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IRENE Working Paper 24-07



Imports Complementarities in European Manufacturing

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Imports Complementarities in European Manufacturing

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Abstract

Do technologies embedded in imports boost domestic productivity? This paper investigates empirically the role of complementarities between absorptive capacity and imports. Different import categories are combined with different proxies for absorptive capacity. The database covers 18 manufacturing industries across 16 European countries over the 2008-2014 period. Our findings suggest that complementarities do exist but are limited to certain types of imports (capital goods) and certain proxies of absorptive capacity (education level). These findings are robust to altering specifications or controlling for endogeneity, and reinforced when the potential non-linearity of the interaction is considered.

Keywords: Capital Imports, Intermediate Imports, Absorptive Capacity, Labour Productivity

JEL Classification: F14, L60, O4

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1 Introduction

The impact of trade openness on economic growth has been widely studied. Early macrolevel research suggested a positive relationship, but methodological limitations were identified (e.g. Rodriguez and Rodrik, 2000), calling for further research. One such avenue of research is the technology spillovers approach, which emphasizes learning by importing. Technology embedded in imports may positively impact domestic productivity either directly from the more advanced exporter as originally suggested by Coe and Helpman (1995) or indirectly from a re-exporting country as further proposed by Lumenga-Neso et al. (2005). However, empirical results have been mixed. Some studies show a positive impact (e.g. Smeets and Warzynski, 2013) while others do not (e.g. Conti et al., 2014). The aim of this paper is to investigate if these mixed results are due to the lack of consideration of complementarities between absorptive capacity and imports.

Absorptive capacity acts as a catalyst, enhancing the utilization of technologies embedded in imports, and potentially leading to a positive impact on productivity through the complementarity between these variables. Estimating this complementarity empirically comes with its challenges. Previous research has investigated the relevance of complementarities at the firm level (e.g. Abreha, 2019). We suspect, however, that absorptive capacity may not be confined to the firm itself, as this same firm could delegate the task of absorbing knowledge to another firm within the same industry or even to another firm of another industry within the manufacturing sector. Besides, firm-level studies do not differentiate between different types of imports, such as intermediate and capital goods. Still, the differentiation between these types of imports may be crucial, as noted by Caselli (2018), to gain a deeper understanding on the complementarity between imports and absorptive capacity and its impact on productivity. Moreover, the benefits of learning-by-importing may be subject to non-linearities, with a significant impact only once a critical threshold is reached. Last but not least, even if absorptive capacity clearly relates to the competence level of the workforce, it is unclear which indicator is best suited to capture this ability.

This study aims to contribute in several ways to the current literature on the impact of complementarities between imports and absorptive capacity on productivity. The investigation focuses on testing the significance of these complementarities by differentiating between capital and intermediate imports and by using different proxies for absorptive capacity related to workers' education or occupational types. The goal is to test whether the importance of the complementarity between imports and absorptive capacity depends on the type of imports and on the absorptive capacity proxy considered. Moreover, the analysis is conducted at the industry level for imports and productivity, and at the manufacturing sector level for absorptive capacity proxies.

We believe that this intermediate level of aggregation presents a number of important advantages to address our empirical issues. Plant-level data can offer interesting insights on within-industry heterogeneity but lack generality as they are often confined to a single country. At the other extreme, cross-country studies may present a substantial global coverage, but national-level variables are contaminated by composition effects. Industry-level data offer an interesting compromise between these two extremes. Moreover, by measuring productivity at a more disaggregated level than absorption capacity (i.e. at the (sub)industry level rather than the level of the overall manufacturing sector), we can address the cases where competences required to master new technologies in a specific industry (e.g. food-processing) have to be found in other industries (e.g. machines). This type of cross-industry dependencies may be quite frequent in practice, making our specification more relevant.

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The analysis is performed using a panel including 18 manufacturing industries across 16 European countries during the 2008-2014 time period. The database is obtained by merging three different data sources. Productivity estimates at the industry level needed are obtained from the 8th Vintage CompNet database (see CompNet, 2021). Information on different types of imports, specifically capital and intermediate imports at the industry level, are inferred from the World Input-Output tables (WIOT) database. Finally, proxies for absorptive capacity at the manufacturing sector level, related to workers' education and occupational types, are collected from the Eurostat database.

