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Small businesses and broadband: Key drivers for economic recovery

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EXECUTIVE SUMMARY

The existing literature on the economic effect of broadband access on small and medium sized business enterprises (SME) states that:

1. Small and medium sized enterprises (SMEs), represent more than half of the U.S. gross domestic product (GDP) and generate two-thirds of new jobs. Their role as the primary drivers of growth in employment and innovation is indisputable.

2. Broadband highly impacts consumer welfare, firm productivity and overall economic growth.

3. Broadband's traditional supply and demand effects are complemented in the new economy by "dynamic network externalities;" the dynamic conceptualization is based upon the dual characterization of network subscribers as both consumers and producers of information, applications and services.

4. In order to realize the full potential of dynamic externalities, policymakers need to simultaneously put in place programs to increase subscribership (universal service), foster firm innovation of new network services (price and speed), and promote unimpeded access between firms and users (net neutrality). Respectively, we recommend a transition of the Universal Service Fund to support broadband, targeted competition policy to drive down prices and increase speeds, and establishing network neutrality rules to preserve an open application market.

5. A discussion of the impact of broadband deployment implies:
   - Small firms are more likely to innovate in environments where market entry is facilitated by new technologies. This highlights the importance of universal service policies;
   - The full scope of dynamic network externalities can be realized only if firms and innovation networks can have unimpeded access to users and participants. This highlights the importance of open networking policies.
   - Small firms tend to adopt ICTs and broadband at lower rates than large firms; as a consequence they miss out on ICT-enabled productivity gains, further widening the economic gap between large and small firms. The solution is to encourage SMEs to adopt broadband and ICTs by lowering costs for small business broadband access and precluding discriminatory business models that disadvantage SME eBusiness.
   - Investment in broadband infrastructure achieves its greatest return when network deployment is balanced between communities, with special policy focus on remedying the disadvantage of rural or high-poverty urban communities. Specifically, policymakers should seek to close digital divides in speed and price between markets.

6. Small businesses face significant constraints in accessing broadband and utilizing it effectively in three dimensions:
   - They are lack the knowledge and personnel to utilize ICTs
   - Many are located in markets where accessing broadband networks and services is difficult due to geographic dispersion
   - They are often unable to develop in-house ICT capabilities due to smaller scale of operations.

7. Small businesses spend disproportionately more on telecommunications services than large businesses; and yet a large percentage of SMEs do not subscribe to broadband at all.

8. It is the adoption of the eBusiness model that can drive renewed SME growth, *but only if* they have access to affordable, fast, reliable broadband services.
   - The eBusiness model leverages the power of the Internet to reduce costs, increase productivity growth and increase revenue and takes full advantage of the capabilities of the Internet.
   - eBusiness offers reduced costs through on-line collaboration and distribution and increased revenue through faster access to both customers and suppliers.
   - Unimpeded access to the "Cloud" allows small businesses to quickly and inexpensively access virtual infrastructure resources, saving money and increasing efficiency.

9. Policies that make the connection between the success of small and medium business enterprises and the development of the Internet have been promoted and implemented in different countries since the introduction of the Internet. They include the promotion of:
   - eGovernment;
   - eBusiness;
   - SME connectivity;
   - Enhancing access of SMEs to capital;
   - Policies that try to overcome SME "fears" of accessing the Internet: knowledge, trust, and cost.

10. Small business programs in other countries offer the following key policy recommendations for the adoption of ICTs by SMEs:
    - Encourage broadband rollout using competition mechanisms to lower prices and raise quality;
    - Initiate policies that strengthen trust, security, privacy and consumer protection;
    - Expand SME usage of online dispute resolution mechanisms;
    - Increase the availability of digital content about the public sector;
    - Invest in improving basic ICT skills through education.

RECOMMENDATIONS

LITERATURE REVIEW DETERMINATION	POLICY RECOMMENDATION
1. Small and medium sized enterprises (SMEs), represent more than half of the U.S. gross domestic product (GDP) and generate two-thirds of new jobs. Their role as the primary drivers of growth in employment and innovation is indisputable.	
2. Broadband highly impacts consumer welfare, firm productivity and economic growth.	**Policy goal I: Focus on SMEs** In order to fully realize the promise of SMEs and their potential to contribute to economic growth, policy needs to help them overcome the barriers that impede both their access to broadband and their ability to utilize it.
3. Broadband's traditional supply and demand effects are complemented in the new economy by "dynamic network externalities;" the dynamic conceptualization is based upon the dual characterization of network subscribers as both consumers and producers of information, applications and services. 4. In order to realize the full potential of dynamic externalities, policymakers need to simultaneously put in place programs to increase subscribership (universal service), foster firm innovation of new network services (price and speed), and promote unimpeded access between firms and users (neutrality).	**Policy goal II: Address dynamic externalities – target both consumers and producers** • Support universal broadband access through the Universal Service Fund • Targeted competition policy to drive down prices and increase speed • Promote open access and non-discrimination on broadband networks by ensuring net neutrality; service providers should not be able to discriminate between packets based on who originates them. Otherwise, small businesses which may not be able to secure advantageous terms may not be able to compete effectively • Net neutrality is also required to ensure that the full potential of dynamic network externalities is realized

5. A discussion of the impact of broadband deployment implies: o Small firms are more likely to innovate in environments where market entry is facilitated by new technologies. o The full scope of dynamic network externalities can be realized only if firms and innovation networks can have unimpeded access to users and participants. o Small firms tend to adopt ICTs and broadband at lower rates than large firms; as a consequence they miss out on ICT-enabled productivity gains further widening the economic gap between large and small firms. o Investment in broadband infrastructure achieves its greatest return when network deployment is balanced between communities, with special policy focus on remedying the disadvantage of rural or high-poverty urban communities.	**Policy goal III: Foster SME innovation** • Improve data collection on small business broadband use, ICT penetration, ICT (hardware and software) spending etc. Benchmarking studies in consultation with SBA, economic census etc, followed by annual data collection. Create clearinghouse for SME ICT use • Implement open networking policies. • Encourage SMEs to adopt broadband and ICTs by lowering costs for small business broadband access and precluding discriminatory business models that disadvantage SME eBusiness. • Policymakers should seek to close digital divides in speed and price between markets.
6. Small businesses face significant constraints in accessing broadband and utilizing it effectively in three dimensions: o They are lack the knowledge and personnel to utilize ICTs o Many are located in markets where accessing broadband networks and services is difficult due to geographic dispersion o They are often unable to develop in-house ICT capabilities due to smaller scale of operations.	**Policy goal IV: Enhance SME capabilities to effectively utilize broadband** • Offer counseling, support and networks of assistance for SME adoption of ICTs and "cloud computing" solutions to inventory management, payroll, etc. Grants to SME organizations to develop best practices • Close digital divide in speed and prices between markets • Preferential pricing (e.g., special access) for SMEs; no caps on bandwidth/usage • Promote standards for technology (openness, interoperability, technological neutrality)
7. Small businesses spend disproportionately more on telecommunications services; and yet a larger percentage of SMEs do not avail of broadband at all.	**Policy Goal V: Affordability** • Promote affordable broadband access for small businesses • Favorable tax treatment (e.g., of capital expenditures, depreciation, etc.) • Preferential loan treatment (cheap government loans, loan guarantees, etc. • No additional taxes/fees/elimination of any unfavorable treatment at federal or state level

8. It is the adoption of the eBusiness model that can drive renewed SME growth, *but only if* they have access to affordable, fast, reliable broadband services. o The eBusiness model leverages the power of the Internet to reduce costs, increase productivity growth and increase revenue and takes full advantage of the capabilities of the Internet. o eBusiness offers reduced costs through on-line collaboration and distribution and increased revenue through faster access to both customers and suppliers. o Unimpeded access to the "Cloud" allows small businesses to quickly and inexpensively access virtual infrastructure resources, saving money and increasing efficiency.	**<u>Policy goal VI: Develop eBusiness friendly policies</u>** • Enhance trust in online transactions by cracking down on identity theft, enhancing security, promoting e-cash, consumer protection, privacy • Subsidize or give tax credits for ICT-focused human resource development, employee training in SMEs
9. Policies that make the connection between the success of small and medium business enterprises and the development of the Internet have been promoted and implemented in different countries since the introduction of the Internet. They include the promotion of: eGovernment; eBusiness; SME connectivity; Enhancing access of SMEs to capital; Overcome SME "fears" of accessing the Internet: knowledge, trust, and cost. 10. Small business programs in other countries offer the following key policy recommendations for the adoption of ICTs by SMEs: o Encourage broadband rollout using competition mechanisms to lower prices and raise quality; o Initiate policies that strengthen trust, security, privacy and consumer protection; o Expand SME usage of online dispute resolution mechanisms; o Increase the availability of digital content about the public sector; Invest in improving basic ICT skills through education.	**<u>Policy goal VII: International benchmarking</u>** • Undertake comparative studies of international policies • Special attention to SMEs with respect to international trade issues • Work to eliminate foreign tariff, taxation, technological or other barriers to SME trade • Simplification of any necessary approvals/paperwork, etc. Eliminate where possible • Monitor international (e.g., OECD, APEC) SME policies. Work to collaborate and coordinate with international standards and practices. • Participate in international meetings and organizations in support of U.S. SMEs

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"Small business and entrepreneurs are the life-blood of the American economy"
– Vorhaus, (2010)

1. The Critical Role of SMEs in the U.S. Economy

Small and medium sized enterprises (SMEs), defined by the U.S. Small Business Administration (SBA) as those with fewer than 500 employees (SBA, 2010), represent more than half of the U.S. gross domestic product (GDP) and generate two-thirds of new jobs. They are the primary drivers of growth in employment and innovation in the economy. According to the SBA (2010), small businesses represent 99.7 percent of all employer firms, employ just over half of all private sector employees, generate more than half of the nonfarm private gross domestic product (GDP), and pay 44 percent of total U.S. private payroll. Their role in new job creation is indisputable, having generated 64 percent of net new jobs (or 14.5 million, of the 22.5 million net new jobs, gains minus losses) over the past 15 years (1993-2008), and hiring 40 percent of high tech workers (such as scientists, engineers and computer programmers). Small and medium businesses also play a major role in international trade, contrary to popular misconceptions of SMEs as predominantly local enterprises: they made up 97.3 percent of all identified exporters and produced 30.2 percent of the known export value in FY 2007. Small businesses are innovation powerhouses, producing 13 times more patents per employee than large patenting firms; these patents are twice as likely as large firm patents to be among the one percent most cited. In short, SMEs are a critical and indispensible part of the U.S. economy, and help make it one of the most dynamic, innovative and efficient economies in the world.

