IZA Institute of Labor Economics

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IZA DP No. 10421

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ABSTRACT

Business Visits, Knowledge Diffusion and Productivity

The aim of this paper is to investigate the productivity impact of business visits, relative to traditional drivers of productivity enhancement, namely capital formation and R&D. To carry out the analysis, we combine unique and novel data on business visits sourced from the U.S. National Business Travel Association with OECD data on R&D and capital formation. The resulting unbalanced panel covers on average 16 sectors per year in 10 countries during the period 1998-2011 (2,262 observations). Our results suggest that mobility through business visits is an effective mechanism to improve productivity. The estimated effect is about half as large as investing in R&D, supporting viewing business visits as a form of long-term investment rather than pure consumption expenditure. In a nutshell, our outcomes support the need to recognize the private and social value of business mobility.

JEL Classification: O33

Keywords: business visits, labour mobility, knowledge, R&D, productivity

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1. Introduction

Over the past decade the growth of output per worker in both developed and developing countries has considerably slowed down (Isaksson, 2007; Conference Board, 2016; OECD, 2016). As labour productivity growth is the main cause of real wage growth, this slowdown has naturally raised concerns about the future of living standards in several countries, and opened a debate about the policy measures needed to reverse this trend.

In *The Future of Productivity*, the Organization for Economic Cooperation and Development (OECD) points to the slower pace at which innovations spread throughout the economy as the main cause of the productivity slowdown. "Indeed, a striking fact to emerge is that the productivity growth of the globally most productive firms remained robust in the 21st century but the gap between those high productivity firms and the rest has risen." (OECD, 2015 p.12). To repair the "breakdown of the diffusion machine", the OECD suggests maintaining policies that favour investing in R&D and bankruptcy laws conducive to firms' experimenting with new processes and products, as well as introducing measures that reinforce global connectivity via skilled labour mobility, trade, and foreign direct investments. With reference to mobility, a recent stream of work analyses the role of short-term skilled labour movements such as those carried out through business trips in enhancing the international production and diffusion of knowledge (Andersen and Dalgaard, 2011; Dowrick and Tani, 2011; Hovhannisyan and Keller, 2015). These movements cause no change in the permanent headcount of the population in the places of origin and destination but may positively contribute to the stock of productive knowledge available to both countries. Therefore, business visits appear as an attractive potential tool to fend off the productivity slowdown.

This paper addresses this issue. In particular, our aim is to investigate the productivity impact of business visits *relative* to traditional drivers of productivity enhancement, namely capital formation and R&D. To carry out the analysis, we combine unique and novel data on business visits sourced from the U.S. National Business Travel Association with OECD data on R&D and capital formation. The resulting unbalanced panel covers on average 16 sectors per year in 10 countries during the period 1998-2011.

A novelty of our contribution is the use of a production function approach, by which we estimate the effect of business visits explicitly taking into account the simultaneous influence of capital, labour, and R&D, which complements the empirical strategies followed by the (scarce, see Section 2.2) extant literature on the topic.

In addition, we could access proprietary data on business visit expenditures at sectoral level for a number of countries and years. This makes our analysis unique, as information on business visits is both scarce and publicly available only at country level.

Our results suggest that mobility through business visits is an effective mechanism to improve productivity. The estimated effect is about half as large as investing in R&D, supporting viewing business visits as a form of long-term investment in producing knowledge and foster productivity rather than pure consumption expenditures.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 presents a testable model. Section 4 discusses the data. Section 5 presents the results. Section 6 briefly concludes and offers some insights for innovation policy.

2. The literature

2.1 Different types of knowledge

There is little doubt that knowledge is a source of competitive advantage, as it promotes innovation and enhances productivity (Pavitt, 1984; Teece, 1998; Malerba, 2002), offering a fundamental edge to firms competing in a global environment (Krugman, 2007). Forming new, useful knowledge is a strategic activity for competing firms and nations (Grant, 1996; Porter, 1997), and a strategic topic for research and policy-making, particularly at a time of sluggish economic growth.