Fixed effects results suggest that the positive and significant impact of complementarities depends on the type of imports and absorptive capacity proxies utilized. Specifically, complementarities related to capital imports turn out significant when using absorptive capacity proxies related to education, but it is intermediate imports, not capital imports that seem to matter when the absorptive capacity proxy is based on occupational types. However, this latter result disappears when controlling for endogeneity on the basis of instrumental variable (IV) regressions. Further analyses are also conducted with different specifications, proxies and considering the potential non-linearity of the interaction. The findings support and reinforce the IV ones with positive and significant complementarities being found for capital imports and education-related absorptive capacity proxies while no significant complementarities emerge for other combinations.

The following section presents the relevant literature. Next, the methodology used for the empirical estimation is explained, followed by the discussion of the main results. We suggest possible avenues for further research in the conclusion.

2 Literature Review

The adoption of more open trade regimes in the last two decades of the previous century coincided with a flurry of empirical investigations attempting to identify the effect of trade openness on opening countries. The macro-level studies conducted during this period (e.g. Dollar, 1992, Sachs et al., 1995, Edwards, 1998) concluded that trade liberalization had a positive impact on economic growth, supporting an optimistic perspective on open trade regimes during the nineties. However, the paper by Rodriguez and Rodrik (2000) raised doubts about this early optimistic view. It revealed that all the previous studies had methodological limitations which impacted their results, implying that additional research on this topic was still required¹.

An imports perspective is one of the research approaches available for examining the significance of trade openness on national performance. There are various research avenues to investigate the role of imports, including imports variety (Broda and Weinstein, 2006, Hsieh et al., 2020)², imports competition (Berthou et al., 2019, Chen and Steinwender, 2021)³, and learning by importing. Our paper adopts a perspective rooted in the technology spillovers nexus, which is related to the learning by importing approach.

The seminal work of Coe and Helpman (1995) introduced the technology spillovers research avenue. They defined the concept of direct technology spillovers and presented evidence

¹ See Irwin (2024) for a recent survey of the literature that followed the Rodriguez and Rodrik (2000)'s critics. An average positive impact of trade openness on countries' economic growth emerges form this survey with, however, heterogeneities across countries.

² Broda and Weinstein (2006) provided evidence in favor of imports variety, which has recently been contested by Hsieh et al. (2020).

³ Two recent papers provided new insights into imports competition. Berthou et al. (2019) used the CompNet database to show that gains from imports competition are enhanced when importing countries have efficient institutions, while Chen and Steinwender (2021) found that imports competition benefits initially unproductive family-owned Spanish firms through an increase in productivity.

supporting a positive impact of imports on countries' total factor productivity. It is true that Keller (1998) raised criticisms on Coe and Helpman (1995)'s results. However, the original findings and the criticisms were later reconciled by Lumenga-Neso et al. (2005) by introducing the concept of indirect technology spillovers. This concept suggests that the benefits of technology spillovers through imports do not depend on the development stages of partner countries. In other words, countries can benefit from technology spillovers even when trading with partners at lower stages of development.

Following Melitz (2003)⁴ the international trade literature has increasingly shifted its focus to firm level analyses. As could be expected, various studies investigating the impact of imports on productivity have been conducted at the firm level. However, the results of these studies do not converge, some finding a positive effect (e.g. Smeets and Warzynski, 2013, Halpern et al., 2015), while others report no significant effect (e.g. Vogel and Wagner, 2010, Conti et al., 2014). A potential missing element in these studies is the concept of complementarity between imports and absorptive capacity.

The relevance of complementarities between imports and absorptive capacity in explaining firms' performance has been investigated by Augier et al. (2013), Yasar (2013), and Abreha (2019). However, we suspect that absorptive capacity at the sectoral level might be more relevant than absorptive capacity within a firm. Indeed, a firm could outsource the task of absorbing knowledge to another firm within the whole manufacturing sector rather than absorbing it itself.

⁴ The author developed a model analyzing the relationship between trade openness and productivity through a firm's perspective. In this model, the exporting process allows for inter-firm reallocation towards the most productive firms and is therefore considered beneficial.

Furthermore, due to data limitation, the firm-level investigations mentioned above lack distinction between different types of imports. Indeed, in a study analysing the impact of complementarities on Chinese firms' output, Yasar (2013) only included machinery imports in the analysis. On the other hand, Abreha (2019) only included intermediate imports in a study focusing on the productivity of Ethiopian firms. Augier et al. (2013), in an empirical investigation analysing the relevance of complementarities in explaining Spanish firms' productivity, included capital and intermediate imports but could not differentiate between the two.