According to a report titled *An Analysis of Small Business and Jobs*, commissioned by the SBA, "While small and large firms provide roughly equivalent shares of the jobs, the major part of job generation and destruction takes place in the small firms sector, and small firms provide the greater share of net new jobs" (Headd, 2010, p. 3). Further, according to the Report, "Small

firms also tend to fill niches in the labor market that are underserved (often have high rates of unemployment, for example). They employ higher shares of Hispanics than large firms (65.9 percent of Hispanics work for firms with fewer than 500 employees). And compared with large firms, small firms also employ higher shares of individuals with low educational attainment – a high school degree or less (63.2 percent); high school-aged workers (63.8 percent); individuals 65 or older (64.6 percent); disabled workers (59.4 percent); and rural workers (64.3 percent)" (p. 6) Most new business start-ups are SMEs, and after an analysis of the data, the Report concludes that there "is a very strong basis for the claim that opening a business has greater consequences for job creation than expanding a business does" (p. 8).

2. SMEs Were Hit Hard by the Recession

According to the SBA's *Report to the President: The Small Business Economy* (2009), small businesses, like the rest of the economy in 2008, were affected by the deepening recession, particularly in the fourth quarter. Real gross domestic product saw a 1.1 percent gain for the year, but fourth quarter GDP was down 6.3 percent on an annualized basis. Average unincorporated self-employment fell from 10.4 million in 2007 to 10.1 million in 2008 and averaged 9.6 million by November and December 2008. Incorporated self-employment remained steady at 5.8 million on average over the 2007-2008 period. Some surveys found small firms expressing less willingness to expand, hire new workers, invest in new plant and equipment, or borrow money, at least in the near term. Demographic trends, including the retirement of the Baby Boomers in coming years, may exacerbate the challenges small businesses face in employee recruitment and retention. Global competition continues to be a challenge for firms of all sizes, but exports have been a bright spot in recent years (SBA, 2009).

However, the Report suggests, if the past is an indication, that small businesses will be the leaders in economic recovery. Under the current unusually adverse conditions, taking full advantage of new technologies, SMEs will be in an even stronger position to lead the recovery. However, access to affordable, reliable, fast broadband connectivity to the Internet is critical to their ability to do so.

3. Broadband as a key to economic recovery

Broadband access[1] has a much wider range of use than Plain Old Telephone Service (POTS), with the result that its impact on consumer welfare, firm productivity and overall economic growth is potentially much higher. Czernich et al. (2009) catalog some of the ways in which broadband deployment leads to economic growth. On the demand side, broadband permits access to a much wider range of applications and services, increasing consumer choice and usage, and consequently welfare. On the supply side, broadband affords the traditional production efficiencies since network goods are both complements and substitutes to other production inputs, such as transportation and labor. But in addition, broadband allows new markets to be developed through the innovation of new network-based products and services, as well as to extend the reach of existing markets. Due to this, broadband is often referred to as a General Purpose Technology (GPT) (Majumdar, Carare, & Chang, 2009).

Thus, in the new economy, these supply and demand side effects are supplemented by what has been called dynamic network externalities (Bar and Riis, 2000). This is the argument that network access constitutes a heterogeneous, multi-dimensional utility to consumers and producers. The valuation that consumers put on network access is dependent on the diversity of products and services that can be accessed over them, and suppliers' willingness to deploy new services is dependent on access to a critical mass of users. Dynamic network externalities are effectuated when both subscribership and firm innovation interdependently increase. But in order to realize the full potential of dynamic externalities, policymakers would have to simultaneously put in place programs to increase subscribership (universal service), foster firm innovation of new network services and promote unimpeded access between firms and users. This is the theoretical premise on which we will frame this report.

Thus, a discussion of the impact of broadband deployment implies not simply a correlation with economic growth, but a host of intermediate variables such as firm behavior, innovation, productivity, job creation, and consumer preferences. In the sections that follow, this report will parse out some of these relationships, with a specific focus on small and medium business

[1] Broadband is defined in the United States as any wired or wireless connection that "enable the end user to receive information from and/or send information to the Internet at information transfer rates exceeding 200 kbps in at least one direction." (FCC, 2009). These speeds are low by international comparisons.

enterprises (SMEs). We attempt to pull together literature from several different fields of study to explicate the link between these different variables. The conceptual map below (Figure 1) provides a general outline of the relationships we will discuss in this report.

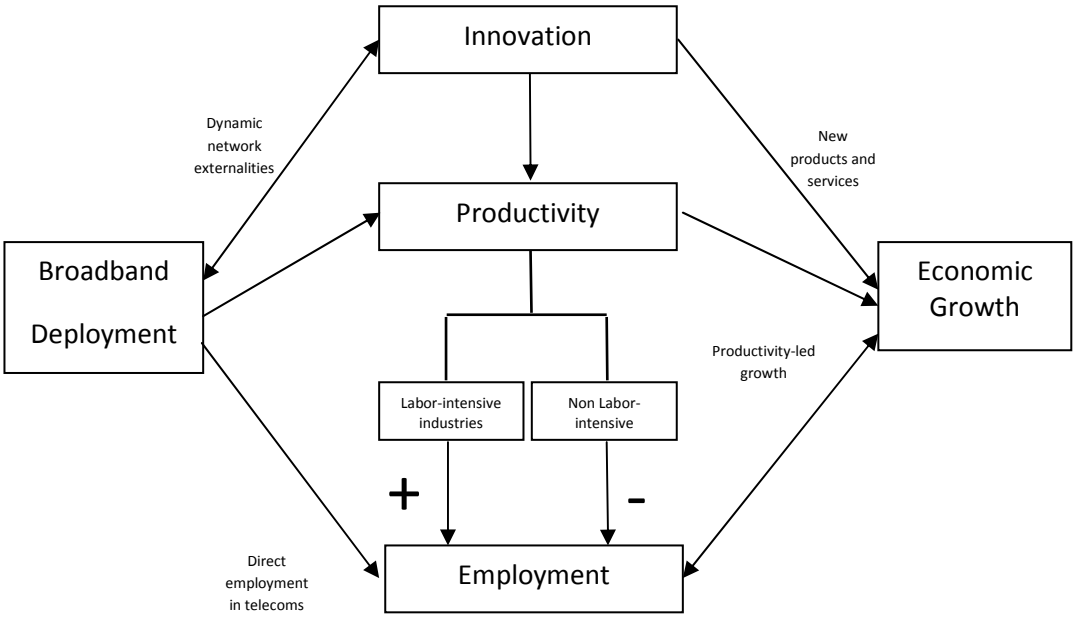

Figure 1: Conceptual model of broadband deployment and economic growth

In broad outline, we begin by discussing the literature on telecommunications and economic growth. We then discuss the "intermediate variables" in this relationship, namely innovation, productivity and employment generation. First, we trace the links between broadband deployment and innovation, defining innovation broadly to cover all forms of new information production, including not only new products and services developed by firms, but also "commons-based peer production" (Benkler, 2006), user generated content and distributed computing projects. We then turn to the second intermediate variable, productivity. The literature on innovation and productivity is discussed, and the relationship of both to economic growth. We then turn to an analysis of the impact of productivity on employment, focusing not only on direct creation of jobs through infrastructure projects, but also indirect impacts through broadband's influence on the overall economy. Whereas the consensus in the literature is that productivity contributes to job growth overall, the sectoral impact is more complicated: some industrial sectors may lose jobs as a result of productivity growth, even though the long-term effect is to

stimulate the operational efficiency of these sectors and contribute to the creation of a better-skilled, and better-paid workforce.

A consensus in the literature on broadband, innovation, and productivity is that organizational structure, business models and operational procedures have to evolve apace with technology in order to capture the full benefits of new technology. New innovations in e-business are as important as broadband access or ICT to enable small businesses to compete effectively in the information economy. So next we discuss the specific ways in which small businesses use ICTs and broadband to deploy e-commerce. We conclude with policy recommendations, based on a review of small business provisions in the national broadband policies of the United States's major industrial competitors.

4. Broadband and economic growth

The close connection between telecommunications deployment and economic development has been long recognized in the economics literature. Jipp's (1963) short article was the pioneering work in this area of research, which correlated the telephone density in a country with the per capita Gross Domestic Product (GDP) and found a positive relationship. Others have built on this hypothesis in later years (Hardy, 1980; Duch, 1991, see Chap. 4; Saunders, Warford & Wellenius, 1994). Telecommunications acts as a substitute for other production inputs, improves productivity, reduces transaction costs, and increases the size of markets, and thus contributes to economic growth. Growth in turn makes more investment capital available for telecommunications development and also contributes to demand by increasing household income. Several econometric studies of network penetration have used economic growth (percentage change in GDP) to predict teledensity, and vice versa. Early studies include Foreman-Peck (1985) and Wallsten (2001). Others use variations of GDP or GDP per capita: for example, statewide average personal disposable income (Albery, 1995).

While it is now recognized that some of these early studies suffered from simultaneity bias and spurious correlation in arguing for a *causal* connection between the telecommunications deployment and economic growth (Koutroumpis, 2009), more recent studies have utilized a number of econometric techniques to eliminate many of these problems (Madden & Savage,

1998; Datta & Agarwal, 2004; Czernich et al., 2009; Kolko, 2010). For example, Cronin et al. (1991, 1993) showed that it is possible to establish causality between appropriately lagged economic growth and telecommunication penetration variables. In other words, these studies show that telecommunications deployment in preceding periods leads to higher economic growth in the current period and vice versa. The presence of a correlation between telecommunications deployment and economic growth is now taken virtually for granted.

Whereas previous research focused on the general correlation between economic growth and telecommunications usage in general, more recent work is focusing specifically on the impact of broadband. In the sections below, we disaggregate the impacts under three headings: broadband and innovation; innovation and productivity; and productivity and employment.

4.1 Broadband deployment and firm innovation

In this section we discuss whether broadband deployment contributes to fostering innovation and consequently to economic growth, and if so, to what extent small and medium businesses take part in this dynamic. The role of innovation in economic growth has been recognized at least since the work of Robert Solow (1956), who posited that technological change progresses at a steady state exogenously to the economy: this is the exogenous growth model. Others have put forward the influential endogenous growth model, in which systemic incentives lead firms to invest in research and development leading to innovation and technological change (Romer, 1990). According to both approaches, a critical input into economic growth is the rate of technical change, dependent in turn on the levels of research and development expenditures and knowledge accumulation.

