ICT Sectors and Clusters, Local Firm Performance and Employment Generation in Latin America[1]
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Fundación Comisión Asesora en Alta Tecnología (CAATEC)

Investigations carried out in:
Argentina[2], Costa Rica[3] and Uruguay[4]

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[1] The study has been undertaken by the Costa Rica High Technology Advisory Committee Foundation (CAATEC), of San José, Costa Rica, and the investigative team includes economists, ICT experts, and statisticians from Argentina, Costa Rica, and Uruguay. Most of the researchers are members of the faculties of the Instituto Tecnológico de Costa Rica, the Universidad Empresarial Siglo XXI of Córdoba, Argentina, and the Universidad ORT of Uruguay.

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1. Executive Summary

This project had as its general objective to generate new knowledge on how interactions between domestic ICT firms and ICT and IT-enabled multinational corporations (MNCs) in Argentina, Costa Rica, and Uruguay impact existing domestic ICT firms and employment in these firms, and contribute to the creation of new domestic ICT firms and more and better employment in these countries. The knowledge created was used to present well-founded policy recommendations to promote the growth of existing domestic ICT firms, the creation of new domestic ICT firms, and the generation of new high-quality employment in those firms for both male and female workers.

Our analyses made use the first truly reliable *inventories* of the domestic and MNC members of the national ICT sectors of each country studied, created by our researchers. Other data sources included the results of *surveys of domestic ICT firms and MNCs* carried out for the project in each country, as well as a *survey of ex-MNC employees* in domestic ICT firms in Costa Rica, and data provided by the governments of Costa Rica and Uruguay which permitted the creation of *databases* (including, in the case of Costa Rica, panel data for domestic firms and a novel matched establishment-worker database) which allowed the productive use of econometric modeling in various aspects of our analyses.

We found that the presence and activities of ICT and IT-enabled MNCs helps the survival, entrance, and growth of domestic ICT firms in all countries through backward, forward, and horizontal supply chain linkages. Nevertheless, relatively low levels of supply chain linkages, and low frequencies of concrete benefits of these linkages, were reported by domestic ICT firms in all countries. The lack of appropriate policies to support the participation of domestic firms in MNC supply chains does not permit domestic ICT firms to take full advantage of the potential benefits of the presence and activities of ICT and IT-enabled MNCs in their respective countries (e.g., knowledge spillovers),

With respect to competition in domestic markets for goods and services, there is strong competition between domestic ICT firms, and much less competition between domestic ICT firms and MNCs. In the labor market, competition for skilled workers is strong from both domestic and MNCs, generating growth in salaries (wage inflation) which reduces the competitiveness of all firms in the sector. The most detailed evidence on salary growth comes from econometric analysis in Costa Rica, where survey data also shows clear evidence of knowledge spillovers from MNCs to domestic firms, associated with a wage premium that benefits workers. Strong gender biases were also found in domestic ICT firms' workforces, with female employment being much higher in administrative and marketing and sales positions than in managerial and technical positions. These findings show the lack of effective human resource development policies in all countries studied.

The principal recommendations made for maximizing the beneficial impacts of the presence and activities of MNCs on domestic ICT firms are concerned with making more effective efforts to support domestic firms in their interaction with multinational companies; improvement of the capacity of domestic firms to absorb knowledge and technology from MNCs; and orienting FDI attraction more explicitly towards MNCs whose characteristics will promote more beneficial interactions with domestic firms. Strong emphasis is placed on taking a wide variety of actions intended to improve the supply of skilled human resources in all three countries, and special efforts are called to create more technically skilled female workers.

2. The research problem

In the modern world, the widespread use of information and communications technologies (ICTs) is vital in maintaining and improving the quality of life of individuals and the economic competitiveness of countries participating in a globalized economy. The development, implementation and maintenance of ICT products and services in a country are facilitated by the firms that make up national ICT sectors[5]. In this context, with the support of the IDRC, the CAATEC Foundation undertook a 2-year comparative study of the national ICT sectors of Argentina, Costa Rica, and Uruguay. The specific objectives of the project were two-fold: First, to determine the degree to which the presence and activities of ICT and IT-enabled MNCs[6] help or hinder the *creation, survival* and *growth* of domestic (locally owned) ICT firms and what types of domestic ICT firms are benefitted or disadvantaged by the activities of these MNCs. Second, to determine the degree to which the creation, survival, and growth of domestic ICT firms facilitates the creation of *more and better jobs* for their employees, and whether there was *gender bias* in the creation of such employment.

The review of the existing literature showed that while there is ample discussion of the impacts of foreign MNCs on the economies of host countries, there are far fewer studies that focus on the nature and impact of the interactions between ICT and IT-enabled MNCs and domestic ICT firms. Likewise, the analysis of existing policies, interviews with major stakeholders in each country, and the collection of data from existing sources and from our own national surveys, led us to conclude that there was a critical lack of useful information necessary to evaluate and modify existing policies that affect national ICT sectors, and to create new ones.

Our major contributions to knowledge in this area were to clarify the size of the ICT sector in each country, the relative importance of both MNCs and domestic firms in that sector, the evolution of these firms, the estimation of the impacts from the interaction between MNC and domestic companies, the clear identification of the channels through which such impacts occur, and the identification of factors that cause these impacts to be positive or negative in nature.

3. Methodology

To investigate the degree to which the presence and activities of ICT and IT-enabled MNCs help or hinder the domestic (locally owned) ICT firms we follow Farole and Winkler (2014), based on earlier work by Paus and Gallagher (2008), in focusing on the types of *mediating factors* which affect whether such impacts will occur and the three *channels* through which possible impacts (positive and negative) make their effects felt (see Appendix A for a fuller discussion of this conceptual framework).

The first category of mediating factors has to do with relevant characteristics of the *national environment* (e.g., government policies, labor markets, access to finance, learning and innovation infrastructure) in which domestic ICT firms and MNCs interact. The second has

[5] These include hardware, software and telecommunications companies, as well as ICT solutions providers.

[6] That is, ICT companies themselves ("ICT MNCs") and "ICT-enabled" MNCs (non-ICT companies which are sophisticated and intensive users of ICTs for purposes which may include supporting their own operations in one or more countries, and the provision of a range of "outsourced" services to clients in other countries).

to do with characteristics of *domestic ICT firms* which may influence the degree to which they are able to absorb the benefits of interactions with MNCs (size, specialization, technological sophistication, human resources, capacity for innovation, etc). Finally, the third group of mediating factors has to do with the *characteristics* of *ICT and IT-enabled MNCs* which may influence the degree to which these firms' strategies' and activities may generate positive or negative effects on domestic ICT firms (including their motives for locating in a country, size, specialization, technological sophistication, global production and sourcing strategies, and whether or not they compete in the local market).

It is important to bear in mind that the state of these factors, and the nature of the interactions between them, may change through time, and to make efforts to detect such changes when analyzing the effects of FDI on the ICT sectors of the countries included in our investigations.

The positive and negative spillovers from MNCs are transmitted to domestic ICT firms through three "*channels*", the first of which has to do with *Supply Chains*. If domestic ICT firms function as suppliers of various types of products and services to MNCs (*backward linkages*), they may be benefitted by having to meet quality, volume, and other requirements for what they provide (a "demand" effect), and may be actively assisted by MNCs to improve their performance in these areas (an "assistance" effect). If this improvement actually occurs, the domestic ICT firms may be more competitive in the local market (a "diffusion" effect).

On the other hand, if domestic ICT firms purchase products and services from MNCs (*forward linkages*), the higher quality of these products and services may also provide the domestic firms with a competitive advantage ("availability" and "quality" effects). In addition, domestic ICT firms may work together with MNCs to sell and maintain MNC products and services under "value-added reseller" and other schemes (*horizontal linkages*), which can provide substantial benefits to both parties.

The two other channels are labor mobility and market restructuring. There may be *labor mobility* between domestic ICT firms and MNCs, of which the most important instances are the movement of workers from MNCs to domestic firms (taking with them valuable experience and knowledge that can be used in existing or new firms), and the movement of skilled workers from domestic ICT firms to MNCs as the result of competition for human resources. Finally, *market restructuring* may occur, in which domestic ICT firms are forced to become more efficient competitors, either to keep up with foreign competitors (the *competition effect*), or through making use of information gained by observing the activities of MNCs (the *demonstration effect*).

Data relevant to all of these topics was gathered through a variety of activities. These began with an extensive review of existing literature at the global level, and at the level of each of the countries studied, accompanied by a series of interviews with relevant local authorities and experts from the public, private and academic sectors (see Appendices C and D). Quantitative data was gathered from a number of secondary sources, ranging from membership lists of various ICT industry and MNC associations, though information periodically compiled by various government organizations on numbers, types, sizes, wages and other attributes of local businesses, to data that was specifically requested from national governments for the purposes of this study (see Appendix E).

Efforts made to collect secondary information in all three countries allowed us to clearly define the size of the population of companies in the ICT sector in each country, individually identify these companies, determine the relative importance of domestic firms and multinational enterprises in national ICT sectors, and identify new firms in each of these sectors. Since there were no previous clear identifications of the amount and identities of these companies, this result represents an important added value of the project.

Most importantly, quantitative data was gathered for the specific purposes of this project through two surveys carried out in each country – one of domestic ICT firms (159 firms in Argentina, 83 in Costa Rica, and 60 in Uruguay), and another of ICT and IT-enabled MNCs (23 MNCs in Argentina, 40 in Costa Rica, and 20 in Uruguay). In the case of Costa Rica, the domestic ICT firm survey also gathered information from 44 employees of these firms who had previously worked in MNCs.

We also carried out case studies to complement and clarify the results of the analysis of secondary data and additional primary data collected in our own national surveys carried out in the project. The survey generated valuable information that was useful in the estimation and analysis of the impact of ICT and IT-enabled MNCs on domestic ICT firms in the three countries investigated in this project. Final versions of the questionnaires used for domestic ICT firms and ICT and IT-enabled MNCs are included in Appendix F.

In addition, investigators in Costa Rica and Uruguay were able to compile firm-level data on various important factors from government sources[7] covering multiple years, allowing the use of econometric analysis to analyze the behavior and evolution of these factors through time (See Appendix B). In addition, in the case of Costa Rica data was gathered for multiple years at the level of individual employees of firms in the local ICT sector, permitting the creation of a novel matched establishment-worker database for the years 2001 to 2012. These types of data permitted especially rigorous analysis on labor mobility and wages (See Appendix B).

4. Project Activities

The following is a detailed discussion of the various activities carried out in the project.

Literature Review

At a general level, the most helpful body of literature relative to the project's objectives that we encountered had to do with the effects of Foreign Direct Investment (FDI) on the economies and businesses of "host" countries (see Appendix A for a fuller discussion of these and other results, and major references consulted). FDI and the presence of foreign multinational corporations (MNCs) in host countries can have a wide variety of positive effects, including increased domestic productivity driven by knowledge spillovers, changes in organizational structures and practices of local businesses, learning and demonstration effects, and movement of personnel from foreign to local firms.

[7] Including the Costa Rican Social Security Administration (CCSS), and in Uruguay the National Agency for Investigation and Innovation (ANII), the Banco Central of Uruguay (BCU), the National Institute of Statistics (INE) and the Regulator of Communications Services (URSEC).

However, empirical studies have also made it clear that FDI can have negative effects on host countries as well, and the results of our literature review have highlighted the factors which must be considered when studying how FDI has affected the ICT sectors and domestic ICT firms in Argentina, Costa Rica, and Uruguay, and how the benefits of FDI may possibly be increased in these sectors.

The literature on the effects of ICT and IT-enabled MNCs on domestic ICT firms in Argentina shows increasingly diverse ICT sectors which nonetheless show low levels of linkages with MNCs and a relative scarcity of skilled workers which could be exacerbated if the country attracts more "labor intensive" MNCs of the sort which have already competed for labor and put pressure on the salaries paid in the sector.

Several sources also cite a low level of linkage between domestic ICT firms and MNCs in Costa Rica, due to a low absorptive capacity of the domestic firms, their inability to satisfy the requirements of MNCs for products and services, and the ability of MNCs to import their supplies without paying taxes. MNCs are also reported to compete with domestic firms for skilled labor, which combined with the relatively small size of that national workforce contributes to increases in salaries and worker turnover.

On the other hand, some studies have reported a relatively high potential level of absorptive capacity based on high levels of skills, innovation, and training within the domestic ICT firms, and there are indications that experiences gained while working for MNCs has led ex-MNC employees to create new domestic ICT businesses with better-than-average chances of surviving. It is also clear that some major ICT MNCs (Intel, Cisco, Microsoft, and others) are willing to work to train local ICT businesspersons in becoming better suppliers, and that "value-added reseller" (VAR) relationships between MNCs and domestic ICT firms can have substantial benefits for the domestic companies that participate in such relationships.

Domestic Uruguayan ICT firms are also reported to be innovative, with relatively strong relationships with academic and scientific institutions, and to have received various types of spillover benefits from MNCs. The government is interested in attracting MNCs in high value-added sectors, and the domestic ICT firms themselves are interested in attracting such firms, both to participate in development of local projects, and to drive the creation of local training centers and creation of new businesses aimed at regional markets.

Policy Review

The governments of the three countries that are the focus of our investigation have created a number of "horizontal" policies which have not been focused directly at supporting national ICT sector, but which nonetheless have had impacts on this sector. For instance, the creation of policies which are intended to promote the *development of science technology, and innovation* began in the 1990s and continues to the present. Examples of this tendency include Argentina's Law 23.877 (1990) for the Promotion and Development of Technological Innovation, followed by the 1992 creation of the Argentine Technological Fund (FONTAR) and the National Agency for the Promotion of Science and Technology (ANPCyT) in 1996; in Costa Rica this tendency extends from the creation of the Ministry of Science and Technology (MICIT) in 1990 to its most recent Science, Technology, and Innovation National Plan (2011-2014) and the creation of a Presidential Council on Competitiveness and Innovation.

The Uruguayan government has placed an especially strong emphasis on the role of innovation in the economy, and has created several institutions to promote innovation, including the Ministerial Cabinet for Innovation (GMI) and the Agency for the Development of Electronic Government and the Knowledge and Information Society (AGESIC) in 2005, closely followed by the creation of the National Agency for Research and Innovation (ANII). Many of these efforts involve the provision of financial and other types of support for promising projects and businesses, among whom local ICT businesses figure prominently, but there are very few evaluations of the effectiveness of this assistance, and the results of such an evaluation in Costa Rica show few positive results (see Appendix C for a fuller discussion of relevant policies).

Other policy efforts in approximately the same period centered around the *opening of telecomunications markets and the creation of national "information societies*", all of which have the potential to increase awareness and availability of ICTs, and to created new market demand for ICT products and services. In Argentina, the state telecom provider ENTEL was privatized in 1990, while information society initiatives did not begin until the creation of the National Program for the Information Society (1998), the Digital Agenda for Argentina (2008), and work beginning in the later 1990s aimed at overcoming "digital divides" (most notably in the creation of community telecenters and the promotion of ICT use in public education), as well as ICT use in government (e-government) and commerce (e-commerce – primarily through legislation on privacy of data and digital signatures).

In Costa Rica, the use of ICTs in education began in the 1980s with the National Program of Educational Informatics (PRONIE) and the Omar Dengo Foundation (FOD), and was followed in the 1990s and 2000s with information society initiatives similar to those of Argentina – removing digital divides, promotion of e-government and e-commerce, and so forth; however, the telecommunications market was not opened to competition until 2009. Uruguay followed a similar "information society" trajectory beginning with the Uruguay in the Internet Agenda (UER) in 2000 (including the outstandingly successful Plan Ceibal in 2007, which has extended access to computers and the Internet not only to public school students, but also to their families in rural areas); although the telecoms market was opened to competition at the beginning of the 2000s, the state telecoms provider ANTEL still maintains a monopoly over all types of Internet access that make use of physical media (wires and cables), and true competition in the market is primarily limited to wireless connectivity and cellular telephony.

There are very obvious differences between the different countries in terms of more "*vertical" government policies and programs that are directly oriented towards their respective ICT sectors.* On one hand, the Costa Rican government has not created any policies that are focused on assisting local ICT businesses, nor has it included specific references to the strategic importance of assisting national ICT companies in any of its more horizontally-focused policy efforts. On the other hand, Argentina convoked a multisectorial Forum on the Competitiveness of the Software and Information Services (SSI) sector in 2003 and passed Law 25.992 for the Promotion of the Software Industry in 2004, granting software firms various types of tax benefits and exemptions and creating the Trust Fund for the Promotion of the Software Industry (FONSOFT), while the recent 20 20 Strategic Plan of the Ministry of Industry names the SSI sector as one of eleven critical sectors for the development of the Argentinean economy. In addition, provincial and municipal governments such as those of Rosario, Córdoba, and Buenos Aires have made strong specific

efforts to provide incentives for multinational ICT companies to locate their facilities in their areas, and have in the case of Rosario also created funds to provide credits to domestic ICT firms.

Uruguay may be regarded as falling between these extremes: while it recognized the ICT sector as strategically important in 1999, worked with assistance of the Uruguayan Chamber of ICT industries (CUTI) to develop the 2007 Strategic Plan for the Development of Software and Computing Services, and assisted members of the SSI sector through the Program for the Competitiveness of Clusters and Value Chains (PACC) until 2011, the majority of assistance that Uruguayan ICT firms can currently access comes in the context of more "horizontal" efforts managed by organizations such as the ANII to promote research, development, and innovation in firms in many different sectors.

Another area in which interesting contrasts between the three countries occur is that of the *attraction of Foreign Direct Investment (FDI). Costa Rica*'s strategy in this area has long been one of attracting multinational corporations (MNCs) operating in high-value-added sectors, explicitly including foreign ICT and IT-enabled companies – sophisticated users of ICTs whose presence has the potential to increase demand for ICT products and services from local ICT companies, and to create opportunities for linkages and knowledge spillovers to local ICT firms. The results of this strategy can be seen in statistics that show increasingly high percentages of Free Trade Zone (FTZ) exportations coming from high-technology MNCs, and studies that indicate the presence of some knowledge spillovers from these MNCs to local ICT firms.

In *Uruguay*, on the other hand, while some spillovers to local ICT firms appear to have occurred from high-technology MNCs, a substantial portion of total FDI in recent years has been concentrated in sectors that produce primary goods with low value-added content, and the expansion of exports from FDI has been highest in these sectors – a situation which the government is working to change through explicit efforts to attract foreign ICT firms, and in which local ICT firms have taken their own steps to attract ICT and IT-enabled MNCs. Finally, while many of the incentives provided by the national government for research, development, and innovation in *Argentina* are available to investors regardless of their national origin, and may accordingly attract FDI which may benefit local ICT firms, the most highly focused efforts to attract investment related to ICT and IT-enabled MNCs are undertaken by provincial and municipal governments, as discussed previously.

Interviews

Interviews were conducted with representatives of national ICT industry associations and of individual domestic ICT firms; representatives of MNCs which were either competing in the local market or were located in free trade zones (FTZs) and not participating significantly in the local market; representatives of government agencies that were responsible for making or executing policies and plans that affect the ICT sector and/or relevant types of MNCs; and representatives of academic institutions that were either involved in the creation of human resources or had carried out investigations related to the ICT sector.

Among the most important results that emerged from the interviews in all countries is that of the *scarcity of skilled human resources*. The number of students graduating from academic institutions in programs related to technical ICT skills (programming, computer science,

networks, etc.) is not regarded as sufficient to meet the demands of the industry in any country, especially when confronted with sharply increasing demand for skilled technical workers by domestic ICT firms and MNCs as the importance of ICTs in business increases, and the sector diversifies into new areas. This has resulted in competition for skilled workers between domestic ICT firms, and between these firms and ICT and IT-enabled MNCs, although the strength of the competition varies by industry sub-sector.

Several sources mentioned that MNCs are able to pay higher salaries for workers of a given skill level than domestic ICT firms can afford, and that movement of workers can be especially damaging when a domestic firm has invested a substantial amount of its resources in training workers who then leave for better salaries. Strategies to improve employee loyalty such as offering them shares in companies are impeded by the lack of strong national stock markets.

The relationship between domestic ICT companies and MNCs was also touched upon in other comments. Costa Rican and Uruguayan interviewees mentioned a lack of knowledge spillovers from MNCs to domestic ICT firms, but Uruguayan sources also stated that partnerships between domestic firms and MNCs has helped domestic firms to better penetrate international markets. Likewise, Costa Rican informants stated that partnerships and other types of cooperation between domestic ICT firms and ICT MNCs provides the domestic firms with a number of substantial advantages in developing products and services that are based on MNC technical platforms (hardware, operating systems, database administration software, etc.). Finally, Costa Rican interviewees have commented on competition between domestic ICT firms and MNCs operating in the local market for the relatively small number of large and wealthy client businesses and organizations, with the MNCs having a substantial advantage due to their reputations, experience, and financial and technical resources.

Sources in Costa Rica and Uruguay criticized the lack of *policies oriented specifically towards the ICT sector*, and sources in all three countries have stated that the benefits for domestic ICT firms of most existing policies are not significant. Uruguayan sources pointed out the lack of in-depth diagnoses of the national ICT sector's situation, which could be used to design more effective policies, rather than depending primarily on inputs from the international literature. In Costa Rica and Uruguay, interviewees have also stated that the level of coordination between the public, private, and academic sectors in the formation of policies (including those related to the formation of human resources) is deficient.

With respect to the possibility of gender biases in national ICT sectors, Argentinean sources stated that there is little explicit bias against women in the ICT industry and substantial participation of women in technical positions, although the number of women participating in the industry at managerial and highly skilled technical levels, and the number of women forming new domestic ICT companies, is undoubtedly significantly lower than the number of administrators or entrepreneurs. Similar comments were made by Costa Rican sources.

Information from secondary databases

The first problem confronted by the project teams in Argentina, Costa Rica, and Uruguay was the necessity of creating a list of the domestic and foreign multinational firms whose characteristics are to be analyzed. There are no authoritative lists of the members of the national ICT sectors in any of these countries, and a similar strategy was followed in each country to develop reliable lists to guide further analysis.

The first step was to attempt to obtain lists of names and other information from the respective national governments of firms whose ISIC codes indicated that they were members of the ICT sector (a list of relevant codes was provided by the project team members in each country). In the case of Costa Rica, the Costa Rican Social Security System (CCSS) provided data on 2,306 active and inactive domestic and multinational companies, and information about almost 6,000 firms in the Uruguayan ICT sector was provided by the national government's Tax Office (DGI) and Social Security Administration (BPS). The Argentinean government declined to provide disaggregated information of this sort.

Further information to assist in the identification of ICT firms and their characteristics was gathered in all three countries from ICT industry associations – CESSI in Argentina, CAMTIC and the Chamber of Infocommunications in Costa Rica, and CUTI and the Uruguayan Telecommunications Chamber in Uruguay. In the case of Uruguay, information was also requested from URSEC, the national telecommunications regulator, and in Argentina further information about ICT firms was obtained from Trade-Nosis, a business research Web site, the Fundación Sadosky, a public-private partnership to promote linkages between the government, businesses, and scientific-technological infrastructure, and the governments of the cities of Buenos Aires, Córdoba and Rosario, all of which maintain lists of members of ICT clusters within their boundaries. The Web sites of all of these clusters were also consulted.

While the information obtained from all of these sources included various ICT and IT-enabled MNCs, information to better identify MNCs and their characteristics was also obtained in Costa Rica from the government's Foreign Trade Corporation (PROCOMER), the Costa Rican Investment Promotion Agency (CINDE) and the Costa Rican-American Chamber of Commerce (AmCham Costa Rica), and in Uruguay from lists of firms located in Free Trade Zones (FTZs) and reports from the Institute for the Promotion of Investments and Exportation of Goods and Services (Uruguay XXI).

The contents of all of these lists were then compared to compile a complete list of possible members of domestic ICT firms and ICT and IT-enabled MNCs in each country, a task which was greatly complicated by the fact that some businesses were listed under their legal names, while others were listed under trade names or the names of their principal products.

When the resulting lists of names and other information were inspected, a number of problems were discovered. It was first necessary to eliminate a substantial amount of supposed firms in each country which were registered under the names of individuals, or which reported no subsidiary employees and no sales. In the case of Costa Rica and Uruguay, we also encountered a substantial degree of error in the ISIC codes in the government databases – both in terms of firms that were erroneously assigned to the sector, and in terms of firms which were known from independent sources to be members of the sector, but were not categorized as such by the government. This made it necessary to revise several thousand firms on a case-by-case basis to determine if they belonged to the national ICT sectors or not, based on Internet searches, yellow pages, and, in some cases, telephone calls; only companies which could be reliably assigned to the ICT sector were included in further analysis. This added several unforeseen months to the time necessary to reliably identify the members of the sectors, but produced reliable lists of firms for further analysis, distributed as follows:

Firm type	Argentina	Costa Rica	Uruguay
Domestic ICT firms	390	587	387
ICT MNCs	65	156	103
IT-enabled MNCs	23	129	29
TOTAL	**487**	**872**	**519**

A description of the other types of information which has been gathered about these firms is presented in Appendix E. Very importantly, data has also been made available by the Costa Rican Social Security Administration (CCSS) for each of the persons registered as employed at any time between the years 2001 and 2012 in any of the businesses included in the list of ICT sector businesses compiled for this project, including employee gender and age, monthly information on that employee's salary, and an indication of the business in which each person was employed during a given month, together with the ISIC code for that business. This information allowed do an extremely interesting analysis of labor mobility, changes in salary, and gender aspects of employment within the Costa Rican ICT sector.

Identification of new domestic ICT firms

As part of the process of collecting data about ICT and IT-enabled firms in Argentina, Costa Rica and Uruguay, we were able to identify ICT firms that began operations within the last five years, including contact information necessary for carrying out case studies with selected new firms. This type of data was needed to carry out the analysis of the impact of the presence of ICT and IT-enabled MNCs on domestic ICT firms. Interestingly, the data from Argentina and Uruguay indicate a decline in the numbers of new domestic ICT firms, while in the case of Costa Rica is observer the opposite trend.