In its traditional characterisation, knowledge includes disembodied features, like data and information, which are codifiable and replicable through blueprints, and embodied features, which are inextricably connected with the individuals holding it, their skills and experiences (Polanyi, 1966). While disembodied knowledge is almost a 'ubiquitous' resource equally available to each competitor, embodied knowledge is tacit, less replicable and heterogeneous, and typically sticks to individuals and the physical spaces where they work (von Hippel, 1987). Indeed, tacit knowledge embodied in scientist, engineers, managers and skilled employees plays a key role in many industries, as detailed by Howells (1996) and Cowan, David and Foray (2000).

Co-locating in places 'buzzing' with innovative activity has been viewed as an important strategy to access knowledge produced externally to firms (Florida, 2002; Howells, 2002; Gertler, 2003; Bathelt, Malmberg, and Maskell, 2004; Storper and Venables, 2004; Torre and Rallet, 2005). So has the importance of certain categories of professionals engaged in filtering and exchanging knowledge between a firm and the wider environment outside its boundaries[1]. Scientific inventors for instance have been found to engage in as much as 50% more knowledge exchanges with their previous workplaces than when such previous experience does not exist (Agrawal, Cockburn and McHale, 2006). Institutional programmes promoting the international mobility of researchers, like the Erasmus programme in the EU, are based on

[1] This includes expatriates (Collings, Scullion, and Morley, 2007), managers of subsidiaries (Riusala and Suutari, 2004), and employees temporarily working for another employer within a collaborative arrangement (Franco and Filson, 2000; Zellner, 2003) among others.

the similar principle. Namely, that a temporary stint in a foreign laboratory favours young researchers' professional development and opportunities for future international collaborations, regardless of where they will eventually work (Ackers, 2005).

However, the role of co-location in producing and diffusing knowledge subsides once a relationship is established; indeed, research suggests that the time spent co-locating is not so critical to create or share new productive knowledge (Gallie, 2009). In contrast, significant knowledge flows can result from very short temporary encounters, like those taking place during trade fairs and conferences (Bathelt and Schuldt, 2008) and short academic and business visits (Hamermesh, 2006).

This evidence points to human interactions as a key driver to generate new productive knowledge and sustain its diffusion over time[2]; more strongly, face-to-face interactions may be seen as the critical step in the process leading to knowledge creation and diffusion (Nelson and Winter, 1982; Dosi *et al.*, 1988; Lundvall, 1988; Gaspar and Glaeser, 1998; Frankel and Romer, 1999). These interactions enable participants to decide immediately whether to trust each other (Gambetta, 1988; Storper and Venables, 2004); if mutual trust is established, then reciprocal understanding and cooperation behaviours arise because of the lower uncertainty associated with sharing or exploring new ideas. Eventually, these circumstances favor the emergence of knowledge exchanges (Hansen, 1999; Amin and Cohendet, 2004), individual and organizational learning, and the creation of social capital and networks (Burt, 1997; Portes, 1998).

[2] This is especially the case within organizational settings favoring social or group activities (Nelson and Winter, 1982; Dosi *et al*., 1988; Kogut and Zander, 1992; Nonaka and Takeuchi, 1995).

2.2 The specific role of business visits

Business visits are short temporary co-locations of agents interacting face-to-face for work-related purposes. They have become more prominent in recent years thanks to advancements in transportation and communication technologies (Button and Vega, 2008), and the rise of global supply chains. The volume of business visits from international passenger surveys in the UK, the US, and Australia suggests that their gross flows (adjusted by the length of stay) are as large as 1% of domestic employment and 30% of the domestic skilled[3] labour force. These volumes are large compared to other people flows, like migration. Research based on in-depth interviews with business visitors supports that visits occur predominantly to share knowledge (Tani, 2014). This purpose often leads to expanded problem-solving capabilities and higher "absorptive capacity" in both visitor and visited individuals and their employers (Cohen and Levinthal, 1989; Teece, Pisano, and Shuen, 1997). Given the dimension and main purpose of business visits, it is not surprising that they positively contribute to knowledge formation and productivity. This relationship is found regardless of how productivity is measured: number of new patents or citations (Hovhannisyan and Keller, 2015), total or multifactor productivity (Andersen and Dalgaard, 2011; Dowrick and Tani, 2011), or other metrics (Hellmanzik, 2013).