Though all firms are influenced by technological change as in the exogenous growth models or invest in innovations themselves as in endogenous growth, there are differences in innovativeness between small and large firms. On one hand, small firms have relatively less investible capital for R&D, and less ability to withstand the risk inherent in large expenditures with uncertain outcomes. But small firms are also likely to be more motivated by the potential of innovations to create new markets, and to afford them opportunity for market entry against entrenched competitors. On the other hand, large firms by definition are more vested in existing

processes, products and technologies, and have less incentive to develop new products, unless they can be assured of relatively risk-free returns on their R&D expenditures due to the availability of captive markets. Thus large and small firms may respond to different incentives in pursuing innovation (Winter, 1984). Whereas small firms are more likely to innovate in environments where market entry is facilitated by new technologies, large firms tend to be more innovative in highly concentrated industries. Acs and Audretsch (1988) found some support for these propositions using data on innovation in small and large firms classified by the 2-digit NAICS code. Though large firms tended to produce more innovations in total, the number of innovations per capita of personnel was higher in smaller firms. The total number of innovations in an industry was negatively related to market concentration, but large firms tended to be more innovative to the degree they were able to dominate an industry: evidently in concentrated industries, the increased innovativeness of dominant large firms was not enough to offset the absence of highly innovative smaller new entrants.

Many scholars have made an explicit connection between broadband and the ability of firms to innovate (Bar & Riis, 2000; Czernich et al., 2009; Brynjolfsson & Saunders, 2010; Benkler, 2006). Czernich et al. (2009) write that in addition to enabling decentralized information processing, "the emergence of telecommunications infrastructure for voice telephony, high-speed internet enables the emergence of new business and firm-cooperation models that rely on the spatial exchange of large batches of information, which fosters competition and innovation processes" (p. 4). Brynjolfsson & Saunders (2010) write at length about the new business models made possible through the availability of broadband (see Chap. 6, Incentives for Innovation).

One phenomenon that is drawing increasing attention of scholars is that in the broadband environment, "innovation" need not be carried on within the locus of the firm but can be a characteristic of the network itself. Bar and Riis (2000) make an interesting distinction between static and dynamic network externalities, based on a conceptualization of network subscribers as creators of content, i.e. innovators. They characterize the traditional conceptualization of network externalities as "static" because the additional benefit of adding a new user is based solely on network size. The dynamic conceptualization is based upon the dual characterization of network subscribers as not just consumers but producers of information, applications and services. For example, a florist might use a broadband connection to create an online sales

presence. A sophisticated user might contribute a freeware utility, while all users can potentially contribute content. The possibility of increased contributions from an enlarged user base feeds into the further development of the network in terms of technological sophistication, product/service variety and intensity of use, not just enlargement of the network in size.

If firm innovation is at the heart of Bar and Riis's conceptualization of dynamic network externalities, Benkler (2006) focuses on a new model of information production and distribution which he terms the "commons-based peer production" (p. 60). This new form of organization is based on open participation in which any person has "the freedom to interact with resources and projects without seeking anyone's permission" (p. 62), and where the participants interact as peers, in "production systems … (that) depend on individual action that is self-selected and decentralized, rather than hierarchically assigned" (p. 62). These networks are decentralized, in the sense that "the actions of many agents cohere and are effective despite the fact that they do not rely on reducing the number of people whose will counts to direct effective action" (p. 62). Benkler cites many instances of commons-based peer production, including free/open source software, online collaborative knowledge databases such as Wikipedia, and multiuser interactive environments like Second Life. Whereas commons-based peer production will generate the dynamic network externalities postulated by Bar and Riis (2000), it may be pointed out that proprietary innovations (in which a firm innovates a network good while retaining control over its distribution and use) will still generate dynamic network externalities while not fulfilling Benkler's "commons-based" assumption.

The examples of commons-based peer production cited by Benkler and quoted in the above paragraph involve active production of programmable intelligence by relatively well-informed users. But there are other examples of environments where less sophisticated users can still create value for themselves and others by contributing content that others can then access. Examples are peer-to-peer music sharing sites and social networking sites such as Facebook. These applications generate network externalities, in the sense that the increased availability of content (downloadable music, personal profiles) attracts new users, while new users increase the availability of content.

Finally, at the lowest level of user involvement are distributed computing projects (Benkler, 2006, p. 83) requiring shared use of computational resources to process massive amounts of data,

such as the Search for Extra-Terrestrial Intelligence (SETI) or the genome@home project. The innovativeness of these projects lies in their ability to find previously undetectable patterns in the data, made possible because of the availability of large-scale telecommunications networks and computers.

Thus, innovations in the broadband environment can arise from a variety of applications under different conditions and production parameters, and requiring different levels of user expertise and participation: within the firm; in user communities at different levels of participativeness; and from the hardware of the network itself. But all these forms of innovation require a system architecture that permits and encourages the free flow of information. The full scope of dynamic network externalities can be realized only if firms and innovation networks can have unimpeded access to users and participants. Benkler (2006), in his *The Wealth of Networks* argues eloquently in favor of autonomy: "The emergence of the networked information economy as described in this book depends on the continued existence of an open transport network connecting general-purpose computers. It therefore also depends on the failure of the efforts to restructure the network on the model of the proprietary networks connecting terminals with sufficiently controlled capabilities to be predictable and well behaved from the perspective of incumbent production models" (p. 397).

4.2 Broadband deployment and productivity

In distinction to the impact of broadband as a facilitator of innovation, it also has an influence on the day-to-day operations and processes of firms. Information and communication technologies (ICTs) and telecommunications have long been recognized as a complement and substitute for other production inputs such as transportation and labor, and increases in ICT and telecommunications use have been widely expected to improve operational efficiencies and productivity gains within firms (Shideler, Badasyan & Taylor, 2007).

Despite a wealth of anecdotal information, up until the mid-1990s, empirical evidence of productivity impacts was hard to locate in the literature, resulting in what has been labeled the "productivity paradox" (Brynjolfsson, 2003; Crandall, Lehr & Litan, 2007). According to the economist Robert Solow, "You can see the computer age everywhere but in the productivity

statistics" (quoted in Brynjolfsson & Saunders, 2010, p. 41). Another version of the same paradox is labeled "Baumol's disease" (Triplett & Bosworth, 2003), after a paper in which the economist William Baumol argued that service industries are less likely than manufacturing industries to demonstrate ICT-related productivity improvements (Baumol, 1967).

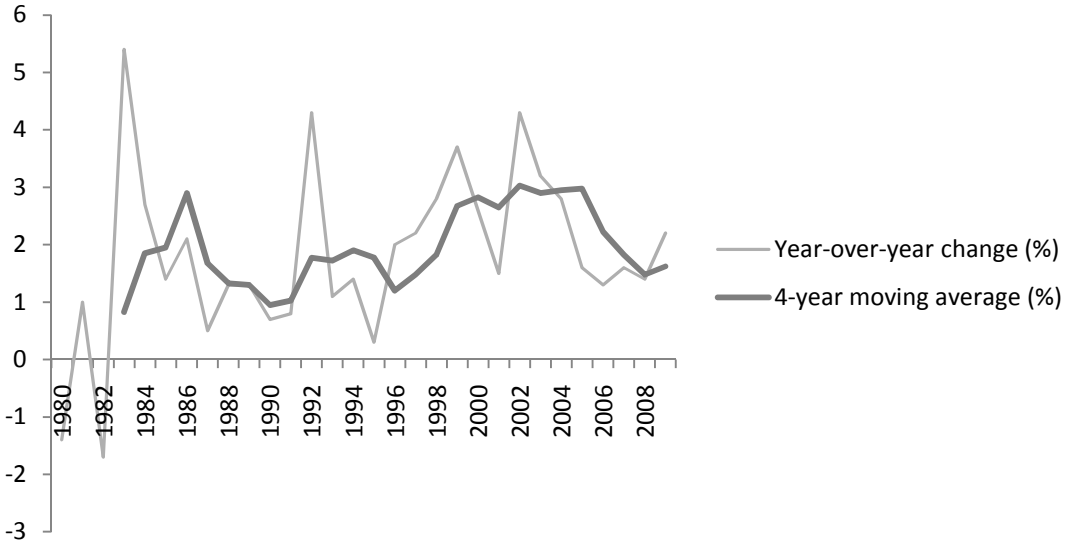

Figure 2:

Annual change in non-farm business productivity (output per hour), 1980-2009

Source: Bureau of Labor Statistics

Figure 2 compiled from Bureau of Labor Statistics data provides some corroboration. The thin line represents annual percentage increases in output per hour in the non-farm business sector in the United States over 1980-2009; it may be seen that there are large variations year-over-year in the data. To smooth these out, a 4-year moving average was also computed, the bold line. Setting aside a peak in the mid-1980s, a steady increase may be noted from the 1990 to 2005, followed by a decline. While this period coincided with strong growth in broadband deployment, the correlation is more tentative than what many scholars expect to see.

Brynjolfsson and Saunders (2010) offer several hypotheses to explain the productivity paradox, the lack of empirical evidence for productivity increases due to information technology. First, echoing Griliches (1994, 1992), they argue that ICT inputs and outputs are hard to measure. Due to Moore's law, the capabilities of ICT have increased exponentially, even as the prices have come down; moreover, multiple overlapping generations of technology sometimes coexist in the same market. Therefore, inputs denominated at purchase price do not give a clear idea about

their actual value to users. Similarly outputs too are difficult to value accurately. As Brynjolfsson and Saunders point out, the stock market value of many IT companies is many multiples of the value of their tangible assets, because of the added valuation placed on their intangible assets such as patents and trademarks, business processes, human resources etc. This hypothesis also offers an explanation for the "Baumol's disease" mentioned in the previous paragraph—ICT-related productivity improvements are more difficult to demonstrate in service industries due to the intangible nature of many service outputs. Among others, Fornefeld et al. (2008) too have identified measurement issues as an explanation for the productivity paradox.

Brynjolfsson and Saunders' (2010) second hypothesis to explain the productivity paradox is the inaccurate valuation of consumer surplus resulting from the use of ICT outputs. Many ICT applications such as Google searches or Hulu video streams are not currently monetized. Many other ICT applications make day-to-day activities easier, healthier or more comfortable: but the value of these benefits is not captured by productivity statistics that remain narrowly focused on the prices charged for ICT goods. For example, Song, Orazem and Singh (2006) found that subscribers are more likely to telecommute in urban areas where there is better availability of broadband connections. Clearly, telecommuting is seen as advantageous by many consumers, but this increased consumer benefit is not factored into the calculus of broadband deployment. This same argument has been made in a different form by Crandall and Jackson (2007) too. "It is possible that current estimates of the demand for broadband underestimate the future demand for broadband because they are based on inferences drawn from the current demand for the service" (p. 22). They argue that consumers and producers have often underestimated the demand for new services; for broadband, this may be even more so, since new broadband application and services are being added, which will presumably make the broadband access more useful to consumers.

