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Date: 4 August 2000

Re: The Rationale for Development Assistance for IT Investment (Draft)

Outline

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1. Overview

The Okinawa Charter on the Global Information Society has prompted some critical reviews. In particular, some observers have raised issue with the priority given to closing the international digital divide, as opposed to other initiatives. The specific question is why one should favor this form of resource transfer over others. Below, the economic rationale for development assistance devoted to information and communication technology (IT) related areas is discussed. Some criticisms of the reasoning underpinning the Charter are also addressed.

2. The Economic Rationale

2.1. Why Focus on IT in Particular?

The reason for focusing on IT is that the rate of return on IT related activities is perceived to be extremely high. In order to rationalize why development assistance (or government intervention at all) is needed, one must appeal to the observation of market failures (externalities) and imperfections (monopoly, asymmetric information) in less developed countries. Externalities may explain why labor, and human and physical capital do not move to the activity where they will receive the highest *social* rate of return. Even in the absence of market failures, market imperfections – perhaps most significantly in credit and capital markets – may lead to under-investment in certain activities.

While such imperfections can cause under-investment in all types of activities economic theory suggests that these imperfections may be very pronounced in activities involving IT. Much of the capital associated with IT-related businesses is intangible in nature – that is only a portion of the worth of a firm is embodied in the physical plant, while a large amount may be embodied in the organization and operating procedures of the firm. In this case, it is more difficult to “monitor” the management of the firm, and hence lenders will require an even higher rate of return than would occur if no asymmetric information existed.

In assessing the case for the G-8 initiative, one is hampered by the lack of quantitative evidence on the benefits and costs of IT-related activities. This comes as no surprise given the relative novelty of the internet and other IT in the developing world. However, there is a substantial body of work addressing a sector that is widely perceived to be analogous to IT – namely telecommunications.

There are externalities associated with having a network through which information can be widely transmitted -- the benefits to society of having an individual firm connected to the phone system exceeds the benefits accruing to that single firm; however, that single firm only invests in phone service up to the point where the cost of the last unit of phone service equals its *private* (not social) benefit of the last unit of phone service. Thus, in this situation, there is under-investment in telecommunications.

The standard policy prescription is for government intervention to internalize the externalities, preferably by a subsidy. Failing that, a properly managed state-owned enterprise can in principle accomplish the task, although not necessarily with the same degree of efficiency.

Unfortunately, most state-owned enterprises in less developed countries are part of the problem, rather than part of the solution (particularly in Africa; see Oshikoya and Hussain, 1998). These entities seldom internalize externalities, but instead provide services inefficiently (technically and economically). Presumably, leaving the development of IT to the market or state would lead to a similar state of affairs. Hence, the argument for intervention.

2.2 The Link from Telecoms to IT

In the least developed countries, establishment of an efficient and extensive telecom infrastructure is a prerequisite for rapid diffusion of internet connectivity. Hence, the most concrete action the G-8 countries can take that will foster IT in developing economies is included in the Charter: "...mobilising resources to improve information and communications infrastructure" (G-8, para. 19). Development assistance of either a technical, managerial, or financial form can be used to assist governments in either reforming their state-owned telecoms, or preferably, privatizing them while simultaneously establishing effective regulatory agencies.¹

The importance of the communications infrastructure to the development of internet use is illustrated by the following study. Using a cross-country data set on 153 countries in 1995, Canning estimated a series of regressions using various measures of internet activity: (i) number of packets; (ii) number of internet hosts; and (iii) the number of internet users.

For countries with internet activity, he found that:

- After controlling for population and income per capita, and the monthly cost of a line, the elasticity of packets with respect to number of main telephone lines per capita is 0.785, and statistically significant at the 1% MSL (Canning, 1999a, Table 1). A fuller specification yields a higher point estimate (1.036) that is only marginally significant.

¹ Goldstein and O'Conner (2000) note that more than 90 developing economies opened their telecom sector between 1990 and 1998. Thus the Charter's emphasis on pro-competitive policies can be viewed as an extension of the current trend toward deregulation.

² Mann (2000: 9) makes explicit the point that other aspects of infrastructure cannot be ignored. Taking advantage of the opportunities afforded by e-commerce, for instance, will require both an efficient telecommunications network and the transportation infrastructure necessary to deliver the goods.

- The number of internet hosts does not depend upon the number of main lines per capita, but does depend negatively upon the number of faults per main line (that is, the interruptions to service), and positively upon the number of digital phone lines (Canning, 1999a, Table 4).

For the *full* sample, including countries that didn't have internet activity:

- After controlling for population and income per capita, the number of main lines per capita is a statistically significant determinant of whether there is any internet activity, regardless of whether the measure is the number of packets or the number of hosts.
- A ten percent increase in the number of main lines per capita increases the likelihood of internet activity by between 2.6% and 3.0% (Canning, 1999a, Table 5).