As the knowledge exchanged through visits affects both parties interacting, it is natural to measure their productivity effect using the aggregate of in- and out-flows rather than net visitors' flows. This feature makes business visits distinctly different from more traditional

[3] Skilled here contains occupations in the top three 1-digit categories of the International Standard Classification of Occupations (ISCO). This includes: managers, professionals, and associate professionals.

forms of factor movements: especially permanent migration, for which a gain in the place of destination generally corresponds to a loss in the place of origin.

The empirical strategy to determine the effect of business visits on productivity requires addressing two main difficulties. The first is dealing with a general lack of information, which is generally publicly available only at country level; this limits the type of analysis carried out by the extant literature so far, as highlighted in the discussion below[4].

The second difficulty is to convincingly address the endogeneity of business visits as a determinant of productivity. Available research supports the view that the volume of visits rises with productivity measures, but this apparent relation masks unobserved factors related to both variables, such as the quality of the available infrastructure or the depth of the connectivity network, that confound their causal link, if any.

The three previous articles studying the relationship between business visits and productivity have differently addressed both problems.

Andersen and Dalgaard (2011) ('AD') use travel data for 72 countries over two years (120 observations in total) sourced from the World Tourism Organization (UNWTO) to link the intensity of international travel (defined as the ratio of international arrivals plus departures to the size of the labor force) on the level of total factor productivity (TFP). AD report that travel intensity accounts for almost 50% of the variation in aggregate TFP using Ordinary Least Squares (OLS), a result that emerges also when determinants of long-run productivity like institutional quality and spatial location are included in the empirical model. The possible

[4] Indeed, the small number of observations used in empirical analyses affects the power of the statistical tests performed, and the robustness of the results obtained.

endogeneity of travel intensity is addressed by using predicted travel shares as instruments[5]. Their 2SLS estimates imply that an increase of 10% in the travel share leads to a 0.2% increase in the level of TFP. This result is robust to several specifications, including the addition of institutional controls and commodity trade flows, and estimation by dynamic panel techniques removing time-invariant heterogeneity.

One limitation of AD is the assumption of no cross-country correlation between observations, as implied by the Arellano-Bond estimator. As a result, similarities in technology, governance and institutions that characterize some of the countries examined and potentially affect their productivity is not controlled for.

While the previous study was cross-countries in nature, the second one is cross-sectors within one country (Australia). Indeed, the study by Dowrick and Tani (2011 - 'DT') expands the analysis to the level of industry thanks to an ad hoc survey matched with in- and out-flows of business visitors aggregate at country level, which is sourced from arrival and departure cards. They hence obtain estimates of the effects of arriving and departing business visitors on multifactor productivity (MFP) for 12 non-agricultural industries of the Australian economy over the period 1991-2005 (143 observations). The endogeneity of business visits is addressed by using its lagged values (once and twice). Estimation is carried out by short-term panel techniques on both MFP levels and differences, modeling the error term as an AR(1) process that is cross-correlated across industries and time. The estimated average elasticity at industry level is 0.01, implying that a 10% rise in the gross flows of business visits in an industry increases multifactor productivity in that industry by about 0.1%. Higher values arise in the case of departing residents (0.15%) relative to arriving foreign visitors (0.06%), suggesting that visiting is more effective than being visited in raising productivity. This

[5] These fitted values are in turn aggregated up from fitted values obtained from a first stage where travel shares for each pair of countries are regressed on a set of geographic characteristics unrelated to productivity (country size, distance between countries, existence of a common border).

asymmetry is perhaps indicative that visitors have a better understanding of where new knowledge learnt via travelling should be applied or diffused within their organizations.

The main limitation of DT besides being a single-country study (the extensive margin of the results obtained is hence unclear) is the small number of observations used in the panel (143), which constrains the power of the statistical tests performed.