Third, Brynjolfsson and Saunders (2010) argue that ICT inputs by themselves do not result in productivity improvements unless accompanied by organizational changes. Citing the work of Milgrom and Roberts (1990), they argue that firms that are better able to identify and exploit "systems of complementarities" between technologies and business practices are more likely to experience improvements in productivity. They cite several case studies to illustrate these complementarities: for example, one firm that instituted a Total Quality Management (TQM) in its newly-computerized workplace also implemented a profit-sharing plan to incentivize workers

to utilize the system better (see pp. 66-74). The lack of evidence for ICT-linked changes in productivity is sometimes because firms/industries/nations do not make the required changes in organizational structure or procedures. For instance, Dewan and Kraemer (2000) found that IT investments in developed countries produced increases in productivity, whereas in developing countries they did not: they argue that this finding is partially explained by the lack of human capital and organizational change, and partially by the lack of complementary physical infrastructures.

It is possible to add to Brynjolfsson and Saunders's list of potential problems in empirically verifying productivity impacts, by focusing on the inadequacy of data on broadband deployment. In the United States, data on broadband lines of service are available at the state level, or on broadband *availability* down to the ZIP-code level.[2] The former is at too high a level of aggregation to enable analysis of local variations, and the latter has been severely criticized since it tends to overstate the extent to which the average consumer is able to access competing service providers. Also, availability does not imply that consumers actually subscribe and use broadband. Nevertheless, the FCC's ZIP-code level broadband availability data is widely used in econometric analyses (Crandall, Lehr and Litan, 2005; Gillett et al., 2006; Kolko, 2010) due to the lack of reasonable alternatives. Kolko (2010) defends this choice based on his argument that service providers are franchised to serve entire areas "sometimes directly through public provision and sometimes indirectly through subsidization or regulation," (p. 14) and their availability in one location implies their availability throughout the area. He also points to his analysis in a yet-to-be-published paper that shows a "monotonic but non-linear relationship between the number of broadband providers and the extent of broadband availability in the ZIP code" (Technical Appendix, p.12).

Despite the problems in productivity measurements discussed above, evidence is mounting since 1995 that broadband and ICT usage does have an impact on productivity. Brynjolfsson and Saunders (2010) track productivity statistics in the United States over time, and find significant productivity gains from 1995 to 2000, followed by a brief hiatus, and a second accelerated wave

[2] To measure broadband availability, the FCC counts the number of ISPs with at least one subscriber within each ZIP-code (Gillett et al., 2006).

in 2001-03, when productivity growth increased to an annual rate of about 3.6 percent.[3] They differentiate between the productivity growth of the first wave (1995-2000) and the second (2001-03): whereas the first wave was led by ICT investments by information technology producers, the second wave was the result of non-IT related businesses innovating new products and services based on the installed base of ICT resources. They opine that the later wave of productivity improvement is the result of a "reap and harvest story" (p. 44) — the full effect of productivity investments and organizational improvements made in the 1990s is now being felt. Similarly, Triplett and Bosworth (2003) reported based on more recent data that "Baumol's disease" too has been cured: the service industries, long laggards with regard to productivity increases, have shown the same rate of productivity growth as the general economy since 1995.

Within the broader field of research on ICTs and productivity, broadband is beginning to occupy an increasingly important space. Broadband has been characterized as a General Purpose Technology (GPT) (Majumdar, Carare, & Chang, 2009). Bresnahan and Trajtenberg (1995), who coined the term 'GPT' defined it as a technology "characterized by the potential for pervasive use in a wide range of sectors and by their technological dynamism" (p. 84). GPTs are "enabling technologies" to the extent that they allow applications in many different business sectors; moreover, feedback loops are present with respect to applications, in the sense that applications in one sector often result in benefits to the GPT itself, which Bresnahan and Trajtenberg (1995) characterize as 'vertical externalities,' or to other industrial sectors, which are labeled 'horizontal externalities.' Thus, new applications of the GPT in a specific sector have industry-wide benefits. But the presence of these externalities also creates a gap between private benefits and the optimum social benefit: firms will invest in creating new applications only if enough of the social surplus thus created can be recaptured by the firm that developed the application.

The economic benefits of broadband deployment have been estimated by a number of investigators. Crandall and Jackson (2001) estimated that by 2006, broadband deployment in the U.S. would contribute an increase of $500 billion in gross domestic product. Using panel data from the major local exchange carriers in the United States from 1995 to 2000, Majumdar, Carare and Chang (2009) found that broadband deployment was positively and significantly

[3] Our own analysis of the output per hour productivity data does not reveal these distinct periods (see Figure 2). To be fair, Brynjolfsson and Saunders (2010) do not base their assessment only on the quantitative data but on interviews, case studies and other contextual information.

associated with the productivity levels of the deploying firms. A study conducted for the European Commission (Fornefeld, 2008) implemented a two-step process for calculating the contribution of broadband to productivity: in the first step, changes in productivity consequent to broadband are identified at the company level; and in the second step, a national level indicator is obtained by multiplying firm-level productivity change by the indicator of online service adoption in each country. At the company level, Fornefeld et al. found that the productivity improvement is dependent on the type of activity and the level of interaction with outside entities; for a knowledge-intensive industry with intense external interactions (for example, e-commerce), the productivity gain could be as much as 20 percent.[4] At the aggregated level, the annual productivity gain for the EU sector (EU27) is calculated to be 0.29 percent (Table 17, p. 85).[5] Annual productivity gains are higher in more advanced knowledge societies (0.41 percent) than in less developed knowledge societies (0.16 percent)—the development gap widens as a result of ICT adoption in business. This supports the findings of Dewan and Kraemer (2000) cited above, about the differences in productivity gains between developed and developing nations.

Of interest is Fornefeld et al.'s (2008) calculation of the relative productivity gains between small and large firms. The estimates state that annual productivity growth in small firms (with less than 50 employees) is likely to be 0.29 percent, whereas it is expected to be 0.44 percent for large firms (with more than 250 employees).[6] The difference is not due to any small-firm disadvantage at the firm level, where the authors state that "there is no consensus on the question of whether or not the size of a company has an influence on the impact of e-business on

[4] Fornefeld (2008) assumed that productivity gains would be linearly related to the information intensity of the firms' activities. For example, in the manufacturing sector with an information intensity of 25 percent, the productivity gain is assumed to be a quarter of the maximal rate; therefore equal to 5 percent.

[5] To arrive at the aggregated estimates, Forenfeld et al. (2008) multiplied the maximal productivity gain (20 percent) by the information intensity of each of three sectors: manufacturing (25%), services (50%) and knowledge-intensive business services (KIBS) (100%) to arrive at a productivity gain estimate in each sector. These numbers were then multiplied by the adoption rate for online services in each sector respectively. An aggregated estimate was then calculated as a weighted average using the share of country or European Union market accounted for by each sector as the weight. The methodology can thus be considered only as a reasonable "back of the envelope" estimation of the productivity gain resulting from broadband adoption.

[6] By implication (though) it is not reported in the tables, the productivity growth in medium size firms is likely to be less than 0.29 percent, since the overall EU27 average (including small, medium and large businesses) is also equal to 0.29 percent.

productivity" (p. 81). Rather, the difference is because the percentage of small firms that have adopted e-business technologies (21.4 percent) was still significantly below e-business use in large companies (37.5 percent). The authors reported that this gap was growing over the study period (2004-06).

Thus, one of the consequences of the deployment of broadband and ICTs seems to be to widen the economic gap between highly advanced and less advanced knowledge societies, and between large and small firms. However, this is not due to any intrinsic disadvantage of the latter, but only due to the differences in broadband/ICT adoption rates, easily remediable through the appropriate incentives.

4.3 Broadband deployment and employment

Some recent research reports have found evidence for the influence of broadband deployment on employment. Singer and West (2010), commissioned by the industry group Fiber-To-The-Home North America, found that if current-generation broadband access[7] were made available to all households in the United States by 2015 under a national broadband plan, it would add $38 billion in output to annual GDP, and create almost 40,000 jobs per year. If instead, next-generation broadband networks[8] were deployed to 80 percent of homes by 2015, the total incremental gains would be $198 billion in annual output, and more than 250,000 jobs per year. Singer and West estimate these two alternative plans to cost additional investments of $14 billion and $63 billion beyond the projected investments expected without a national broadband plan.[9] In arriving at these estimates, Singer and West calculated both direct and indirect impacts. To calculate the direct impact, they used the RIMS II methodology developed by the Bureau of

[7] "Current generation broadband access" is defined as (3 megabits per second (Mbps) downstream, 768 kilobits per second (Kbps) upstream) (Singer & West, 2010).

[8] Next generation broadband networks are expected to deliver peak-period speeds of at least 50 Mbps downstream and 20 Mbps upstream (Singer & West, 2010).

[9] "Normal" capital expenditures over the 5-year period (without any national broadband plan) are expected to be $37 billion in current generation networks, and $11 billion in next generation networks. A national broadband plan to extend current generation broadband networks to all households is expected to cost $51 billion (an increment over projections of $14 billion); a target of 80 percent penetration for next generation networks will cost a total capital expenditure of $74 billion (an increment of $63 billion over projections) (Singer & West, 2010).

Economic Analysis to estimate the number of jobs that will be created through increased capital investments in equipment, and through increased employment for installation, etc. Singer and West expect indirect effects to be generated through increased productivity as a consequence of broadband deployment, and as a result of increased demand for other goods and services. To estimate this, they relied on Crandall, Lehr and Litan's (2005) finding that a 1 percent increase in broadband penetration will increase private, nonfarm employment by 293,200 jobs annually.

Singer and West's (2010) mostly optimistic findings are not uniformly supported by other studies. Some (eg. Fornefeld, 2008) argue that ICT-enabled productivity gains may actually lead to job losses in the short term. "A company improves its processes to increase its employees' efficiency. After the change has been made, the company is able to produce more with the same personnel or produce the same with fewer personnel" (p. 96). However, over the long term, as the benefits of process improvements percolate through the economy, the demand for labor may increase. Others, for example Crandall, Lehr and Litan (2005) and Shideler, Badasyan and Taylor (2007) have found that broadband deployment results in overall employment growth, but the impact on specific industrial sectors varies.