In *Argentina*, 42 new firms which had begun operations within the last five years were identified in the sample, of which six are MNCs. Sixty-two percent (62%) of the new firms are in the Federal Capital of Buenos Aires, with the other firms located in the cities of Córdoba and Rosario. No businesses in the Argentinean data were created within the last two years, and the annual totals of new businesses detected decreased sharply between 2010 and 2011.

In *Costa Rica*, it was possible to identify ICT firms which were created in each of the years between 2002 and 2011, permitting us to detect a clear trend towards increases in *numbers* of new ICT firms. In *percentage* terms the increase in new firms among all businesses operating in the ICT sector in each year declines slightly in the period 2010-2011. The following data shows this trend.

Costa Rica	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
New firms	34	44	44	53	66	63	90	83	80	92
% of total ICT firms operating in the indicated year	21%	22%	19%	20%	21%	17%	21%	17%	15%	15%

The data for *Uruguay* also indicate declining rates of formation of ICT firms in the last few years, as shown in the following table.

Uruguay	# of new firms			
	2005-2009		2010-2012	
	Total	Avg. per year (5 yrs)	Total	Avg. per year (3 yrs)
Hardware	2	0.40	0	0.00
Telecoms	1	0.20	1	0.33
Software	83	16.60	28	9.33
Hosting/Data processing	33	6.60	14	4.67
IT-enabled	13	2.60	7	2.33
TOTAL	132	26.40	50	16.67

Definition and estimation of econometric models

In Appendix F, we describe the basic econometric models that were estimated during the second half of the project, using secondary and primary data sets from each country. Time series data from secondary sources were only available in the cases of Costa Rica and Uruguay; however, we carried out a survey in each country – Argentina, Costa Rica and Uruguay – on a representative sample of domestic ICT firms, and ICT and IT-enabled MNCs, which allowed us to obtain primary data appropriate for additional statistical analysis.

Since the secondary data collected for Costa Rica is different from that for Uruguay (in terms of variables and years), the econometric models that were estimated in each country using these data sets are also different. The models estimated with secondary data in Costa Rica take advantage of the existence of a panel covering more than a decade, including valuable information on commercial relations between ICT and IT-enabled MNCs and ICT domestic firms. Thus, following the conceptual framework developed by Farole and Winkler (2014), we proposed models that permit investigating the degree to which the presence and activities of ICT and IT-enabled MNCs help or hinder the survival and growth of *existing* domestic (locally owned) ICT firms, as well as the formation of *new* domestic ICT firms (start-ups), and what types of existing and new domestic ICT firms are benefitted or disadvantaged by the activities of these MNCs. On the other hand, the models used in the case of Uruguay take advantage of the availability of information on sales and employment that allow us to study the impact of the relationship between ICT and IT-enabled MNCs and ICT domestic firms on labor productivity.

The results from the surveys that we carried out in Argentina, Costa Rica and Uruguay on samples of domestic ICT firms and ICT and IT-enabled MNCs, together with the results obtained from the estimation of our econometric models, allowed us to carry out comparative analyses that explored in unprecedented detail certain important aspects of the relationships between domestic ICT firms and ICT and IT-enabled MNCs in these countries.

Questionnaire design

There were two different questionnaires used in the project survey carried out starting in May 2014 – one for domestic ICT firms in each country, and one for ICT and IT-enabled MNCs in each country.

The final versions of the questionnaires are included in files appended to this report (see Appendix G). The questionnaire for domestic ICT firms begins with collection of information about the interviewee, and is then divided into four major sections.

The first is intended to collect information related to the *channels* through which the effects of FDI make themselves felt – supply chain relationships, labor mobility, and market restructuring driven by competition and/or demonstration effects. The second requests information about *characteristics of the ICT and IT-enabled MNCs* with which the domestic ICT firm interacts, including the perceived motives of the MNCs for locating themselves in the host country, their global production and sourcing strategies, their intensity of use of technology, their countries of origin, entry modes, and the length of time they have operated in the country.

The third section solicits information about the *characteristics of the domestic ICT firm itself*. This includes basic aspects such as size, industry specialization, and sources of capital, followed by the ability of the firm to access necessary technology and workers skilled in ICT use, the presence of research and development (R&D) activities, human resources, exportation, and the nature of competition. The final section contains questions about *host country factors and institutional frameworks*, including labor market regulations, intellectual property protection, access to financing, and industrial policies.

The MNC questionnaire begins with the recording of MNC and interviewee contact information, data about the country of origin of the MNC, the reasons why it chose to locate its offices in the country and when it established that presence, what activities it carries out, the types of clients that it has in the country (if any), and where its principal providers are located. This is followed by the collection of information about the level of innovative activities in the MNC, and the amounts and destinations of its exportations. MNC representatives were then asked to provide evaluations of the national business environment and relevant public policies in the country being studied. This was followed by the collection of information about the number of local employees of the MNCs (in total, by position, and by gender), and the perception of the MNC representatives of the facility with which satisfactory employees may be found, and types of employee training.

The focus of the questionnaire then shifted to collecting information about the types and amounts of goods and services purchased from domestic ICT firms, whether these goods and services are incorporated into the MNC's goods and services, the ease of encountering satisfactory local providers, and the presence or absence of programs to integrate domestic ICT firms into MNC supply chains. Other questions were concerned with the formation of consortia or other types of commercial alliances with domestic ICT firms (including value-added reseller or other types of arrangements to jointly promote the sales of their products and services), and what benefits these types of arrangements may provide to domestic ICT businesses.

Final sections of the MNC questionnaire have to do with requirements that MNCs may have for their local suppliers, types of training that they provide to their local partners, products or services that they sell to and purchase from local ICT firms, perceptions of levels of labor mobility and its causes, competition between MNCs and domestic ICT firms in the national marketplace, how and where the MNCs obtain the workers that they need, and general opinions about how their presence in the country may promote better productive and administrative practices among domestic ICT firms. In closing, information is gathered that provides indicators of the productivity of the MNCs, including the value of their capital, salaries that they pay, and the amounts of their sales.

Analysis and writing of country papers

Based on all the above information, we carried out an in-depth analysis of the relationships between ICT and IT-enabled MNCs and domestic ICT firms in each one of the three countries studied. Based on our findings, we wrote three country reports (see Appendix H), in which we present main findings, conclusions and well-founded policy recommendations for each country. Before we ended the project and in order to validate our final drafts of main findings and policy recommendations, we carried out three workshops, one in each country. The discussion with stakeholders from academia, the private sector and government authorities enriched the content of the three country papers and this final report.

5. Project Products

We produced four documents: a country-specific report for Argentina, Costa Rica, and Uruguay (see Appendix H), and the current document. In each of the country reports we specify what new knowledge was generated through the activities of the project in the respective country and policy recommendations based on our findings.

It is important to point out that as part of the project we also created awareness of the importance of strengthening the ICT sector in each country and the type of policies that could be followed to achieve such this goal. This was done throughout the entire period of the project, in the process of collecting and discussing information with stakeholders, as well as through the three workshops we hold in Argentina, Costa Rica and Uruguay at the end of the project to discuss our main findings, conclusions and policy recommendations, and to benefit from the observations and comments made by participants during these workshops.[8]

Our major knowledge contributions are to clarify the size of the ICT sector in each country, the relative importance of both MNCs and domestic firms in that sector, the evolution of these firms, the estimation of the impacts from the interaction between MNC and domestic companies, the clear identification of the channels through which such impacts occur, and the identification of the main factors that make such impacts positive or negative in nature.

We summarize below the main contributions to knowledge obtained from the three country studies regarding the impact of the ICT and IT-enabled MNCs on domestic ICT firms, following the discussion of the conceptual framework for our analysis discussed in section 3 of this document.

[8] The workshops in Argentina, Uruguay and Costa Rica were hold on June 1st , 4th and 18th, 2015, respectively.

Mediating factors

In general terms, the national environments and capabilities of domestic firms to take advantage of opportunities offered by the presence of MNCs are unfavorable for realizing positive effects in domestic ICT firms. In addition, the potential for spillovers from the MNCs is relatively low.

- An index based on survey data was constructed for each country to measure the degree to which the *national environment* favored the emergence of positive impacts from the interactions between ICT and IT-enabled MNCs and domestic ICT firms. On a scale of 1-5 (where a score of five is most favorable for promoting positive impacts), all countries had a very low score; Uruguay scored 2.0, Costa Rica 1.82, and Argentina 1.78. Factors such as human resource creation, access to finance, intellectual property protection, telecommunications infrastructure, and trade, investment, and industry policies all require substantial improvement.

- A similar index was created to measure the degree to which domestic ICT firms were likely to be able to *absorb knowledge and technology* from their interactions with ICT and IT-enabled MNCs (the higher the score, the better). Again, all countries had relatively low scores; Uruguay scored 2.91, Costa Rica 2.51, and Argentina 2.43. Local firms' relatively low levels of productivity, proportions of skilled labor in the workforce, levels of innovation, and exports, among other factors, make it difficult for these firms to take full advantage of opportunities offered by interactions with MNCs.

- A final index was constructed to measure the potential of ICT and IT-enabled MNCs to generate knowledge spillovers towards local ICT firms (the higher the score, the better). The score is highest in the case of Uruguay (2.93), followed by Argentina (2.30), and Costa Rica (2.01). These results show that there is a need to improve the foreign direct investment attraction policies in all countries, so that the MNCs being attracted have much higher potentials for generating spillovers in the host country.

Supply chain effects

Backward linkages - acting as a supplier of products and services to ICT and IT-enabled MNCs – are infrequent among domestic ICT firms in all countries, and are not regarded as having significant non-pecuniary benefits (e.g., knowledge spillovers). However, these sales do frequently integrate the domestic ICT firms making such sales into the MNCs' Global Value Chains, a potentially very important result for domestic ICT firms in the three countries.

- Slightly more than 20% of all domestic ICT firms interviewed supplied ICT MNCs with products and services (28% in Costa Rica, 27% in Uruguay, and 16% in Argentina).
    - Of those that did so, only 15% reported receiving significant benefits from these sales, which included training of personnel by the MNCs, advance payments for orders, and assistance in improving product quality and production techniques (22% in Costa Rica, 18% in Uruguay, and 11% in Argentina).
- Slightly less than half of all ICT MNCs surveyed reported purchasing products and services from domestic ICT firms (70% in Uruguay, 58% in Costa Rica, and 17% in Argentina).
    - More than 80% of all MNCs that made purchases from domestic ICT firms incorporated their purchases into their own products and services, thus integrating the domestic firms into the Global Value Chains of the MNCs.

Forward linkages – Approximately one-third of domestic ICT firms surveyed purchase high-quality products and services from ICT MNCs which they almost always incorporate into their own products and services, thus increasing the quality and competitiveness of their offers in the marketplace.

- Approximately 40% of domestic ICT firms in all countries purchase products and services from MNCs (42% in Uruguay, 39% in Costa Rica, and 38% in Argentina).
    - More than 90% of those local firms that purchase from MNCs incorporate what they purchase into their own products and services.
- Only 23% of ICT MNCs surveyed sell products and services to domestic ICT firms (35% in Uruguay, 22% in Costa Rica, and 13% in Argentina).

Horizontal linkages – Only one-quarter of all domestic ICT firms surveyed participate jointly with ICT MNCs in the provision of products and services, but almost all of the domestic firms that do participate report receiving significant benefits as a result.

- Approximately one-quarter (25.2%) of all domestic ICT firms interviewed have relationships as distributors, resellers, or representatives of ICT MNCs (36% in Costa Rica, 23% in Uruguay, and 20% in Argentina).
    - More than 90% of the domestic firms that have such relationships with ICT MNCs report receiving significant benefits, including discounts for MNC products and services, training in technical areas and marketing, and assistance in obtaining quality certifications.

Labor Mobility

Labor mobility has both negative and positive impacts on domestic ICT firms.

The presence of ICT MNCs has a negative effect on the ability of domestic ICT firms to recruit and retain skilled technical workers, and the loss of employees to MNCs is likely to have a high cost to domestic firms, given the technical training that they have provided to their employees

- More than half of all domestic ICT firms surveyed state that highly-trained technical workers are the most difficult type of employee to recruit (59% in Costa Rica, 56% in Uruguay, and 49% in Argentina).
    - Almost 90% of all domestic ICT firms provide training for their employees, and more than 85% of them provide training in software use and development – more than twice as many as train their employees in any other area
- More than three-quarters of domestic ICT firms interviewed in all countries (83%) agree that competition for skilled human resources contributes to employee turnover (95% in Uruguay, 82% in Argentina, and 76% in Costa Rica)
    - Almost half (49%) of domestic ICT firms that believe that competition for human resources contributes to employee turnover state that the most significant competitors are ICT MNCs (64% in Uruguay, 48% in Argentina, and 37% in Costa Rica); only one-third of domestic ICT firms (32%) believe that other domestic ICT firms are the most significant competitors for human resources.
- Almost half of MNCs surveyed (49%) also believe that ICT MNCs are the strongest competitors for skilled staff (66% in Argentina, 50% in Costa Rica and 24% in Uruguay); only 7% of them believe that domestic ICT firms are the strongest competitors.

Labor mobility from ICT and IT-enabled MNCs to domestic ICT firms has a positive effect on domestic ICT firms in the form of knowledge spillovers – that is, transfer of knowledge obtained by the founders and employees of domestic ICT firms while working in MNCs.

- More than half of domestic ICT firms in Costa Rica (55%) and Uruguay (52%) have founders who previously worked in MNCs in their countries; this is only true for 29% of domestic firms in Argentina.
- More than half of all domestic ICT firms surveyed have employees who have previously worked in MNCs. In addition, more than half of domestic ICT firms in Costa Rica (54%), a little less than half of firms in Uruguay (46%) and more

than a third of firms in Argentina (34%) have managers who previously worked in MNCs.

- In the case of Costa Rica, interviews with employees of domestic ICT firms who previously worked in MNCs show that almost two-thirds of them worked in ICT or IT-enabled MNCs; almost all of them reported transferring knowledge acquired in MNCs to their domestic employers, primarily through employee training and improved administrative skills, providing an exceptionally clear example of knowledge spillover through labor mobility.

Experience gained in ICT and IT-enabled MNCs can contribute to higher wages of employees when they move to domestic ICT firms, Econometric analyis on Costa Rican data shows that:

- Employees of domestic ICT firms that previously worked in ICT or IT-enabled MNCs between 1 and 3 years earn a wage premium of 13%, while those whose working experience in such MNCs was more than 3 years earn a wage premium of 21%.

- The wage premium for workers of domestic ICT firms that previously worked for other domestic ICT firms is 9% for those who worked in such firms for between 1 and 3 years, and 31% for those whose previous experience was more than 3 years.

- These results suggest not only a wage premium for knowledge accumulation, but also wage inflation due to high levels of competition for labor in the country.

- Women receive salaries that are approximately 23% lower than those of men with similar characteristics in terms of previous experience in MNCs or domestic ICT firms when they move to new employment in domestic ICT firms. This is due primarily to the fact that they are likely to be moving from one lower-paid administrative or sales and marketing position to another, rather that to more highly-paid managerial or technical position.

<u>Market restructuring</u>

The primary drivers of competition which may stimulate domestic ICT firms to improve their capabilities are not ICT or IT-enabled MNCs, but rather other domestic ICT firms.

- More than 80% of domestic ICT firms in Costa Rica, and more than 50% of such firms in Argentina and Uruguay consider that their local markets are highly competitive.

- Approximately 60% of domestic ICT firms in all countries believe that their strongest competitors are other domestic ICT firms; only 30% believe that their principal competitors are ICT MNCs.

- Only one-quarter of MNCs surveyed stated that they compete with domestic ICT firms in the sale of ICT-related products and services; almost one-half of these MNCs stated that they did not compete with domestic ICT firms in any way.

6. Direct Project Impacts

The focus of our study, the methodology that we used, the quality of the data that was gathered and analyzed, and the weight that the rigor of our analysis gives to our final recommendations, all constitute an important contribution to the literature, and a valuable tools for policy makers interested in improving the productivity and competitiveness of domestic ICT businesses in developing countries. Our documentation of gender imbalances in employment and wages in the ICT sector is a noteworthy example of our contributions to the literature, and an important input to policies for equitable development of human resources.

The project's activities have already led to the creation of awareness among important stakeholders in Argentina, Costa Rica, and Uruguay of the need for designing policies to support the development of their national ICT sectors. This was initially achieved through discussions in the interviews that we carried out with selected members of the public, private, and academic sectors in the initial stages of the project, which were sometimes continued in later stages of the project.

The process of raising awareness among important stakeholders was also assisted through holding workshops in each country in the final months of the project. In these workshops, we were able to not only inform these stakeholders of our results and policy recommendations, but also to participate in dialogs with these individuals concerning how these results and recommendations could inform policy making in these countries in the near future.

The final important impact, in the case of Costa Rica, is the participation of CAATEC in a governmental Steering Committee for the Development of an ICT Ecosystem, which was created by the Government and in which CAATEC was invited to participate based on our presentation of the main findings of this study. In this case, we will use the main findings from the project as reference material to design initiatives that overcome the weaknesses detected in the development of the ICT sector, as well as take advantages of the opportunities identified in the Costa Rican country study.

7. General Evaluation and recommendations

Our investigation has addressed an area which is of great practical interest to policy makers and members of the private and academic sectors in all developing countries, and has been carried out in a professional and highly productive manner.

- The focus of the study unites the topics of strengthening firms in an absolutely vital sector of any country's economy – that of information and communications technology – with the equally important topic of the economic impacts on developing countries of the increasing presence of multinational corporations (MNCs) in these countries.

- We have based our activities on a conceptual framework that gives us confidence that we are taking into account the channels through which domestic ICT firms may interact with ICT and IT-enabled multinationals operating in developing host countries, and the factors which may influence the magnitude of these impacts, and cause them to be positive or negative in nature.

- Our investigation has been carried out in three countries – Argentina, Costa Rica, and Uruguay – which permits us to compare and contrast the results obtained in these countries, greatly strengthening the confidence that we may place on the results which we have obtained, and the utility of the policy recommendations that we have made based on these results.

- As a result of intense effort, we created the most reliable existing inventories of the domestic and multinational companies that make up the ICT sectors in the three countries studied. We also collected primary and secondary data which allowed us to investigate the interactions of a sample of these companies in unprecedented detail, including databases which were used in powerful econometric analyses of a type that has not been previously carried out in this area.

  This data includes not only information about characteristics of individual firms, but also (in the case of Costa Rica) about the labor experience of individual employees of these firms, as well as data about aspects of the national environments of each country that may have an impact on the results of interactions between domestic firms and multinationals in the ICT sector.

- The results of our investigation have allowed us to comply with the specific objectives of the project – documenting the impact of the presence of MNCs on the survival and growth of existing domestic ICT firms, and on the creation of new domestic firms, as well as on the creation of new and better employment in the ICT sector (taking into account the possibility of gender biases in ICT firm formation and employment). This, in turn, has allowed us to comply with

our general objective of making well-founded policy recommendations in each of these areas.

- In summary, Our major knowledge contributions have been to clarify the size of the ICT sector in each country, the relative importance of domestic firms and MNCs in those sectors, the evolution of these firms, the estimation of the impacts from the interaction between domestic companies and MNCs, the clear identification of the channels through which such impacts occur, and the identification of the main factors that make such impacts positive or negative in nature.

Although the project and its implementation were designed with great care, we did encounter problems during the period of the project, especially those related to obtaining cooperation from important stakeholders in each country. These problems were most obvious in the earlier stages of the project, when we were attempting to gather the data that we required for our analyses.

There were clear differences in the levels of interest and committment from certain government institutions and industry associations in the three countries when we approached them for assistance in data collection. More specifically, while important industry and government stakeholders in Costa Rica were almost uniformly highly interested and cooperative, levels of cooperation by counterpart organizations in Argentina and Uruguay were sometimes significantly lower.

In the case of Argentina, the government refused to provide any type of information for the study, while in both Uruguay and Argentina industry associations and their member firms were often reluctant to share information about their operations, even though our project teams emphasized that any information gathered would be held in strictest confidence, and we made use of well-known and highly respected survey firms in each country.

These problems, and the unexpectedly poor state of existing information from governments and some industry associations on the membership of the ICT sector in each country, led to months of delays in the collection of necessary data. In retrospect, it is clear that we should have made even stronger efforts to stimulate interest in participation at the beginning of the project. These efforts might have included holding initial workshops to build awareness, rather than a single final workshop in each country, and more strongly emphasizing the confidentiality of data supplied to our investigators from the beginning of the project. The potential benefits to domestic ICT firms of placing our results and recommendations in the hands of government policy makers should also have received stronger emphasis in early project stages.

While these problems and delays were regrettable, we still have no hestitation in stating that the investments made in our project in terms of funding, time, and effort expended were fully justified by the project's results.

Appendix A: Literature Review

1. Effects of FDI on host countries

As discussed by Werchola (2010), the neoclassical analysis of effects of FDI is mostly based on the work of Sir Donald MacDougall (1960), who used a model in which output in a host country is a function of the inputs of labor and a homogenous stock of capital. Foreign Direct Investment is a marginal addition to the stock of capital, which has the effect of increasing the domestic wage rate and reducing domestic return to capital. Stephen Hymer (1960) extended this analysis, showing that FDI represents something more than simple capital flow; in his model FDI is thought to be a bundle of capital stocks, know-how, management and superior technology.

At the macro level much of the empirical literature has found a positive impact of FDI on a host country´s output. In fact, foreign investors contribute to economic growth of the host country because they are likely to be more productive than domestic firms (Dunning et. al., 2008). Multinational companies, particularly those involved in high technology activities, are characterized by being global leaders in the possession of the most advanced knowledge in their field.

It is thus often claimed that MNCs have technological superiority and strong management skills which can be transferred to, or emulated by, local firms in the host country, especially in developing countries. This phenomenon is referred to as knowledge spillover, and is defined as a positive externality for local firms stemming from the attraction of FDI, which may result in labor productivity growth for these firms (Blomström, 1986; Caves, 1974; Spencer, 2008).

MNCs may raise domestic productivity in the sectors where they are present through transfer of knowledge, organizational structures and practices, spillovers such as learning and demonstration effects, reverse engineering, or movement of personnel (Blomström and Kokko, 1998; OECD, 2003). However, their impact varies from country to country depending on the host country´s conditions (Paus and Gallagher, 2008). Abramovitz (1979) used the term "absorptive capacity" to refer to domestic capabilities to absorb spillovers of foreign technologies, and some more recent papers highlight the complementarities between human capital and technology, both of which are influenced by endogenous policy choices (Paus, 2005; Paus and Gallagher, 2008).

Previous studies in this area have arrived at mixed or even contradictory results regarding knowledge spillovers related to FDI in developing countries or emerging economies. Some of these studies have found evidence of positive effects stemming from spillovers on local firms (e.g., Blomström, 1986; Buckley, Clegg, and Wang, 2007; Tian, 2007; Wei and Liu, 2006), while other studies have found that FDI has not produced any knowledge spillovers, or that if they do occur, their effects have been negative for local firms (Feinberg and Majumdar, 2001).

According to Zhang et al. (2010), these contradictory results can be explained using two main arguments. First, the approach adopted by empirical studies of knowledge spillovers associated with FDI are focused simply on whether or not the presence of FDI affects local firms' productivity. In Görg and Strobl's (2005) words, one of the limitations of such studies is that they treat the specific mechanisms through which knowledge spillovers are supposed

to occur as a "black box". Secondly, knowledge spillovers imply a process through which local firms learn from foreign firms. Thus, the effect of knowledge spillovers associated with FDI also depends on the role played by local firms as recipients of these spillovers. In other words, it is important to consider firms' capacity to absorb and adapt knowledge (absorptive capacity), since this is one of the determinants of positive effects from knowledge spillovers (Lim, 2001).

In an effort to clarify the first weakness in the approach used by other studies, Saggi (2002) identified three channels through which knowledge spillovers from multinational to local firms can occur: (i) demonstration effects, which include emulation or reverse engineering of multinational companies' products and practices by local firms; (ii) labor mobility, which allows for employees trained by multinational companies to apply their knowledge in local firms, once they stop working for multinationals; and, (iii) forward and backward vertical linkages between multinational companies and their local suppliers. This is important, since studies which have clearly identified a channel through which knowledge spillovers occur offer very solid results about the positive externalities of such spillovers.

Based on an extensive literature review and analysis of empirical evidence, Farole and Winkler (2014) present one of the most comprehensive conceptual frameworks for the identification of mediating factors for FDI spillovers. These authors claim that in order to understand how spillovers occur it is not only necessary to have MNCs and domestic firms operating in a host country, but to take into account characteristics of MNCs such as their motives for establishing operations in the host country, as well as their global production and sourcing strategies, entry models, and the length of their presences in the host country, all of which determine *MNC spillover potential*. It is also necessary to take into account the capacity of domestic firms to absorb knowledge and technology through their direct and indirect interaction with MNCs (*absorptive capacity of domestic firms*), as well as the *host country factors and institutional framework*, such as labor market regulations, intellectual property rights, access to finance, and learning and innovation infrastructure. Finally, in agreement with Saggi (2002), the authors argue that there are three channels for FDI spillovers: (i) supply chains; (ii) labor turnover; and (iii) market restructuring.

An important dimension of this framework is that the set of mediating factors influencing the relationship between MNCs and domestic firms is not static, but dynamic. It means that the composition of the set of such factors (FDI spillover potential, domestic firm absorptive capacity, host country factors and institutional framework, and transmission channels) change through time, which must be taken into account in any analysis of the relationship between multinationals and local firms.