Hence, a substantive component of the Charter would be a renewed emphasis on reforming and improving the telecommunications sector in developing countries.

3. Some Critiques and Responses

- *Critique: Debt relief would be a superior form of assistance, as compared to additional resource commitments for IT investment.*

Response: This criticism requires careful analysis in order to respond correctly. First, it is important to remember that no country has indicated that it would decrease funds for debt reduction in exchange for additional funding for the DOT force initiative.

Second, to the extent that the *additional* resources represented by DOT-force funds could be devoted instead to debt relief, one needs to ask to what end those funds freed up by debt relief will go to. If the funds go to subsidize consumption for urban groups, for instance, then recipient countries will again accumulate debt without appreciable acceleration in growth. If the funds instead go to finance health and education expenditures, then substantial gains to economic growth will occur over time. A similar argument can be applied to investment in basic infrastructure.

However, a dollar's worth of investment in IT (interpreted as internet connectivity) is likely to yield a greater rate of return than a dollar's worth of investment in other infrastructure. No plausible estimates for the social rate of return on internet investments exist; however Canning (1999b) extrapolates from the experience with the expansion of telephony. Citing the 1994 *World Development Report*, he notes that the average financial rate of return of telecommunications projects was approximately 20%, a relatively high number even when compared to private rates of return.

To some extent, one is more concerned with economic growth, rather than financial rates of return. Using data on a panel of 57 countries over at least 20 years, he obtains a point estimate of 0.139 for the elasticity of output-per-worker with respect to main phone lines per worker, holding the capital stock constant. However, the telecommunications related capital stock is

included in the aggregate capital stock number, implying that a unit of telecommunications capital has a higher marginal product than a generic unit of capital.³

● *Critique: The DOT force initiative is the most recent in a line of inappropriate technology fads. Without the infrastructure to supply a consistent power supply or relatively fault-free telephone system, efforts to raise interconnectivity will result in wasted equipment.*

Response: Substantial gains can be achieved even without networking the entire country. Introduction of IT into certain key government agencies might enhance LDC welfare too. For instance, a \$1 million investment in Mauritania reducing the customs processing time from 48 hours to 30 minutes, and the time to declare goods, 5 to 20 days down to one or two. A pilot program in Colombia reduced customs related transactions costs by 40% days (cited in Talero and Gaudette, 1996).

● *Critique: E-Commerce is an infeasible proposition for least developed countries; even when the infrastructure might be able to sustain e-commerce, the lack of computer literacy, the absence of effective protection for property rights and accompanying legal sanctions, will constitute insurmountable barriers.*

Response: There is some anecdotal evidence indicating the e-commerce can take place even without many of these pre-requisites existing in full force.

“○ A women’s weaving cooperative in an isolated village in Guyana is selling its principal product, hammocks, over the internet for \$1000 each.

○ In Peru, indigenous Ashaninkas use public Internet booths to sell their crafts over the Web.

○ A man in New York has created an Internet company through which immigrants from Ghana can buy goats for their families and villages back home.

○ Firms in Africa can now access and bid on procurement contracts tendered by General Electric.” (examples cited in Mann, Eckert, Knight, 2000, p. 178-79).

Additional examples are cited in UN (2000, Box 1).

As indicated by the examples cited above, the fostering of widespread e-commerce is not amenable to large, top-down investment projects. Even if access is provided, individuals and firms will not incur the access costs if the benefits of internet use are not made clear to them. While it is not clear that we know how demonstrate these benefits, Mann, Eckert and Knight (2000) cite a number of encouraging examples. In Thailand, e-commerce firms have been incubated through the use of industrial parks; in Morocco and Thailand, internet systems have been upon previously existing networks of franchises.⁴ These small-scale interventions indicate

³ Additional surveys of the impact of telecommunications investment on output, consumer welfare, wages and income distribution are described in Bedi (1999).

⁴ Conversation with Catherine Mann (August 4, 2000).

that development assistance from a variety of sources can accelerate the adoption of information and communication technologies in less developed countries.

- *Critique: Even if e-commerce thrives, attempts to bridge the information gap will founder upon the lack of technical support for the equipment.*

Response. This is a substantive critique. On the hardware and software side, the threat is not pronounced because the various providers of IT related goods (Cisco, Microsoft) have found it in their own interest to invest in substantial training programs, so that their equipment and network systems are properly maintained.⁵ However, on the education side, the externalities from transferring knowledge are so great that the private sector does not have an incentive to invest in training for the use of IT in educational purposes.

The Japanese initiative addresses this concern by committing part of the \$15 billion expenditures to “[t]he education and training of technical experts to introduce and make use of IT...in developing developing countries.” (GoJ, 2000).

⁵ Conversation with Catherine Mann (August 4, 2000).

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