Crandall, Lehr and Litan's (2005) result was based on analysis of state-level data for three years, 2003-2005. Using broadband penetration per capita as the main independent variable, and with a number of controls in place (state tax levels, union membership, education level, hourly wages, mean temperature), Crandall et al. estimated the year-over-year growth rates in private nonfarm employment and state gross domestic product. The results for employment were positive and significant, while those for GDP were positive but not significant. Interestingly, Crandall, Lehr and Litan also reported results disaggregated by industry sectors (2-digit SIC codes). Broadband penetration affected employment growth positively and significantly for manufacturing; finance and insurance; educational services; healthcare and social assistance; and accommodation and food services. The effect on GDP growth was positive and significant for finance and insurance; real estate rental and leasing; administrative support, waste management and remedial services; educational services; and other services (SIC code 81). Only for finance and insurance and educational services was the effect positive and significant for both employment growth and GDP growth. Also, interestingly, coefficients were *negative* for a few industrial sectors: management of companies and enterprises; and arts, entertainment and recreation.

Similarly complex relationships between broadband deployment and employment growth and GDP growth were reported by Shideler, Badasyan and Taylor (2007). Unlike other studies that use data at the state level, Shideler et al. used census-block level data aggregated to the county level, generated from the Connect Kentucky program that sought to encourage full broadband deployment in Kentucky by the year 2007: their data therefore was limited to one state. Their regressions examined the impact of broadband penetration on employment growth in 20 industrial sectors (by 2-digit NAICS codes). They found that broadband had a positive and significant impact on total employment (across all sectors) and on employment in mining; construction; information; and administrative support, waste management and remedial services. Positive and significant coefficients were observed in some models (but not all) for arts, entertainment and recreation; real estate rental and leasing; and other services. Positive but non-significant coefficients were observed for retail trade; professional, scientific and technical services; and healthcare and social assistance. *Negative* and significant coefficients were observed for only one industrial sector, accommodation and food services.

When Shideler et al.'s (2007) results are compared to those of Crandall, Lehr and Litan (2005), some interesting points may be made. First, though the sectors affected and the directions of the effects are different in the two studies, it may be seen that broadband deployment affects different industrial sectors differently. At least in some limited cases, there is potential for job losses as well. Shideler et al. speculate that this may be the result of "substituting broadband technologies for less productive workers" (p. 117). Another explanation they put forward is that, in sectors such as travel, accommodations and food service, broadband has allowed the creation of new online services such as hotel bookings and air reservations, which replace traditional in-person services. Broadband also makes it possible to replace local jobs with identical services provided by personnel from across the county, state or even national borders (eg. call centers or CRM). While the net impact of broadband on job creation is likely to be positive, as both Shideler, Badasyan and Taylor (2007) and Crandall, Lehr and Litan (2005) found, the specific impact might be a redistribution of some jobs between industrial sectors, or sometimes the loss of jobs to distant locations.

Fornefeld et al. (2006) discuss the different processes by which firms may realize efficiencies through optimizing the locus of their production activities. Outsourcing occurs when a company

entrusts part of its production or distribution activities to another company, usually but not always based in the same geographical location. The incentives to seek maximal cost efficiencies by going farther and farther afield may be increased because of the availability of broadband. Off-shoring thus involves a company's decision to move some activity to another country with a labor cost advantage. The off-shore facility may still be owned by the parent company, in which the operation is off-shored but not outsourced. Business-process outsourcing (BPO) involves the outsourcing of some of a company's knowledge-intensive activities, such as CRM, legal services, or accounting to another company. Originally intended to achieve cost advantages, BPO activities are now pursued to secure competencies for a company that it cannot or does not want, to make available internally. All these processes are strongly related to the availability of high-quality broadband connectivity and advanced telecommunications services. Whereas firms stand to realize productivity gains from these processes, the impact on job creation is not always positive.

Thus, the consensus from the studies on productivity and employment seems to be that the effect of productivity growth on job creation is a function of the nature of a firm's economic activity, as well as local economic conditions. However, Shideler, Badasyan and Taylor (2007) indicate that even if an industrial sector were to lose jobs as a result of productivity gains, wage rates are likely to improve for the remaining workers. The long run prospects are that that industrial sector will emerge with better-educated and higher paid workers, and a more knowledge-intensive production mode.

One other conclusion from Shideler, Badasyan and Taylor (2007) is worthy of further discussion. In addition to a broadband deployment variable,[10] they also included the squared deployment variable in their regression models. The coefficient on this squared variable was negative in the models, indicating diminishing effects of broadband deployment once a certain threshold of availability is reached. Their conclusion is that "investment in broadband infrastructure achieves its greatest return, measured by employment growth, in communities that have average saturation

[10] Broadband availability was measured by computing the area of a county for which broadband service is available using Connect Kentucky's GIS database. Broadband service availability from any viable technology such as digital subscriber lines (DSL), cable modem service, and fixed wireless networks, is measured at the point of service availability (i.e., at the location of infrastructure placement). Coverage area is then aggregated to the county level by Census block groups. The ratio of the coverage area to total area of the county was computed, and used as the dependent variable, "saturation rate" (Shideler, Badasyan & Taylor, 2007).

levels" (p. 117). This may be interpreted as one more argument in favor of balancing network deployment between communities, with a special policy focus on remedying the disadvantage of rural or high-poverty urban communities.

5. Small businesses and broadband access and usage

From the discussion so far, it is evident that broadband adoption is an indispensible tool for small businesses to compete effectively in the new economy. At the same time, small businesses face significant constraints in accessing broadband and utilizing it effectively; Arbore and Ordanini (2006) identify three such constraints. First, the "ICT absorptive capacity, namely the ability to exploit ICT potentials" (p. 84) may vary according to firm size. Second, small business firms are much more geographically dispersed than larger firms; they may face difficulties in accessing the physical infrastructure, locating appropriate service providers or consultants. Third, small firms may not find it viable to develop in-house ICT capabilities due to the smaller scale of their operations; the pressure is therefore greater to outsource these functions. International studies have found similar results: an OECD report found that SMEs benefit from ICT access and use, but also that they face several barriers that slow down their ICT adoption (OECD, 2004). As a result, small businesses are traditionally slower than large ones in adopting new technologies.

A national mail survey of 458 small businesses (Pociask, 2004) found that 27 percent of small businesses do not subscribe to any Internet access service. Dialup services were used by 38 percent of small businesses, with cable modems (26%), DSL (21%), satellite (4%), T-1 (4%) and wireless broadband services (3%) making up the rest. However, as can be seen from adding up the percentages, many small businesses subscribe to more than one access technology. Eliminating double counting, only 48 percent of all small businesses had access to broadband services, while 25 percent had only dial-up. Only 3.3 percent of businesses had access to voice-over-internet protocol services.

While these statistics on broadband access have definitely changed since this study was conducted, it is Pociask's (2004) expenditure data that reveals the importance that small businesses place on telecommunications and internet access. The survey found that small businesses spent an average of $543 per month, 89% of which were for local, long distance and

wireless telephone services. Small businesses in the finance and insurance sector spent the most ($1803 per month), with manufacturing ($724), wholesale trade ($786), transportation and warehousing ($701), and real estate, rentals and leasing ($741) reporting above average spending. Telecommunications expenditures were lowest for farming and agriculture ($197), retail trade ($383), and accommodation and food services ($317).

The survey also found that telecommunications spending was relatively inelastic with respect to firm size, with the smallest businesses spending disproportionately more on telecommunications services. For example, firms with less than 5 employees spent approximately $83 per employee for local and long distance telephone service, while firms with 5-9 employees spend $50 per employee, and firms with 10-499 employees spend $21 per employee (Pociask, 2004).

Just as important as broadband and ICTs are to small business success, are innovative business models, operating procedures and organizational structures made possible through these technologies. E-commerce and e-business have been embraced by the SME sector to achieve production efficiencies, reduce marketing expenditures, develop and deploy new products and services, and seek out new markets. But not all enterprises have been equally adept in embracing these new possibilities. The next section discusses the potential that e-commerce and e-business presents to SMEs and the problems that some firms face in adopting them.

6. eCommerce and eBusiness

To fully appreciate the importance of broadband to SMEs, it is necessary to understand the concepts of both eCommerce and eBusiness. eBusiness includes online transactions, but is more than just e-commerce. eCommerce is about selling and buying goods and services online. eBusiness is a state of mind. It is a complete rethinking of the nature of the enterprise. It involves business processes spanning the entire value chain: electronic purchasing and supply chain management, processing orders electronically, handling customer service, and cooperating with business partners. E-business software solutions allow the integration of intra and inter firm business processes. E-business can be conducted using the Web, the Internet, intranets, extranets, or some combination of these. The eBusiness model involves the transformation of key business

processes to include key stakeholders and integrate them with Internet technologies. eBusiness extends to all Internet based interactions with business partners, suppliers. These online interactions are aimed at improving or transforming business processes and efficiency (Austrade, 2010). It is the adoption of the eBusiness model that can drive renewed SME growth, *but only if* they have access to affordable, fast, reliable broadband services.

6.1 Benefits to SMEs of eBusiness

The eBusiness model opens the door to new services, new applications and new business models. It can leverage the power of the Internet to reduce costs, increase productivity growth and increase revenue. The adoption of the eBusiness model takes full advantage of the capabilities of the Internet, integrating them into the core operations of the business. In general, even without reference to the use of the "cloud," eBusiness offers the potential to both reduce costs and increase revenues (which are made even more accessible, useful and productive in the "cloud" context). Costs can be reduced through better knowledge sharing, on-line collaboration, videoconferencing (saving travel); improved accuracy, quality and time required for updating and delivering information on products and/or services; new distribution channels via the electronic delivery of some products and services, for example, product design collaboration, publications, software, translation services, banking, etc.; and reducing routine administrative tasks (invoices and order records) freeing staff to focus on more strategic activities. At the same time, revenues may be increased through faster access to customers and suppliers; improved ease, speed and immediacy of customer ordering; access for customers to catalogues and prices - 24 hours x 7 days; quicker and easier response to new business opportunities; enhanced market, industry or competitor intelligence acquired through information gathering and research activities; and expansion of customer base and growth in export opportunities.

Many of these benefits are available even to those who do not wish to directly sell their products or services on-line, in terms of better communications, more efficient operations, greater visibility and promotion. In the past, these benefits have been available only to those with the revenues, technical skills, technology and know-how to implement them. But now, using the "cloud", they are accessible to a far wider range of SMEs.