In the case of the supply chain channel, some studies have found important FDI spillovers, specifically when local firms become input or service suppliers of multinational firms (backward spillovers), or when the goods and services provided by MNCs are used as inputs by local firms (forward spillovers). Among the most important of these studies are those of Giroud, Jindra, and Marek (2012), Javorcik and Spatareanu (2009), Jordaan (2011), Gentile-Lüdecke and Giroud (2012), Godart and Görg (2013), and Fu (2012). These spillovers may occur because MNCs help local producers to upgrade their technological capabilities directly through sharing of production techniques and product design and assisting with technology acquisition (Paus, 2005; Paus and Gallagher 2008), or because MNCs help local firms with personnel training, advance payments, leasing of machinery, provision of inputs, help with quality assurance, and organization of product lines (Lall 1980; Crespo and Fontoura 2007;

Javorcik 2009). Since in all of these cases the supplying firm does not fully compensate the multinational for these benefits, it is clear that they constitute real spillovers (Farole and Winkler, 2014).

One important study shows evidence of both *technology spillover* and *crowding out* effects on domestic firms caused by the presence of multinational businesses (Kosová, R., 2010). According to the author, the *crowding out* effect is a short-term or static phenomenon: foreign entry increases the exit rates of domestic firms at the time, but subsequently the growth of the foreign industry segment is accompanied by increases in both the growth rate and survival of domestic firms. This last result is important in pointing out that FDI spillovers are more likely to be realized in the medium to long term, as knowledge first needs to be absorbed by the local workforce.

This short-term crowding out effect can be also observed in the case of the labor market. As pointed out by Farole and Winkler (2014), in the short term, it is more likely that foreign firms will take away high-quality labor from domestic firms by offering higher wages and benefits, resulting in a potentially negative spillover effect (Sinani and Meyer 2004; Hoekman and Javorcik 2006; Crespo and Fontoura 2007). This loss of skilled labor can also have a negative effect on the absorptive capacity of domestic firms to benefit from FDI spillovers.

In another important study, Paus and Cordero (2008) found few backward linkages between high-tech MNCs and local firms in Costa Rica. They claim that such a situation is due both to the limited potential for spillovers from foreign investment as well as the limited domestic absorptive capacity for linkages.

Several studies have found important FDI spillovers coming from labor turnover – another transmission channel – since MNCs invest in providing their workers with knowledge and skills, the benefits of which may not be completely internalized, as knowledge may be horizontally or vertically carried over to local firms through labor mobility (Markusen and Trofimenko, 2007). Thus, knowledge embodied in the labor force may move from multinational to local firms—either to existing local firms or when workers start their own firms (Fosfuri, Motta, and Ronde 2001; Glass and Saggi 2002; Crespo and Fontoura 2007). In the case of Costa Rica, Monge-González *et al.* (2012) found evidence of the type of knowledge and skills obtained by MNC workers who later moved to local industries. They also found that new firms created by former MNC employees (spinoffs) show much lower death rates than other Costa Rican firms, which is interpreted by the authors as a result of the managerial skills acquired by local entrepreneurs when working for MNCs in Costa Rica.

De la Peña (2010) analyzes FDI effects on entrepreneurial activity and the factors that foster or hinder that activity. He presents evidence against the hypothesis that FDI is positively correlated with the creation of new firms, particularly in a setting in which the host country's economic structure is heavily characterized by micro- and small low-tech firms. On the other hand, Balsvik (2011) found that Norwegian manufacturing employees with previous work experience in MNCs contribute more to increased productivity than their counterparts without such experience. This result is stronger in the case of less-skilled workers.

Finally, in the case of market restructuring – the last transmission channel – there is also empirical evidence of FDI spillovers. In fact, increased competition between MNCs and local firms (if the foreign company also sells to the local market) may push the latter to improve

productivity, quality, and reliability to keep up with foreign competitors and avoid becoming a part of the exit of the worst performers (Farole and Winkler, 2014). The presence of multinational firms may also increase competition among local firms that want to become their suppliers, resulting in higher quality and reliability of inputs (Crespo and Fontoura 2007; Javorcik 2009). Other FDI spillovers can arise from market restructuring due to direct imitation or reverse-engineering by local firms when the latter are exposed to MNC products, marketing strategies and production processes (Farole and Winkler, 2014).

2. Effects of ICT and IT-enabled MNCs on host country ICT firms

Although there is little research dedicated specifically to the subject of the effects of ICT and IT-enabled MNCs on local ICT firms in their host countries, the body of literature related to the formation of ICT clusters is especially interesting because it is often claimed that one of the benefits of cluster formation is a strengthening of domestic ICT firms through their association with MNCs. However, one of the most important points to emerge from a consideration of this literature is the fact that just as successful cluster formation cannot be simply mandated by governments, but rather depends heavily on the previous existence of favorable conditions such as market demand for the products or services produced by a cluster's members and the proximity of large numbers of skilled workers (Porter 1998, Wadhwa 2010), the simple act of placing MNCs and domestic ICT firms in proximity to each other in clusters, or technology or software parks, does not guarantee the formation of productive linkages or spillovers.

Mohan (2006) notes that an evaluation of Malaysia's Multimedia Super Corridor (MSC) initiative found that ICT MNCs tended to be highly self-sufficient and generated few linkages with local suppliers, and similar results were reported by Gallagher and Zarsky (2007) in the case of Mexican clusters centered around hardware manufacturing. Similarly, Tessler *et al*. (2003) found that in Ireland local employees of ICT MNCs tended to work in lower-level positions such as technical support and software testing, rather than in areas which would allow the workers to develop their own entrepreneurial capabilities, and that the most successful local companies forming linkages with these MNCs were most often "low-margin, low-tech businesses like printing and packaging".

In fact, governments in countries which are leaders in the promotion of large-scale ICT clusters have learned that they must make specific efforts to promote productive relationships of MNCs and domestic ICT firms. In the case of Malaysia, for example, the government required MNCs wishing to locate themselves in the MSC to provide benefits for local ICT firms through training, joint development projects, or other efforts, with results such as the formation of a Technopreneur Development Center by Sun Microsystems (later acquired by Oracle Corporation) to provide assistance to small domestic ICT firms developing applications using the Java programming language (Blogspot 2005). In the case of China, admission of ICT MNCs to Special Economic Zones (SEZs) also often involves a commitment on the part of these MNCs to assist local ICT companies to develop their capacities (Gregory, N., *et al.* 2009)

In a particularly well-documented study, Zhou and Xin (2003) analyzed the interactions between MNCs and local technology actors in China's leading information communication technology (ICT) service cluster in Zhongguancun, Beijing. They found that the relationship between MNCs and local firms is hierarchical, but also interdependent and evolutionary. Local firms' collaboration with MNCs provided them with vital technological and

organizational training, which the local firms use strategically to develop their market networks and innovative capacities in their home markets. The learning capacity of local firms is greatly improved by the presence of other related enterprises, research and development facilities, and an advanced developmental state of the countries hosting a market-oriented spatial cluster. Zhou and Xin's analysis shows the importance of dynamic interactions between the micro and the macro levels required for a host country of High-Tech FDI to achieve an industrial upgrade.

Argentina

Lopez, *et al.* (2009) indicate that the software and information services (SIS) sector in Argentina began to develop almost 50 years ago and that its expansion occurred spontaneously in response to incentives in the domestic market, particularly in the area of services and "customized products" designed for management and administration. While at the beginning of the 2000s the focus of SIS businesses was reported to be almost exclusively on the production of management and financial software for local consumption (Chudnovsky and López 2002), López, *et. al* (2009) later describe describe the SIS sector as consisting of large segments: (i) a relatively small group of large companies, almost all of foreign capital, focused on the marketing of foreign products and oriented towards large customers, both in the local and export markets, (ii) a second set of locally-owned companies, with between 200 to 300 employees that develop software and offer other services, and, (iii) a numerous and heterogeneous core of small businesses, dedicated to the development of local software and the provision of a wide range of services. This group includes a large group of companies (almost one third of the total) less than 5 years old with innovative potential, and a group of companies that survive due to their flexibility and ability to offer on-demand solutions.

In recent years, in addition to software development and information services companies, new players have begun to enter the market in the area of connectivity (Jordan, Galperin and Peres, 2013). The private ICT sector is currently represented by 40 industry associations, includes technological clusters with regional and national presence, and has several business incubators created through private-public cooperative efforts.

A relatively small number of authors have produced a substantial number of historical studies of the SIS sector that include discussion of the arrival of MNCs in the country, either as a result of FDI attraction efforts or because the MNCs arrive on their own to compete in the local and regional markets or be close to major clients (Bastos Tigre, *et al.* 2011, Bastos Tigre, ed. 2009, López, ed. 2008, etc.) The availability of skilled human resources with lower wages than similarly skilled workers in developed countries is noted as an especially strong attractant for MNCs, and competition for these resources between domestic ICT firms and MNCs has been noted (López and Ramos 2009). In this context, Bastos Tigre, *et al.* (2009) make an interesting distinction between "labor intensive" and "knowledge intensive" MNCs – the former have competed for labor and put pressure on the salaries paid in the sector, while the latter have lower labor requirements, work in higher value-added sectors, and "tend to be welcomed by local companies as an important contribution to the visibility of the industry at the international level and a potentially positive factor for the improvement of the technical capabilities available in each region". These authors have also noted relatively low levels of linkages between MNCs and domestic ICT firms.

Costa Rica

Hewitt and Monge-González (2007) carried out the first mapping of the Costa Rican ICT sector. The authors analyzed 125 firms, both local and multinational, working in the areas of c*omponents/hardware, software products, direct ICT services and IT-enabled services* (ITES), with several of the multinationals operate in Export Processing Zones (EPZs). With respect to factors affecting the knowledge absorptive capacity of domestic firms, the authors find that most of these companies are exporters, employ high skilled workers, are involved in innovation activities, have certifications for quality control, and face strong competition from both other firms operating in Costa Rica and from abroad. Two main obstacles in this area were also identified by the authors: lack of labor availability, especially of highly-skilled workers, and access to loans. The scarcity of highly-skilled workers might be indicating the existence of a crowding out effect in the labor market due to the operation of MNCs in the country – one of the most important topics to be covered in later analysis for this project.

Ciravegna (2012) study the linkages between MNCs and local ICT firms in Costa Rica during the year 2007. The author claimed that although some linkages can be seen, which generate positive effects such as providing access to new clients and opportunities to learn new organizational practices, linkages are still scare in the ICT cluster. In fact, he found that MNCs argue that local firms lack the necessary abilities to work with them, and that since the MNCs operate in EPZs they can import all of their inputs tax-free, echoing the findings of both Giuliani (2008), and Paus and Gallagher (2008).

Mata and Mata (2008) claimed that the FDI strategy followed by Costa Rica presents more negative than positive effects for local ICT firms, especially due to the lack of spillover effects from ICT MNCs to local firms. They point out two main negative effects of the FDI strategy on the local ICT firms: (i) MNCs can pay higher wages than local ICT firms to recruit qualified human resources in a tight labor market, and (ii) cost and infrastructure disadvantages of local ICT firms with respect to MNCs operating in the country (for example, given that MNCs can operate in EPZs, government procedures and customs processes are streamlined for them while local ICT firms have to deal with bureaucratic procedures and processes). In short, the authors claim that local ICT firms face a more challenging business environment than MNCs operating in Costa Rica.

Nicholson (2008) described the human resource development policy of Costa Rica in the context of software exports. The author concludes that in general Costa Rica has a small labor pool, with relatively high costs compared to competing countries. He also points out that the English speaking skills of technical workers in Costa Rica are generally weak, that there are no significant numbers of returnees to the country from the Costa Rican diaspora, and that the linkages between universities and industry are weak. All of this supports the idea of a potential crowding out in the labor market due to the attraction of FDI in the ICT sector.

Monge-González and González-Alvarado (2007), on the other hand, illustrate the contribution of ICT multinationals to skills development in Costa Rica, based on the experiences of Intel, Microsoft, and Cisco. They highlight the importance of the learning and innovation infrastructure; specifically, they describe how businesses, universities, and training and research institutes work together to develop curricula that better respond to the demands of the productive sector.

In a more recent study, Monge-González and Hewitt (2010) found that most domestic ICT companies have been highly involved in innovative activities that include a wide range of changes in their activities, such as product/services innovations, organizational innovations, and marketing innovations. Levels of activity in these areas ranged between 27 percent in the case of introducing a new product/service in the international market to 89 percent in the case of improving an existing product or service. Most of these companies are highly involved not only in R&D activities, but also in other important innovation-input activities such as training of human resources, product or process design, receiving consulting services and technical assistance, carrying out organizational changes, and patenting. This is a positive finding regarding the knowledge absorptive capacity of local ICT firms in the country.

It was also found that local ICT firms interact very little with private and public educational and research institutions, and do so mostly for training purposes. On the other hand, a stronger relationship was found between domestic ICT firms and the suppliers and clients with whom they were involved in the productive chain. In fact, more than half of domestic ICT firms surveyed had MNCs as clients in Costa Rica. A substantial portion of these local companies reported the need to carry out radical or significant changes in their organization, the variety of their products and/or services, their production techniques, their levels of investment in new machinery and technological equipment, delivery times, levels of production, and/or expenditures on training in order to improve delivery of goods or services to MNCs.

With respect to knowledge spillovers through worker mobility between MNCs and local ICT companies, almost half of all domestic ICT firms surveyed had at least one owner that previously worked for an MNC in Costa Rica, while 26 percent of managers, 9 percent of engineers, and 5 percent of programmers in the local ICT companies had previously worked for MNCs in Costa Rica.

Finally, some of the local ICT firms reported having commercial relationships such as "channel partnering" with ICT multinationals, in which the domestic ICT companies are themselves clients of ICT MNCs who compete in the local market, entering into formal relationships to sell and/or locally support the multinationals' products and services. The local companies reported important benefits from these commercial relationships with ICT MNCs, such as training in sales and marketing techniques, obtaining information about current or possible clients, participation special events for network formation between domestic ICT companies involved with the same multinational ICT companies, and increased visibility for local partners (being featured in local advertisements by the multinational firms, for instance).

Uruguay

Public policies aimed at improving production technologies in the Uruguayan economy have been effective in some ways, but have still not generated the increases in innovative practices that have been hoped for. Their impact on ICT firms has been larger than those for firms in other sectors, and these firms have received proportionately more financial aid from programs of the National Agency for Investigation and Innovation (ANII) (22%) than have those in other sectors. However, it should also be remembered that ICT firms have also traditionally had a higher propensity to innovate than firms in other sectors, independent of such assistance.

ICT firms have also had relatively stronger linkages with the academic and scientific communities than firms in other sectors, and the results of interviews with relevant actors suggest that cooperation with the academic community, public direct support and technical assistance from diverse sources have had positive externalities on the performance of ICT firms, particularly those of smaller size (Kesidou and Romijn, 2006; Dalberg GDA and IADB, 2010).

Kesidou, *et al.* (2009) suggest that spillovers based on informal interactions between domestic ICT firms and MNCs have their strongest effect in the area of improved product and services innovation, while more spillovers that are produced by more formal, market-transaction types of interaction may be associated more with relatively advanced organizational capability.

A consideration of different ICT sector segments in Uruguay suggests that the entry of ICT MNCs has indirectly generated some positive externalities by stimulating domestic firms to participate in new activities, but knowledge spillovers seem to be scarcest when they create few incentives for increasing the skill levels of the workforce. In this context, it is interesting to note that the results of analysis of secondary data collected for this project indicate that ICT MNCs in the telecommunications sector are associated with the hiring of the lowest amount of workers with tertiary education, and the largest gender wage gaps. On the other hand, IT-enabled MNCs and software developers that establish partnerships with domestic entrepreneurs may produce more positive impacts. The results of Interviews carried out in a recent study (Uruguay XXI, 2012) also suggest that the attraction of foreign companies may be more beneficial to Uruguayan ICT companies when the multinationals operate in areas that involve products and services sold directly to consumers (e.g., those linked to e-commerce and IT infrastructure) given they involve large financial investments and international recognition.

This diagnosis coincides in some ways with the recommendations made by foreign agencies to their national entrepreneurs on the best market penetration strategies (e.g., Oficina Económica y Comercial de la Embajada de España en Montevideo, 2006). For instance, the US government stated that areas of interest for US firms interested in Uruguay include telecommunications-related products (cellular phones, cable TV) and IT computer hardware (CPUs, monitors, printers, network, boards, ATM equipment, hubs, magnetic discs, memory cards, ink cartridges, etc.); it also noted that call centers, back office outsourcing, and IT offshoring were considered attractive business when located in FTZs (Bittencourt et al., 2009).

Betarte, *et al.* (2008) argue that spillovers may be created in the case of ICT and IT-enabled services multinationals in Uruguay due to the large value-added content and comparatively greater share of skilled labor embedded in the their products, as well as to the high rate of knowledge capital accumulation inherent in the activity. Further, given that companies within FTZs generally engage in joint business activities to promote commodity chains and horizontal cooperation with intensive use of new technologies, MNCs there located are more likely to act as significant drivers for the expansion of domestic ICT industries.

This view has been reflected in the government's early active support for the location in Zonamerica of a major technology-related corporation - Tata Consultancy Services – as a means of demonstrating to other foreign investors that Uruguay is a profitable spot for the provision of software and business services to the region (Hausmann, Rodríguez-Clare and

Rodrik, 2005). Moreover, even though domestic ICT firms are internationally competitive, they are currently seeking to attract foreign investors to the market (as reflected in the contacts made in 2013 between the CUTI and US firms such as Cisco, Apple and Paypal) with a twofold goal: to stimulate these companies to provide funds for the development of innovative local ICT projects and to promote the location in Uruguay of training centers and other business targeting the region (CUTI 2012).

References

Balsvik, R. 2011. "Is Labor Mobility a Channel for Spillovers from Multinationals? Evidence from Norwegian Manufacturing." Review of Economics and Statistics 93 (1): 285–97.

Bastos Tigre, Paulo, ed. 2009. Outsourcing y clusters de software en Argentina y Brasil. Available at idl-bnc.idrc.ca/ dspace/bitstream/10625/46109/1/132598.pdf.

Bastos Tigre, Paulo, *et al.* 2009. Final Report of Challenges and Opportunities for the Software and Information Services in Brazil and Argentina. A study of clusters. ANEXO II. 2009 Available at idl-bnc.idrc.ca/ dspace/bitstream/10625/44639/1/131113.pdf.

———. 2011. Knowledge Cities: A Taxonomy for Analyzing Software and Information Service Clusters. Available at rae.fgv.br/sites/rae.fgv.br/files/artigos/10.1590_S0034-75902011000100003.pdf.

Bercovich, Néstor 2010. Desarrollo de la industria del software, outsourcing y clusters de TI. Available at www.eclac.cl/socinfo/noticias/noticias/5/40165/Presentación_Bercovich-rv-annags_[Compatibility_Mode].pdf

Betarte, G., H. Cancela and J. Moleri 2008. Tecnologías de la Información y Comunicación en el marco del Plan Estratégico Nacional en Ciencia, Tecnología e Innovación. Montevideo: ANII. Available at: http://bibliotecas.ort.edu.uy/ bibid/62702.

Bittencourt, G., G. Carracelas, A. Doneschi and N. Reig Lorenzi 2009. "Tendencias Recientes de la Inversión Extranjera Directa en Uruguay", dECON Documento de Trabajo 27, Facultad de Ciencias Sociales, Universidad de la República, Uruguay.

Blogspot. 2005. Sun opens Java Technopreneur Centre in Putrajaya (techparadise.blogspot.com/2005/06/sun-microsystems-opens-java.html)

Blomström, Magnus 1986. "Foreign Investment and Productive Efficiency: The Case of Mexico". Journal of Industrial Economics, Vol. 3 5, pp. 97-112

Blomstrom, M. and A. Kokko, 1998. "Multinational Corporations and Spillovers," Journal of Economic Surveys 12, 247-277.

Buckley PJ, Clegg J, Wang C. 2007. Is the relationship between inward FDI and spillover effects linear? An empirical examination of the case of China. Journal of International Business Studies 38(3): 447-459

Chudnovsky, Daniel, and Andrés López 2002. The Software and Information Services Sector in Argentina: the Pros and Cons of an Inward-oriented Development Strategy. Available at www.udesa.edu.ar/files/img/ Administracion/dtn23.pdf

Ciravegna, Luciano 2012. "Linkages in the New ICT Clusters of Latin America: Evidence from Costa Rica" Journal of Latin American Studies #44, 553-580.

Crespo, N., and M. Fontoura. 2007. "Determinant Factors of FDI Spillovers—What Do We Really Know?" World Development 35 (3): 410–25.

CUTI 2012. Uruguay promueve inversiones para la industria TI en Silicon Valley. Available at www.cuti.org.uy/novedades/2386-uruguay-promueve-inversiones-y-acuerdos-para-la-industria-del-software-en-silicon-valley.html.

Dalberg Global Development Advisors and Inter American Development Bank 2010. "Impact evaluation of the business development program for the software industry in Uruguay". Report. Available at: http://www.iadb.org/en/publications/publication-detail,7101.html?id=30506.

De la Peña, P. 2010. Measuring the Effects of Foreign Direct Investment as a Conduit for the Creation of a New Entrepreneurial Class in México. PhD Thesis. The University of Arizona.

ECLAC 2011. Foreign direct investment in the software industry in Latin America. Available at www.eclac.org/ publicaciones/xml/9/43289/2011-322-LIE-2010-WEB_ULTIMO.pdf.

Farole, T. and Winkler, D. 2014. Making Foreign Direct Investment Work for Sub-Saharan Africa. Local Spillovers and Competitiveness in Global Value Chains, The World Bank.

Feinberg SE y Majumdar SK. 2001. Technology spillovers from foreign direct investment in the Indian pharmaceutical industry. Journal of International Business Studies 32(3): 421-437.

Fosfuri, A., M. Motta, and T. Ronde. 2001. "Foreign Direct Investment and Spillovers through Workers' Mobility." Journal of International Economics 53 (1): 205–22.

Fu, X. 2012. "Foreign Direct Investment and Managerial Knowledge Spillovers through the Diffusion of Management Practices." SLPTMD Working Paper Series 035, Department of International Development, University of Oxford.

Gallagher, K., and L. Zarsky. 2007. The Enclave Economy: Foreign Investment and Sustainable Development in Mexico's Silicon Valley. Cambridge: The MIT Press

Glass, A., and K. Saggi. 2002. "Multinational Firms and Technology Transfer." Scandinavian Journal of Economics 104 (4): 495–513.

Gentile-Lüdecke, S., and A. Giroud. 2012. "Knowledge Transfer from MNCs and Upgrading of Domestic Firms: The Polish Automotive Sector." World Development 40 (4): 796–807.

Giroud, A., B. Jindra, and P. Marek. 2012. "Heterogeneous FDI in Transition Economies: A Novel Approach to Assess the Developmental Impact of Backward Linkages." World Development 40 (11): 2206–20.

Godart, O., and H. Görg. 2013. "Suppliers of Multinationals and the Forced Linkage Effect: Evidence from Firm Level Data." CEPR Discussion Paper 9324, Centre for Economic Policy Research (CEPR), London

Giuliani, Elisa 2008. "Multinational Corporations and Patterns of Local Knowledge Transfer in Costa Rican High Tech Industries", Development and Change, 39: 3, pp. 385-407.

Görg, H., and Strobl, E. 2005. Spillovers from foreign firms through worker mobility: an empirical investigation. Scandinavian Journal of Economics, 107(4), 693–709.

Gregory, N., et al. (2009). New Industries from New Places: The Emergence of the Software and Hardware Industries in China and India. Stanford University Press, The World Bank, Washington, D.C., Stanford, California.

Hausmann, R., Rodríguez-Clare, A. and Rodrik, D., 2005. Towards a strategy for economic growth in Uruguay, Economic and Social Study Series, IADB, Washington D.C.

Hewitt, J. and R. Monge 2007. Mapeo del Sector de las TICs de Costa Rica, Fundación Comisión Asesora de Alta Tecnología y Cámara de Tecnología de Información y Comunicación, San José, Costa Rica.

Hoekman, B., and B. Javorcik. 2006. “Lessons from Empirical Research on Technology Diffusion through Trade and Foreign Direct Investment.” In Global Integration and Technology Transfer, edited by B. Hoekman and B. Javorcik. Washington, DC: Palgrave/ World Bank.

Javorcik, B., and M. Spatareanu. 2008. “To Share or Not to Share: Does Local Participation Matter for Spillovers from Foreign Direct Investment?” Journal of Development Economics 85 (1–2): 194–221.

———. 2009. “Liquidity Constraints and Firms’ Linkages with Multinationals.” World Bank Economic Review 23 (2): 323–46.

Jordaan, J. 2011. “Local Sourcing and Technology Spillovers to Mexican Suppliers: How Important Are FDI and Supplier Characteristics?” Growth and Change 42 (3): 287–319.

Jordán, V., Galperín, H. and Peres, W. (eds) 2013. Banda Ancha en América Latina: más allá de la conectividad. Santiago de Chile, CEPAL.

Kesidou, E. and H. Romijn 2006. “Do Local Knowledge Spillovers Matter for Development? An Empirical Study of Uruguay’s Software Cluster”, Eindhoven Centre for Innovation Studies Working Paper, Technische Universiteit Eindhoven, The Netherlands.

———., M.C.J. Caniëls and H. Romijn. 2009. Local Knowledge Spillovers and Development: An Exploration of the Software Cluster in Uruguay. Industry and Innovation, 16:2, 247-272 Available at dx.doi.org/10.1080/13662710902764444.

Kosová, R. 2010. Do Foreign Firms Crowd Out Domestic Firms? Evidence from the Czech Republic, The Review of Economics and Statistics, November, Vol. 92, No. 4, pp. 861-881.

Lall, S. 1980. “Vertical Inter-firm Linkages in LDCs: An Empirical Study.” Oxford Bulletin of Economics and Statistics 42 (3): 203–26.

Lim, E.G. 2001. “Determinants of, and the Relation Between Foreign Direct Investment and Growth: A Summary of the Recent Literature”. IMF Working Paper WP/01/175.

López, Andrés, ed. 2008. Complementación Productiva en la Industria del Software en los Países del Mercosur. Available at www.cuti.org.uy/documentos/industris_software_ mercosur.pdf.