This lack of distinction between intermediate and capital imports is regrettable given the importance of technology embodied in capital imports revealed by previous studies. Indeed, at the turn of the century Caselli and Wilson (2004) had already shown that the composition of imported capital may explain part the observed cross-country heterogeneity in total factor productivity. More recently, the plant-level analysis of Mexican manufacturing by Caselli (2018) has found that capital good imports are more likely to embody technological improvements than intermediate inputs.

The objective of this paper is to provide a contribution to the literature that analyses the impact of the complementarity between imports and absorptive capacity on productivity. The empirical investigation is performed at the industry level⁵ for imports and productivity related variables and at the overall manufacturing sector level for absorptive capacity proxies, to account for absorptive capacity not necessarily occurring within the firm or the industry. Moreover, our study aims to test the significance of different complementarities by differentiating between capital and intermediate imports and by using either educational or

⁵ Industry level analysis is also performed by Bournakis et al. (2018), but their focus is on the development of indices of R&D-based international knowledge spillovers rather than on the complementaries between imports and absorptive capacity.

occupational workers' characteristics as alternative absorptive capacity proxies. This empirical setting allows testing if the significance of complementarities depends on the type of imports and on the type of absorptive capacity proxies considered.

3 Methodology

3.1 Data

The analysis is constructed by merging data from three different sources: CompNet, WIOT, and Eurostat databases. The CompNet database is used to collect data on productivity, the WIOT database to obtain information on different types of imports and the Eurostat one to gather absorptive capacity proxies. The merging of these databases provides us with a panel of 18 manufacturing industries for 16 European countries covering the 2008-2014 time period⁶. This constitutes our basis to empirically investigate the impact of different complementarities on the productivity of European manufacturing industries⁷.

The CompNet institute collects firm-level data from multiple European national statistical centers⁸. Data are made consistent and reaggregated at the industry level before being made available for researchers. The industry-level variables in the database contain various information related to the distribution of firm-level variables within the industry. For instance, in our study, the dependent variable is the mean labour productivity calculated at the industry level.⁹

⁶ We suspect that, despite the short time period under consideration, it is worth analyzing because crises like the subprime one that began in 2008 are intense periods more likely to accelerate structural changes in the economy.

⁷ Tables describing the industries/countries and the variables used are respectively available in Appendix sections A.1 and A.2.

⁸ See the User Guide for the 8th Vintage CompNet Dataset.

⁹ Other distribution information, such as values for selected percentiles, are also available.

The World Input Output Tables (WIOT) offers consistent information on inter-industry flows for a large panel of countries¹⁰. Critically for us, the database provides data on raw material and intermediate imports at the industry level, but capital and consumption imports are originally available only at the country level. To overcome this limitation, we use simple proportionality rules to construct capital and consumption imports at the industry level by exploiting the information contained in the WIOT database. A detailed description of the implemented procedure is available in the Appendix section A.2.3.

The Eurostat database¹¹ contains the information on worker's education and occupational types which we use to construct our proxies for absorptive capacity. Our core set of results is based on four simple ratios depending on the persons considered at the numerator (either manufacturing workers with tertiary education or manufacturing workers employed in science and technology activities) and the comparative benchmark at the denominator (either the overall number of people at the national level sharing the same characteristic or the whole manufacturing workforce irrespective of its characteristics).

3.2 Econometric Strategy

The econometric specification to test the impact of complementarities between imports and absorptive capacity on productivity includes labour productivity as the dependent variable and capital and intermediate imports interacted with absorptive capacity as independent variables. We also include some control variables in addition to time and industry-country effects.

¹⁰ See Dietzenbacher et al. (2013) and Timmer et al. (2015)'s for a deeper explanation on how the WIOT database is constructed.

¹¹ Database from the Statistical Office of the European Union, Brussels.