6.2 SMEs and the "Cloud"

The "Cloud" has become widely used shorthand for the provision of a wide array of Internet facilities and services by third-parties at locations away from the user. It can provide shared virtual infrastructure, platforms, software and computing capacity on-demand. Major corporations such as Google, Amazon, Apple, IBM and others are currently offering a wide range of hosted "cloud" services. There are significant advantages to the use of "cloud" computing compared to a company's providing them internally. The cloud provides technology and applications that can be accessed from anywhere with Internet access, on any kind of device. Most, however, require broadband for full utilization and benefits. These advantages are relatively greater for SMEs, which otherwise may lack the technical and financial resources of large companies.

Users can quickly and inexpensively get access to virtual infrastructure resources. The capital which would otherwise have been spent on purchase of such resources is converted from a capital expenditure to an operational expenditure, lowering barriers to entry. This helps control an array of costs (fewer IT skills are required in-house, maintenance costs are reduced and support improved since changes and updates reach the clients instantly, often at no additional charge). The need for regular new software purchases is reduced or eliminated.

The costs of the resources are shared across a pool of users, allowing for centralization of infrastructure in locations with lower costs, and high peak load capacity (individual users do not have to engineer for highest possible levels). The reliability is improved through the use of redundant sites. Scalability is offered through dynamic provisioning of resources. Security is improved because providers are able to devote resources to solving security issues that many customers could not afford.

According to the CIO of Appirio, a cloud services solutions provider, significant savings have been seen from the implementation of these capabilities, especially at the platform and service application levels. At the platform level, there are significant savings because you no longer need to run a datacenter or maintain infrastructure software. Within his company's 150+ customers, they have seen savings of over 30% on operating costs and 2-3x improvements in

time-to-market when building on cloud platforms. In terms of ongoing cost/productivity improvements, they estimate a 50-75% reduction in the time and effort it takes to add new products.

With respect to applications services, the benefits are multiplied further, adding to the platform benefits a substantial reduction in maintenance and costly (to implement) upgrades every 3-5 years. The savings, he says, have been well documented: 25-40 percent in terms of implementation costs and operating cost savings of 50 percent or more (Narasimhan, 2009). Although the author appears to have a commercial interest in promoting his cloud services, substantial savings seem quite plausible.

6.3 Benefits to SMEs of Using the "Cloud"

There are potential benefits from using cloud applications to implement e-business, and specific applications for different uses. The general benefits include time saved dealing with technology issues, allowing staff to focus on core competencies. Many of the same functions can be performed faster and more efficiently. Costs are reduced compared to leased T1 circuits, while further cost reductions can be achieved based on a "license" vs. "purchase" model. The "cloud" allows more flexible purchasing and use of software. Travel costs can be reduced through use of teleconferencing. Contacts with national and global supply chain networks can uncover new opportunities. It is easier to provide remote access to support telework. It creates an automatic global presence. Continuous data protection is provided. Greater security is possible due to economies of scale and the ability to afford better security experts. Sites are more resilient against DDOS attacks as companies such as IBM, Google, etc. are better resourced and have greater expertise to defend against them.

At the same time, "Cloud" computing also provides some specialized benefits. Some specific applications that are central to successful implementation of the eBusiness model are almost all facilitated through use of the "cloud". A recent article (*Cloud computing and the tech giants*, 2009) listed some of these specific applications that promise enormous gains to operational efficiency. Unified Communications is an increasingly important enterprise tool bundling and

serving all the company's communications needs. HD videoconferencing depends largely on broadband. Customer management tools including contact management, secure data storage, server management and 24/7 IT support may be sourced from the "Cloud." Vendors have also deployed software packages including enterprise resource planning tools; purchasing, invoicing, accounting, record keeping systems; document management, editing, productivity and project management tools; advanced graphical, audio and video editing capabilities; provision of e-Commerce services such as "shopping carts" and secure servers; and duplication and replication services. Access to these "cloud" services is becoming a critical element of firm competitiveness and efficiency; conversely, lack of access would imply that the SME sector is not able to live up to its full potential.

7. Policies Supporting SME Broadband

It is evident from the discussion above that broadband access, ebusiness, and the emerging systems of "cloud" computing have the potential to multiply the productivity, efficiency and profitability of small scale enterprises. However, some SMEs remain reluctant to avail of broadband services, or initiate or invest in entry into the use of cloud computing due to perceptions (or misperceptions) regarding possible capital investment, fear of complexity, lack of understanding of the potential benefits, and lack of technical resources. Others are willing to test broadband or cloud applications, but do not see it as part of a larger strategy.

According to the FCC, the story of broadband for small businesses is not just one of basic access and adoption. It is also a story of education, which leads to usage. Broadband is a tool, and like any tool, its utility is predicated on being applied correctly. In the case of broadband, this means allowing businesses to take advantage of new services, new applications and new business models that are only possible in a world of high-speed, reliable connectivity. Large businesses with dedicated IT staffs and broad resources can rise to this opportunity internally, but small businesses often have more pressing concerns. The Commission concludes that to make it as easy as possible, it is necessary to "lay the tools at the SMEs feet". These include counseling, support and developing networks of assistance. It also includes making SMEs key cogs in the federal government's existing small business supply efforts (Vorhaus, 2010).

Beyond that, supportive policy initiatives to accelerate SME use of broadband could include favorable tax treatment, a supportive legal, policy and fiscal environment, development of strategies for sector-wide transformations (as in Europe- see below), the removal of cross-border and inter-jurisdictional barriers, technological neutrality, and standardization and interoperability of facilities. Operationally, the avoidance of the imposition of additional taxes or fees on SME broadband users, and a plan for compensation of SMEs when networks, facilities or services or "clouds" "go down" would be desirable (Vorhaus, 2010).

The international experience with promoting broadband access and use may be of relevance as we examine what policies or combinations of policies are likely to have the most beneficial effects on the small and medium enterprise sector.

8. International Approaches to Promotion of SMEs

Policies that make the connection between the success of small and medium business enterprises (SME) and the development of the Internet have been promoted and implemented in different countries since the introduction of the network that has changed the way businesses operate worldwide. There seems to be international agreement that access to information and communication technologies (ICT) is a key requirement for the success of SMEs. The United Nations Development Program published in 2007 a report on the role of governments in promoting ICT access and use by SMEs. While geared toward the developing world, the report nonetheless can be seen as a general endorsement of pro-active government policies aimed at encouraging access of SMEs to ICTs in order to support their development (UNDP, 2007). The policies cited by the report as worthy of support include: facilitating SME connectivity; using e-procurement techniques to enhance access of SMEs to capital; and make law, policy and regulatory frameworks accessible to SMEs online by encouraging the development of e-government. This latest UN document follows on the heels of an older report supporting the creation of pro SME policies with regards to the development of e-commerce (Kuwayama, 2001).

In different regions of the world, specific policies aimed at enhancing SME connectivity and access have been identified and promoted, under the assumption that SME connectivity will enhance SME productivity and SMEs contribution to the growth of the economy. As Beal (2001) suggests

> "There are many ways in which SMEs have to interact with government, of which taxes is the most obvious example. Payment online, with consequent savings in cost and time, is but one way in which governments can stimulate SME ICT use. Governments can also provide strong incentives for SMEs to go online voluntarily to interact with it. Accessing the wide range of services governments supply, such as export intelligence and SME support services, is one example. An even more powerful tool is the use of e-procurement." (p. 5)

An OECD report tying the development of SMEs to their accessibility to ICTs identifies the barriers SMEs face, barriers that slow down their ICT adoption (OECD, 2004). Among those, the report identifies that: Small businesses are traditionally slower than large ones in adopting new technologies; a growing number of business sectors are increasingly global and dominated by large firms; there is lack of applicability of ICTs for SME needs and as a result there is little incentive to change business practices when the prospects of returns are unclear; there is concern with trusting transactions and with their level of security; differences in regulatory and legal environments limit cross-border ecommerce potential (OECD, 2004, pp. 19-30)

The OECD report goes on to propose key policy recommendations for the adoption of ICTs by SMEs, among them proposing that government should facilitate ICT adoption by SMEs that goes beyond connectivity and promote e-business; encourage broadband rollout using competition mechanisms to lower prices and raise quality; initiate policies that strengthen trust, security, privacy and consumer protection; expand SME usage of online dispute resolution mechanisms; increase the availability of digital content about the public sector; and invest in improving basic ICT skills through education. (p. 6)

Scholars argue at the same time that while the globalizing information society promises global economic growth, it requires an attentive government policy agenda, which focuses, among others, on ensuring the competitive position of SMEs as they are encouraged to take part in the

global market (Fariselli et al., 1999). In the sections below, we examine the experiences of Europe, Asia and Oceania and China in terms of their ICT/broadband policies directed at the small business sector.

8.1 Europe

As early as 1994, the Bangemann Report provided to the European Commission, and which launched European Union policies in the ICT sector, the role of SMEs and the proactive role of governments in ensuring their equitable access to the network were addressed (Bangemann, 1994). While the Bangemann Report as a whole has been both hailed and criticized for its free market approach, with regards to SMEs, it uncharacteristically promotes a pro-active course of action. Under the heading "Markets for Small and Medium Sized Enterprises," the Report states:

> "Though Europe's 12 million SMEs are rightly regarded as the backbone of the European economy, they do need to manage both information and managerial resources better. They need to be linked to easy access, cost-effective networks providing information on production and market openings. The competitiveness of the whole industrial fabric would be sharpened if their relationships with large companies were based on the new technologies. Networked relationships with universities, research institutes and laboratories would boost their prospects even more by helping to remedy chronic R&D deficiencies. Networking will also diminish the isolation of SMEs in Europe's less advantaged regions, helping them to upgrade their products and find wider markets" (p. 10).

The Report then goes further to state that

> "The authority will need to address … a single regulatory framework valid for all operators, which would imply lifting unequal conditions for market access. It would also ensure that conditions for network access and service use be guided by the principles of transparency and non-discrimination, complemented by practical rules for dispute resolution and speedy remedy against abuse dominance." (p. 13)

And adds that

> "Market segments based on the new information infrastructures cannot provide an adequate return on investment without a certain level of demand. In most cases, competition alone will not provide such a mass, or it will provide it too slowly… **It is recommended to promote public awareness. Particular attention should be paid to the small and medium sized business sector…**" (pp. 15-16, bold lettering in the original document)

One policy arena in which the SME sector has been identified as most vulnerable and that has already been identified in the Bangemann Report is the provision of more "effective administration." (p. 32). This in turn includes the replacement of paper-handling with electronic handling, with the result that "small and medium sized enterprises will benefit from participating in trans-European public procurement and from the diffusion of telematic services." Among the "issues to watch," the Report stresses "the need to ensure open access particularly for SMEs". While, as said, the Report as a whole stresses the role of the market in developing the envisioned "information society" and emphasizes that "there will be no need for public subsidies" (p. 35), one area in which "public investment will assume a role" is directing "modest amounts of public money … to support awareness campaigns mainly directed at small and medium sized businesses."