López, A., and Ramos, D., 2009. La Industria del software y servicios informáticos argentina. Tendencias, Factores de competividad y clusters. PEC B-107-FLACSO-IDRC.

López, A., Ramos., D. and Starobinsky, G. 2009. “Clusters de software y servicios informáticos: los casos de Córdoba y Rosario a la luz de la experiencia internacional”, Documento de Trabajo Nº 32, CENIT, abril de 2009.

Mata, F. and G. Mata 2008. Foreign Direct Investment and the ICT Cluster in Costa Rica: Chronicle of a Death Foretold?, Paper presented for the VI Globelics Conference, September 22-24, 2008, Mexico City.

Markusen, J.R. y Trofimenko, N. 2007. “Teaching Locals New Tricks: Foreign Experts as a Channel of Knowledge Transfer”. NBER Working Paper 12872. Cambridge, Mass.: National Bureau of Economic Research.

Mohan, Avvari. 2006. Promotion of High-Tech SMEs through Clustering and Networking - Cases from Malaysia's MSC Cluster and the MSC Technopreneur Development Flagship (MTD) Programme. United Nations Economic And Social Commission For Asia And The Pacific (UNESCAP).

Monge-González, R., Leiva J.C. and Rodríguez, J.A. 2012. Movilidad laboral y derrames de conocimiento: Un estudio aplicado en empresas multinacionales en Costa Rica. Editorial Académica Española, Deutschland, Alemania.

Monge-González, R. y González-Alvarado, C. 2007. "The role and impact of MNCS in Costa Rica on skills development and training: The case of Intel, Microsoft and Cisco". Documento preparado para The International Labor Organization. Geneva: Switzerland.

Monge-González, R. and John Hewitt 2010. Innovation, R&D and Productivity in the Costa Rican ICT Sector: A Case Study, IDB Working Paper Series No. IDB-WP-189. Department of Research and Chief Economist, Inter-American Development Bank.

Nicholson, B 2008. "Human resource development policy in the context of software exports: case evidence from Costa Rica", Progress in Development Studies 8, 2, pp. 163-176.

Oficina Económica y Comercial de la Embajada de España en Montevideo 2006. "El mercado del software en Uruguay". Available at: http://www.cuti.org.uy/articulos/679-el-mercado-del-software-en-uruguay.html.

Paus, E. 2005. Foreign Investment, Development, and Globalization. Can Costa Rica Become Ireland? New York: Palgrave-Macmillan.

Paus, E. and K. Gallagher 2008. "Missing Links: Foreign Investment and Industrial Development in Costa Rica and Mexico," Studies in Comparative International Development. 42, 4, 53-80.

Paus, E. and J. Cordero 2008. Foreign Investment and Economic Development in Costa Rica: The Unrealized Potential. Discussion Paper Number 13, Working Group on Development and Environment in the Americas

Porter, Michael. 1998. Clusters and the New Economics of Competition. Available at hbr.org/1998/11/ clusters-and-the-new-economics-of-competition/ar/1.

Saggi, K. 2002. "Trade, foreign direct investment and international technology transfer: A survey". World Bank Research Observer 17(2): 191-235.

Sinani, E., and K. Meyer. 2004. "Spillovers of Technology Transfer from FDI: The Case of Estonia." Journal of Comparative Economics 32 (3): 445–66.

Tian X. 2007. Accounting for sources of FDI technology spillovers: evidence from China. Journal of International Business Studies 38: 147-159

URUGUAY XXI-Instituto de Promoción de Inversiones y Exportaciones 2012. Servicios Globales de exportación. Oportunidades de Inversión en Uruguay", Montevideo.

Wadhwa, Vivek. 2010. Top-Down Tech Clusters Often Lack Key Ingredients. Available at www.businessweek.com/technology/content/may2010/tc2010053_047892.htm.

Werchola, E. 2010. Macroeconomic effects of foreign direct investment inflows on the host country. PhD Thesis, University of Illinois at Chicago.

Wei Y and Liu X. 2006. Productivity spillovers from R&D, exports and FDI in China´s manufacturing sector. Journal of International Business Studies 37(4): 544-557.

Zhang, Y., Li, H., Li, Y. and Zhou, L. 2010. "FDI Spillovers in an emerging market: The role

of foreign firms´ country origin diversity and domestic firms´ absorptive capacity". Strategic Management Journal, 31: 969-89.

Appendix B: Econometric models

In what follows, we describe the basic econometric models that we estimated as part of the project, using secondary data sets from Costa Rica and Uruguay. As we pointed out in the original proposal, time series data from secondary sources were only available in the cases of these two countries. However, we carried out a survey in each country – Argentina, Costa Rica and Uruguay – on a representative sample of both domestic ICT firms, and ICT and IT-enabled MNCs, which will provide us with primary data that allows us deepen the analysis for all three countries. We begin by discussing the models developed by team members in Costa Rica and Uruguay, which will constitute the basic set of tools we will use to perform econometric estimations in these two countries, selecting the most appropriate models(s) for the data available in each one of them.

To investigate the degree to which the presence and activities of ICT and IT-enabled MNCs help or hinder the survival and growth of *existing* domestic (locally owned) ICT firms, as well as the formation of *new* domestic ICT firms (start-ups), and what types of existing and new domestic ICT firms are benefited or disadvantage by the activities of these MNCs, we follow the conceptual framework developed by Farole and Winkler (2014). This framework identifies the mediating factors for Foreign Direct Investment (FDI) spillovers, based on earlier work by Paus and Gallagher (2008).

For spillovers to occur it is not only necessary to have MNCs and domestic firms operating in a host country like Costa Rica, but to take into account characteristics of MNCs such as motives for establishing operations in the host country, global production and sourcing strategies, entry models, and length of presence, all of which determine MNC spillover potential. It is also necessary to take into account the capacity of domestic firms to absorb knowledge and technology from their direct and indirect interactions with MNCs (absorptive capacity of domestic firms), as well as host country factors and institutional framework, such as labor market regulations, intellectual property rights, access to financing, and learning and innovation infrastructure. An important aspect of this framework is that the set of mediating factors influencing the relationship between ICT and IT-enabled MNCs and domestic ICT firms, is dynamic, not static. Since the composition of the set of such factors may change through time, it is important to use time-series analysis in addition to cross-sectional analysis whenever possible.

In modeling the impact of ICT and IT-enabled MNCs on the survival and growth of domestic ICT firms, we consider in all our analyses and models both the potential channels for MNC spillovers and the three sets of mediating factors affecting the relationship between such MNCs and domestic ICT firms, as mentioned previously. The literature review carried out as part of this project showed that the three channels mentioned in the conceptual framework (supply chains, labor turnover and market restructuring) are clearly relevant to the study of the ICT sectors of Argentina, Costa Rica and Uruguay.

Costa Rica

<u>MNC impact on local firm survival</u>

To estimate the impact of ICT and IT-enabled MNCs on *survival* of ICT domestic firms, a Cox proportional hazard model was calculated (Cox, 1972):

$$h(t) = h_0(t)e^{X_t^{'}\beta} \qquad (1)$$

where *h(t)* is the rate at which firms exit at time *t* given that they have survived at *t-1* and $h_0(t)$ is the baseline hazard function (the parametric form of which is not specified) when all of the covariates are set to zero. *X* is a vector of covariates that include firm and industry-specific characteristics which affect the survivability of firms, and β is a corresponding vector of regression coefficients to be estimated. Following the literature on firm survival we include two sets of explanatory variables in our model. The first is related to several characteristics of domestic ICT firms: firm employment size at time *t* (*lLogEmpH*), minimum efficient scale, defined as the log of median employment size in sector *j* (*logmedEmp*), and the sectorial Herfindahl index of sector *j* measured in terms of firms´ employment shares (*Herfindahl index*).

The second set of explanatory variables refers to the presence and activities of ICT and IT-enabled MNCs in Costa Rica: experience in years of domestic ICT firms selling to ICT MNCs (*ExperMNCICT*), experience in years of domestic ICT firms selling to IT-enabled MNCs (*ExperMNCIT_E*), presence of ICT and IT-enabled MNCs (*FOR*), and presence of ICT and IT enabled MNCs located outside free zones (*FORcompetence*). A detailed description of the variables used in model (1) is presented in Appendix A.

The coefficients associated with the last set of explanatory variables are those of interest when measuring the impact of MNCs on domestic firms in the ICT sector. We estimate Equation (1) for the whole sample of domestic ICT firms, as well as for the solutions providers, software, and telecommunications subsectors, using a panel of only domestic ICT firms from 2001 to 2011.

As pointed out by Ferragina, Pittiglio and Reganati (2010), there is no clear theoretical basis for presumptions about the nature of impacts of the presence of MNCs on exit patterns at the firm level. In fact, as discussed in the presentation of the conceptual framework, this impact will depend on the channels through which MNCs relate to domestic firms, as well as on the characteristics of each type of companies, and the context in which they operate in the host country. For this reason it is not reasonable to assume beforehand the possible signs of the coefficients associated with the variables that are intended to measure the presence and activities of MNCs in equation (1).

<u>MNC impact on local firm growth</u>

In order to explore whether the presence of MNCs help or hinder the growth of existing domestic ICT firms, we estimate a model based on that developed by Haltiwanger, Jarmin and Miranda (2010). These authors analyzed the relationship between firm size and growth using a method developed by Davis, Haltiwanger and Schuh (1996) to measure the growth of a firm, which allows the analyst to avoid what is referred to in the literature as the regression

fallacy – that is, the role of regression to the mean effects[9]. According to the discussion of the conceptual framework related to the impact of the presence of multinationals on the domestic firms, the model to be estimated can be specified as follows:

$$\mathrm{DHSgrowth_{jt}} = Z_{jt}^{'}\delta + \mu_{jt} \qquad (2)$$

where DHSgrowth is the growth rate of firm j in year t according to Davis, Haltiwanger and Schuh (1996). Z is a vector of covariates that include firm and industry specific characteristics which affect the growth rate of firms and δ is a corresponding vector of regression coefficients to be estimated. We include in our model two sets of explanatory variables. The first one is related to several characteristics of domestic ICT firms: firm employment size at time *t* (*lLogEmpH*), age (*varage*), a dummy variable that takes the value of one if the firm *i* enters and leaves the market during the study period and zero otherwise (*flashing*), level of corruption (*CPIscore*), engineering graduates (*logEngGrad*), technology gap (*techgapICT95*), and sales to MNCs not belonging to the ICT and IT-enabled sectors (*MNCother provider* and *ExperMNCother*).

The second set of explanatory variables refers to the presence and activities of ICT and IT-enabled MNCs in Costa Rica: sales of domestic ICT firms to ICT MNCs (*MNCICT provider, ExperMNCICT,* and *timMNCICT3*), sells of domestic ICT firms to IT-enabled MNCs (*MNCIT_E provider, ExperMNCIT_E* and *timMNCIT_E3*), permanence of MNCs (*lengthMNCICT*), presence of ICT and IT-enabled MNCs (*FOR*), and presence of ICT and IT enabled MNCs located outside free zones (*FORcompetence*). A detailed description of the variables used in model (1) is presented in Appendix A.

The coefficients associated with the last set of explanatory variables are those of interest when measuring the impact of MNCs on domestic ICT firms. We estimate Equation (2) for the whole sample of domestic ICT firms, as well as for the solutions providers, software, and telecommunications subsectors.

The error term in equation (2) -μ_{jt}- is a two-component term with one component related to an unobserved specific effect of the firm which does not vary over time (productive sector, managerial capacity, etc.), but which may have an impact on the outcome variable, and another component which is purely stochastic.

The challenge in the estimation of equation (2) lies in estimating the coefficients associated with the impact of the presence and activities of ICT and IT-enabled MNC while controlling for any factor that might affect the growth rates of the firm j in year t. We therefore combine a method of regression with fixed effects and the inclusion of several control variables that might affect the growth rates (the first set with explanatory variables). We estimate equation (2) by OLS using both fixed-effects and cluster-robust standard errors, and consider a panel of only domestic ICT firms from 2001 to 2011.

[9] These authors point out that "businesses that recently experienced negatively transitory shocks (or even transitory measurement error) are more likely to grow while businesses recently experiencing positive transitory shocks are more likely to shrink. This effect alone will yield an inverse relationship between size and growth." (p. 6). Therefore, DHS proposes a classification based on current size, which is based on the average of employment (*L*) in years t-1 and t. Thus, the firm-level employment growth rate was measured as follows:

$$DHSgrowth_{jt} = [L_{jt} - L_{jt-1}]/[0.5 * (L_{jt} + L_{jt-1})]$$

MNC impact on local firm creation

To estimate the impact of ICT and IT-enabled MNCs on the *creation* of new ICT domestic firms, the entry model used by Görg and Strobl (2002) was followed. The model features two types of industries – intermediate and final consumer goods production – and three types of firms: domestic firms producing intermediate goods, domestic firms producing final consumer goods, and multinational firms producing final consumer goods. Both industries are assumed to be imperfectly competitive with increasing returns to scale of production.

According to the model and the previous discussion of the conceptual framework, the presence of multinationals can have three effects on the host economy. First, there may be competition effect as multinationals compete with domestic producers of final goods. Second, multinationals may create additional demand for domestically produced intermediate goods through linkages with local suppliers. Third, in an imperfectly competitive domestic supplier industry, this additional demand may lead to decreasing average costs, leading in turn to increases in profits for intermediate good producers, stimulating entry into the intermediate good producing sector. Customer firms can be either domestic or multinational final-good-producing firms, or both. Through these effects, multinationals may stimulate the entry of domestic intermediate good producers as well as domestic final good producing firms. As stated by Görg and Strobl (2005), whether the latter two positive effects outweigh the potential negative competition effects remains an empirical question.

In order to test whether the presence and activities of ICT and IT-enabled MNCs help or hinder domestic ICT firms in Costa Rica, we run a simple entry rate model as follows:

$$E_{jt} = D_{jt}^{'}\vartheta + \omega_{\mathrm{jt}} \qquad (3)$$

where *E* is the entry rate, defined alternatively as the total gross and net number of domestic entrants over *t* to *t+1* relative to total firms population in industry *j* at time *t*, and *D* is a vector of firm and industry characteristics postulated to have an impact on a firm´s hazard rate. In accordance with authors as Acs and Audretsch (1989) and Mata and Machado (1996), *D* includes measures of firm employment size at time *t* (*lLogEmpH*), a minimum efficient scale defined as the log of median employment size in sector *j* (*logmedEmp*), the sectorial Herfindahl index of sector *j* measured in terms of firms´ employment shares (*Herfindahl index*), and the net sectorial (employment) growth rate. Most importantly, the model includes measures of the presence and activities of ICT and IT-enabled MNCs in Costa Rica: presence of ICT and IT-enabled MNCs (*FOR*), and average number of linkages that ICT and IT-enabled MNCs have with domestic ICT companies (L.avgChainsByMNCs). In addition, we include another variable that refers to the average number of linkages that other MNCs (neither ICT nor IT-enabled) have with domestic ICT companies (L.avgChainsByMNCno) as an additional control variable. A detailed description of the variables used in model (1) is presented in Appendix A. We estimate equation (3) using a panel of only domestic ICT firms from 2001 to 2011.

MNC impact on domestic ICT firm wages

To estimate impacts of ICT and IT-enabled MNCs on salaries of employees of domestic ICT firms, we begin by noting that MNC presence and activities may drive up salaries paid by domestic firms (a wage premium) due to two possible effects. First, MNC activities may

increase demand for labor in a market in which, in general, the offer is relatively inelastic. Second, workers with experience in MNCs may have acquired knowledge during their time with these companies which will make them more attractive for other companies (for instance, domestic firms), and they may therefore expect to receive a better salary than those who have not gained such experience while working in an MNC. It should be noted that the present study is not intended to estimate the impact of this second effect (externalities, or knowledge spillovers) separately.

The methodological approach used by Balsvik (2011) was followed to estimate impacts of ICT and IT-enabled MNCs on *real wages* paid by domestic ICT firms (while also considering the existence of a possible gender bias in these wages). In so doing, we use linked employer-employee data to construct firm-specific measures for the share of workers in domestic ICT firms with experience gained from working in ICT and IT-enabled MNCs. In short, we wish to explore to what extent the experience gained from working in ICT or IT-enabled MNCs is rewarded by domestic ICT firms. In order to do this, we estimate wage equations for workers in domestic ICT firms and compare the wages of the *movers* to those of *stayers*[10] in domestic ICT firms. We use dummies to indicate workers who are new to the firm and take the reference group to be stayers:

$$w_{it} = \beta_0 + \sum_{s=l,m,h} \beta_s \, ICT\_IT\_MNC_{is} + \sum_{s=l,m,h} \beta_s DomICT_{is} + \sum_{s=l,m,h} \beta_s Otherfirms_{is} + X_{it}^{'}\beta_4 + F_{j(it)}^{'}\beta_5 + v_j + v_t + v_t * v_I + \epsilon_{it} \quad (4)$$

where w_{it} is the log real wage of worker *i*, and X_{it} and $F_{j(it)}$ contain the observable individual and firm characteristics. $ICT\_IT\_MNC_{is}$ is a dummy equal to 1 if the worker is new to firm *j*, comes from an ICT_IT_MNC, and has a tenure of *s* in that MNC. We divide tenure into low, medium, and high and set the thresholds at less than one year, from one to less than three years, and three years or more, respectively. Similarly, $DomICT_{is}$ is a dummy for workers who are new to firm *j*, but come from a different domestic ICT firm. On the other hand, $Otherfirms_{is}$ is a dummy for workers who are new to firm *j*, but come from any other firm. Following the approach of Abowd, Creecy, and Kramarz (2002), we estimate equation (4) where firm fixed effects (v_j) can be identified[11]. This is highly important, because if domestic ICT firms make use of better technology, intermediate inputs, or management, this is a firm-specific advantage that may give rise to a wage premium through rent sharing with workers[12]. In addition, equation (4) includes time fixed effects (v_t), and industry-year interaction terms ($v_t * v_I$). Finally, we mention as a caveat that due to data limitations we do not include workers fixed effects in equation (4)[13].

[10] That is, workers who never change firms.

[11] The work by these authors has shown how the presence of labor mobility in linked employer-employee data sets makes it possible to identify both unobserved worker and firm fixed effects.

[12] If domestic ICT firms do not share rents with workers, a firm-specific advantage may exist even though we do not observe a wage premium in the data.

[13] In fact, if domestic ICT firms tend to a large extent to select workers with "better" unobserved (to the researcher) characteristics, this may explain part of the wage premium.

Uruguay

In the case of ICT and IT-enabled MNCs, positive externalities are theoretically expected in terms of economic development, given the incidence of ICTs on knowledge accumulation and technical progress. The mechanisms explored involve the enhanced quality of domestic production factors (through the transfer of technology, knowledge capital accumulation, qualification of domestic human resources hired by MNCs, or domestic firms' introduction of new ICT tools imitating their foreign competitors, among others); and through the increased dynamism of exports and local demand of ICT products demand that would in turn allow for the expansion of the domestic ICT sector (Farole and Winkler, 2014).

The accumulated empirical evidence is however still inconclusive with respect to their existence, sign and magnitude. The lack of consistency of results has been linked to the use of models that do not acknowledge for the complexity of the actual mechanisms at work, partially due to the non-availability of the necessary data. A strand of the literature has recently proposed to explicitly account for the conditionality of spillovers based on the presence/absence of certain characteristics of MNCs and domestic firms as well as on the institutional framework within which they operate (Zhang *et al.*, 2010). The potential generation of positive externalities would thus be conditional on the goals sought by MNCs that enter the market and their absorption by domestic companies would depend on their technical and organizational abilities, while their transmission may in turn be eased or hampered by the regulatory and macroeconomic entourage.

The analyses summarized here follow these lines, specifiying models for the economic performance of domestic ICT companies as reflected in the level and/or rate of growth of employment, wages and productivity, and also by studying the influence of MNCs on the decision of domestic agents to start a new ICT business.

The eventual impact that the presence of ICT MNCs would have on the performance of domestic ICT firms is here modeled under the assumption that spillovers materialize in their use of improved production technology. The specification of a production function that accurately reflects the technology used by ICT domestic firms is therefore the first step in the proposed analysis.

Under a Constant Elasticity of Substitution (CES) technology and assuming value-added separability, the value of gross production (*gpv*) for firm 'i' in year 't' (Q_{it}) can be expressed as a function of raw materials (RM_{it}), physical capital (K_{it}) and labor (L_{it}) as:

$$Q_{it} = RM_{it}^{\alpha}+[K_{it}^{\beta}+L_{it}^{\beta}]^{\gamma/\beta} \qquad (1)$$

Given the nature of intermediate consumption in ICT industries, it is possible to simplify the specification by assuming RM_{it}^{α} is a proportion of *gpv* that does not vary across ICT firms within a particular segment. Thus, Equation (1) may be re-stated as:

$$Q_{it} = 1/(1-a)*[K_{it}^{\beta}+L_{it}^{\beta}]^{\gamma/\beta} \qquad (2)$$

Equation (2) is further modified so as to allow for the introduction of technical progress in production as derived from the accumulation of knowledge capital. Increases in knowledge capital are in turn assumed to stem from two sources: innovation practices undertaken by the

domestic firm itself and positive externalities driven by the presence of ICT MNCs in the domestic market. Equation (2) hence becomes:

$$Q_{it} = 1/(1\text{-}a)*[K_{it}^{\beta}+L_{it}^{\beta}]^{\gamma/\beta})*e^{\lambda \mathbf{X}_{it}} \quad (3)$$

Where vector $\boldsymbol{X}_{it}$ includes a set of variables that account for knowledge capital increases that may be partially linked to the presence of ICT and IT-enabled MNCs.

The demand for labor is next obtained from the profit maximization conditions derived from Equation (3) for a given level of product demand and price of inputs. The resulting level of employment for firm 'i' in logs is expressed as:

$$l_{it} = \lambda_0 + \lambda_1(w/p)_{it} + \lambda_2 q_{it} + \lambda \mathbf{X}_{it} \quad (4)$$

Where *w/p* is the average wage relative to the product price.

Equation (4) can be in turn used to specify a model for labor productivity as:

$$q_{it} - l_{it} = -\lambda_0 - \lambda_1(w/p)_{it} + (1-\lambda_2)q_{it} - \lambda \mathbf{X}_{it} \quad (5)$$

Wages at the firm level cannot be taken as exogenously determined given the institutional frame of labor relations in Uruguay. Indeed, wages for each occupation category cannot be set below the values negotiated at the industry level between employers' and workers' representatives. However, they may be set above such levels as a result of collective bargaining in the firm and/or the unilateral decision of the company (as a means of increasing workers' commitment to the organization). The average wage may also vary across firms due to the differing skill compositions of their workforce. In order to account for these dimensions, wages should be modeled jointly with the employment and productivity equations as follows:

$$w_{it} - p_{it} = \theta_0 + \theta_1(w_{st}-p_{st}) \quad \theta_1 = f(\mathbf{W}_{it}) \quad (6)$$

Where vector $\boldsymbol{W}_{it}$ includes a set of factors that determine the existence and magnitude of eventual firm's mark-ups over the sectoral wage (w_{st}).

In order to explore whether or not the presence of MNCs promote the creation of new ICT enterprises at the host country, the birth of a domestic ICT firm in year 't' is rationalized in terms of the decision made at least one year in advance to the launching of the start-up. The decision is assumed to depend on the level of expected profits (π^{e}_{ist}), which should surpass a certain threshold (π^{*}) that varies across firms with different characteristics (e.g., size; sales market; ICT segments; etc.). Expected profits are assumed to be a function of the actual level observed during the period immediately before to the entry of the new firm for both the specific segment in which it will operate and the overall ICT industry. It is further hypothesized that the presence of MNCs would also play a role, acting either as an attractor or a deterrent. Therefore, the phenomenon can be approximated using the following model:

$$P(x_{ist}) = 1 \text{ if } \pi^{e}_{ist} \geq \pi^{*} \; ; \quad \pi^{e}_{ist} = f(\mathbf{Z}_{ist}, \mathbf{Y}_{st}, \mathbf{X}_{ist}) \quad (7)$$

Where $\mathbf{Z}_{ist}$ includes firm characteristics, and $\mathbf{Y}_{st}$ accounts for sector specificities.

Statistical models

The analyses are founded on the estimation of Equations (4) or (5) jointly with Equation (6) and of Equation (7) using firm level data for 2012 on a set of 444 companies (that involve 519 establishments). Dynamics are allowed to enter the specifications by including lags of the dependent variables and also through the specification of models in terms of growth rates instead of levels. In all cases the variance is allowed to vary across ICT sectors.

The endogeneity of the variable 'sales' in equations (4) and (5) is dealt with using its lagged values as instruments. In the case of Equation (6), the sector's average wage is instrumented using the variables that enter the bargaining model that gives rise to the reduced form specified (the wedge between consumption and product prices; the exchange rate; unionization).

Definition of variables

The number of workers is used to calculate employment levels, using the data on dependent staff (from the Tax Office and Social Contribution agency) augmented by an estimate of the proportion of non-subordinate employees based on information from other sources (the Annual Economic Activity Survey and the Household Survey from the INE and also from the CUTI).[14] The same sources are used to calculate the value of sales (in US dollars) as a proxy for the *gpv* (given the already mentioned negligible level of inventories that characterizes these industries) as well as the average wage. Industry level sales and employment are defined as the sum of individual values within each ICT segment.

Prices of interest relate to the product price and average wage (calculated at the 2-digit ISIC level); the Consumption Price Index (CPI); and the exchange rate (Uruguayan pesos *per* US dollar) that are published by the INE and the BCU.

As is general practice in the empirical literature, MNCs' spillovers are proxied by the share of FDI in total output. Intra-industry effects can be thus proxied using the corresponding sector's average share. In order to allow for additional effects driven by the presence of MNCs in other ICT segments, analogous ratios are calculated for the overall industry (including the activity of IT-enabled companies).