The third study, by Hovhannisyan and Keller (2015) ('HK'), undertakes an altogether different approach by estimating the impact of inward business visits from the United States on the destination countries' patenting activity. HK uses patenting data at industry level from 37 sectors in 34 countries over the decade 1993-2003. This results in a total of 5,202 available observations, the largest among the studies in this literature. The endogeneity of business visits is addressed using an instrumental variable approach where visits due to business reasons are proxied by visits by family and friends. These are positively related to work-related flows but HK assume that they do not respond as much to changes in economic conditions, but rather reflect personal choices (on the different drivers of different forms of travelling, see also Moll-de-Alba, Prats and Coromina, 2016). HK find that, on average, a 10% increase in business travellers from the US raises patenting in the host country by about 0.2%. They also find that business travel from the United States accounts on average for about 10% of the total difference in patenting across countries, and that such positive impact is higher if the US place of origin of the business traveller is a high-patenting state, like California.

A limitation of HK is the focus on patenting activity, which covers only some limited aspects of knowledge production and diffusion. These - as discussed in Section 2.1 - tend to be tacit in their most strategic and valuable manifestations. In addition, although combining the country and industry dimensions, HK only focus on inflows from a leading country (US).

Differently from the previous studies, our analysis uses a comprehensive panel based on country/sector data and tests the impact of bilateral gross flows of business visits.

3. Data

Information on business visits is sourced from proprietary data compiled by the U.S. National Business Travel Association for the benefit of its members. These are predominantly commercial airlines (NBTA, 2010). The data cover 48 sectors of 72 countries and report the US$ total expenditure for business visits undertaken domestically and internationally during the period 1998-2011. The data represent expenditures made by incoming and outgoing domestic and international travellers in a given industry-country-year cell. This dataset is constructed using primarily expenditure information on travel services recorded in national input-output tables. A more detailed description of the methodology used is in NBTA (2010)[6].

Access to information on expenditures has the advantage of enabling us to compute the elasticity of a dollar spent on business visits on productivity, making it comparable with estimates of elasticity for other knowledge production activities such as R&D expenditures. However, the database does neither disentangle visitors' inflows from outflows, which are useful to test which flow has stronger influence, if at all. Nor it informs on the personal characteristics of travellers (especially education) that are useful to understand the human capital content of these visitor flows.

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[6] Available from the authors upon formal request, given the proprietary nature of the data.

NBTA (2010) does not discuss how the collection and construction of the database released to us may be affected by potential measurement errors. We address this issue assuming that any measurement errors are not systematic and add fixed effects for countries and time in the regressions performed.

For the other variables (namely: value added, physical capital, R&D expenditures and employment), the source is the OECD. In particular, OECD-STAN is the statistical source for most of the information, coupled it with OECD-ANBERD as far as R&D is concerned. Reliable harmonized OECD ANBERD and STAN sectoral data based on the two-digit ISIC Rev. 4 industrial classification are available[7] in the 1998-2011 time-span for a limited number of countries: Austria, Belgium, Czech Republic, Denmark, Finland, Germany, Hungary, Italy, Norway, United States. The final panel, merging data from NBTA and OECD, is unbalanced (due to missing values) and covers a total of 2,262 longitudinal observations.

All the series have been corrected for purchasing power parities, expressing, at the end, all the monetary values in constant prices and PPP 2005 US dollars. The final sample is presented in Table 1.

Table1: Sample composition by countries

Country	Observations
Austria	304
Belgium	337
Czech Republic	277
Denmark	31
Finland	219
Germany	276
Hungary	214
Italy	210
Norway	250
United States	144

[7] See Table A1 for the list of the industries included in the analysis and the corresponding number of observations.

Total	**2,262**

4. Empirical specification and econometric methodology

To evaluate the potential impact of business mobility on productivity we adopt a production function approach and follow Hall and Mairesse (1995). In particular, we test an augmented production function in four inputs: physical capital, knowledge capital, business visits capital and labor:

(1) $$\ln\left(\frac{VA}{E}\right)_{i,j,t} = \alpha + +\beta \ln\left(\frac{C}{E}\right)_{i,j,t} + \gamma \ln\left(\frac{K}{E}\right)_{i,j,t} + \delta ln\left(\frac{BV}{E}\right)_{i,j,t} + \vartheta \ln(E)_{i,j,t} + \varepsilon_{i,j,t}$$

With: i (sector) = 1,…, 29; j (country) = 1,…, 10; t (time) = 1998,…, 2011;

ln = natural logarithm.

