Mutually assured prosperity:

why innovation policy must go global

Innovation – fueled by ICT – has rapidly become the leading driver of global productivity and economic growth. But for policy makers, **the toughest challenge still lies ahead**. It's no longer enough to maximize innovation – with global prosperity at stake, governments need to **compete for innovation leadership** in a way that generates positive-sum results for everybody.

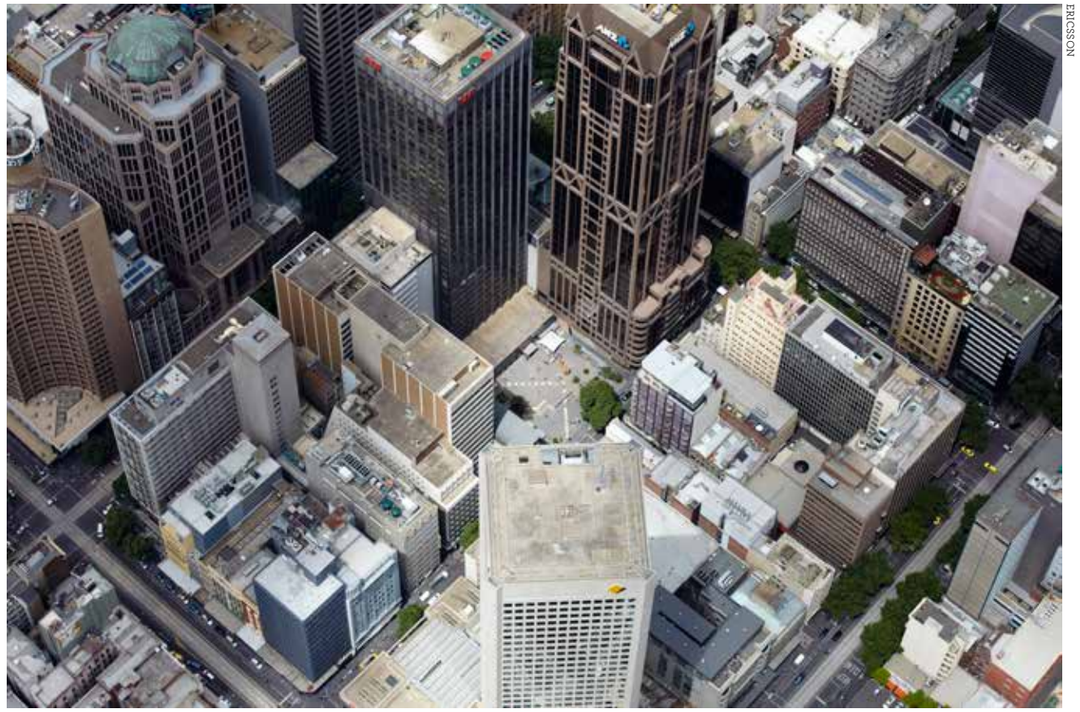
"It's time to move beyond innovation as a zero-sum game to a perspective that views mutual global prosperity as the goal"

INNOVATE OR DIE – that's the message that famed management guru Peter Drucker sharply delivered to corporations. Yet this advice applies no less to nations as well. Countries throughout the world are increasingly aware of this fact, which is spawning intense competition for global innovation leadership, as Robert D. Atkinson and Stephen J. Ezell of the Information Technology and Innovation Foundation write in *Innovation Economics: The Race for Global Advantage* [1]. Indeed, policy makers in capitals worldwide wake up every morning ready to do whatever it takes to incubate, grow, scale and/or attract enterprises and industries in the highest-value-added sectors of economic activity, such as advanced manufacturing, renewable energy, life sciences, robotics and ICT. And as this competition for global innovation leadership intensifies, it's being fought with all the tools at a nation's disposal, including the establishment of national innovation foundations and strategies, expanded support for science and technology, restructured tax and regulatory systems, improved education systems, and increased investments in digital platforms such as broadband internet and 4G mobile networks.

This article explains why innovation, along with productivity growth, has become the core driver of global economic growth, examines how ICT plays a central role in driving innovation, and describes how policy makers can maximize innovation while structuring the competition for innovation leadership in a way that generates positive-sum results for the businesses and citizens of all nations.

INNOVATION, NOT CAPITAL ACCUMULATION

Countries' intense focus on innovation-based economic growth has been driven largely by a growing realization among economists that it is not so much the accumulation of capital (as long held by neoclassical economists) but rather innovation – the improvement of existing (or the creation of entirely new) products, processes, services, and business or organizational models – that drives countries' long-run economic growth. For instance, the US Department of Commerce reported in 2010 that technological innovation can be linked to three-quarters of the US growth rate since the end of World War II [2]. The UK reports that two-thirds of the country's private-sector productivity growth between 2000 and 2007 resulted from innovation [3]. And the economists Klenow and Rodriguez-Clare have found that 90 percent of the variation in the growth of income per worker across nations is attributable to innovation [4]. Put simply, innovation has become the central driver of economic well-being, competitiveness, and even long-run employment growth



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for most economies [5]. As Organisation for Economic Co-operation and Development (OECD) Secretary-General Angel Gurría commented upon the release of the *OECD Innovation Strategy* in March 2010: "Countries need to harness innovation and entrepreneurship to boost growth and employment, for innovation is the key to a sustainable rise in living standards [6]."