Following Farole and Winkler (2014), the existence and magnitude of positive externalities are assumed to vary with the absorption capacity of domestic firms, the potential ability of MNCs to generate spillovers and the characterization of the overall environment that are in turn determined by diverse factors. There is however one non-negligible difference between the specification here proposed and that in Farole and Winkler (2014): the relevant factors to be considered are those that prevailed in the period prior to the analysis since their current values would be already influenced by the eventual existence of spillovers.

The absorption capacity of domestic firms is assumed to differ depending on their scale and technology of production, that are proxied by the firm's size, maturity degree, labor productivity, knowledge capital accumulation, and the quality of the goods and services supplied, as reflected in its ability to compete in international markets.

[14] The models will be afterwards re-estimated using actual data collected through the project survey.

The potential of MNCs to generate spillovers is assumed to be conditioned by their size and labor productivity with respect to the levels that prevail in the corresponding segment but also by their relative presence in the market in terms of length of stay and number of MNCs.

The ICT segment in which the company operates and its geographical location (in a FTZ or an industrial/technology park) are also considered as differentiating environmental factors that may influence both the ability of domestic firms to benefit from spillovers and MNCs' potential to create externalities.

Except for labor productivity, the above-listed factors are proxied using binary/categorical variables that state whether or not/to what extent the characteristic/behavior is observed in the previous period (2011).

Two size strata are distinguished – large and small – depending on the level of employment and/or sales (over 20 employees; over US$ 1 million sales value).

The degree of maturity of domestic firms is assimilated to four distinct stages of their life cycle – fully mature, partially mature, experienced and recent. Four binary variables are used to acknowledge for each of these cases that are matched to companies that entered the market prior to 2000; during 2000-2004; during 2005-2009; and after that date, respectively.

References

Davis, Steven J., John C. Haltiwanger, and Scott Schuh. (1996). *Job Creation and Destruction*. Cambridge, MA: MIT Press.

Farole, T., and Winkler, D. (2014). *Making Foreign Direct Investment Work for Sub-Saharan Africa: Local Spillovers and Competitiveness in Global Value Chains*. The World Bank.

Haltiwanger, J. C.; Jarmin, R. S. and Miranda, J. (2010). Who Creates Jobs? Small vs. Large vs. Young. National Bureau of Economic Research Working Paper.

Monge-González, R., and Hewitt, J. (2010). Innovation, R&D and Productivity in the Costa Rican ICT Sector: A Case Study. IDB Working Paper Series No. IDB-WP-189.

Monge-González, Ricardo and Juan A. Rodríguez-Alvarez (2013). "Impact Evaluation of Innovation and Linkage Development Programs in Costa Rica: The Cases of PROPYME and CR Provee", IDB Working Paper Series No. IDB-WP-461.

OECD (2013). Entrepreneurship at a Glance. www.oecd-ilibrary.org/industry-and-services/ entrepreneurship-at-a-glance-2013_entrepreneur_aag-2013-en

Paus, E., and K. Gallagher. (2008). "Missing Links: Foreign Investment and Industrial Development in Costa Rica and Mexico." Studies of Comparative International Development 43 (1): 53–80.

Appendix C: Review of policies

Argentina

The creation of modern policies with direct or indirect effects on the national ICT sector and its members can be regarded as having begun in 1990, with the creation of Law 23.877 for the Promotion and Development of Technological Innovation, which was the first of many actions intended to promote innovation in businesses. This Law in particular was intended to improve productivity and commerce through the strengthening of research and development capabilities among individuals or businesses which carried out productive, scientific, technological, or financial activities.

At the time of the passing of Law 23.877, it was believed that the principal obstacle to research, development and innovation activities in businesses was the difficulty which innovative businesses encountered in obtaining financing for their projects. The government therefore created the Argentine Technological Fund (FONTAR) in 1992, which created several lines of credit through the National Bank of Argentina (BNA) for businesses and public sector projects which were intended to improve productivity in the private sector through technological innovation; these credits could be applied for at any time. Beginning in 1998, a paradigm shift occurred and more emphasis was placed on dealing with the impact of the cost of investment on decisions to carry out technological innovation. As a result, a new series of financial instruments was added which included tax credit certificates for projects with low or medium risks, non-reimbursable contributions for longer-term projects with more substantial risks, and, in 2003, subsidized credits for long-term projects; the availability of these types of assistance was announced in periodic public calls for applications[15].

In 1996, the government created the National Agency for the Promotion of Science and Technology (ANPCyT), a dependency of the Ministry of Science, Technology, and Productive Innovation (MINCyT), which replaced the National Council of Scientific and Technical Research (CONICET) as the organization officially in charge of administering national initiatives for the development of science, technology, and technological innovation. Both FONTAR and the Fund for Scientific and Technological Research (FONCyT) passed under the control of the new agency.

Beginning with the passage of legislation related to the use of electronic documents and digital signatures in 1996, the government began to involve itself in a number of measures typical of early-stage “Knowledge Society” initiatives. In 1998, the government announced the National Program for the Information Society, which was primarily concerned with removing inequalities in access to ICTs (“digital divides”) within the country, which stimulated the creation of more than 700 Community Telecenters throughout the country in the following years. In 2000, the Ministry of Education began a program aimed at reducing digital divides in education through training teachers in the use of ICTs, and beginning the process of connecting all public schools to the Internet. In the area of e-government, the Digital Government Program of 2001 and the National Plan for E-government in 2005 were dedicated to increasing the use of ICTs for the modernization of the national and provincial governments.

[15] *Incentivos tributarios para la I+D+i en Argentina: Una evaluación de las políticas recientes* (idbdocs.iadb.org/wsdocs/getdocument.aspx? docnum=37271771)

The Government convened a Forum on the Competitiveness of the Software and Information Services (SSI) sector in 2003, with the participation of the national, provincial, and municipal governments, ICT cluster representatives, regional forums, technology NGOs, and major banks. The Forum produced a Strategic Plan for the SSI sector (2004-2014), which concluded with a number of recommendations for the promotion of the SSI sector itself, SSI clusters, and credits for SSI firms, as well as improving the supply of human resources, and increasing the use of ICTs in government[16].

More concretely, the government also passed law 25.856 in 2004, which formally recognized the software sector as an important industrial activity with potential to improve national competitiveness, which qualified software firms for various types of preferential treatment in terms of national taxes, lines of credit for production, and possible exemption from provincial taxes on gross income. This was closely followed by the passage of Law 25.992 for the Promotion of the Software Industry, which specifically granted software firms various types of tax benefits and exemptions in areas such as investments in hardware and other tools necessary for the creation of software (including imports) and social security payments for employees. Law 25.992 also created the Trust Fund for the Promotion of the Software Industry (FONSOFT), intended to promote investments in research, development, and quality certification for software in universities, research centers, and small and new businesses, as well as to improve educational curricula in ICT-related areas, and promote exportation and new projects. In 2011, the benefits extended to software companies in Law 25.992 were extended until 2019 through Law 26.692, which also allowed individuals, as well as businesses, to apply for inclusion in the regime.

The problem of scarcity of skilled workers for the ICT sector was addressed in 2005, when the Chamber of Software and Information Services (CESSI) and the Ministry of Education, Science, and Technology created the "InverTI en vos" ("Invest in Yourself") program, aimed at informing the public of opportunities in careers in ICT-related fields, and providing scholarships for studies in these areas. In the same year, the Ministries of Labor, Economy, and Education implemented the National Plan for Professional Training for Workers in the ICT sector, which included the creation of a Fund for Improvement of ICT Training (FOMENI) to provide resources for ICT training in businesses and educational institutions.

Several ICT sector associations and NGOs worked with a wide range of stakeholders to draft a Digital Agenda for Argentina in 2008, covering areas including infrastructure, applications, human resources, financing, and appropriate legal frameworks. The Agenda emphasized the creation of projects to increase national productivity and competitiveness, and the creation of mechanisms to support technological innovation and small businesses; among other topics, it specifically discussed the importance of the software and information services (SSI) sector, and the need to create appropriate human resources for SSI businesses[17]. While the Agenda was a multisectorial initiative, in 2009 the national government issued Decree 512/098, which adopted the Agenda as an official guideline for further government activities and policy formation. In the same year, the government also created the Argentinean Sectorial Fund (FONARSEC) within the ANPCyT, intended to assist in the creation of new technology-based companies in priority sectors, one of which is the ICT sector.

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[16] *Plan Estratégico de SSI 2004-2014/Plan de Acción 2004-2007* (www.cicomra.org.ar/cicomra2/img/informes_especiales/fotos/fssi_libro_ayb.pdf)

[17] *Modelo Social de la Agenda Digital Argentina: Inclusión Digital para la Integración Social 2003-2011* (www.redgealc.org/download.php?len=es&id=2765&nbre=ada_ebook.pdf), *Bases y Lineamientos para una Agenda Digital Argentina* (www.cicomra.org.ar/cicomra2/asp/ADA FINAL.pdf)

The 20 20 Strategic Plan of the Ministry of Industry also names the software and information services sector as one of the eleven sectors chosen for special attention[18]. Significant emphasis is placed on increased coordination between the public, private and academic sectors to achieve not only more efficient creation of human resources for the SSI sector, but also to promote the integration of the SSI sector into the value chains of other strategic sectors. Other goals include increased spending on research and development within the sector, the widespread adoption of quality certification mechanisms, improved access to sources of government funding, and attempts to improve the sales of software and services by domestic firms to the government.

Many of the most productive actions taken to benefit the Argentinean ICT sector have involved provincial or municipal governments, rather than the national government. For instance, the city of Rosario in the province of Santa Fe created a Strategic Plan at the end of the 1990s which emphasized technological innovation in local businesses and the creation of a technology park. In the year 2000, stimulated by the possibility that the multinational ICT company Motorola might locate facilities in Rosario (although they were finally located in Córdoba), an agreement was signed between local universities, businessmen, and the provincial and municipal governments to create the Rosario Technology Pole, using space provided by the municipal government.

In 2007, a group of local SSI and telecommunications companies formed the Rosario ICT cluster to provide economies of scale for their operations and assist in their efforts to expand to international markets. While this action received support from the Program for the Development of Regional Productive Complexes of the national Ministry of the Economy, the provincial government's Law for Industrial Promotion also provided for support for certain industries, including software, and allowed for the possibility of exemption, reduction and/or deferral of taxes for up to 10 years, sale or donation of public goods, expropriation of land, and construction of infrastructure to assist in the creation of industrial parks. Provincial and municipal laws also allow budgeting funds for credits at attractive rates to support innovation and development of new products in the ICT sector; in 2013 a Rotating Fund was created with $1,000,000 from the provincial government, administered by the Rosario Technology Pole and the Rosario ICT Cluster, to provide credits to ICT firms.

The choice of Motorola to locate its offices in the municipality of Córdoba, in the province of the same name, was greatly influenced by the fact that in return for the creation of a major software development center, the provincial and municipal governments committed themselves to subsidize the training of engineers and work with local universities to develop engineering curriculums, and to provide certain tax exemptions and space and infrastructure for the facilities. In 2006, Intel Software Argentina agreed to create another software development center in Córdoba with certain pre-established levels of local employment, in return for subsidies from the provincial government for labor costs for eight years, assistance with the purchase of materials and supplies, and the construction of the installations where software development would be carried out. Similar types of tax and human resource subsidies were given to Electronic Data Systems (EDS) in 2007 in return for creating an IT services and business process outsourcing center which would employ at least 1500 persons, and later to other companies such as Gameloft Argentina (gaming software for cellular telephones) and Indra (software development and Internet solutions).

[18] *Cadena de Valor: Software y Servicios Informáticos* (www.industria.gob.ar/software-2/)

The original arrival of Motorola in the municipality of Córdoba in 2001 stimulated the formation of the Córdoba Technology Cluster by local ICT companies, with the goal of promoting their integration, sustainability, and competitiveness. In 2007, the provincial government exonerated software production in the province from taxes on gross income, and in 2008 representatives of the Cluster, the provincial government, industry associations and the Provincial Bank of Córdoba signed an agreement for the creation of an industry-technology pole which would receive subsidies for the construction of infrastructure, for new employee salaries, and for electricity, in addition to credit on attractive terms. In 2013, the provincial government authorized the creation of the Córdoba ICT Foundation, which will receive infrastructure, human resource training, and investment support to promote the provincial ICT sector.

The Buenos Aires IT Pole was created in 2003 to promote and facilitate the growth of ICT firms in the national capital city, and to assist in the formation of alliances between the Pole, universities and research institutions, and other public and private sector organizations. In 2008 the metropolitan government moved to support the formation of the Technological District of the Autonomous City of Buenos Aires, offering ICT firms in the city benefits such as exemptions from taxes on gross income, non-reimbursable grants to assist in obtaining quality certifications, credit on attractive terms to assist in relocalization of ICT firms to the city, special education plans, and benefits for educational institutions that establish themselves in the metropolitan area.

Costa Rica

The Costa Rican government has seldom focused its policy making specifically on the development of the national ICT sector, but has rather been oriented towards the creation of policies intended to affect more general aspects of the society and economy, whose effects may partially or indirectly benefit the ICT sector. Several of the more important of these policy orientations are briefly discussed below.

The government of Costa Rica has promoted widespread public education for more than a century; the country achieved universal primary education more than 50 years ago, and currently provides free primary and secondary education through 11th grade, with mandatory attendance until 9th grade. The public educational system was also a pioneer among developing countries in introducing public school students to the use of computers, through the creation of the National Program of Educational Informatics (PRONIE) and the Omar Dengo Foundation (FOD), which since the 1980s have provided primary students with basic "digital literacy" computer use skills, as well as introductions to programming and logical problem solving; by 2011, almost two-thirds of primary and secondary public schools were covered by these programs[19]. These efforts have created the foundations for an unusually well-educated workforce for a developing country, providing significant numbers of workers both for the ICT sector itself and for other types of businesses which make use of ICT products and services. However, it is clear that that further strong efforts will be necessary to meet ever-increasing demands by domestic and foreign firms for technically skilled workers in the near future, and the government has responded with actions such as the creation of a

[19] *Reporte de Beneficiados del PRONIE MEP-FOD: Datos al 30 de Setiembre del 2011* (www.fod.ac.cr/pdf/informes/Reporte_de_ beneficiados_ del_PRONIE_(Sept_30).pdf

multisectorial Human Resources Working Group in 2011 to develop new human resource strategies.

As shown by the creation of the PRONIE and the FOD, the government has been clearly aware of the necessity of increasing the levels of access to, and use of, ICTs in all areas of Costa Rican society for several decades[20]. The current elements of the national strategy for increasing the use of ICTs are set forth in the latest statement of the government's Digital Social Agenda: development of a national broadband plan; improved connectivity for the educational and health sectors, and for disadvantaged segments of the population (including the extension of the national network of community telecenters [CECIs]) ; and increased use of ICTs in government institutions ("e-government")[21]. The government also worked to facilitate the wider use of "e-commerce" through the passage of a law recognizing the validity of digital signatures.

In addition, after more than 50 years of state monopoly control, the national telecommunications market was opened to competition in 2009 and new operators began to provide private network services, Internet access, and mobile telephony; partly as a result of this opening, the proportion of homes with Internet connectivity and the proportion of cellular telephony accounts almost doubled between 2010 and 2012[22]. All of these policies and actions have the potential to greatly increase the size of the local market for ICT products and services, to the benefit of the national ICT sector.

The 1980s saw the beginnings of the implementation of a number of policies related to trade liberalization and access to international markets which have hade extremely important implications for the development of the national ICT sector[23]. These policies included the reduction of trade barriers to importing hardware and software, as well as reduction of internal taxes on local purchases of computers and software, thus increasing the use of, and demand for, these products and associated services. They also included a number of successful measures to promote trade in Costa Rican products and services, all of which have the potential to assist national ICT companies to increase their sales abroad. These ranged from the creation of the Ministry of Foreign Trade (COMEX) and the Costa Rica Export Promotion Agency (PROCOMER), to participation in the General Agreement on Tariffs and Trade (GATT, 1990), membership in the World Trade Organization (WTO), and the signing of a number of Free Trade Agreements (FTAs) with the United States (USDR- CAFTA), Canada, Mexico, Chile, and Panama, while the signing of FTAs with China, Singapore, and the European Union are currently pending.

The government also cooperated with the private sector in the formation of the first investment promotion agency in Latin America in 1982 - the Coalición Costarricense de Iniciativas para el Desarrollo, or CINDE (www.cinde.org). This agency remains one one of the most effective organizations in the region in attracting FDI, and follows a strategy of attracting FDI to specific high-value-added sectors, which in 2011 included ICTs (software), advanced manufacturing (advanced electrical components, automotive components,

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[20] See *Bridging The Digital Divide in Costa Rica: Access to and Use of ICTs* (www.caatec.org/CAATEC/publicaciones/crdigital/BridgingThe DigitalDivideInCostaRica.pdf

[21] *Acuerdo Social Digital: hacia una sociedad digital inclusiva* (www.presidencia.go.cr/presidencia/presidenta/discursos/903-acuerdo-social-digital-hacia-una-sociedad-digital-inclusiva)

[22] *Líneas celulares crecieron 2.2 millones* (sutel.go.cr/Ver/Contenido/primer-informe-estadisticas-sector-telecom/312)

[23] *Innovation, R&D and Productivity in the Costa Rican ICT Sector: A Case Study (idbdocs.iadb.org/wsdocs/getdocument.aspx? docnum= 35218958); Costa Rica's Efforts Toward an Innovation-Driven Economy: The Role of the ICT Sector* (reports.weforum. org/wp-content/ pdf/gitr-2011/03-part-2/2.1-costa-ricas.pdf)

aerospace), life sciences (medical instruments, pharmaceuticals and biotechnology, new materials), and clean technologies, as well as various types of services outsourcing provision (ITO, BPO, KPO)[24]. This emphasis has the obvious effect of attracting companies which are highly sophisticated producers and/or users of ICTs, offering in both cases the opportunity for domestic ICT firms to provide them with a variety of products and services.

Export Processing Zones (EPZs) also began to appear in the 1980s, administered by PROCOMER and backed by legislation that grants foreign and domestic companies incentives for investing in the country, provided those investments comply with certain conditions, which vary according to the type of company, investment amount, sector of investment and location (inside or outside the major metropolitan area in the center of the country, inside or outside an industrial park)[25]. These incentives include exemption from all taxes and duties on imports, exemption from all municipal taxes and licenses for a 10-year period, and additional exemptions from income taxes for those companies that make further investments in the country after they have been operating for four years under the EPZ regime.

It is important to note that in the implementation of the EPZ regime, the Costa Rican government has not attempted to create special economic areas, zones, or industrial parks that are dedicated specifically to foreign and national ICT-related businesses, which have been associated with activities related to the attraction of FDI in many other countries[26]. Likewise, it has not made systematic efforts to promote the formation of a "national ICT cluster" in which domestic and foreign companies could interact in a mutually beneficial fashion among themselves and with academic and research organizations, financial institutions, and other vital actors in a true industrial cluster.

The EPZ initiative has nonetheless been extremely successful, assisted by the country's reputation for well-educated workers and political stability[27]. Most high-technology multinational corporations (MNCs) in the country operate under the EPZ regime, where they generated almost 9.6% of GDP in 2007. In keeping with the government's emphasis on attracting investment in high-value-added sectors, the composition of EPZ exports has evolved from natural resource-based and low-skilled labor-intensive activities to more advanced high-technology production systems based on highly-skilled labor, with electronic and electrical goods, and medical devices and pharmaceutical products, accounting for almost 65% of EPZ exports in 2007, and exports of international services (BPO, call centers, etc.) increasing rapidly as well.

While these results may benefit the national economy as a whole, it is not clear that FDI attraction has had a uniformly positive impact on domestic ICT firms. There is some evidence that the increased presence of MNCs might actually have negative effects for local firms, such as the generation of shortages of technically-trained human resources, with

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[24] *Attracting knowledge-intensive FDI to Costa Rica: challenges and policy options* (www.oecd.org/dev/americas/E-book FDI to Costa Rica.pdf); *2013 Top 100 Outsourcing Destinations* (www.tholons.com/TholonsTop100/pdf/Tholons Top 100 2013_Rankings and Report Overview.pdf)

[25] To comply with the provisions of the Agreement on Subsidies and Countervailing Measures (ASCM) of the WTO (see www.wto.org/english/docs_e/legal_e/24-scm.pdf), existing subsidies contingent on export orientation will be removed in 2015

[26] E.g., *Promotion Strategy for Technology-Based Innovative SMEs: Malaysia's MSC Cluster and the MSC Technopreneur Development Flagship Programme*. (www.unescap.org/tid/publication/indpub2435.pdf); Gregory, N., *et al.* (2009). *New Industries from New Places: The Emergence of the Software and Hardware Industries in China and India*. Stanford University Press, The World Bank, Washington, D.C., Stanford, California.

[27] *Costa Rica, a high-technology incubator: Long-standing education policies yield big dividends* (www.iadb.org/idbamerica/archive/stories/1997/eng/6d.htm)

associated higher employee turnover rates and salary inflation[28]. Several studies have also concluded that even though specific efforts have been made by the government to promote *linkages* between local and foreign companies in Costa Rica, few positive results have been obtained, due both to lack of coordination and proper program design on the part of the government, and to aspects of the MNCs and domestic firms themselves, such as "the global-oriented strategy of MNCs, a weakly developed domestic production system, lack of international certifications and standards and concerns over economies of scope, trust and quality control" [29]. On the other hand, there is some evidence of beneficial *spillovers* between MNCs and local ICT companies; for instance, almost half of domestic ICT firms surveyed in one study had at least one owner who previously worked for a multinational firm in Costa Rica, while some domestic ICT firms reported substantial benefits from acting as value-added resellers of the products and services of MNC ICT companies[30].

The promotion of science, technology, and innovation in Costa Rica has become increasingly important to the government as the world economy becomes more globalized and competitive, creating an environment in which the country cannot compete with other countries based on the availability of abundant natural resources, low salaries, or high productivity, but must rather compete based on the creation of innovative new products and services. One of the four principal axes of Costa Rica's National Development Plan for 2011-2014 is concerned with competitiveness and innovation, and the country's Science, Technology and Innovation (STI) National Plan for 2011-2014[31] acknowledged that the country is facing a problem of low economic growth and, in particular, low productivity. The STI Plan therefore strongly recommended strengthening research and development, promoting business innovation, strengthening links between research centers and productive activities, and creating an ecosystem that that enables entrepreneurship. ICTs have a clear role to play in this process through their contribution to information management and knowledge generation, and actions taken to realize these goals can provide many opportunities to directly or indirectly strengthen firms in the ICT sector.

The National Council for Scientific and Technological Investigation (CONICIT) was created in 1972 with a council of directors from the largest public universities in the country, and counts among its responsibilities the promotion of research and the education of investigators. In 1990, the Costa Rican Legislative Assembly created the Ministry of Science and Technology (MICIT – more recently, the MICITT, or Ministry of Science, Technology, and Telecommunications) as the governing body of the National Science and Technology System (NSTS), responsible for promoting and coordinating science and technology activities and policies in the country. Both of these organizations, with the assistance of other government agencies such as the Ministry of the Economy, Industry and Commerce (MEIC), have responsibilities for the design, implementation, and administration of various programs intended to assist in the funding of research, development, and innovation in academic and research institutions and the private sector. Although none of these instruments is specifically

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[28] *Costa Rica in the Offshore Services Global Value Chain: Opportunities For Upgrading (www.cggc.duke.edu/pdfs/2013-08-20_Ch5_ Offshore_Services.pdf)*

[29] *Productive development policies in Costa Rica: Market failures, government failures, and policy outcomes* (www.iadb.org/res/ publications/pubfiles/pubIDB-WP-157.pdf); *Attracting knowledge-intensive FDI to Costa Rica: challenges and policy options* (www.oecd.org /dev/americas/ E-book FDI to Cost Rica.pdf)

[30] *Innovation, R&D and Productivity in the Costa Rican ICT Sector: A Case Study (idbdocs.iadb.org/wsdocs/getdocument.aspx? docnum= 35218958)*

[31] *MICIT: Plan Nacional de Ciencia, Tecnología e Innovación 2011-2014* (www.vinv.ucr.ac.cr/docs/dmdocuments/plan-nac-cti-2011-2014.pdf)

oriented towards promoting research, development, and/or innovation in the ICT sector, many members of that sector are likely to benefit from such assistance.

However, these programs have not produced significant positive results, due among other things to problems such as excessive bureaucratic requirements, small sizes of loans or awards, limited lack of awareness of the programs by potential beneficiaries, design flaws in the structure of the programs, and limited coordination between government agencies[32]. The MICITT is working to address shortcomings of these and other STI programs and policies, assisted by input from all sectors of Costa Rican society and the results of previous efforts such as the Estrategia Siglo XXI initiative (www.estrategia.cr). Priority areas which it is considering which have obvious implications for domestic ICT firms include new sources of financing for businesses; creation of technology parks which bring together the public, private, and academic sectors; improved access to intellectual property protection; business incubation; innovation in small businesses; improved cooperation between universities and the private sector; promotion of entrepreneurship; and the creation of a national innovation agency.

The government has also recently created several presidential councils, among which is a Presidential Council on Competitiveness and Innovation, whose members include the president, both vice presidents, the ministers of the MICITT and most other major government ministries, as well as the executive presidents of major government institutions, such as the National Training Institute (INA), the branch of the Ministry of Labor (MTSS) in charge of technical training, and the Costa Rican Electrical Institute (ICE), the government telecommunications and electricity provider. The creation of this council has for the first time provided a forum in which the highest government authorities regularly discuss innovation and its economic impacts. The Technical Secretariat of the Council provides its members with diagnostics and other information that they may request, and assists in the design of solutions in priority areas and monitors the execution of policies, plans, and actions related to the promotion of innovation.