3.2.1 Baseline Specification

The econometric specification -- in double ln so that estimated coefficients represent elasticities -- is the following:

$$\ln(PROD)_{i,j,t} = \alpha 1 \ln(ABS)_{i,t} + \alpha 2 \ln(KIMP)_{i,j,t} + \alpha 3 \ln(IIMP)_{i,j,t} + \alpha_4 \ln(ABS)_{i,t} \times \ln(KIMP)_{i,j,t} + \alpha_5 \ln(ABS)_{i,t} \times \ln(IIMP)_{i,j,t} + CV_{i,j,t} + \mu_{i,j} + \gamma_t + \varepsilon_{i,j,t}$$

$$[1]$$

In Equation [1], the subscripts *i*, *j*, and *t* respectively represent the country, industry, and year. The model includes industry-country effects denoted by $\mu_{i,j}$, a time effect represented by γ_t , and the error term denoted by $\varepsilon_{i,j,t}$. The dependent variable is the natural logarithm (ln) of the average of labour productivity, in terms of real value-added, for firms in industry *j* in country *i* at time *t* (*PROD*_{*i*,*j*,*t*}). The variables *KIMP*_{*i*,*j*,*t*} and *IIMP*_{*i*,*j*,*t*} respectively represent the capital and intermediate imports of industry *j* divided by its output in country *i* at time *t*. Additional control variables are included in the analysis, represented by *CV*_{*i*,*j*,*t*}, which consist of (ln of) consumption imports over output (*CIMP*_{*i*,*j*,*t*})¹², raw imports over output (*RIMP*_{*i*,*j*,*t*), as well as capital intensity i.e. real capital over labour ratio (*KINT*_{*i*,*j*,*t*).}}

The interaction terms $\ln(ABS)_{i,t} \times \ln(KIMP)_{i,j,t}$ and $\ln(ABS)_{i,t} \times \ln(IIMP)_{i,j,t}$ are included to investigate the impact of complementarities between the two different types of imports (*KIMP* and *IIMP*) and the absorptive capacity proxy (*ABS*) on productivity (*PROD*). The proxies for *ABS* are derived from indicators of the skill level of the manufacturing workforce. The two skill indicators used are the number of persons with tertiary education (*TER*) and the number of persons engaged in science and technology activities (*TEC*). These numbers are converted into shares using two possible denominators: either total national employment of the corresponding skill category (*n*) or total manufacturing employment over all skill categories (*m*).

¹² The consumption imports are included to control for competition effects.

This leads to four absorptive capacity proxies, two of them capturing how the manufacturing sector manages to attract highly skilled employees (TER_n and TEC_n) and the other two capturing the share of skilled employees in the composition of the manufacturing workforce (TER_m and TEC_m). As can be appreciated in the Appendix section A.2.2, over the whole sample, even if the dispersion across countries is quite large, the manufacturing sector captures on average 10% of the corresponding skill shares, while those skill shares account for close to 20% of manufacturing employment. At first glance, each indicator qualifies as a proxy for manufacturing absorptive capacity, and will be used as such in separate regressions. We conduct these investigations to test if the significance of complementarities depends not only on the type of imports but also on the absorptive capacity proxy that is used.

3.2.2 Instrumental Variables

To further control for the robustness of our findings, we need to address endogeneity issues.

Indeed, our setting may be affected by a self-selection pattern (Vogel and Wagner, 2010, Caselli, 2018), under which the most productive industries might be the ones more involved in the importing process. Besides, measurement errors may affect productivity estimates, and unobserved variables may confound both imports and productivity. In such cases, the import variables will be correlated with the error term leading to biased fixed effects coefficients. To account for this potential bias, instrumental variables (IV) regressions are performed.

The constructed instruments used in this research are inspired by the procedure followed by Autor et al. (2013), who instrumented *US* imports from China by *European* imports from China. In our case, we instrumented the four types of import ratios for a given country *i* (*KIMP_i*, *IIMP_i*, *RIMP_i* and *CIMP_i*) by the average import ratios of groups of "*kindred*" countries considered as most similar to country *i*.

The degree of similarity is based on the production and import structure. More precisely, for each country and each year, we calculate the cross-industry correlation between this country and all other countries in the sample, for both imports and output. Then we calculate the average of import and output correlations over all years to identify single average correlation coefficients per country pair for each criterion. We rank these average numbers to identify the three kindred countries according to the import and output criteria. For each group of kindred countries (i.e. for each criterion) we calculate our variables by dividing the sum of the imports (for each type of imports) over the sum of the outputs of the corresponding countries. Finally, we calculate the average between the variable based on the production structure and the variable base on the import structure.

This procedure generates instruments for capital, intermediate, consumption and raw imports for each industry in each country for every year during the 2008-2014 time period. The interaction between the instrument for capital and intermediate imports with absorptive capacity are also used as instruments for the original interactions¹³.