SUPER CAPITAL

Innovation – the wellspring of that "gale of creative destruction" of which Joseph Schumpeter famously wrote – achieves its outsized economic impact through two principal channels: empowering productivity improvements (e.g. increases in economic output from a given level of input, whether labor or capital) and spurring the dynamic creation of new firms or activities that create new value for society. And here ICT, which is the modern economy's leading general-purpose technology sector – a term for technology systems that produce spillover effects by enabling new products or services and by enhancing the productivity of downstream industries – has taken the lead in spurring global innovation and productivity growth.

Indeed, ICT is powerful precisely because it enhances the productivity and innovative capacity of every individual, enterprise and industry it touches throughout an economy – and this holds true for developed and developing countries alike. As Ahmed and Ridzuan observe in *The Impact of ICT on East Asian Economic Growth*: "The ICT revolution has contributed significantly to the whole economy by raising productivity. First, ICT increases labor productivity in ICT-using industries by making labor produce more or work more efficiently. [Second], ICT makes physical capital become more productive [7]." Indeed, as research performed in 2011 by Oxford Economics confirms, ICT generates a bigger return to productivity growth than virtually all other forms of capital investment [8]. Studies in the early 2000s found that investment in ICT capital increased productivity by three to eight times more than investment in non-ICT capital, and that ICT workers contributed three to five times more productivity than non-ICT workers [9]. Put simply, ICT is "super capital" that has a much larger impact on productivity than other forms of capital [10].

Yet ICT is just as vital to enabling innovation as it is to boosting productivity. For example, the OECD has found that the probability of innovation in a firm increases with the intensity of ICT use, and that this holds true for both manufacturing and services firms and for different types of innovation [11]. Likewise, in the European Union (EU), 32 percent of companies report being "active innovators," with ICT enabling half of those firms' product innovations and 75 percent of their process innovations [12]. And ICT also drives firm profitability, with Brynjolfsson, Hitt and Yang finding that, on average, for every dollar a firm in the US invests in ICT, its market valuation rises by over USD 10 [13].

> "Europe needs to be doing much more to unleash the potential of ICT-enabled innovation"

Ultimately, the productivity-enhancing and innovation-enabling benefits of ICT at the individual, enterprise and industry level aggregate to enable productivity and economic growth at an economy-wide level. For example, ICT is estimated to have contributed on average approximately 20 percent to annual Chinese GDP growth each year from 1980 through 2007 [14]. Japan's Ministry of Internal Affairs & Communications estimates that ICT production and application contributed 34 percent of the country's economic growth from 2005 to 2010 [15]. And over that same period, one-third of US value-added growth has been attributed to the adoption of ICT by organizations. More broadly, McKinsey estimates that the internet alone accounted for 21 percent of the aggregate GDP growth from 2006 to 2011 across thirteen leading economies – Brazil, Canada, China, France, Germany, India, Italy, Japan, Russia, South Korea, Sweden, the UK and the US [16]. Put simply, ICT is today the leading driver of global innovation, productivity and economic growth.

CONTINENTAL DRIFT

Unfortunately, as ITIF writes in *Raising European Productivity Growth Through ICT*, one of the reasons that European GDP growth has significantly lagged that of the US in recent decades is that European productivity growth has significantly lagged that of the US [17]. In fact, whereas from 1980 to 1995 EU-15 countries steadily closed their labor productivity gap with the US, from 1995 to 2013 the labor productivity gap between the EU and the US expanded by 10 percentage points, as European labor productivity fell from 89 percent to just 79 percent of US levels. That represents a substantial missed opportunity, for if EU-15 nations had maintained the productivity growth rate they enjoyed from 1980 to 1995 through to 2013, their annual GDP would be 16 percent larger today, with their economies collectively over EUR 1.6 trillion larger than their current EUR 10.6 trillion level [18].

The principal explanation for why Europe has achieved lower productivity growth than the US over this period is that Europe has achieved lower productivity gains from ICT, in large part because European countries have significantly lagged the US in ICT investment – both as a percent of total investment and as a percent of GDP – since the 1990s. Unfortunately, that gap has only widened over time: in 2000, EU-based firms invested about 80 percent as much as the US in ICT as a share of total capital investment; by 2011 that ratio had declined to 57 percent [19]. As a consequence, from 1985 to 2010, ICT capital contributed almost twice as much to the US annual GDP growth rate than it did in European countries such as Germany and Italy. As Strauss and Samkharadze conclude in their study, *ICT Capital and Productivity Growth*: "U.S. productivity has outgrown the EU-15's mainly because of stronger ICT capital deepening and faster progress in productive efficiency [20]."