The Bangemann's Report recommendations notwithstanding, it was only in recent years that the European Union has started taking pro-active policy initiatives promoting the role of SMEs in the information economy, recognizing that it is indeed in the midst of an e-economy revolution that requires "policy makers to revisit and reassess a broad number of policies – from research and innovation to entrepreneurship, to ensuring a fully functional internal market in such key areas as financial services" (Vittet-Philippe, 2002, p. 28). In 2005 the European Commission adopted its "Modern SME policy for growth and employment" (cited in Commission for the European Communities [CEC], 2005). The policy set five areas in which specific action needs to be taken: promoting entrepreneurship and skills; improving SME's access to markets; cutting red tape; strengthening dialogue and consultation with SME stakeholders; and improving SMEs growth potential. The latter area called to "address persistent and well-identified market gaps that limit SMEs' **access to finance, research, innovation and Information and Communication**

Technologies (ICT) and hinder their potential to grow" (CEC, 2005, p. 9, bold lettering in original document), and added that "Promoting the take-up of **Information and Communication Technologies (ICT), e-learning and e-business** is a key element in improving SMEs' competitiveness" (CEC, 2005, p. 10, bold lettering in original document). A subsequent explanatory document makes the connection between the proposed levels of access and a direct contribution to "unlocking" SMEs "potential for growth" (CEC, 2007).

In 2006, the European Union's Council called to adopt "Think Small First" as a guideline for future SME policy and in 2007 following an internal acknowledgment that the "modern policy" was bearing fruit, the course was set to pass a pan-European "Small Business Act." In the public consultation leading to the enactment of the Act, the Commission was in particular interested in means by which to promote SMEs access to markets, finance, skills and innovation (Social Economy Europe, 2008). The "Think Small First" report published in September of 2008 outlines the Commission's recommendations for driving an ambitious policy agenda to support SMEs (European Commission, 2008). The report sets 10 principles guiding the policies on both the pan-European and national levels. The principles call among others to "facilitate SMEs' participation in public procurement … [and] access to finance and develop a legal and business environment supportive to timely payments in commercial transactions" (European Commission, 2008, p. 4). In order to facilitate these principles, the Commission invites member states to "set up electronic portals to widen access to information on public procurement opportunities." (European Commission, 2008, p. 15) In addition it asserts that supporting the development of online e-skills and a "career portal" will "enable firms to self assess their e-Skills needs and find out how to develop the careers and qualifications of their staff" (European Commission, 2008). Indeed, the Commission does not only pay lip service to SME development and its correlation to online access but actually operates a portal specifically for the needs of SMEs (http://ec.europa.eu/enterprise/sme/index_en.htm). Among the features on the portal are "on-line tools" designed to provide access to EU laws, policies and initiatives that directly affect SMEs.

The Commission committed to presenting an action plan "to promote the use of interoperable electronic signatures and electronic authentication" (European Commission, 2008, p. 14) within the context of encouraging SMEs' participation in the European market. The report notes that

"SMEs suffer in particular from the lack of skilled labor in the field of new technologies" (European Commission, 2008, p. 15). One first step in this direction is the Commission's review of VAT rules invoicing. The Commission proposed to reduce costs and simplify rules, in particular with regard to small value invoices, mainly in order to benefit SMEs.

The connection between the growth of the SME sector and its reliance and dependence on ICT access and availability for SMEs is an ongoing theme in European policy circles that is still being developed and discussed. Most recently, with the restructuring of the European Union following the entering into force of the Treaty of Lisbon and with the ascension of the Spanish presidency, additional initiatives have been taking place in this area. Among other initiatives, the incoming innovation commissioner has revealed plans to set up a task force to look at how cooperation with the European Investment Bank (EIB) and the European Investment Fund (EIF) could be extended to help involve more SMEs in innovation (Euractiv.com, 2010). In 2007, an association representing the interests of Europe's ICT SME sector was formed. It currently represents some 50,000 ICT SME companies and has been actively lobbying the Spanish presidency to make the centrality of SMEs to the EU economy a cornerstone of this year's economic policies.

The European e-Business Support Network for SMEs (eBSN) was established by the European Commission in response to a high-level political focus on the important role of ICTs in boosting the competitiveness of the overall EU economy. The eBSN aims to encourage SMEs to look into the innovative potential of ICT and e-Business (European Commission, 2010b). The eBSN has confirmed its focus on a new policy trend, namely the Digital Supply Chains approach for eBusiness, i.e. supporting SMEs to develop their eBusiness strategy in full cooperation with their business partners, namely their suppliers, customers, or knowledge providers, along the entire value chain. Emphasis is given to the productive use of ICT by an entire group of enterprises that are interacting in daily business transactions, either within the same sector or between interacting sectors. SMEs do not operate in isolation: they maintain complex business links with business partners, customers and providers, often from different industrial or services sectors and spread all over the world.

According to the eBSN, "a wider and productive use of ICT and e-Business models has the potential to revolutionize business processes and organizations, make them more efficient and boost overall competitiveness. Europe needs to do more to exploit the role of ICTs as a motor for innovation, competitiveness and growth. In fact, investment in ICT is recognized as a key factor for firms' competitiveness and for overall economic growth." (European Commission, 2010a)

8.2 Asia and Oceania

The SME segment represents between 30 and 60 percent of GDP across the Asia-Pacific region. Across the Asian region, the growth in the economies is behind a huge take-up in broadband services. However, the majority of subscribers are based in urban areas where the infrastructure is in place to deliver broadband services. South Korea, Malaysia, Japan and Australia are major centers of growth. Broadband services are often used by larger corporations in retail, petroleum, banking and the like, plus SMEs in the region. However, it is the rural areas that are in need of a broadband connection due to their remoteness and the total lack of infrastructure in these areas.

Beal (2001a) cites various examples of government policies aimed at enhancing SME usage of ICTs, beginning in the early days of broadband Internet and in recognition of the contribution to the economy such a combination provides. In South Korea, e-commerce and IT policy laid down an "e-commerce road map" to help establish a knowledge based economy. China's "Innovation Fund for Small Technology-based Firms" (STF) finances innovation activities of small enterprises active in the technology sector. Australia's e-procurement policy was specifically designed to increase the uptake of electronic purchasing by SMEs. Its "E-commerce for Small Business" program required the government's National Office for the Information Economy (NOIE) to conduct research, coordination and consultation in order to promote the uptake of e-commerce by SMEs, or in the words of the program "the use of computers and electronic communications networks to do business." New Zealand's government joined a Swedish led e-portal called eMarketservices.com in order to facilitate SME exporting while adhering to WTO regulations (Beal, 2001a, see p. 5). Indeed, the past decade has seen significant activity promoting SMEs in New Zealand. Though it has traditionally been one of the less planned economies, however it is also one in which SMEs are all but the essence of private sector

enterprise. New Zealand's SME policies have been emphasizing the relationship between ICT access and the development of the SME sector (Locke, 2004). A study of the impact of these policies has concluded that growth in SME profit is correlated with high levels of Internet adoption (Locke, 2004).

A major element in South Korea's emergence from the economic crisis that plagued Asia in the second half of the 1990s was based on encouraging SMEs to take a greater role in building the economy, which was traditionally based on the power of the government supported conglomerates, the *chaebols*. The government's main effort in this regard was focused on Korean SMEs that were knowledge- and technology-intensive. They included fostering technology-based development and the establishment of the Technology Innovation and Development Fund aimed at facilitating SME research and development (Gregory, Harvie & Lee, 2002).

The connection between SME development and ICTs has also been a key policy tool in Singapore (Lim, 2000/1). In 1991, Singapore implemented a national technology plan that supported growth in the establishment of small businesses. The plan incorporated a "small enterprise computerization program" and a "small enterprise computerized accounting program," both aimed at energizing SMEs through the usage of ICTs (p. 6-7). Following this initiative the Singaporean government initiated a national information infrastructure program in the early 1990s. Among the elements of this initiative was the development of a network for an electronic transfer system that was seen as encouragement for SME business development (p. 10). The national electronic commerce network was also designed with policies encouraging SME participation. These included discounts for SMEs on broadband access charges, subsidies for human resource training, tax incentives and grants for developing electronic commerce applications. An additional program named the "local enterprise electronic commerce program" was a companion program to Singapore's telecommunications policy of the 1990s. It provided SMEs with access to a database that allowed them to obtain competitive pricing on IT services (p. 11-12). The next step in Singapore's proactive pro-SME policy was the enactment of the Electronic Transactions Act in the late 1990s, which was to enhance SME confidence and trust in electronic commerce. More recently, Singapore's Infocomm 21 program was to guide the development of IT into the 21st century. Its main feature, the "dotcomming of the private sector,"

(Ibid, p. 15) was to create a common and consistent legal framework that will encourage SME adoption of ICTs, which is to further Singapore's economic growth.

The organization for Asia Pacific Economic Cooperation (APEC) set a working group on SME development as early as 1995 (Beal, 2001b). APEC had identified soon after its establishment in the 1990s the potential that lies in international economic cooperation of SMEs through the usage of ICTs in light of what then was the looming information revolution (Bonk, 1996). The 2001 meeting in Shanghai of APEC leadership encouraged the partnering economies to focus on ICT development as a means for strengthening SMEs contribution to the economy. Among specific recommendation their report suggested were the encouragement of e-government initiatives; encouragement of application of ICTs in SMEs to improve their economic performance; develop SME e-commerce training programs; build confidence in the use of ICT for business; encourage electronic exchange of documentation; encourage active participation of SMEs in the e-marketplace; and more (Beal, 2001b).

In 2002, the European Space Agency ran a project entitled Pacific Skies aimed at SMEs in Asia and the Middle East. SES NEWSKIES, Newtec and Alcatel Bell Space combined their expertise and resources in the development of a two-way service offering. The companies defined, developed and implemented a premium service for Internet access and corporate services for SMEs with an emphasis on areas where the telecommunications infrastructure was limited. Entitled the IPSys Broadband Service, the project was expected to allow regional ISPs to provide cost-effective, high bandwidth, high speed and increasingly reliable service to a significantly expanded market. It would also implement and demonstrate applications increasingly necessary in the developing world such as telemedicine, e-governance, integrated and collaborative user portals and distance learning. IPsys is now offered by SES NEW SKIES that directly connects the Points of Presence (PoPs) or customer premises of remote ISPs to the global Internet backbone via satellite. IPsys connections bypass all shared ground networks and associated congestion points – as well as any terrestrial connectivity gaps – to seamlessly deliver rich Internet content to even the most remote locations at high speeds.