Productivity is measured by labor productivity (Value Added, VA, over total Employment, E), while our control impact variables are the physical capital stock (C) per employee and the R&D stock (K, for knowledge) per employee. Our proxy for business mobility is the whole Business Visits stock (BV) per employee.

Taking per capita values permits both standardization of our data and elimination of possible sector/country size effects. In this framework, total employment (E) is a kind of control variable: in case ϑ turns out to be greater than zero, it indicates increasing returns.

In more detail, C/E (physical capital stock per employee) is the result of the accumulated investment, implementing different vintages of technologies, while K/E (R&D stock per employee) captures that portion of technological change, which is related to the cumulated R&D investments. Turning to our variable of interest, BV/E (business visits stock per employee) measures the cumulative process of investments in business visits, assuming a similar dynamics to the one affecting investments in physical capital and R&D.

The stocks are computed following the Perpetual Inventory Method (PIM):

$$(2) \qquad S_{t0} = \frac{INV_{t0}}{(g+\delta)}; \qquad S_{t1} = S_{t0}(1-\delta) + INV_{t1}$$

where S is the stock, INV measures the investment flow, δ is a depreciation rate (6% for capital stock; 15% for knowledge capital stock; 15% for business visits stock[8]) and *g* is computed as an "ex post" three-year compound growth rate.

The chosen specification (1) is an extension of a standard microeconometric setting that goes back to Zvi Griliches (1979), who started a flourishing empirical literature devoted to investigate the relationship between R&D and productivity at the firm or sectoral level (for comprehensive surveys, see Griliches, 2000; Hall, Mairesse and Mohnen, 2009; Mohnen and Hall, 2013). On the whole, this microeconometric literature based on the above specification (1)[9] has provided robust evidence of a positive and significant impact of R&D on productivity at the firm and sectoral level, with an elasticity ranging from 0.05 to 0.25 (Verspagen, 1995; Harhoff, 1998; Los and Verspagen, 2000; Ortega-Argilés et al., 2010; Heshmati and Kim, 2011; Kumbhakar et al., 2012; Ortega-Argiles, Piva and Vivarelli, 2014 and 2015).

As it is common in this type of literature, stock indicators rather than flows are considered as impact variables; indeed, productivity is affected by the accumulated stocks of different inputs and not only by volatile current or lagged flows. Moreover, dealing with stocks rather than flows has two additional advantages: on the one hand, since stocks incorporate the

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[8]This is what assumed by the reference literature, taking into account that the knowledge capital (in our case both R&D expenditures and business visits) exhibits a faster degree of obsolescence rather than the physical capital (see Nadiri and Prucha, 1996 for singling out 6% as the proper discount rate for physical capital; Hall, 2007 and Hall, Mairesse and Mohnen, 2009 for proposing 15% as the standard discount rate for R&D).
[9] Not including the business visits.

accumulated investments in the past, the risk of endogeneity is minimized[10]; on the other hand, there is no need to deal with the complex (sometimes arbitrary) choice of the appropriate lag structure for the flows.

Specification (1) has been estimated through different econometric techniques. Firstly, pooled ordinary least squared (POLS) regressions were run to provide an overall preliminary evidence. Although elementary, these POLS regressions have been controlled for two sets of country and time dummies (always jointly significant, as shown in Table 3)[11].

Secondly, firm fixed effect (FE) regressions have been run in order to take into account sector specific unobservable time-invariant characteristics. The advantage of the FE estimates is that different sectors are not pooled together and therefore the estimates control for both unobserved heterogeneity and the within-sector dependence structure. The disadvantage is that time constant variables (in our case country dummies) are not individually identified anymore, since they are encompassed by the individual sector-level fixed effects.