Uruguay

In the late 1990s and the first years of the new century, the Uruguayan government began to place systematic emphasis on the the transition of the country to a Knowledge-based society and the promotion of innovation-based economic competitiveness. The Committee for the Information Society was created in the year 2000, and set forth a strategy known as the Uruguay in the Internet Agenda (AUER); however, the strategy did not directly produce many concrete results, due among other things to a lack of coordination among participants and a national economic crisis that began in 2001-2002. Nonetheless, a number of actions were taken at this time which directly or indirectly affected the domestic ICT sector.

Actions that directly affected the sector included the declaration in 1999 that the Uruguayan software industry was of “national interest”, which qualified all production and investment activities carried out by ICT firms for benefits granted to firms in “national interest” sectors, including full or partial exemption of custom duties on imports and taxes, as well as reduction of public fees, public tariffs and social security employers’ contributions. In the year 2001, two Interamerican Development Bank (IADB)-financed projects were carried out

[32] *Productive development policies in Costa Rica: Market failures, government failures, and policy outcomes* (www.iadb.org/res/publications/pubfiles/pubIDB-WP-157.pdf); *Innovation and Employment Growth in Costa Rica A Firm-level Analysis* (idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=36505253)

– one for Development of the Software Industry, and another for The Creation of New ICT Businesses – which provided business incubation services and training for ICT firms. The deduction of software import costs from taxable income was allowed in 2002, which was intended to support domestic ICT companies that sell foreign software in the local market as a part of their commercial activities.

More generally, a number of actions were taken to promote the wider use of ICTs in Uruguayan society, which had the potential to benefit the ICT sector through increasing familiarity with, and demand for, ICT products and services. These actions include a strong push to promote transparency and efficiency in government through the use of ICTs (e-government) which began with the appearance in 2001 of a government Internet portal site (portal.gub.uy), and the passage in 2001-2002 of laws recognizing the validity of digital signatures in online commercial activities, and the right to privacy of personal data in digital formats, intended to promote e-commerce. The Educational Connectivity program (CEP) was launched in the year 2000 to promote the penetration of computers and Internet access in public education, and beginning in 2007 the internationally acclaimed Plan Ceibal (www.ceibal.edu.uy) has distributed hundreds of thousands of small portable computers to students and teachers in the public education system (which has also had the effect of greatly increasing the penetration of computers in poorer households), as well as providing free Internet access and training in the use of ICTs. Physical access to computers and Internet has also been extended through the creation of a network of more than 270 community telecenters under the RedUSI program since 2001[33].

Very importantly, the national telecommunications market was opened to competition in some areas between 2000 and 2002, although the previous state monopoly telecommunications provider ANTEL still maintains a monopoly not only in fixed-line telephony, but also in Internet connectivity based on physical media; the private sector is only allowed to compete in cellular telephony and wireless Internet connectivity.

Beginning in the year 2005, the government created several institutions which were made explicitly responsible for the creation and implementation of national strategies and plans related to science, technology and innovation, many of whose actions had the potential to provide direct or indirect support for the strengthening of the national ICT sector. At the highest level, a Ministerial Cabinet for Innovation (GMI) was formed in 2005[34], which is responsible for the creation of the National Strategic Plan for Science, Technology and Innovation (PENCTI). A far greater emphasis has been placed on the systematic development of the national innovation system (NIS) in the PENCTI than was the case in the earlier AUER; a direct, continuous participation of the government in this area was called for, and public funding was made available for science and research, coupled with with the promotion of public-private partnerships (PPPs) for science, technology, and innovation.

In the same year, the Agency for the Development of Electronic Government and the Knowledge and Information Society (AGESIC) was created, which is responsible for creating policies for extending and improving e-government, e-commerce, and connectivity for public schools, as well as the expansion of the national software industry; the major

[33] *Programa USI* (www.usi.org.uy/programa-usi)

[34] The government is represented in the Cabinet through the Ministers of Education and Culture; Economy and Finance; Industry, Engineering and Mining; and Livestock, Agriculture, and Fisheries. The academic and private sectors are respresented through the National Council of Innovation, Science and Technology Research (CONICYT), which was the sole public agency involved in the design of incentives to knowledge accumulation activities before the year 2000.

conclusions of AGESIC's planning efforts are published in periodic National Digital Agendas[35]. A third major institution was created in 2006 – the National Agency for Research and Innovation (ANII), which is intended to develop plans to assist in achieving the goals of the PENCTI, to improve the competitiveness of the national productive sector through the strengthening of the NIS and funding support for high-impact technologically based projects and innovative businesses, to improve the association and coordination of actors in the private, academic, and public sectors within the context of the NIS, and in general to promote the creation and use of knowledge to the benefit of Uruguay and its citizens. The ANII also assumed responsibility for initiatives that were previously carried out through the Technological Development Program (PDT) of the Ministry of Education and Culture.

Beyond the creation and strengthening of higher-level government institutions with missions involving the promotion of science, technology, and innovation, a number of more specific actions have been carried out that have implications for the strengthening of the national ICT sector. Until 2011, the government's Program for the Competitiveness of Clusters and Value Chains (PACC) aided members of the domestic ICT sector to improve competitiveness and export penetration of software products and services, guided by the 2007 Strategic Plan for the Development of Software and Computing Services created with the assistance of the Uruguayan Chamber of ICT Businesses (CUTI). Access to funding for innovative businesses has been provided not only through the ANII, but also through such sources as the National Bank of the Republic, which provides a special credit line to companies that are members of the CUTI, and the Emprender Fund (www.fondoemprender.com.uy), a public-private initiative supported by the IADB's Multilateral Investment Fund that provides angel, seed, and venture capital in amounts of up to $US 50,000 and has supported several early-stage domestic ICT firms. In a related area, early-stage domestic ICT firms have been assisted through small business incubation services provided by the Ingenio Incubator (latu21.latu.org.uy/ingenio/), supported by public and private sector organizations and funded by the IADB and the InfoDEV program of the World Bank, and by the Idear incubator (www.idear.com.uy), whose government support comes from the Department of Maldonado and the municipality of San Carlos, rather than the national government.

Uruguay is a member of Mercosur, has signed a Free Trade Agreement with Mexico, and has settled a Trade and Investment Framework Agreement (TIFA) with the US, substantially reducing barriers for the exportation of ICT products and services to major markets in the Americas. Foreign companies have been attracted to the country not only by its proximity and ties to major regional markets and a reputation for political stability and availability of skilled workers, but also by benefits offered by the government to businesses that locate in Free Trade Zones (FTZs); these include tax franchises, capital mobility and banking confidentiality, flexibility in the management of "in transit" merchandise, and simplification of bureaucratic processes. While there are also usually no requirements for the share of local inputs in the production of goods and services, this is not true in the case of labor – at least 75% of workers in FTZs must be Uruguayan, a factor which has the potential to intensify problems of competition with local ICT firms for technically skilled workers.

A special regime exists in the case of foreign companies that invest in ICT industries: additional tax exemptions are granted at least until 2019 for the commercialization of ICT products manufactured both locally and abroad, while MNCs within FTZs are allowed to

[35] See, for example, *Agenda Digital Uruguay 2011 – 2015: 15 objetivos para el 2015* (www.agesic.gub.uy/innovaportal/file/1443/1/agesic_agendadigital_2011_2015.pdf)

provide services linked to mobile telephony; international call centers; e-mailing; online training and education courses on equal terms with national providers, unless they jeopardize a state monopoly (Decree 84/006, 2006).

Further incentives for the attraction of FDI were more recently provided by allowing the participation of foreign companies in public-private infrastructure projects in areas such as energy and communication (Law 18.786, 2011) as well as in initiatives considered to be of social interest (housing, urban development, construction of facilities). New incentives to invest in the country are being currently discussed that involve not only the provision of enlarged benefits for firms within all FTZs (e.g., relaxing the restrictions on workforce composition by national origin; or additional tax exemptions for start-ups within FTZs outside Montevideo) but also the extension of the FTZ legal regime to projects with an intensive use of skilled labor and technological content.

A substantial portion of total FDI in recent years has been concentrated in sectors that produce primary goods with low value-added content, and the expansion of exports from FDI has been highest in these sectors[36]. The amount of spillovers from MNCs operating in these sectors is likely to be quite low, and a strategy to increase the attraction of FDI in ICT industries and IT-enabled services offers the possibility of increasing spillovers due to the large value-added content and comparatively greater share of skilled labor labor embedded in these products and services, as well as the high rate of knowledge capital accumulation inherent in these activities.

An awareness of this problem can be seen in the government's early active support to the settlement in the Zonamérica Free Trade Zone of a major technology-related corporation - Tata Consultancy Services – as a means of demonstrating to foreign investors that Uruguay is a desirable location for the provision of software and business services to the region[37]. Domestic ICT firms themselves are also seeking to attract foreign ICT and IT-enabled investors such as Cisco, Apple, and PayPal, with the dual goals of convincing these companies to provide funds for the development of innovative local ICT projects and promoting the location in Uruguay of training centers and other types of facilities targeting the region[38].

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[36] *Uruguay: Program for Strategic International Positioning* (idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=37537653)

[37] *Towards a Strategy for Economic Growth in Uruguay* (www.hks.harvard.edu/fs/rhausma/new/uruguay05.pdf)

[38] *Uruguay promueve inversiones para la industria TI en Silicon Valley* (www.cuti.org.uy/novedades/2386-uruguay-promueve-inversiones-y-acuerdos-para-la-industria-del-software-en-silicon-valley.html)

Appendix D: Interviews

	Costa Rica		Argentina		Uruguay	
Industry Associations	CAMTIC	ICT companies - emphasis on software	Cluster Córdoba Technology	Association of ICT companies in Córdoba		
	Cámara de Infocomunicaciones	ICT companies - emphasis on telecommunications				
	AZOFRAS	Empresas de Zonas Francas - multinationals				
Domestic ICT firms	Grupo Babel	software	Dequo	software		
	ITS	Telecommunications	Prominente	software		
	Avantica	Outsourced programming	*Consultant*	*Free-lance consultant in ICTs*		
Government	PROCOMER	Export promotion; Zonas Francas	Secretario de Industria	Gobierno de la Provincia de Córdoba	URSEC	Regulatory framework, market operation, ; policy design and instrumentation
	CINDE	Attraction of Foreign Direct Investment; Zonas Francas	ADEC	Agencia para el Desarrollo Económico e la Ciudad de Córdoba	ANII	Financial and technical support to ICT firms; policy design and instrumentation
	MICITT	Ministry of Science, Technology, and Telecoms (responsible for the telecoms sector, promotion of science and technology)			ANTEL	Telecommunications infrastructure investment, market operation
MNCs competing in the local market	Microsoft	software	Hewlett Packard	hardware and software		
	Cisco	network hardware	Claro	telecommunications		
MNCs in Special Economic Zones	Hewlett Packard	hardware, BPO, ITO, R&D				
	Sykes	outsourced customer services				
Academic sector	CENFOTEC	Private sector university - oriented towards forming technical workers	Universidad de Córdoba - Departamento de Computación	human resource formation	CSIC	Comision Sectorial de Investigacion Cientifica - UdelaR. Scientific academic research activities & Financial support to research/education human resource qualification programs;
	INCAE	Instituto Centroamericano de Administración de Empresas - professors who have carried out studies in related areas				
	UCR	Universidad de Costa Rica - human resource formation, research (public sector)				
	ITCR	Instituto Tecnologico de Costa Rica - - human resource formation, research (public sector)				
	UNA	Universidad Nacional de Costa Rica - human resource formation, research (public sector)				

Appendix E: Gathering secondary data

Argentina

It was not possible to encounter any existing and sufficiently detailed database containing information on individual firms for the entire ICT sector (including firms specializing in software and Information services, hardware, or telecommunications) which could be accessed for this project. Previous studies have faced a similar problem, and have had to relay heavily either on special survey with specific research purposes, or on qualitative analysis. More inclusive surveys conducted by Government offices have produced official summaries of principal sector characteristics, but the more disaggregated information (i.e. at the firm level) that were collected to prepare those documents is not available to investigators. Due to the scarcity of existing data, and restrictions on access to government data, there is no possibility of constructing panel data from available secondary sources for preliminary analysis.

It was therefore necessary to create a custom database, resorting to information available from membership lists of various ICT sector associations, lists of exporters, yellow pages, web information on clusters associates and the like. Some, but not all of the sources that were consulted are listed below:

- Trade-Nosis: a Web site providing a business tree-shaped network of companies and individuals worldwide. Information at the firm level includes location, sales, export profile, level of employment, local Tax Identification Number (CUIT) and ISIC code.
- Fundación Sadosky: a public-private partnership to accelerate the consolidation of linkages between the Government, the productive sector and the scientific-technological infrastructure. It has a database listing major entrepreneurs and firms in the ICT sector, and contact information, location, and branch of production are available for all listed firms.
- List of associates of the national Chamber of Software and Information Service businesses CESSI).
- Federal Capital (City of Buenos Aires): Lists of firms located within the “Distrito Tecnológico de Parque de los Patricios” a complex of ICT firms grouped in this Buenos Aires neighborhood, as well as in other strategic locations showing high concentrations of High-Tech and ICT firms (e.g., Córdoba and Rosario).
- City of Córdoba: a list of members of the Cordoba Technology Cluster (approximately 140 firms in 2013) was made available for this research.
- City of Rosario: a list of members from the Web site of the Cluster ICT-Rosario, and a listing of local ICT firms made available by the municipal government, thanks to the collaboration of the Ministerio de Industria, Comercio y Minería of the Province of Córdoba.

A consolidated version of the data gathered from these sources was then created, using the *legal names* of the firms as a key for matching data from different sources, rather than the trade names or names of principal products that firms were sometimes registered under. The next step was to seek additional information for each firm in the Internet and other sources to eliminate cases that had mistakenly been included in the initial creation of the database. Among other things, efforts were made to identify all cases which involved individuals rather than firms (based on a consideration of legal names and Tax Identification Numbers [CUITs]), and these cases were excluded. Finally, care was taken to verify the validity of the contact information provided, to assure that these firms could be contacted when carrying out the survey of firms for the purposes of this project.

The final product of these activities was a database of information on 564 firms, containing reliable contact information and the data necessary to generate sample stratification and apply a random sampling design in each of the selected locations. Further efforts are being made to improve and expand this data before carrying out the project survey.

Firm type	# Firms
Domestic ICT firms	476
Foreign ICT MNCs	65
Foreign IT-enabled MNCs	23
TOTAL	564

Variables	Period	Source
ID		Fundación Sadosky, Trade Nosis, ICT industry Chambers and Associations
Name		
City		
Employment	2013	
Foundation year		
Sales	2013	
Branch of activity		

Costa Rica

The Costa Rican Social Security System (CCSS) initially provided data on 2306 active and inactive domestic and multinational companies belonging to the ICT sector, as defined by ISIC codes used by the institution.

The Chamber of Information and Communication Technologies (CAMTIC), the government's Foreign Trade Corporation (PROCOMER), the Costa Rican Investment Promotion Agency (CINDE) and the Costa Rican-American Chamber of Commerce (AmCham Costa Rica) were then asked for data to assure that companies which were actually members of the ICT sector, but

had not been identified as such in the CCSS databases, were included in the project's final database. PROCOMER provided a list of MNCs operating under the Free Zone regime, while CINDE provided the list of companies that have been established in the country thanks to its actions, and AmCham provided the list of its member companies. CAMTIC provided a listing of its affiliates, and ICT companies included in a recently completed mapping of the national ICT Sector. At a later date, the Ministry of Finance (MH) also provided information about commercial relationships between domestic ICT firms and MNCs.

Comparing companies in the list provided by the CCSS with lists obtained from these other institutions identified a total of 168 additional companies which needed to be added to the initial CCSS list; the names and other identifying information of these businesses was forwarded to the CCSS to obtain the same types of additional information that the CCSS provided in their initial data.

The resulting list was submitted to the National Registry of Costa Rica (RNP) to obtain information on the date on which the businesses was formally registered; it is important to note that this year is only an approximate indicator of when these companies began operations, since companies often begin their activities without registering themselves in the RNP and sometimes only begin operations sometime after they have been formally registered. PROCOMER also provided additional information on whether or not the companies on the list exported during each of the years in the period being investigated, where "exportation" is defined as a company that made $10,000 or more of sales outside the country during a given year.

Once this information was obtained, the list of firms was further evaluated. The ISIC codes assigned to companies by the CCSS were found to be inaccurate in many cases, and a number of businesses which could not be reliably assigned to the ICT sector were found and eliminated from the list. The criteria used to justify this elimination began with a simple inspection of the names of the businesses, but also included a highly time-consuming process of searching for information on individual business on the Internet and in other sources; only companies which could be reliably assigned to the ICT sector were included in further analysis. In addition, many supposed companies were registered under personal names, with personal official identification numbers; these cases could have represented erroneous classifications by the CCSS, or one-person companies, but in any case the information available on them from the CCSS did not permit us to obtain matching information from other sources, and these cases were therefore eliminated from consideration.

The detailed consideration of domestic and foreign companies, together with information provided by the organizations mentioned previously also provided sufficient information to be able to classify businesses as purely domestic or multinational, to divide foreign MNCs into ICT and IT-enabled categories, and to provisionally divide domestic ICT companies according to their specializations within the ICT sector – hardware, software, services, telecommunications, etc. To ensure compatibility with similar subsector categorizations in Argentina and Uruguay, these categories may be slightly modified in the future.

After taking these steps, the final database included 872 companies, distributed as follows:

Business type	Number of Companies
Domestic ICT Firms	587
MNC ICT Firms	156
MNC IT-enabled Firms	129

The final database contains the following information for each of these businesses:

Variables	Period	Source
Identification number		CCSS, CAMTIC, PROCOMER, AMCHAM
Name		CCSS, CAMTIC, PROCOMER, CINDE, AMCHAM
CIIU		CCSS
Active or inactive		CCSS
Address		CCSS
First pay roll year		CCSS
Average employment	2001-2012	CCSS
Total Wages	2001-2012	CCSS
Total social security payments	2001-2012	CCSS
Multinational		PROCOMER, Web pages
Domestic or foreign		Experts, MH, Web pages
ICT		Experts, MH, Web pages
IT-enabled		Experts, MH, Web pages
ICT subsector		Experts, Web pages, CAMTIC
Year of creation		RNP
Exportation	2001-2012	PROCOMER
Linkages with MNCs	2001-2011	MH

Very importantly, data has also been made available by the Costa Rican Social Security Administration (CCSS) for each of the persons registered as employed at any time between the years 2001 and 2012 in any of the businesses included in the list of ICT sector businesses compiled for this project, including employee gender and age, monthly information on that employee's salary, and an indication of the business in which each person was employed during a given month, together with the ISIC code for that business. This will allow an extremely interesting analysis of labor mobility, changes in salary, and gender aspects of employment within the Costa Rican ICT sector, although similar data is not available in the cases of Argentina and Uruguay.

Uruguay

Information about the members of the national ICT sector was first gathered from the government's Tax Office (DGI) and Social Security Administration (BPS), where all firms are required to be registered. The initial list of almost 6,000 firms whose ISIC codes indicated that they belonged to the ICT sector was reduced to approximately 2,500 firms through the elimination of all firms with only one employee, or which reported no sales and no subordinate employees.

Revising the reduced list of firms, it appeared that many of the firms on the new list had inaccurate ISIC codes – that is, that they should either be re-assigned to a different ICT sub-sector, or did not belong to the ICT sector at all. A revision of all businesses in the list was therefore carried out on a case-by-case basis using information from the Annual Surveys of Economic Activities of the National Statistical Institute (INE), as well as the results of Internet searches and a consideration of company Web sites, and, at times, telephone calls to the firms. This process was greatly complicated by the fact that the legal firm names used in government databases often differ from the trade names under which the firms are known to the public, and appear in the Internet. At the end of this process, those firms which were judged to not belong to the ICT subsector were removed from the initial list of ICT firms, leaving approximately 575 firms.

A further revision of the accuracy of the list of members of the ICT sector involved a consideration of lists of firms located in Free Trade Zones (FTZs), lists of members of the Uruguayan Chamber of ICT Businesses (CUTI) and the Uruguayan Telecommunications Chamber (CTU), as well as information from the national telecommunications regulator (URSEC) and reports from the Institute for the Promotion of Investments and Exportation of Goods and Services (Uruguay XXI). The results of these activities were compared to the provisional list of members of the ICT sector, and around 50 additional firms were added to the list, producing a final list of 519 firms, distributed as follows:

Business type	Number of Firms
Domestic ICT Firms	387
Foreign multinational ICT Firms	103
Foreign multinational IT-enabled Firms	29

The problems with the reliability of government data mentioned above, and the activities needed to to at least partially remedy these problems, extended the period needed to produce an acceptable database of members of the ICT sector and data associated with these members from the original estimate of three months to more than eight months. While the list of members of the national ICT sector in 2012 created for this project is now far more accurate than any other existing alternative, the experiences gained in the construction of this list also cast some doubt on previous official summary statistics for numbers of ICT firms, employment, sales, etc. for the sector.

Other problems were encountered in the compilation of data associated with these firms, including the fact that the results of the 2009 Annual Survey of Economic Activities of the INE were not released until the first months of 2014, and that the majority of Uruguayan software firms may not be included in the INE's 2010 repetition of this survey. As a consequence, it will not be possible to construct panels of firms for econometric analysis. The data for these analyses will now be limited to the year 2012 although information on 2010-2011 will also be used to include lagged variables when necessary. The information for 2012 should be at least partially obtained from the survey to be carried out for the project.

Uruguay: Database variables

Variable	Period	Source *
CPI	1999 – 2012	INE
GDP – deflator	1999 – 2012	BCU
Exchange rate	1999 – 2012	BCU
GDP/GPV (mill.U$S) – economy	1999 – 2012	BCU
Investment (mill.U$S) – economy	1999 – 2012	BCU
Private Investment (mill.U$S) – economy	1999 – 2012	BCU
FDI (mill.U$S) – economy	1999 – 2012	BCU
Employment (number workers) – economy	1999 – 2012	INE
Exports (mill.U$S) – economy	1999 – 2012	BCU
Sales (mill.U$S) - ICT & IT-enabled sector	1999 – 2011	CUTI
Investment (mill.U$S) - ICT sector	1999 – 2008	BCU
FDI (mill.U$S) - ICT sector	2001 – 2011	BCU
Employment (number workers) - ICT & IT-enabled sector	1999 – 2011	INE/CUTI
Exports (mill.U$S) - ICT & IT-enabled sector	1999 – 2011	BCU/CUTI
GDP/GPV (mill.U$S)-Telecommunications sector	1999 – 2012	BCU/URSEC
FDI (mill.U$S) - Telecommunications sector	2001 – 2011	BCU
Employment (number workers) - Telecommunications sector	1999 – 2011	INE
Telephone (fixed & mobile)/PC/Internet access - households (share)	2000/2005/2008/2012	INE/URSEC
PC/Internet access - firms (share)	2005/2008/2012	INE/URSEC
E-money usage	2000/2005/2008/2011/2012	INE
Online transactions	2000/2005/2011/2012	INE
Innovative firms (by input/output/novelty degree & firm size)	2000/2003/2006/2009	ANII
Number of private firms by employment strata (1d ISIC sector)	2004 2012	DGI/BPS
Total private subordinate workers by employment strata (1d ISIC sector)	2004 2012	DGI/BPS
Share of MNCs in total firms – Industry	2000/2001/2008/2009	INE
Number of firms - ICT & IT-enabled by employment strata, size, location (FTZ or not) & national ownership (2d ISIC sector)	2012	DGI/BPS
Total subordinate workers - ICT & IT-enabled by employment strata, size, location (FTZ or not) & national ownership (2d ISIC sector)	2012	DGI/BPS
Total sales - ICT & IT-enabled by employment strata, size, location (FTZ or not) & national ownership (2d ISIC sector)	2012	DGI/BPS
Number of firms - Software industry by type of output, size, location (FTZ or not) & national ownership	2012	DGI/BPS
Total subordinate workers - Software industry by type of output, size, location (FTZ or not) & national ownership	2012	DGI/BPS
Total sales - Software industry by type of output, size, location (FTZ or not) & national ownership	2012	DGI/BPS

** ANII - National Agency for Investigation and Innovation (Agencia Nacional de Investigación e Innovación); BCU - Central Bank of Uruguay (Banco Central del Uruguay); BPS - Social Security Administration (Banco de Previsión Social); CUTI - Uruguayan Chamber of ICT Businesses (Cámara Uruguaya de Tecnologías de la Información); DGI - National Tax Office (Dirección General Impositiva); INE - National Statistical Institute (Instituto Nacional de Estadística); URSEC - National Telecommunications Regulator (Unidad Reguladora de Servicios de Comunicación)*

Appendix F: Survey questionnaires

(See attached Excel files "Cuestionario-MNCs.xlsx" and "Cuestionario-Empresas domesticas de TICs.xlsx")

Appendix G: Project timetable

Timetable (revised schedule)			Months																											
Specific Objectives	Activities	Deliverables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
			Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15
Collection of information relevant to achieving all specific objectives - global background, baselines, best practices, knowledge frontier - national contexts, contacts with experts and policy makers - first-stage synthesis and progress report	Literature Review																													
	Collection of information on FDI policies and other related government policies and actions, and relevant aspects of national environments in each country.																													
	Collection and first analysis of secondary databases related directly to ICT firms, sectors and clusters performance in each country.																													
	Interviews with authorities and experts in the public, private, and academic sectors in each country.																													
A. Determine the degree to which the presence and activities of ICT and IT-enabled MNCs helps or hinders the survival and growth of existing domestic (locally owned) ICT firms, and determine what types of existing domestic ICT firms are benefitted or disadvantaged by the activities of these MNCs	Definition of first set of econometric models (existing ICT firms and MNCs).																													
	Create questionnaire																													
	Selection of sample firms for each country.																													
	Survey fieldwork; continual revision of results, problem resolution, feedback of econometric model definitions.																													
	Run the first econometric models (data from survey, secondary databases)																													
B. Determine the degree to which the presence and activities of ICT and IT-enabled MNCs helps or hinders the formation of new domestic ICT firms (start-ups), and determine what types of new domestic ICT firms are benefitted or disadvantaged by the activities of these MNCs.	Identification of new domestic ICT firms created during the period analyzed in each country.																													
	Case studies in each country.																													
	Definition of second set of econometric models (new ICT firms and MNCs)																													
	(survey period; monitoring of results, feedback to econometric model definition)																													
	Run the second econometric models (data from survey, secondary databases)																													
Second-stage synthesis, initial policy recommendations and progress report	Develop initial policy recommendations based on the results from all previous activities																													
	Write and submit mid-term progress report	Mid-term progress report																												
C. Determine the degree to which the creation, survival, and growth of domestic ICT firms facilitates the creation of more and better jobs for their employees, considering any possible gender biases in all these topics.	Case studies in each country.																													
	Definition of third set of econometric models (employment creation)																													
	(survey period; monitoring of results, feedback to econometric model definition)																													
	Run the third econometric models (data from survey, secondary databases)																													
Final stages of synthesis - refine policy recommendations, begin final document draft - present results and policy recommendations in workshop for local experts and policy makers; submit draft to IDRC - incorporate feedback from IDRC and workshops into final documents - preparation of manuscript for submission to journal	Derive main policy recommendations based on the results from all previous activities																													
	Carry out workshops in each country studied	National workshops																												
	Write drafts of final report for each country																													
	Write final country reports and final technical report, incorporating feedback from workshop participants and IDRC reviewers.																													
	Submission of final technical report, including final country reports	Final technical report and final versions of national reports																												
	Create and submit final financial report	Final financial report																												

Original period of execution Delayed, but completed Deliverable

Appendix H: Country reports

See the attached Word files:

Giuliodori, D., H. Gertel, and R. Giuliodori (2015), "ICT Sectors and Clusters, Local Firm Performance and Employment Generation in Argentina", working paper.