4 Results

4.1 Fixed effects

The fixed-effect results derived from the estimation of Equation (1) are reported in Table 1. Each column presents the findings obtained using one of the four absorptive capacity proxies. All remaining explanatory variables, as well as the dependent one, remain the same across all columns. The structure of this table facilitates a comparative analysis of results using the

¹³ The IV regressions are performed using the natural logarithm of the instruments.

different absorptive capacity proxies. Although our main focus will be on the coefficients of imports and absorptive capacity, we first provide general comments on all other coefficients.

The estimated coefficients for control variables are quite stable across columns. The coefficient for real capital intensity variable remains positive and statistically significant across all specifications. Coefficients for consumption and raw imports are respectively positive and negative although not always significant depending on the specification.

Considered in isolation, coefficients for all absorptive capacity proxies are always positive, even if only statistically significant for TEC_n and TEC_m . The signs and significance of import ratios coefficients are more contrasted. Reading the table from left to right, the coefficient for capital imports starts positive (significantly so for TER_n) and then switches sign (significantly so for TEC_m). For intermediate imports, the reverse happens: the coefficient starts negative and then becomes positive and strongly significant. This contrasted pattern is replicated identically for the interaction terms, which are aimed to capture the complementarities between imports and absorptive capacity.

The above results cast doubts about the fixed effects specification. It is one thing to admit that different absorptive capacity proxies may uncover different dimensions of the relationship between capital imports and productivity. But it is more difficult to explain why this relationship would turn negative, and significantly so in the last column of Table 1. This may be an indication of collinearity between capital imports and intermediate imports. Indeed, foreign-produced machines and equipments may require specific inputs which are also imported. However, it is unclear how this collinearity is linked to absorptive capacity and why it may lead to a sign reversal. Another potential explanation of this puzzling pattern of fixed effects results is endogeneity. This could arise from self-selection or because imports and labour productivity are affected by confounding factors. In fact, as intermediate imports are closely associated with yearly operations, and probably more so than capital imports, which are linked to longer-term prospects, it could be argued that *IIMP* is probably more prone to endogeneity problems than *KIMP*. This is what is investigated in the next section.

	Absorption: TER _n	Absorption: TEC _n	Absorption:TER _m	Absorption: TEC _m
Ln (Absorption Capacity)	0.308	0.302*	0.096	0.197*
	(0.197)	(0.171)	(0.127)	(0.114)
Ln (Capital Imports / Output)	0.378**	0.121	-0.070	-0.114*
	(0.155)	(0.135)	(0.068)	(0.061)
Ln (Intermediate Imports / Output)	-0.138	0.126	0.280***	0.353***
	(0.232)	(0.242)	(0.094)	(0.091)
Ln (Capital Imports / Output)×	0.163***	0.055	-0.036	-0.068**
Ln (Absorption Capacity)	(0.062)	(0.058)	(-0.036)	(0.032)
Ln (Intermediate Imports / Output)×	-0.090	0.023	0.119**	0.187***
Ln (Absorption Capacity)	(0.088)	(0.102)	(0.052)	(0.055)
Ln (Consumption Imports / Output)	0.103*	0.084	0.083	0.093*
	(0.056)	(0.056)	(0.056)	(0.054)
Ln (Raw Imports / Output)	-0.017	-0.022*	-0.017	-0.012
	(0.013)	(0.013)	(0.013)	(0.013)
Ln (Real Capital Intensity)	0.191***	0.188***	0.189***	0.189***
	(0.058)	(0.058)	(0.059)	(0.058)
Constant	3.895***	3.775***	3.210***	3.484***
	(0.568)	(0.520)	(0.362)	(0.342)
Country-Industry Effect	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes
Observations	1947	1947	1947	1947
<i>R</i> ²	0.081	0.083	0.148	0.245

Table 1: Complementarities and Labour Productivity, Fixed Effect Results

Notes: Absorption capacity is defined either as the share of manufacturing in national employment of the skill category (*n*) or as the share of the skill category in total manufacturing employment (*m*). The skill categories are either persons with tertiary education (*TER*) or persons employed in science and technology (*TEC*). FE regressions with clustered standard errors in parenthesis. Fixed effects not reported but available upon request. The dependent variable in each regression is the natural logarithm of labour productivity.

p < 0.1, p < 0.05, p < 0.01.