Thirdly, random effect (RE) regressions have also been performed and tested against the FE specification through the Hausman test. According to the outcomes of the test (reported in Table 3), the FE estimates have turned out to be preferable to the RE ones.

5. Results

The summary statistics for the main variables and the correlation matrix are presented in Table 2.

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[10] As discussed in Section 2.2, endogeneity is a common issue in the pertinent literature.

[11] The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity has not rejected the null hypothesis of constant variance of the residuals, therefore no correction for heteroskedasticity has been introduced.

Table 2: Descriptive statistics and correlation matrix

	Mean (St.Deviation)	ln(VA/E)	ln(C/E)	ln(K/E)	ln(BV/E)
ln(VA/E)	-2.965 (0.876)				
ln(C/E)	-2.468 (1.135)	0.4567*			
ln(K/E)	-5.471 (2.394)	0.4716*	0.2066*		
ln(BV/E)	-4.365 (1.501)	0.1215*	0.2009*	0.2837*	
ln(E)	11.088 (1.619)	-0.2628*	0.0152	-0.2418*	-0.2074*

Note: * Significant at 95%

From Table 2, positive correlations among the conventional stock variables (physical and knowledge capital) and productivity clearly emerge (with a similar coefficient for both of them). This is expected and consistent with the extant literature (see previous section). Moreover, our main hypothesis of a positive relationship between Business Visits stock per employee and Value Added per employee is also supported by a positive correlation coefficient (lower than in the previous cases, but still significant at the 95% level of confidence). Obviously enough, these univariate correlation evidences are preliminary to the multivariate econometric analysis discussed below. Finally, among the regressors of specification (1), the correlation coefficients are not worryingly high (the highest being 0.28) reassuring about possible risks of multicollinearity.

Table 3 provides the econometric results concerning the whole sample of 2,262 observations. Firstly, we run estimates without the BV stock, to test the consistency of our results with the previous literature about the link between physical capital and R&D on the one side and productivity on the other side (see Section 4). Indeed, columns (1) and (2) provide robust evidence of a positive and significant impact of physical capital on productivity with an elasticity ranging from 0.134 to 0.268, according to the adopted estimation techniques (FE and POLS). Physical capital embodying vintages of new technologies emerges as an important driver of productivity, as also found in the extant literature.

As far as knowledge capital is concerned, we also found a positive and significant impact ranging from 0.058 to 0.092 (POLS and FE, respectively). As mentioned in the previous section, in the reference literature the estimated elasticity of productivity to R&D ranges from 0.05 to 0.25; therefore, the obtained estimates are in line with previous empirical studies.

When the BV stock per employee is added to the estimated specification, previous results are substantially confirmed (columns (3) and (4)).

Turning the attention to our main focus of interest, the impact of the BV stock per employee on productivity turns out to be positive and statistically significant at the 99% level of confidence, ranging from 0.023 to 0.053 (POLS *vs* FE). This outcome supports our hypothesis that productivity is also significantly explained by the expenditures devoted to the business visits[12], albeit this additional impact is lower in magnitude than those originated by physical and knowledge capital.

[12] Therefore, the BV stock does not overlap with what measured by the physical and knowledge capital, indeed contributing to better explain the productivity dynamics. Moreover - although POLS is not our preferred estimation - the adjusted R^2 slightly increases when BV is included, supporting the opportunity to add the BV stock to the regressors' matrix.

Table 3: Dependent variable: ln (Value Added per employee)

