., 171, 194
 Mitchell, R.C., 142, 165
 Miyoshi, H., 285, 287
 Moomaw, R., 63
 Morgan, A., 292, 312
 Moschella, D., 90, 105
 Mulder, N., 42
 Murphy, M., 293, 312
- Nakanishi, M., 285, 286, 287
 Nardi, B.A., 171, 194
 Nava, M., 40
 Navas-Savater, J., 88, 105
 Nelson, R., 18, 41, 42
 Network, 1, 4, 5, 6, 8, 10, 88, 89, 90,
 91, 93, 95, 96, 98, 101, 102, 104,
 105, 125, 133, 135, 136, 137, 138,
 139, 141, 167, 170, 171, 172, 174,
 175, 176, 177, 179, 180, 182, 183,
 184, 185, 186, 187, 189, 192, 193,
 194, 199, 203, 206, 210, 213, 221,
 233, 236, 238, 247, 260, 293, 294,
 295, 300, 301, 302, 304, 305, 308,
 309, 317, 321, 323
 Nevo, A., 107, 128, 129
 Newey, W.K., 126, 129
 Newman, F.A., 310
 Nguyen, ThiT.U., 329, 334
 Noce, A., 90, 105
 Norris, M., 64
 Norris, P., 89, 105
 Novak, J., 194
- OECD, 3, 29, 34, 38, 40, 43, 44,
 45, 46, 47, 48, 50, 51, 52, 54, 55,
 58, 62, 63, 64, 65, 67, 68, 69, 84,
 89, 105, 207, 208, 210, 232, 294,
 304, 312, 313, 315, 333, 334, 335
 Offshoring, 7, 8, 9, 234
 Ogawa, M., 8, 259, 260, 285,
 286, 287
 Ohnemus, J., 235, 257
 Online Transactions, 5
 Ordanini, A., 69, 84
 Organizational Change, 1, 33, 292,
 293, 294, 307, 311, 313, 315, 319,
 321, 323, 327
- Organizational Investment, 10,
 315, 316
 Osiewalski, J., 64
 Ospina, S., 311
 Osterman, P., 293, 312
 Ottens, M., 312
 Oulton, N., 41
 Outsourcing, 7, 8, 9, 34, 234, 264
 Oxendine, A., 90, 105
 Oyelaran-Oyeyinka, B., 105
- P2P, 123, 203, 207, 209, 211,
 215, 221, 230
 Paganetto, L., 63
 Pagano, P., 315, 334
 Palvia, P.C., 266, 286
 Panel Data, 45, 63, 186, 256,
 317, 335
 Paraponaris, A., 165
 Paré, G., 312
 Pashardes, P., 128
 Peitz, M., 224, 225, 232
 Penard, T., 105
 Perelman, S., 64
 Performance, 8, 10, 13, 15, 23, 38,
 41, 74, 259, 271, 272, 287, 288, 293,
 294, 311, 312, 313, 314, 315, 316,
 319, 334
 Peters, B., 334
 Petrin, A., 107, 128, 129
 Pilat, D., 313, 335
 Piracy, 202, 203, 211, 214,
 232, 233
 Podsiadlo, R., 193
 Pohjola, M., 89, 105
 Porter, M.E., 34, 42
 Poussing, N., 90, 105
 Powell, P., 278, 286
 Premkumar, G.P., 210, 232
 Prescott, E.C., 42
 Prichard, G., 317, 333
 Pricing, 110, 134, 208, 218, 318
 Prince, J., 124, 129, 208
 Principal Components, 2, 70, 76
 Pritchett, L., 49, 54, 65
 Probit, 4, 8, 114, 116, 120, 237, 242,
 243, 244, 245, 246, 252, 261, 276,
 278, 279, 296, 297, 300, 314, 319,
 320, 326, 328, 329, 331, 332, 335

- Process Innovation, 213, 314, 316,
 317, 318, 321, 323, 324, 327, 328
 Product Innovation, 318, 319, 323,
 324, 328
 Production Function, 2, 16, 17, 45,
 48, 49, 50, 52, 53, 54, 62, 63
 Public Goods, 165, 200, 201, 204
 Putnam, R.D., 91, 93, 105

 Quiggin, J., 170, 194

 Raghavan, P., 194
 Raman, K., 287
 Random Utility Model, 142
 Rappoport, P., 90, 105
 Raymond, L., 312
 Raynes-Goldie, K., 169, 170, 194
 Reciprocal Attention, 5, 167
 Repkine, A., 43, 46, 47, 62, 65
 Ribstein, L.E., 170, 194
 Rights, 1, 132, 141, 201, 202, 203,
 204, 207, 231
 Rob, R., 221, 222, 224, 225, 232, 233
 Roberts, J., 33, 42, 293, 312
 Robin, S., 244, 257
 Rogers, E.M., 67, 84, 312
 Romano, E., 64
 Romer, D., 65
 Roux, P., 243, 257, 311
 Ruiz-Mercader, J., 278, 287
 Rymaszewicz, E., 193

 Saaty, T.L., 266, 287
 Sabater-Sánchez, R., 287
 Sadun, R., 41
 Sako, M., 255
 Saporta, G., 165
 Savvides, A., 63
 Scheidt, L., 193
 Schiano, D.J., 194
 Schivardi, F., 311
 Schmidt, J., 64, 170, 194
 Schreyer, P., 51, 54, 64, 65
 Sciadas, G., 90, 106
 Seltsikas, P., 235, 256
 Service Innovation, 314, 315, 319,
 323, 327
 Shapiro, C., 221, 233, 335
 Shapiro, M.D., 41