Monge-González, R., J. Hewitt and F. Torres-Carballo (2015), "Do Multinationals help or hinder local firms? Evidence from Costa Rican ICT sector", working paper.

Cassoni, A. (2015), "ICT Sectors and Clusters, Local Firms Performance and Employment Generation: The case of Uruguay", working paper.

CIUDAD	FECHA	Nº

CUESTIONARIO TICS LOCALES/ DOMÉSTICAS (1)

Estimado señor(a): La Fundación CAATEC de Costa Rica (www.caatec.org), en forma conjunta con investigadores de la Universidad Nacional de Córdoba, Argentina (www.unc.edu.ar) y de la Universidad ORT de Uruguay (www.ort.edu.uy), está realizando un estudio titulado "Clusters de las Tecnologías de la Información y Comunicación (TIC), desempeño de las empresas locales y generación de empleos en América Latina". Dicho estudio está siendo ejecutado en los tres países: Argentina, Costa Rica y Uruguay. CAATEC es una organización no gubernamental y sin fines de lucro que busca fomentar el desarrollo económico de la región mediante el diseño y promoción de políticas de innovación y desarrollo tecnológico, en especial el aprovechamiento de las ventajas que trae consigo el avance de las Tecnologías de la Información y la Comunicación. Los estudios de CAATEC están regidos por los principios de rigor científico, independencia e imparcialidad. El estudio señalado está siendo patrocinado por el Centro Internacional de Investigaciones para el Desarrollo (www.idrc.ca). El propósito de esta investigación es contar con información y conocimientos sólidos sobre los retos y oportunidades que enfrenta las empresas del sector TIC, para formular políticas públicas que favorezcan la creación de nuevas empresas, el crecimiento de las actuales, así como la generación de más y mejores fuentes de empleo y el incremento de la participación de las mujeres como empresarias y trabajadoras en el sector de las TIC. Toda la información que usted nos proporcione será estrictamente confidencial y para fines estadísticos únicamente.

SECCIÓN 1 - DATOS DE IDENTIFICACIÓN

Nombre del Entrevistado _____ ☎ _____

Correo electrónico _____ Fax _____

Dirección _____ Código Postal _____

¿Es esta una sucursal? **SI** **NO** Dirección de casa matriz _____

¿Cuál es su cargo|rol en la empresa? Gerente General (1) Gerente Administrativo (2) Dueño (3)

SECCIÓN 2 - PERFIL DE LOS FUNDADORES

1 ¿Cuál es el grado de educación que poseen los principales fundadores de esta empresa?

(REGISTRAR NIVEL DE ESTUDIO DE HASTA 3 FUNDADORES)	1º	2º	3º
Sin estudios	1	1	1
Primaria	2	2	2
Secundaria	3	3	3
Educación Técnica	4	4	4
Universitaria incompleta	5	5	5
Universitaria completa	6	6	6
Posgrado	7	7	7
Ns|Nc	8	8	8

2 ¿Los fundadores de esta compañía fundaron otras empresas?

1 SI 2 NO **(PASA A 4)** 3 Ns|Nc **(PASA A 4)**

3 ¿De qué sector?

1 TIC´s

2 Otro. ¿Cuál? _____

4 Antes de fundar esta empresa, ¿alguno de los fundadores trabajó en una empresa MNC (Multinacional) en Costa Rica?

1 SI 2 NO **(PASA A 6)** 3 Ns|Nc **(PASA A 6)**

5 ¿Cuál? (CONSIGNAR EL NOMBRE)

_____

6 ¿Cuál es el género de los socios? **(REGISTRAR CANTIDAD DE SOCIOS)**

Masculino ____ Femenino ____ Persona Jurídica (SRL, SA) ____

SECCIÓN 4- EMPRESA / PRODUCTO

15 ¿Cuáles son las tres principales actividades de su empresa? RM

(MARCAR SOLO 3 ACTIVIDADES, EN ORDEN DE IMPORTANCIA)

ENTREGAR TARJETA AL ENCUESTADO	1º	2º	3º
Diseño, fabricación, ensamblaje, o comercialización de productos de hardware JARWER			
Creación y venta de productos de software propio estandarizado			
Desarrollo de aplicaciones/sistemas a la medida (incl. bases de datos, sitios Web, etc.) para clientes			
Servicios de valor agregado - venta e implementación de hardware y/ o software de terceros, junto con servicios/productos propios, testing.			
Servicios de centros de datos remotos (colocación de equipos del cliente, hospedaje de aplicaciones en infraestructura propia, etc.)			
Subcontratación o tercerización de procesos de negocio ("Business BISNES Process Outsourcing", o "BPO" BIPIO)			
Instalación y/o mantenimiento de cableado estructurado, redes locales de computadoras			
Telefonía			
Servicios de comunicaciones personales / mensajería			
Servicio Internet para uso público			
Otra (ESPECIFICAR) _____			

16 ¿Qué porcentaje de sus ingresos totales representa la principal actividad de la empresa en 2013?

____ % **(REGISTRAR PORCENTAJE)**

17 ¿Cuáles son las tres razones más importantes por las que sus clientes compran sus productos y/o servicios?

SECCIÓN 3- ORIGEN DE LA EMPRESA

7 ¿En qué año y en qué país inició operaciones la empresa?

AÑO [ ] **PAÍS** [ ]

(SALTA A P10, SI RESPONDE COSTA RICA)

8 ¿Cuándo inició las operaciones en COSTA RICA?

AÑO [ ]

9 ¿Cuántas oficinas tienen en total en el mercado local (Costa Rica)?

[ ] **(REGISTRAR CANTIDAD)**

10 ¿Tiene su empresa oficinas que realizan operaciones en otros países?

1 SI 2 NO **(PASA A 12)**

11 ¿Cuál|Cuáles? INDIQUE LOS 3 PRINCIPALES PAISES

12 ¿Cómo nació esta empresa? RESPUESTA UNICA

Actividad unipersonal	1
Desprendimiento de otra empresa nacional	2
Desprendimiento de otra empresa internacional	3
Grupo de profesionales ó técnicos	4
Otra	5
Ns|Nc	6

(SI RESPONDE 2ó3, PASAR A P13; SI RESPONDE 1ó4 PASA P14; SINO P15)

13 ¿Cuál? [ ]

14 ¿Uno o más fundadores son egresados de carreras informáticas?

1 SI 2 NO 3 Ns|Nc

(MARCAR 3 OPCIONES, SIENDO 1 LA RAZÓN MAS IMPORTANTE)

ENTREGUE TARJETA 17 AL ENTREVISTADO	1º	2º	3º
Precio del producto/servicio			
Calidad del producto/servicio			
Nivel de innovación del producto/servicio			
Tamaño de su empresa			
Prestigio de su empresa			
Solidez financiera de su empresa			
Otra			

18 Actualmente, ¿A que sector pertenecen los clientes más importantes de su empresa en Costa Rica, en términos de sus ventas en el último año calendario? (CONSIGNAR EL SECTOR)

ESPONTÁNEA	1º	2º	3º
Telecomunicaciones			
Otras empresas del sector de las TICS			
Servicios de outsourcing (BPO; KPO; call centers, etc.)			
Financiero (Bancos, Financieras)			
Seguros			
Sector público / gobierno			
Salud			
Educación			
Agropecuario, pesca, industria alimenticia			
Construcción y bienes raíces			
Comercio			
Industria farmacéutica			
Turismo (hoteles, restaurantes, otros)			
Otra manufactura (especifique)			

SECCIÓN 5- CANALES DE TRANSMISIÓN

CLIENTES MNC (mis clientes)

19 **¿Vende su empresa bienes o servicios a empresas Multinacionales que operan en Costa Rica?** 1 SI 2 NO **(PASA A P29)**

20 ¿Estas empresas son del sector de las TICs u otras Multinacionales?

1 SI a TICs MNCs 2 SI a otras MNCs 3 Ambas

20A ¿Qué porcentaje del total de las ventas de su empresa representan las ventas a?

% a TICs MNCs % a Otras MNCs

21 **¿Cuáles son los dos principales productos o servicios tecnológicos que su empresa le vende a las Multinacionales en Costa Rica? (PUEDE SER SOLO 1)**

1º	
2º	

22 **¿El producto o los dos principales productos o servicios que su empresa le vende a Multinacionales llegan a ser parte del producto o servicio final de la Multinacional?**

1 SI 2 NO 3 Ns|Nc

23 **¿Cómo fue que su empresa logró comenzar a venderle a empresas Multinacionales que operan en la Costa Rica?LEER** **(RESP. MULTIPLE)**

Participación en concurso de precios cerrados	1
Participación en otros tipos de concursos	2
Relaciones personales con funcionarios de la Multinacional	3
Recomendación de otro cliente	4
Gestiones del cluster a que pertenece su empresa	5
Gestiones de organismo público (nac., prov. o munic.)	6
Otra:_____	7
Ns|Nc	8

24 **¿Cuáles fueron los principales REQUISITOS que debió cumplir para convertirse en proveedor de las Multinacionales? LEER**
(RM=RESPUESTA MULTIPLE)

Avales financieros	1
Exclusividad comercial	2
Normas internacionales de calidad	3
Organización societaria	4
Pertenecer a algún cluster	5
Otro:_____	6
Ns|Nc	7

27 **Al ser su empresa proveedora de Multinacionales, ¿Ha recibido alguno de los siguientes beneficios?**
(RM=RESPUESTA MULTIPLE) ENTREGUE TARJETA 27

Asistencia para mejorar técnicas de producción y/o diseño de producto	1
}	2
Capacitación a personal de su empresa	3
Adelantos de pago por parte de la Multinacional	4
Arrendamiento (leasing) de maquinaria o equipo	5
Provisión de insumos	6
Asistencia para mejorar su nivel de calidad	7
Asistencia p/mejorar la organización de la producción	8
No recibió beneficios	9

28 **En el proceso para convertirse en proveedora de Multinacionales a las que le vende hoy, ¿ ha recibido algún tipo de apoyo externo? Por favor, mencione el o los principales.** **(RESPUESTA MULTIPLE)**

SI, de instituciones públicas	1
SI, de instituciones privadas	2
SI, de universidades	3
SI, de centros de capacitación	4
SI, de otras empresas	5
SI, de consultores	6
No recibimos apoyo	7
Ns|Nc	8

29 **¿Qué acciones específicas considera usted que debería realizar el gobierno nacional para fomentar las ventas de empresas como la suya a Multinacionales que operan en Costa Rica?**

_____
_____
_____
_____

(ABIERTA)POR FAVOR SER MUY PRECISO EN LA RESPUESTA

30 **¿Ha formado su empresa consorcios u otros tipos de alianzas comerciales con empresas Multinacionales del sector de las Tecnologías de Información y Comunicación para vender sus productos o servicios a mayor escala, o para participar de proyectos de envergadura?**

1 SI 2 NO

31 **¿Su empresa es distribuidora, comercializadora o represen-**

25 **¿Cuál considera usted que es el VALOR AGREGADO que le brinda a su empresa el ser proveedora de una Multinacional? LEER (RM=RESPUESTA MULTIPLE)**

Prestigio	1
Poseer un cliente importante (concentra volumen de negocios)	2
Bajo riesgo de incobrabilidad	3
La obliga a estar siempre actualizada tecnológicamente	4
Mayor inserción internacional	5
Otra:_____	6
Ns|Nc	7

26 **Su empresa, ¿Cómo acostumbra a financiar los requerimientos para ser proveedora de Multinacionales? Indique su fuente principal. LEER (RESP**

Con capital propio	1
Con entidades bancarias o financieras	2
Con capitales externos	3
Otras	4

tante oficial de productos o servicios de Multinacionales del sector de las Tecnologías de Información y Comunicación?

1 SI 2 NO (PASE A PREG. 34)

32 **¿Qué tipo de relaciones comerciales tiene con estas empresas Multinacionales TICs? MULTIPLE (RM=RESPUESTA MULTIPLE)**

Distribuidora / mayorista	1
Comercializadora/ detallista (minorista)	2
Revendedora de valor agregado (VAR)	3
Representante	4
Otra relación empresarial	5

33 **¿Le ofrecen estas Multinacionales TICs a su empresa alguno de los siguientes beneficios? Resp. Multiple (MARCAR TODOS LOS QUE CONSIDERE)**

ENTREGUE TARJETA 33

Descuentos para los productos/servicios	1
Créditos	2
Capacitación - aspectos técnicos	3
Capacitación - técnicas de ventas y/o mercadeo	4
Información sobre clientes actuales y/o potenciales	5
Participación en eventos especiales para socios	6
Certificaciones de calidad de productos y servicios	7
Publicidad/visibilidad de su compañía	8
Contratos previsibles y a más largo plazo	9
No ofrecen beneficios adicionales a la actividad normal	10
Ns|Nc	11

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CIUDAD	FECHA	Nº

CUESTIONARIO TICS LOCALES/ DOMÉSTICAS (3)

PROVEEDORES MNC (mis proveedores)

34 Su empresa, ¿Compra bienes o servicios a empresas Multinacionales que operan en Costa Rica? EN CASO DE RSPONDER SI, LEA OPCIONES

SI, insumos tecnológicos incorporados al producto	1
SI, servicios de outsourcing de administración de los recursos	2
Si, otros productos o servicios	3
NO **(PASA A P38)**	4

35 Estas empresas son TICs u otras Multinacionales?

1 SI a TICs MNC 2 SI a otras MNC 3 Ambas

36 ¿Qué porcentaje del total de sus compras, representan las compras a?

____ % a TIC´s Multinacionales ____ % a Otras Multinacionales

37 ¿Cuáles son los dos principales productos o servicios que su empresa compra a las Multinacionales TICs?

REALIZAR A LOS QUE RESPONDIERON CODIGO 1 O 3 EN P35

	PRODUCTO O SERVICIO
1º	
2º	

ENTORNO

38 En su opinión, la existencia de Multinacionales TICs, en Costa Rica provee mayores posibilidades de desarrollo para su empresa?

1 SI 2 NO 3 Ns|Nc

Explicar fundamentos:_____

_____

39 ¿Me podría indicar si alguno de los empleados actuales de esta empresa ha trabajado previamente para una Multinacional establecida en el país o en el exterior?

1 SI 2 NO 3 Ns|Nc **(2 Y 3 PASA A P41)**

40 Podría indicar qué porcentaje del total de los empleados ha trabajado previamente en una Multinacio ____ %

SECCIÓN 6- CAPITAL HUMANO

41 ¿Cuál es el grado de educación alcanzado del gerente general?

(SI ENCUESTADO=GERENTE, SALTAR A P42)

Secundaria o inferior	1
Educación Técnica	2
Universitaria incompleta	3
Universitaria completa	4
Posgrado	5

42 En total, ¿cuántos años de experiencia en puestos gerenciales en el sector TICs acumula el gerente general de esta empresa?

____ **AÑOS**

43 ¿El gerente ha trabajado alguna vez en una empresa Multinacional?

1 SI: ¿Cuántos años? ____

2 NO

3 Ns|Nc

44 ¿Podría indicarme la cantidad de personal que contrató su empresa por categoría para los años 2012 y 2013?

	2012	2013
Asalariados		
Contratos de Serv. (menos de 4hs diarias)		
Contratos de Serv. (más de 4hs diarias)		
Profesionales Externos Indep.		
OTROS		
TOTAL		

45 Del total de empleados en el año 2013, según pregunta anterior, ¿podría indicarme cuántos LEA PUESTO hay? POR CADA PUESTO MENCIONADO PREGUNTAR Y de estos cuántas son mujeres?

	TOTAL	Mujeres
Gerentes		
Administrativos		
Comerciales, marketing y ventas		
Técnicos de alto nivel (planificadores de sistemas, lideres de equipos, o equivalentes)		
Técnicos de nivel medio (ejecutores - ingenieros, analistas programadores o equivalentes)		
Infraestructura y soporte TI, sin incluir aquellos que participan directamente en la producción		
Otros		

DEBE SUMAR IGUAL QUE PREGUNTA 44 AÑO 2013

46 Respecto a los puestos de trabajo en su empresa, ¿Cuáles son los tres perfiles más difíciles de reclutar a futuro? Mencione del que tiene el mayor grado de dificultad al que tiene menor grado de dificultad.

	1º	2º	3º
Gerentes			
Administrativos			
Comerciales			
Técnicos de alto nivel			
Técnicos de nivel medio			
Infraestructura y soporte TI			
Otros			

47 ¿Cuánto cree Ud. que influye cada uno de los siguientes aspectos en las dificultades para encontrar el personal adecuado? (indique en escala de 1 a 5, siendo 1 el menor grado de dificultad y 5 el mayor grado de dificultad) LEER UN ATRIBUTO POR VEZ Y ESPERAR RESPUESTA

	1	2	3	4	5
Cantidad insuficiente de candidatos					
Calidad insuficiente de destrezas o habilidades					
Alto **costo** salarial de los candidatos acepados					

48 ¿Considera usted que una mayor competencia entre las empresas para contratar los mejores empleados, ha llevado a una mayor rotación de los empleados del sector?

1 SI 2 NO **(PASA A P50)** 3 Ns|Nc **(PASA A P50)**

49 Indique seguidamente los DOS (2) tipos de empresas que Ud. considera que tienen el efecto más grande en estimular esta competencia? INDICAR SOLO DOS

	1º	2º
Empresas costarricenses fuera del sector de las TICs		
Empresas Multinacionales en Costa Rica fuera del sector TICs		
Otras empresas costarricenses del sector de las TICs		
Empresas Multinacionales del sector TICs en Costa Rica		

50 ¿Su empresa regularmente capacita a su personal? ¿En qué área (s)? (RM=RESPUESTA MULTIPLE)

No capacita	1
En hardware	2
En software (uso, desarrollo, etc.)	3
En administración, gestión y organización	4
En comercialización	5
En idioma	6
Otra	7

SECCIÓN 7- COMPETENCIA

51 ¿Qué tan competitivo considera ud es el mercado costarricense en el que su empresa vende sus productos TICs?

1 Muy Compet. 2 Algo Compet. 3 Nada Compet.

52 ¿De dónde proviene la principal competencia en el mercado costarricense que enfrenta su empresa? LEER OPCIONES

De otras empresas TICs costarricenses	1
De empresas Multinacionales TICs que operan en Costa Ric	2
De importaciones de productos o servicios TICS	3

SECCIÓN 8- GESTIÓN E INNOVACIÓN

53 ¿Cuenta en la empresa con:

LEER OPCIONES	SI	NO
Objetivos definidos y escritos		
Un plan de negocios o estratégico explícito		
Seguimiento y control de los planes de la empresa		
Un plan de mercadeo claramente diseñado		
Una definición clara de los mercados o clientes		
Conocimiento claro de las caract. de su competencia		
Control formal de finanzas		

54 ¿Su empresa ha llevado a cabo alguna de las siguientes actividades en los últimos dos años (2012-2013)?

LEER	SI	NO	Ns
Mejoras en los prod. o ss. que ofrece al merc. Nacional			
Mejoras en los prod. o ss. que ofrece al merc. Internacional			
Lanz. de un nvo. producto o servicio al merc. Nacionales			
Lanz. de un nvo. producto o servicio al merc. Internacionales			
Desarrollo de una nueva marca en el merc. Nacional			
Desarrollo de una nueva marca en el merc. Internacional			
Mejoras en los procesos productivos			
Cambios en la comercialización de sus prod. y/o serv.			
Cambios en la organización de su empresa			
Vinculación con centros académicos o de investig.			

55 ¿Su empresa toma medidas formales para proteger su Propiedad intelectual?

1 SI **(PASA A 56)** 2 NO **(PASA A 57)**

56 ¿Qué tipo de medidas toma la empresa? (RESPUESTA MULTIPLE)

Registro de propiedad intelectual o patente en el ext.	1
Registro de propiedad intelectual o patente en Costa Rica	2
Otra:	3

(PASA A 58)

57 ¿Por qué no lo hacen? Indique la razon más importante. (RESPUESTA UNICA)

Por falta de conocimiento sobre los mecanismos de protección de propiedad intelectual	1
Por falta de conocimiento sobre los mecanismos de protección de propiedad intelectual en otros países	2
Porque obtener este tipo de protección es demasiado caro	3
Porque la empresa no ofrece productos y/o servicios que sean aptos para este tipo de protección	4
Porque considero que estos mecanismos no pueden prevenir que la competencia imite nuestra innovacion	5
Otros	6

59 Del total de ventas realizadas en los años 2012 y 2013, indique qué porcentaje corresponde a exportaciones:

(SI EN 2012/13 =0%, PASAR A P63)

	2012	2013
Ventas en el mercado nacional	%	%
Exportaciones	%	%
	100%	100%

60 ¿Cuáles son los tres principales países a los que su empresa exporta? (NOMBRE COMPLETO DEL PAÍS)

	1
	2
	3

61 ¿En qué año realizó la primera exportación esta empresa? Y, ¿a qué país?

ÑO ____ **A QUE PAIS?** ____

62 Desde la primera vez que exportó, las exportaciones se han hecho de manera ininterrumpida a través de los años?

1 SI 2 NO 3 Ns|Nc

SECCIÓN 10- ACTIVIDADES DE APOYO y INVESTIGACIÓN Y DESARROLLO

63 ¿Pertenece su empresa a algún cluster o grupo tecnológico?

1 SI ¿Cuál? ____
2 NO

64 ¿Ha sido su empresa beneficiaria de algún régimen de promoción industrial y|o programas de ciencias y tecnología?

1 SI 2 NO **(PASA A 66)**

65 ¿Cuál|Cuáles? Indique desde que año y si es aún beneficiario.

(RM=RESPUESTA MULTIPLE)

LEER	DESDE AÑO	AÚN BENEF.
Encadenamientos Producitivos (antes Costa Rica Pro		
Fondo de Incentivos al Desarrollo Científico y Tecnol		
Fondo PROPYME (MICITT/CONICIT)		
Fondo especial para el Desarrollo de las MIPYMES (F		
Otros:_____		
Otros:_____		

66 En su opinión ¿el apoyo del Gobierno a su empresa con respecto a empresas locales TICs es?: LEER, (RESPUESTA UNICA)

mayor que a otras empresas locales	1
menor que a otras empresas locales	2
igual que a otras empresas locales	3
No recibió apoyo	4

66A y con respecto a empresas Multinacionales TICs es?: (RESPUESTA UNICA)

mayor que a empresas multinacionales	5
menor que a empresas multinacionales	6
igual que a empresas multinacionales	7
No recibió apoyo	8

67 Usando una escala del 1 al 5, donde 1 significa que la calificación es muy mala y 5 que es muy buena, por favor califique los siguientes aspectos del entorno en Costa Rica.

LEER UNA POR VEZ Y ESPERAR RESPUESTA DE C/U	1	2	3	4	5
Regulaciones laborales					
Opciones de enseñanza y capacitación para la mano					

SECCIÓN 9- EXPORTACIONES

58 **¿Su empresa realiza ó realizó exportaciones alguna vez?**

1 SI 2 NO **(SI RESPONDE NO PASAR A P63)**

de obra					
Protección de derechos de propiedad intelectual					
Infraestructura en telecomunicaciones					
Acceso a fuentes de financiamiento					

68 **Usando una escala del 1 al 5, donde 1 significa que la calificación es muy mala y 5 que es muy buena, por favor califique las siguientes políticas públicas en Costa Rica.**

	1	2	3	4	5
Apoyo a nuevos emprendimientos					
Formación de clusters					
Creación de cadenas de valor					
Fomento a la innovación					
Generación de Recursos Humanos calificados					
Promoción de inversión privada					
Atraccción de inversión extranjera directa					
Otorgamientos de incentivos fiscales					
Promoción de exportaciones					

69 **¿Llevó a cabo durante los años 2012 y 2013 acciones para mejorar el nivel de tecnología de su empresa?**

SI. Especificar:_____	1
NO, Especificar_____	2
Ns/Nc	3

SECCIÓN 11 - Para terminar….