	(1) POLS	(2) FE	(3) POLS	(4) FE
ln(C/E)	0.268*** (0.009)	0.134*** (0.013	0.264*** (0.009)	0.126*** (0.014)
ln(K/E)	0.058*** (0.005)	0.092*** (0.009)	0.058*** (0.005)	0.089*** (0.009)
ln(BV/E)			0.023*** (0.008)	0.053*** (0.020)
ln(E)	-0.062*** (0.009)	-0.001 (0.044)	-0.052*** (0.009)	0.027 (0.046)
Time-dummies	Yes	Yes	Yes	Yes
Country-dummies	Yes	-	Yes	-
Time-dummies Wald test	8.09*** (0.000)	20.03*** (0.000)	7.79*** (0.000)	18.77*** (0.000)
Country-dummies Wald test	402.28*** (0.000)	-	390.62*** (0.000)	-
Hausman test (p-value)		62.38*** (0.000)		79.14*** (0.000)
Constant	-0.791*** (0.125)	-1.844*** (0.501)	-0.811*** (0.124)	-1.965*** (0.503)
Adj. R^2 / R^2 within	0.77	0.16	0.78	0.16
Number of country/sector	211			
Number observations	2,262			

6. Conclusions

The results presented support that business visits can be an effective mechanism to promote global connectivity and repair, at least in part, the "breakdown of the diffusion machine", which the OECD views as the main reason of recent slowdown in productivity growth. Our estimates point to an elasticity of 0.02-0.05: raising expenditures on business visits by 10% increases productivity by 0.2%-0.5%. This magnitude turns out to be as half of the elasticity estimated for R&D expenditures, which researchers and policy-makers alike generally see as the prime mechanism to foster productivity.

Therefore raising business mobility per se offers a way to increase productivity, and with no change in the permanent headcount of visiting and visited locations and workplaces, unlike other forms of labour movement. Hence, our results emphasize the win-win nature of business visits and their dynamic potential in fostering productivity. Interacting via business visits can be a strategic choice to improve an organization's efficient use of human resources. This is particularly relevant for firms and countries unable to attract highly skilled workers due, for instance, to disadvantages in size and location. These aspects, however, remain under-discussed in the domain of innovation policy.

In terms of policy implications, two considerations follow naturally. Firstly, business travelling is hardly incentivized. At times of economic difficulties, organizations often cut travel budgets indiscriminately (perhaps because it is easy to do so) without realizing that the actual cost of such actions may reduce or even eliminate an important source of competitiveness to access and develop new knowledge. To counteract this tendency, policy makers should favor business mobility, especially in periods of crises and productivity slowdown, as the current one.

Secondly, although interacting in person matters to the economy at large, business visits are predominantly viewed as consumption expenditures rather than as a long-term investment in knowledge production and diffusion. For instance, for a small-medium sized company accessing knowledge through business visits might be more relevant and cheaper than undertaking expensive and risky R&D investments. Whether there is a scope to reduce taxation for business visits at least for SMEs depends on more accurate measurement of their social benefits across organizations; this is not an impossibly difficult task, but requires new efforts to collect data at the firm level.

However, time seems now ripe to begin recognizing the private and social value of business mobility.

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APPENDIX

Table A1:Sample composition by industries

Industries	ISIC Rev. 4	Number of observations
Agriculture, forestry and fishing	01-03	82
Mining and quarrying	05-09	6
Food products, beverages and tobacco products	10-12	97
Textiles	13	62
Wearing apparel	14	49
Leather and related products, footwear	15	45
Wood and products of wood and cork, except furniture; articles of straw and plaiting materials	16	67
Paper and paper products	17	99
Printing and reproduction of recorded media	18	96
Coke and refined petroleum products	19	50
Chemicals and chemical products and basic pharmaceutical products and pharmaceutical preparations	20-21	96
Rubber and plastics products	22	102
Other non-metallic mineral products	23	97
Basic metals	24	90
Fabricated metal products, except machinery and equipment	25	113
Computer, electronic and optical products	26	124
Electrical equipment	27	85

Machinery and equipment n.e.c.	28	114
Motor vehicles, trailers and semi-trailers	29	107
Other transport equipment	30	108
Furniture; other manufacturing; repair and installation of machinery and equipment	31-33	97
Electricity, gas and water supply; sewerage, waste management and remediation activities	35-39	64
Wholesale and retail trade, repair of motor vehicles and motorcycles	45-47	105
Transportation and storage	49-53	72
Telecommunications	61	65
IT and other information services	62-63	65
Real estate activities	68	17
Scientific research and development	72	84
Public administration and defense; compulsory social security	84	4

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