Put simply, Europe needs to be doing much more to unleash the potential of ICT-enabled innovation. Two ways it can better do so include encouraging European enterprises to invest more in ICT (such as by providing incentives like investment tax credits) and removing barriers to innovations that leverage ICT – something to which Europe has too often taken a schizophrenic approach. For example, Dutch bank ING Group was the first bank in the world to introduce online banking, but Dutch regulators – fearing the impact online banking would have on employment (i.e., tellers) – introduced laws that slowed the introduction of online banking and compelled ING to launch its service first in the US, not Europe [21]. More recently, Belgium and Germany have banned the ride-sharing car service Uber [22]. And French ministers have called for a "data tax" that would tax enterprises that use the very data-mining techniques that have unlocked tremendous value for the global economy [23]. Whether enacted in Europe or elsewhere, such policies that impede or preclude digital innovation only inhibit countries' long-run economic growth.

EMBRACING INNOVATION

In contrast, leading nations are enacting policies that actively embrace innovation. Some three dozen nations, developed and developing alike, have created national innovation foundations and articulated national innovation strategies whose intent is to support both private-sector innovation and the innovation capacity of governments (such as through smart public-procurement policies). For example, UK Prime Minister David Cameron has recently called for development of a modern industrial strategy focused on turbocharging UK competitiveness in six sectors key to its economy – life sciences, finance, creative industries, aerospace, clean energy and marine technologies. Likewise, the *Swedish Innovation Strategy* and its complementary *2012 Research and Innovation Bill*, which increased the Swedish government's R&D investment by 25 percent from 2012 to 2016, called for specific policies to boost innovation in the life sciences, ICT, advanced manufacturing, and forestry and mining sectors that are critical to the Swedish economy [24]. The bill also introduced "Excellence Requirements" that reward universities for boosting their knowledge- and technology-transfer activities and for working more closely with industry. Similarly, China has

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identified seven key strategic and emerging industries, and has committed to investing USD 1.7 trillion in those sectors through 2020 as part of its Innovation 2020 plan [25].

THE GOOD, BAD, UGLY – AND SELF-DESTRUCTIVE

Put simply, the competition for global innovation leadership is not for the faint of heart. But it's important to remember that as countries implement a range of policies to bolster their levels of innovation and economic competitiveness, they can enact policies that have differing qualitative impacts on the global innovation economy. As Figure 1 shows, countries can implement their innovation policies in ways that are either: 1) "Good," benefiting the country and the world simultaneously; 2) "Ugly," benefiting the country at the expense of other nations; 3) "Bad," appearing to be good for the country, but actually failing to benefit either the country or the world; or 4) "Self-destructive," actually failing to benefit the country but benefiting other countries [26].

Figure 1: A Matrix Depicting the Qualitative Impact of Countries' Innovation Policies

Country		World	
		Wins	Loses
	Wins	Good	Ugly
	Loses	Self-destructive	Bad

Examples of "Good" innovation policies include countries' increasing investments in education, basic and applied scientific research, and robust physical and digital infrastructures; implementing innovation-enhancing tax policies such as collaborative R&D credits; or introducing incentives to support entrepreneurship or technology transfer from universities to the private sector. "Good" innovation policies are positive for the world, as discoveries, inventions and innovations made in one nation ultimately spill over to the benefit of citizens worldwide.

Unfortunately, all too often today, countries are fielding "Ugly" innovation policies – such as forced intellectual-property or technology-transfer requirements as a condition of market access or localization barriers to digital trade – designed to benefit themselves to the detriment of others. Examples of "Bad" policies are import substitution industrialization or restrictions on foreign direct investment that a country believes will help it (i.e. by helping protect infant industries), but that in fact do more harm than good to the country's economy. Finally, "Self-destructive" innovation policies, such as a country turning away high-skill immigrants or raising corporate taxes so high that multinational corporations relocate elsewhere, are those that hurt a country while actually benefiting others.

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MUTUALLY ASSURED PROSPERITY

The goal for global policy makers therefore needs to be policies in the upper left-hand quadrant. Nations must recognize that constructive competition forces countries to ratchet up their game and that "Good" innovation policies leave all countries better off. In short, it's time for the world collectively to move beyond perceiving the pursuit of economic growth through innovation as a zero-sum game to embracing a perspective that views mutual global prosperity as the goal [27]. With the right global policy framework, nations can increase the global supply of innovation in a win-win manner, to the benefit of citizens, consumers and countries throughout the world. ●

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