70 **El capital de su empresa es:**

100% costarricense	1
costarricense- extranjero; mayoría extranjero	2
costarricense- extranjero; mayoría costarricense	3
100% extranjero	4

71 **Hipotéticamente, si su empresa tuviera que comprar toda la maquinaria, vehículos y equipos que posee actualmente y en las mismas condiciones en que se encuentran, ¿cuánto estima que sería el costo de reposición?**

$

72 **¿Podría indicarme el bruto de sueldos y jornales pagados durante 2012 y 2013 respectivamente?**

2012	2013
$	$

73 **¿Podría darme el monto aproximado de las ventas totales que realizó su empresa en los años 2012 y 2013?**

2012	2013
$	$

Nota: SI L A PERSONA NO RESPONDE EN FORMA INSTANTANEA, FAVOR USAR LOS SIGUIENTES RANGOS PARA CADA AÑO. ENTREGAR TARJETA DE RANGOS

	2012	2013
MENOS DE $100,000		
DE $100,000 A MENOS DE $250,000		
DE $250,000 A MENOS DE $500,000		
DE $500,000 A MENOS DE $750,000		
DE $750,000 A MENOS DE $1,000,000		
DE $1,000,000 A MENOS DE $2,000,000		
DE $2,000,000 A MENOS DE $3,000,000		
DE $3,000,000 A MENOS DE $4,000,000		
DE $4,000,000 A MENOS DE $5,000,000		
DE $5,000,000 A MENOS DE $7,500,000		
DE $7,500,000 A MENOS DE $10,000,000		
$10,000,000 O MÁS		

74 **Como parte de este estudio necesitamos entrevistar a empresas Multinacionales del sector de las TIC. ¿Podría sugerirnos nombres de estas empresas en Costa Rica?**

1	
2	
3	

75 ¿Podría darnos la siguiente información sobre su empresa?

Razón Social:	
Nombre Comercial:	
Cédula Jurídica:	

DATOS DEL ENCUESTADOR

FECHA			HORA	
ENCUESTADOR				

Declaro y Certifico que la entrevista ha sido realizada por mi en la empresa y que las respuestas son las que aparecen en este formulario sin ser alteradas en ningún caso

_____

Firma del Encuestador

ESPACIO DE SUPERVISIÓN

TOTAL DE PREGUNTAS Y CASILLEROS COMPLETOS SI NO

ENCUESTA SUPERVISADA SI NO — APROBADA SI NO

A TESTEO EN CAMPO SI NO — TESTEO POSITIVO SI NO

_____

Firma del Supervisor

CUESTIONARIO PARA EMPRESAS MULTINACIONALES *EXTRANJERAS* DE TIC Y IT-ENABLED

SECCIÓN 1 - DATOS DE IDENTIFICACIÓN

Estimado señor(a): La Fundación CAATEC de Costa Rica (www.caatec.org), en forma conjunta con investigadores de la Universidad Nacional de Córdoba, Argentina (www.unc. edu.ar) y de la Universidad ORT Uruguay (www.ort.edu.uy), está realizando un estudio titulado: "Clusters de las Tecnologías de la Información y Comunicación (TIC), desempeño de las empresas locales y generación de empleos en América Latina". Dicho estudio está siendo ejecutado en los tres países: Argentina, Costa Rica y Uruguay. CAATEC es una organización no gubernamentaly sin fines de lucro que busca fomentar el desarrollo económico de la región mediante el diseño y promoción de políticas de innovación y desarrollo tecnológico, en especial el aprovechamiento de las ventajas que trae consigo el avance de las Tecnologías de la Información y la Comunicación. Los estudios de CAATEC están regidos por los principios de rigor científico, independencia e imparcialidad. El estudio señalado está siendo patrocinado por el Centro Internacional de Investigaciones para el Desarrollo (www.idrc.ca). El propósito de esta investigación es contar con información y conocimientos sólidos sobre los retos y oportunidades que enfrenta las empresas del sector TIC, para formular políticas públicas que favorezcan la creación de nuevas empresas, el crecimiento de las actuales, así como la generación de más y mejores fuentes de empleo y el incremento de la participación de las mujeres como empresarias y trabajadoras en el sector de las TIC. Toda la información que usted nos proporcione será estrictamente confidencial y para fines estadísticos únicamente.

Fecha de la entrevista:

SI ENTREVISTÓ MÁS DE UNO PARA ESTE MÓDULO, INDÍQUELO **ESTO DEBE APARECER HASTA EL FINAL DEL CUESTIONARIO**

Nombre del entrev	Puesto en la empresa:	Teléfono:	Correo electrónico:
1.			
2.			
3.			
4.			
5.			
6.			

Dirección exacta:
Nombre de la Empresa:
Razón Social:

Cédula Jurídica:

NOTA: ESTA INFORMACIÓN YA DEBE IR COMPLETADA AL MOMENTO DE LA VISITA

SECCIÓN 2 - SPILLOVER POTENTIAL

Antes de iniciar quiero comentarle que esta entrevista cuando mencione "su Empresa" me refiero a la operación de su firma en Costa Rica

1 **Actualmente, el capital de esta empresa radicada en el país está conformado:**
LEER OPCIONES
en un 100% por el aporte de la casa matriz en el exterior 1
En más del 50% por socios residentes en el exterior 2
en menos del 50% por socios residentes en el exterior 3
OTRO - **ESPECIFICAR**

2 **¿Podría indicar cuál es el país de origen de la casa matriz?** **(ESCRIBIR EL NOMBRE COMPLETO DEL PAÍS)**

3 **¿Qué motivó a la empresa a establecer sus operaciones en Costa Rica ? RESP. MULTIPLE**
ENTREGAR TARJETA 2

Precios bajos de insumos claves (por ejemplo: electricidad, telecomunicaciones, materia prima, etc.)	01
Disponibilidad de mano de obra calificada (por ejemplo: calidad / disponibilidad de la fuerza laboral)	02
Disponibilidad de mano de obra con dominio de idiomas	03
Para tener acceso al mercado costarricense para vender sus bienes o servicios	04
Para tener acceso a los mercados regionales para vender sus bienes o servicios	05
La proximidad a las oficinas centrales / zona horaria similar a la de las oficinas centrales	06
Para tener acceso a investigadores y experticia tecnológica nacional	07
Incentivos del gobierno para la Inversión Extranjera Directa (IED)	08
Clima de negocios (marco jurídico, tramitología, estabilidad política y macroeconómica, etc.)	09
Existencia de clusters en TIC	10
OTRO - **ESPECIFICAR**	98
NS/NR	99

4 **¿En qué año la empresa inició operaciones en Costa Rica?:** .

5 **¿De qué forma inició la empresa sus operaciones en Costa Rica? LEA OPCIONES RESP. UNICA**
a. La casa matriz la creó como una planta de producción nueva en Costa Rica
b. La casa matriz tomo la decisión estratégica de adquirir o absorber otra empresa ya en funcionamiento en Costa Rica 1
c. Forma parte de un joint-venture (IVO IN VENTURE) o empresa conjunta en Costa Rica 2
d. Otra **ESPECIFIQUE:** 3
9

6 **¿Podría indicarme cual es la principal actividad de su empresa en Costa Rica?**

7 **¿Podría indicarme cual es la principal actividad de la Casa Matriz?**

8 **¿Cuales son los principales tipos de clientes de su Empresa en Costa Rica ? Favor indicar en orden de importancia, donde 1 es el mas importante, 2 el siguiente, etc.** **RESP. MULTIPLE**
LEER OPCIONES

01 Individuos	
02 Empresas pequeñas	
03 Empresas grandes	
04 Gobierno	
05 otras oficinas/filiales de su empresa	
98 otro **ESPECIFICAR:**	
99 no tenemos clientes en Costa Rica	

PASAR A PREGUNTA 10

9 **Podría indicar cuáles son los productos o servicios más importantes que su empresa vende en Costa Rica?**
a. Producto o servicio 1:
b. Producto o servicio 2:
c. Producto o servicio 3:

10 **¿En que países están ubicados los principales proveedores de productos o servicios TICs de su Empresa? /ESCRIBIR NOMBRE COMPLETO DEL PAÍS)**
a. País 1:
b. País 2:
c. País 3:

SECCIÓN 3 - INNOVACIÓN

11 **¿Cuál de las siguientes actividades ha llevado a cabo su empresa durante los últimos dos años? RESP. MULTIPLE**
ENTREGAR TARJETA 11

01.Mejoras en los productos o servicios que ya ofrece al mercado Nacional	
02.Mejoras en los productos o servicios que ofrece ya al mercado internacional	
03.Lanzamiento de un nuevo producto o servicio al mercado Nacional	
04.Lanzamiento de un nuevo producto o servicio al mercado Internacional	
05.Desarrollo de una nueva marca en el mercado Nacional	
06.Desarrollo de una nueva marca en el mercado Internacional	
07.Mejoras en los procesos productivos	
08.Cambios en la contratación de sus productos y/o servicios	
09.Cambios en la organización de su empresa	
10.Actividades de vinculación con centros académicos o de investigación	

SECCIÓN 4 - EXPORTACIONES

12 **Del total de ventas realizadas en los años 2012 y 2013, indique cuál porcentaje corresponde a:**

VALIDAR CON P8.1 SI MENCIONO QUE SI VE

	2012	2013
Ventas en el mercado nacional	%	%
Exportaciones	%	%
	100%	100%

(SI EN LOS AÑOS 2012 Y 2013 LAS EXPORTACIONES=0%. PASAR A P14)

13 **¿Cuáles son los tres principales países a los que su empresa exporta? /ESCRIBIR NOMBRE COMPLETO DEL PAÍS)**

1	
2	
3	

SECCIÓN 5 - ENTORNO

14 **Usando una escala del 1 al 5, donde 1 significa que la calificación es muy mala y 5 que es muy buena, por favor califique los siguientes aspectos del entorno en Costa Rica.**
LEER UNA POR VEZ Y EXPERAR RESPUESTA DE CADA UNO ANTES DE CONTINUAR CON EL SIGUIENTE ENTREGAR TARJETA 14 DE ESCALA

	1	2	3	4	5
	Muy mala				Muy buena
1.Regulaciones laborales	1	2	3	4	5
2.Opciones de enseñanza y capacitación para la mano de obra	1	2	3	4	5
3.Protección de derechos de propiedad intelectual	1	2	3	4	5
4.Infraestructura en telecomunicaciones	1	2	3	4	5
5.Acceso a fuentes de financiamiento	1	2	3	4	5

15 **Usando una escala del 1 al 5, donde 1 significa que la calificación es muy mala y 5 que es muy buena, por favor califique los siguientes políticas públicas en Costa Rica.**
LEER UNA POR VEZ Y EXPERAR RESPUESTA DE CADA UNO ANTES DE CONTINUAR CON EL SIGUIENTE ENTREGAR TARJETA 15 DE ESCALA

	1	2	3	4	5
	Muy mala				Muy buena
1.Apoyo a nuevos emprendimientos	1	2	3	4	5
2.Formación de clusters	1	2	3	4	5
3.Creación de cadenas de valor	1	2	3	4	5
4.Fomento a la innovación	1	2	3	4	5
5.Generación de RRHH calificados	1	2	3	4	5
6.Promoción de inversión privada	1	2	3	4	5
7.Atracción de inversión extranjera directa	1	2	3	4	5
8.Otorgamientos de incentivos fiscales	1	2	3	4	5
9.Promoción de exportaciones	1	2	3	4	5

SECCIÓN 6 - RECURSO HUMANO

16 **¿Podría indicarme la cantidad de personal que trabajó en su empresa por regimen para los años 2012 y 2013? LEER UNO A UNO CADA REGIMEN**
LEER OPCIONES

Régimen bajo el que trabajaron las personas	2012	2013
1.Asalariados		
2.Contratos de Servicios (menos de 4hs diarias)		
3.Contratos de Servicios (más de 4hs diarias)		
4.Profesionales Externos Independientes		
5.OTROS		
TOTAL		

17 **Del total de empleados de su Empresa en el año 2013 ¿Podría indicarme cuántos LEA PUESTO hay? POR CADA PUESTO MENCIONADO PREGUNTAR Y de estos cuántas son mujeres?**

Puesto	TOTAL	Mujeres
1.Gerentes		
2.Administrativos (asistentes, secretarias, etc)		
3.Personal de marketing y ventas		
4.Técnicos de alto nivel (planificadores de sistemas, líderes de equipo, o equivalentes)		
5.Técnicos de alto nivel (programadores - ingenieros, analistas programadores o equivalentes)		
6.Infraestructura y soporte TI, sin incluir aquellos que participan directamente en la producción		
7.Otros		
TOTAL		

DEBE SUMAR IGUAL QUE PREGUNTA 16 AÑO 2013

18 **Usando una escala de 1 a 5, donde 1 significa muy difícil de conseguir y 5 muy fácil de conseguir, por favor califique cual tan difícil o fácil es para su empresa conseguir los empleados que ocupa en las siguientes categorías?**
ENTREGAR TARJETA 18 DE ESCALA
LEER OPCIONES

Puesto	1	2	3	4	5
	Muy difícil				Muy fácil
1.Gerentes	1	2	3	4	5
2.Administrativos (asistentes, secretarias, etc)	1	2	3	4	5
3.Personal de marketing y ventas	1	2	3	4	5
4.Técnicos de alto nivel (planificadores de sistemas, líderes de equipo, o equivalentes)	1	2	3	4	5
5.Técnicos de alto nivel (programadores - ingenieros, analistas programadores o equivalentes)	1	2	3	4	5
6.Infraestructura y soporte TI, sin incluir aquellos que participan directamente en la producción	1	2	3	4	5
7.Otros	1	2	3	4	5

19 **¿Su empresa capacita regularmente a su personal, ya sea interna o externamente?**
1.Si 2.No **(PASAR A PREGUNTA 20)**

19A **¿Cuáles son las tres principales áreas de capacitación?**
1.
2.
3.

20 **¿Su Empresa compra bienes o servicios TIC en Costa Rica? RESP. MULTIPLE SI RESPONDE SI PREGUNTE Estas empresas TICs / son domésticas o multinacionales?**
LEER OPCIONES

1	Si a empresas domésticas (locales) de TICs	
2	Si a empresas MNC de TICs	**(PASE A PREGUNTA 20)**
3	No	**(PASE A PREGUNTA 20)**

21 **¿Qué porcentaje representan las compras a empresas domésticas (locales) TICs del total de las compras de productos y servicios TICs que hace su empresa?**

1. 25% o menos	
2. entre 26 y 50%	
3. entre 51% y 75%	
4. mas del 75%	

22 **¿Cuáles son los tres principales productos o servicios TIC que su empresa le compra a empresas domésticas (locales) TIC?**
a. Producto o servicio 1:
b. Producto o servicio 2:
c. Producto o servicio 3:

23 **¿Los productos o servicios TIC que su empresa compra a empresas domésticas (locales) son incorporados en los bienes y servicios que su empresa elabora? Es decir, son insumos estratégicos?**

Son insumos estratégicos	1
No son insumos estratégicos	2

24 **¿Quien toma las decisiones en su empresa sobre donde comprar productos y servicios de TICs? Las decisiones son tomadas por ....**
ENTREGAR TARJETA 24
A. la casa matriz/oficina nacional **sin consultar** o pedir la opinión de la subsidiaria. 1
B. principalmente por la casa matriz/oficina regional **después** de consultar o buscar la opinión de la subsidiaria. 2
C. principalmente por la subsidiaria **después** de consultar o buscar la opinión de la casa matriz/oficina nacional. 3
D. por la subsidiaria **sin consultar** ni buscar la opinión de la casa matriz/oficina nacional. 4

25 **¿Desde cuando su empresa compra productos o servicios TIC a empresas domésticas (locales) en Costa Rica? Año**

26 **¿Cuál de los siguientes problemas tiene su Empresa para encontrar proveedores domésticos (locales) de productos y servicios TICs en Costa Rica? RESP. MULTIPLE**
ENTREGAR TARJETA 26

Los proveedores no pueden llenar el volumen de producción requerido	1
Los productos o servicios demandados por nosotros son demasiado sofisticados para los proveedores domésticos	2
Los proveedores domésticos (locales) no pueden garantizar la calidad requerida	3
Los proveedores domésticos (locales) no pueden garantizar la continuidad en el suministro requerida	4
Otro problema **(ESPECIFICAR)**	5
No tengo problemas	6

27 **¿En el proceso de contratar proveedores domésticos (locales) de productos o servicios TIC, ha recibido su Empresa algún tipo de apoyo de parte de...? RESP. MULTIPLE**
MOSTRAR TARJETA 27

Respuesta		27.1 ¿Cuál es el tipo de apoyo?	27.2 ¿Cuál es el nombre de la institución?
Instituciones públicas	1		
Instituciones privadas	2		
Universidades	3		
Centros de capacitación	4		
Otras empresas	5		
Consultores	6		
No he recibido apoyo alguno	7		
No/Ns	8		

28 **¿Su Empresa brinda a los proveedores domésticos (locales) de productos o servicios TIC LEA OPCIONES RESP. MULTIPLE**

Asistencia para mejorar técnicas de producción o/o diseño de productos	1
Ayuda para adquisición de tecnología	2
Capacitación al personal de la empresa	3
Adelantos de pago	4
Arrendamiento (leasing) de maquinaria o equipo	5
Donación de insumos	6
Asistencia para mejorar su nivel de calidad	7
Asistencia p/mejorar la organización de la producción	8
No/Ns	9

29 **¿Qué acciones específicas considera Usted que debería realizar las autoridades costarricenses para fomentar las compras de productos y servicios TIC por parte de su Empresa a empresas domésticas (locales)?**

SECCIÓN 8 - ALIANZAS ESTRATEGICAS

30 **¿Ha formado su empresa consorcios u otros tipos de alianzas comerciales con empresas domésticas (locales)de TIC s, por ejemplo para vender sus productos o servicios?**

1 Si 2 NO **PASE A PREGUNTA 32**

30A **¿Qué tipo de relaciones comerciales tiene su Empresa con estas empresas domésticas (locales) de TICs? LEA OPCIONES** **RESP. MULTIPLE**

	Tipo de alianza	
LEER OPCIONES	Distribuidora / mayorista	1
	Comercializadora/ detallista	2
	Franquicia de valor agregado (VAR)	3
	Representante	4
	Otra relación empresarial **(ESPECIFIQUE)**	9

31 **¿Brinda su Empresa a los socios estratégicos domésticos algunos de los siguientes beneficios?** **(RESP MULTIPLE)**

MOSTRAR TARJETA 31	1 SI	2 NO
01. Descuentos en productos/servicios TIC de su Empresa	1	2
02. Capacitación en aspectos técnicos	1	2
03. Capacitación en técnicas de ventas y/o mercadeo	1	2
04. Información sobre clientes actuales y/o potenciales	1	2
05. Participación en eventos especiales (ej. Ferias)	1	2
06. Certificaciones de calidad de productos y servicios	1	2
07. Publicidad/visibilidad de su compañía ante terceros	1	2
98. Otro tipo de beneficios **(ESPECIFIQUE):**	1	2
NS/NC		

SECCIÓN 9 - SPILLOVERS

32 **¿Exige su Empresa a los proveedores domésticos (locales) en Costa Rica ciertos requisitos en los productos o servicios TICs que estos le venden?** **Si 1 No 2**

32A **¿Por qué su Empresa INSERTE RESPUESTA 32 exige a los proveedores domésticos requisitos en los productos o servicios TICs que estos le venden?**

Supply chain Assistance effect

33 **¿Brinda su Empresa capacitación y/o asistencia técnica a los proveedores domésticos (locales) de productos o servicios TICs en Costa Rica, para garantizar la calidad que se requiere?** **Si 1 No 2**

33A **¿Por qué su empresa SI/NO brinda capacitación v/o asistencia técnica a los proveedores domésticos (locales) de productos TICs?**

PASE A P35 SI EN P33 = NO

34 **¿Considera usted que la capacitación v/o asistencia técnica que su Empresa brinda a los proveedores domésticos (locales) les da una ventaja competitiva respecto de otras empresas similares en Costa Rica?** **Si 1 No 2**

34A **¿Por qué considera que la capacitacion y/o asistencia técnica que su empresa brinda a los proveedores domésticos (locales) RESPUESTA 34 les da una ventaja competitiva respecto de otras empresas similares en Costa Rica?**

35 **¿Provee su Empresa productos o servicios a compañías domésticas (locales) del sector de las TICs?** **Si 1 No 2** **(PASE A PREGUNTA 37)**

36 **¿Considera usted que tales ventas aumentan la disponibilidad, variedad y calidad de los insumos que requieren las empresas domésticas (locales) del sector de las TICs en Costa Rica?** **Si 1 No 2**

36A **¿Por qué considera que dichas ventas RESPUESTA 36 aumentan la disponibilidad, variedad y calidad de los insumos que requieren las empresas domésticas (locales) del sector de las TICs en Costa Rica?**

37 **MOSTRAR TARJETA 37 ¿Cómo considera Usted que es la movilidad laboral de los trabajadores calificados (turnover) en su empresa?**

1. Muy baja 2. Baja 3.Media 4. Alta 5. Muy Alta

38 **¿Cuáles son los principales factores que Usted considera explican la movilidad laboral de los trabajadores calificados en su empresa? MOSTRAR TARJETA** **RESP. MULTIPLE**

38.1 **De los factores que mencionó ¿cuál es el más importante y cuál es el segundo más importante? FAVOR MARQUE EN LA COLUMNA CON 1 EL FACTOR MÁS IMPORTANTE, CON 2 EL SEGUNDO MAS IMPORTANTE**
SI EL ENTREVISTADO SOLO MENCIONA UN FACTOR EN LA PREGUNTA 38, ASIGNE UN 1 A ESE ATRIBUTO Y PASE A P39

	P38	P38_1
Los empleados de mi empresa se van a trabajar a otras MNCs TICs en Costa Rica	01	
Los empleados de mi empresa se van a trabajar a otras MNCs (no de TICs) en Costa Rica	02	
Los empleados de mi empresa se van a trabajar a empresas domésticas (locales) TICs en Costa Rica	03	
Los empleados de mi empresa se van a trabajar a otras empresas domésticas (locales) (no de TICs) en Costa Rica	04	
Los empleados de mi empresa se independizan para trabajar por su cuenta	05	
Otra **ESPECIFIQUE**	98	

39 **¿Dónde consiguen su Empresa en Costa Rica los trabajadores calificados que requiere? MOSTRAR TARJETA** **RESP. MULTIPLE**

39.1 **De los lugares que mencionó en la pregunta anterior, cuál es el más importante y cuál es el segundo más importante? FAVOR MARQUE EN LA COLUMNA CON 1 EL FACTOR MÁS IMPORTANTE, CON 2 EL SEGUNDO MAS IMPORTANTE**
SI EL ENTREVISTADO SOLO MENCIONA UN FACTOR EN LA PREGUNTA 39, ASIGNE UN 1 A ESE ATRIBUTO Y PASE A P40

	P39	P39_1
En otras MNCs TICs en Costa Rica	01	
En otras MNCs (no de TICs) en Costa Rica	02	
En empresas domésticas (locales) TICs en Costa Rica	03	
En otras empresas domésticas (locales) (no de TICs) en Costa Rica	04	
En Universidades	05	
Colegios técnicos	06	
Otra fuente **ESPECIFIQUE**	98	

40 **¿Compiten las firmas domésticas (locales) de TICs en Costa Rica entre ellas para proveerle productos y servicios TICs a su Empresa?** **Si 1 No 2**

40A **¿Por qué considera que dichas empresas RESPUESTA 40 compiten entre ellas para proveerle productos y servicios TICs a su empresa?**

41 **¿Compite su Empresa con empresas domésticas (locales) de TICs en el mercado Costarricense. LEER OPCIONES? RESP. MULTIPLE**

En el mercado laboral	1
En el mercado de venta de sus propios productos o servicios	2
En el mercado de otros insumos	3
No compite	4
Otro **ESPECIFIQUE**	9

42 **¿Considera usted que la operación de su Empresa en Costa Rica ha promovido la adopción de mejores practicas productivas y/o administrativas por parte de empresas domésticas (locales) de TICs?** **Si 1 No 2**

42A **¿Por cual considera que la operación de su empresa en Costa Rica RESPUESTA 42 ha promovido la adopción de mejores practicas productivas y/o administrativas por parte de empresas domésticas (locales) de TICs?**

SECCIÓN 10 - PRODUCTIVIDAD

43 **¿Hipotéticamente, si su empresa tuviera que comprar toda la maquinaria, vehículos y equipos que posee actualmente y en las mismas condiciones en que se encuentran, ¿cuánto estima que sería el costo de reposición?**

$	INCLUIR ESPACIO PARA QUE SE ESCRIBA MONTO $ EN TEXTO

44 **¿Podría indicarme el monto total de sueldos y honorarios profesionales (sin incluir cargas sociales) pagados durante 2012 y 2013 respectivamente?**

2012	2013
$	$

INCLUIR ESPACIO PARA QUE SE ESCRIBA MONTO $ EN TEXTO

45 **¿Podría darme el monto aproximado de las ventas totales que realizó su empresa en los años 2012 y 2013?**

2012	2013
$	$

INCLUIR ESPACIO PARA QUE SE ESCRIBA MONTO $ EN TEXTO

Nota: SI L A PERSONA NO RESPONDE EN FORMA INSTANTANEA EN LA PREGUNTA 45, FAVOR USAR LOS SIGUIENTES RANGOS PARA CADA AÑO. ENTREGAR TARJETA DE RANGOS

METODO DE RANGOS	2012	2013
DE $100,000 A MENOS DE $250,000	01	01
DE $250,000 A MENOS DE $500,000	02	02
DE $500,000 A MENOS DE $750,000	03	03
DE $750,000 A MENOS DE $1,000,000	04	04
DE $1,000,000 A MENOS DE $2,000,000	05	05
DE $2,000,000 A MENOS DE $3,000,000	06	06
DE $3,000,000 A MENOS DE $4,000,000	07	07
DE $4,000,000 A MENOS DE $5,000,000	08	08
DE $5,000,000 A MENOS DE $7,500,000	09	09
DE $7,500,000 A MENOS DE $10,000,000	10	10
$10,000,000 O MÁS	11	11