Broadband is gaining recognition as an invaluable tool for those small to medium enterprises in Asia wishing to market and sell their goods effectively. Once broadband is delivered via satellite,

it can open hundreds of doors for those who wish to expand their business and trade their wares or services all over the world (ESA, 2008).

9.3 China

Contrasted with the approaches of the countries/international groupings mentioned above, the distinctive feature of China is that it is viewing the issue of SME broadband access through the lens of mobile services. This may perhaps be due to the relatively backward state of the traditional wired telecommunications network, and the vast size of the country, making mobile telecommunications a more attractive and cost-effective means of service delivery.

There are more than 42 million small and middle-sized enterprises (SMEs) in China, representing 99.3 percent of the total number of Chinese enterprises. China has undertaken a project to promote broadband to its SMEs by means of mobile broadband as 3G applications. They believe this will help SMEs reduce their cost of operation and management, improve their ability to respond to the market, and boost their integrated competitive. The government has announced that, under this project, about 10,000 activities will be conducted over the next two years in 100 cities to show the potential of 3G for SMEs, providing free training on 3G applications for almost 1 million SMEs.

In promoting mobile broadband to SMEs, China has always had to address the twin problems of capital and technology. Through training nearly 1 million SMEs across the country, they plan to establish a base of users to support mobile portals and mobile stores, and to implement mobile marketing to realize real-time mobile management. Qualified enterprises can also obtain services such as website design and construction for free, as well as marketing advice and free 3G applications, in order to eliminate their obstacles to entering the 3G marketing era.

Currently, China's mobile phone users exceed 700 million, of whom more than 100 million use their mobile devices to surf the Internet and search for products and services. Shao Xianglin, Secretary General of the China Association of Enterprises with Foreign Investment (CAEFI), believes that driving the numerous SMEs to use the mobile internet and develop mobile

commerce will also enable health and other practical information to become the mainstream of the mobile phone information space (Xin, 2010).

9. Summary and Conclusions

America's SMEs, the "backbone" of the economy, are currently presented with an unprecedented opportunity for growth using formerly unavailable Internet tools offered through broadband and "cloud" computing. To take advantage of them, they need to be informed of the benefits and trained in the techniques, and provided with a supportive legal, policy and fiscal environment and networks and technology that are standardized, interoperable and open.

In this report, our objective was both to analyze the different pathways through which broadband deployment leads to economic growth, and to suggest policies and programs that might help the SMEs' economic recovery. The link between broadband deployment and economic growth is indubitable. However, the specific pathways through which broadband deployment leads to growth are complex and interdependent and influenced by intermediate variables such as innovation, productivity and employment generation.

Innovations in the broadband environment can arise from a variety of applications under different conditions and production parameters, and requiring different levels of user expertise and participation: within the firm; in user communities at different levels of participativeness; and from the hardware of the network itself. It can for instance include "commons-based peer production," user generated content and distributed computing projects. But all these forms of innovation require a system architecture based on open networks, that permits and encourages the free flow of information. The full benefit of dynamic network externalities can be realized only if innovating firms have unimpeded access to a user base, and users in turn are able to access the full spectrum of products and services deployed online.

Despite the lack of evidence for ICT-led productivity improvements in the early years, more recent data has begun to show the impacts on firm productivity. But there is also concern that the deployment of broadband and ICTs seems to be to widen the economic gap between highly advanced and less advanced knowledge societies, and between large and small firms. However, this is not due to any intrinsic disadvantage of the latter, but only due to the differences in

broadband/ICT adoption rates, easily remediable through the appropriate incentives. It is imperative in the broadband environment that small and medium enterprises be encouraged to adopt broadband and ICTs, without which their inherent disadvantages due to lack of scale will be exacerbated. Affordability and geographical access are key to SME adoption of broadband.

Another consensus in the literature on broadband, innovation, and productivity is that organization structure, business models and operational procedures have to evolve apace with new technology in order to capture the full benefits of the latter. New innovations in e-business are as important as broadband access or ICT to enable small businesses to compete effectively in the information economy. Firms should be given incentives through fiscal policy, training programs, and awareness campaigns to adopt new practices in E-commerce, E-business and "cloud computing".

In analyzing the impact of productivity on employment, we need to focus not only on direct creation of jobs through infrastructure projects, but also indirect impacts through broadband's influence on the overall economy. Whereas the consensus in the literature is that productivity contributes to job growth overall, the sectoral impact is more complicated: some industrial sectors may lose jobs as a result of productivity growth, even though the long-term effect is to stimulate the operational efficiency of these sectors and contribute to the creation of a better-skilled, and better-paid workforce. In the interim, retraining programs focusing on digital literacy and new technology skills will help displaced workers, but also employers by ensuring a greater supply qualified personnel.

Our detailed recommendations follow in the next section.

10. Recommendations

LITERATURE REVIEW DETERMINATION	POLICY RECOMMENDATION
11. Small and medium sized enterprises (SMEs), represent more than half of the U.S. gross domestic product (GDP) and generate two-thirds of new jobs. Their role as the primary drivers of growth in employment and innovation is indisputable.	
12. Broadband highly impacts consumer welfare, firm productivity and economic growth.	**Policy goal I: Focus on SMEs** In order to fully realize the promise of SMEs and their potential to contribute to economic growth, policy needs to help them overcome the barriers that impede both their access to broadband and their ability to utilize it.
13. Broadband's traditional supply and demand effects are complemented in the new economy by "dynamic network externalities;" the dynamic conceptualization is based upon the dual characterization of network subscribers as both consumers and producers of information, applications and services. 14. In order to realize the full potential of dynamic externalities, policymakers need to simultaneously put in place programs to increase subscribership (universal service), foster firm innovation of new network services (price and speed), and promote unimpeded access between firms and users (neutrality).	**Policy goal II: Address dynamic externalities – target both consumers and producers** • Support universal broadband access through the Universal Service Fund • Targeted competition policy to drive down prices and increase speed • Promote open access and non-discrimination on broadband networks by ensuring net neutrality; service providers should not be able to discriminate between packets based on who originates them. Otherwise, small businesses which may not be able to secure advantageous terms may not be able to compete effectively • Net neutrality is also required to ensure that the full potential of dynamic network externalities is realized

15. A discussion of the impact of broadband deployment implies: o Small firms are more likely to innovate in environments where market entry is facilitated by new technologies. o The full scope of dynamic network externalities can be realized only if firms and innovation networks can have unimpeded access to users and participants. o Small firms tend to adopt ICTs and broadband at lower rates than large firms; as a consequence they miss out on ICT-enabled productivity gains further widening the economic gap between large and small firms. o Investment in broadband infrastructure achieves its greatest return when network deployment is balanced between communities, with special policy focus on remedying the disadvantage of rural or high-poverty urban communities.	**Policy goal III: Foster SME innovation** • Improve data collection on small business broadband use, ICT penetration, ICT (hardware and software) spending etc. Benchmarking studies in consultation with SBA, economic census etc, followed by annual data collection. Create clearinghouse for SME ICT use • Implement open networking policies. • Encourage SMEs to adopt broadband and ICTs by lowering costs for small business broadband access and precluding discriminatory business models that disadvantage SME eBusiness. • Policymakers should seek to close digital divides in speed and price between markets.
16. Small businesses face significant constraints in accessing broadband and utilizing it effectively in three dimensions: o They are lack the knowledge and personnel to utilize ICTs o Many are located in markets where accessing broadband networks and services is difficult due to geographic dispersion o They are often unable to develop in-house ICT capabilities due to smaller scale of operations.	**Policy goal IV: Enhance SME capabilities to effectively utilize broadband** • Offer counseling, support and networks of assistance for SME adoption of ICTs and "cloud computing" solutions to inventory management, payroll, etc. Grants to SME organizations to develop best practices • Close digital divide in speed and prices between markets • Preferential pricing (e.g., special access) for SMEs; no caps on bandwidth/usage • Promote standards for technology (openness, interoperability, technological neutrality)
17. Small businesses spend disproportionately more on telecommunications services; and yet a larger percentage of SMEs do not avail of broadband at all.	**Policy Goal V: Affordability** • Promote affordable broadband access for small businesses • Favorable tax treatment (e.g., of capital expenditures, depreciation, etc.) • Preferential loan treatment (cheap government loans, loan guarantees, etc. • No additional taxes/fees/elimination of any unfavorable treatment at federal or state level

18. It is the adoption of the eBusiness model that can drive renewed SME growth, *but only if* they have access to affordable, fast, reliable broadband services. o The eBusiness model leverages the power of the Internet to reduce costs, increase productivity growth and increase revenue and takes full advantage of the capabilities of the Internet. o eBusiness offers reduced costs through on-line collaboration and distribution and increased revenue through faster access to both customers and suppliers. o Unimpeded access to the "Cloud" allows small businesses to quickly and inexpensively access virtual infrastructure resources, saving money and increasing efficiency.	**Policy goal VI: Develop eBusiness friendly policies** • Enhance trust in online transactions by cracking down on identity theft, enhancing security, promoting e-cash, consumer protection, privacy • Subsidize or give tax credits for ICT-focused human resource development, employee training in SMEs
19. Policies that make the connection between the success of small and medium business enterprises and the development of the Internet have been promoted and implemented in different countries since the introduction of the Internet. They include the promotion of: eGovernment; eBusiness; SME connectivity; Enhancing access of SMEs to capital; Overcome SME "fears" of accessing the Internet: knowledge, trust, and cost. 20. Small business programs in other countries offer the following key policy recommendations for the adoption of ICTs by SMEs: o Encourage broadband rollout using competition mechanisms to lower prices and raise quality; o Initiate policies that strengthen trust, security, privacy and consumer protection; o Expand SME usage of online dispute resolution mechanisms; o Increase the availability of digital content about the public sector; Invest in improving basic ICT skills through education.	**Policy goal VII: International benchmarking** • Undertake comparative studies of international policies • Special attention to SMEs with respect to international trade issues • Work to eliminate foreign tariff, taxation, technological or other barriers to SME trade • Simplification of any necessary approvals/paperwork, etc. Eliminate where possible • Monitor international (e.g., OECD, APEC) SME policies. Work to collaborate and coordinate with international standards and practices. • Participate in international meetings and organizations in support of U.S. SMEs

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