 Skills, 6, 9, 15, 27, 29, 68, 69, 76, 77,
 84, 117, 118, 119, 122, 123, 126,
 164, 239, 264, 303, 304, 305, 308,
 311, 312, 315, 316, 317, 334
 SME, 8, 259, 260, 261, 262, 263,
 264, 265, 267, 272, 273, 280,
 284, 312
 Smith, M., 194
 Smith, M.D., 128
 Smith, N., 287
 Social Network, 5, 6, 98, 101, 125,
 167, 168, 193
 Soete, L., 311
 Soh, C., 287
 Spiegel, M., 49, 54, 63
 Standing, C., 312
 Steadman, R., 236, 257
 Steel, M.F.G., 64
 Stefani, A., 235, 258
 Sterlacchini, A., 244, 257
 Stevens, P., 45, 46, 50, 64
 Stiroh, K.J., 16, 41, 42, 43, 65, 311
 Stochastic Production Frontier, 43,
 44, 48, 51
 Stoneman, P., 289, 290, 291, 310, 312
 Strange, L., 165
 Strobl, E., 257
 Sugden, R., 171, 193
 Suire, R., 105
 Sullivan, J.L., 105
 Summers, R., 51, 64
 Sunde, U., 193
 Sung, J., 235, 256
 Sunstein, C., 170, 194
 Supply Chain, 261, 262, 263, 267
 Survey, 4, 5, 7, 8, 21, 29, 45, 89, 90,
 91, 101, 107, 110, 116, 118, 127, 135,
 146, 165, 168, 191, 193, 199, 203,
 213, 214, 218, 219, 224, 226, 228,
 229, 235, 236, 237, 240, 242, 257,
 259, 261, 264, 265, 266, 296, 309,
 314, 320, 321, 325, 326, 328
 Swanson, E.B., 312
 Szymczyk, S., 193

 Takeda, M., 193
 Tatham, R.L., 84
 Taylor, A., 312
 Taylor, L.D., 105

- Technical Efficiency, 3, 43, 44, 45, 47, 49, 55, 56, 58, 62, 63, 334
 Telecommunications, 4, 10, 35, 36, 37, 39, 40, 46, 47, 67, 68, 84, 87, 88, 90, 91, 104, 105, 129, 135, 141, 232
 Terra, S., 165, 166
 Thesmar, D., 333
 Thoenig, M., 333
 Thomas, A., 297, 312
 Thomas, B., 312
 Thompson, H., 43, 46, 47, 62, 65
 Thong, J.Y.L., 261, 278, 287, 292, 312
 Time Opportunity Cost, 6, 107, 110
 Timmer, M.P., 41, 42
 Tomkins, A., 194
 Topiol-Bensaid, A., 334
 Total Factor Productivity, 2, 3, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 35, 36, 37, 43, 44, 49, 54, 58, 61, 316, 317
 Trajtenberg, M., 17, 41, 288, 310
 Trento, S., 80, 311
 Triplett, J.E., 17, 41
 Trkman, P., 69, 84
 Tsakalidis, A., 235, 258
 Tsaknaki, J., 235, 258
 Tsuji, M., 8, 259, 260, 266, 285, 286, 287
 Tsutsumi, E., 287
 Turk, T., 84
 Tushman, M.L., 26, 40
 Tyran, J.R., 193

 Uchiyama, K., 193
 Ueki, Y., 287

 Van Ark, B., 14, 16, 17, 41, 42, 43, 49, 65
 Van Der Wiel, H., 317, 334, 335
 Van Dijk, J., 89, 106
 Van Leeuwen, G., 317, 334, 335
 Van Reenen, J., 41, 311
 Varian, H.R., 1, 10, 221, 233, 317, 335
 Vassiliadis, B., 235, 258
 Venkatraman, N., 234, 257
 Verdier, T., 234, 257
 Vergnaud, J.C., 165
 Veugelers, R., 244, 256

 Vicente, M.R., 2, 3, 66, 68, 69, 70, 74, 76, 84, 105

 Waelbroeck, P., 225, 232
 Waldfogel, J., 221, 222, 224, 225, 232, 233
 Walstrom, J., 235, 257
 Ward, J.M., 8, 74, 241, 259, 261, 264, 265, 278, 284, 286, 287
 Watjatrakul, B., 235, 251, 258
 Watts, A., 171, 194
 Weber, G., 128
 Wei, S.J., 235, 256
 Weil, D.N., 65
 Weinberg, B., 184, 194
 Welfare, 4, 5, 6, 68, 107, 108, 128, 129, 130, 131, 132, 133, 138, 139, 140, 141, 165, 199, 219, 222, 223, 224, 225, 227, 232, 233, 312
 Welser, H., 194
 Wenger, A., 168, 194
 Weyman-Jones, T., 45, 46, 65
 Whinston, A.B., 193
 Willcocks, L., 239, 251, 258
 William, R., 194
 Willingness To Pay, 142, 143, 145, 150, 152, 218, 221, 229
 Wilson, E.J., 89, 106
 Windrum, P., 312
 Wireless, 4, 6, 87, 130, 131, 132, 133, 135, 136, 137, 138, 139, 140, 141
 Wodon, Q., 45, 46, 64
 World Bank, 51, 64, 65, 104, 105, 106
 Wright, E., 193, 194

 Xiaojing, G., 334
 Xiaoyun, Y., 334

 Yang, C., 235, 258
 Yap, C.S., 261, 266, 278, 287
 Yorukoglu, M., 41
 Ypma, G., 42

 Zeile, W., 64
 Zeli, A., 43, 46, 47, 62, 65
 Zentner, A., 226, 233
 Zhang, Z., 64
 Zinatelli, N., 278, 286