4.2 IV Regressions

The results of the IV approach are presented in Table 2, for the same set of variables and under a similar presentation as for the fixed effects regressions¹⁴. The difference lies in the instrumentalization of the import variables as described in section 3.2.2

Globally speaking, apart from capital intensity, which remains positive and strongly significant, a number of explanatory variables loose significance in IV regressions. This is particularly true of intermediate imports, which become non-significant whatever the specification. The absorptive capacity proxies based on skill shares within the manufacturing sector (*TER_m* and *TEC_m*) also lead to non-significant results in the last two columns of Table 2. Oppositely, the coefficient of capital imports remains positive and significant in the first two columns, and also when interacted with the share of manufacturing in national employment of people with tertiary education (*TER_n*).

From the above, we can infer that endogeneity issues affect more seriously intermediate imports than capital imports. As suggested above, this is probably due to the fact that intermediate imports are determined jointly with productivity, and the more specialized the manufacturing workforce (in the sense of higher TER_m and TEC_m values), the more acute the link with unobserved factors. As a consequence, the highly significant coefficients of the last two columns of Table 1 must be considered with suspicion. By contrast, the sign and significance of the coefficients for capital imports remain fairly stable when controlling for endogeneity.

¹⁴ The first stages F statistics are reported in the corresponding appendix section for all the IV regressions presented in the paper (including also the regressions in the Appendix). The reported F-Statistics provide no evidence in favour of weak instruments. The detailed results for all the first stages remain available upon request.

We interpret this stability of the interaction term coefficient as evidence of the complementarity between capital imports and the manufacturing share of tertiary educated people (TER_n). This finding is in line with the argument that technology is embodied in capital imports (as stressed by Caselli and Wilson, 2004), which suggests that absorptive capacity may be essential to benefit from it.

	Absorption: TER _n	Absorption: TEC _n	Absorption:TER _m	Absorption: TEC _m
Ln (Absorption Capacity)	1.718	1.148*	-0.215	0.238
	(1.174)	(0.653)	(0.769)	(0.444)
Ln (Capital Imports / Output)	2.031*	0.982*	0.737	0.592
	(1.175)	(0.587)	(1.257)	(1.145)
Ln (Intermediate Imports / Output)	-1.791	-0.699	-1.797	-1.226
	(1.583)	(1.225)	(2.903)	(2.325)
Ln (Capital Imports / Output)×	0.574*	0.215	0.011	-0.005
Ln (Absorption Capacity)	(0.305)	(0.141)	(0.202)	(0.214)
Ln (Intermediate Imports / Output)×	-0.269	0.073	-0.318	-0.098
Ln (Absorption Capacity)	(0.441)	(0.384)	(0.855)	(0.787)
Ln (Consumption Imports / Output)	0.578	0.333	0.742	0.316
	(0.680)	(0.555)	(0.848)	(0.611)
Ln (Raw Imports / Output)	0.038	0.050	0.042	0.054
	(0.253)	(0.216)	(0.318)	(0.316)
Ln (Real Capital Intensity)	0.181***	0.180***	0.176***	0.180***
	(0.063)	(0.061)	(0.066)	(0.063)
Constant	9.388**	7.113**	5.531**	5.004**
	(4.740)	(2.872)	(2.547)	(2.154)
Country-Industry Effect	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes
Observations	1947	1947	1947	1947
<i>R</i> ²	0.027	0.021	0.016	0.0001

Table 2: Complementarities and Labour Productivity, IV Results

Notes: Absorption capacity is defined either as the share of manufacturing in national employment of the skill category (*n*) or as the share of the skill category in total manufacturing employment (*m*). The skill categories are either persons with tertiary education (*TER*) or persons employed in science and technology (*TEC*). FE regressions with clustered standard errors in parenthesis. Fixed effects not reported but available upon request. The dependent variable in each regression is the natural logarithm of labour productivity.

* p < 0.1, ** p < 0.05, *** p < 0.01

However, as the degree of significance of this variable also decreases with instrumentalization, we investigate the robustness of the IV results by introducing control variables one at a time. The different specifications and their results appear in section A.3 of the Appendix. Four tables are reported, corresponding to the four proxies of absorptive capacity used in this study. The last column of each column reports the same results as those appearing in each column of Table 2.

Results broadly confirm previous findings. It is true that for one specification of the TER_n table, the coefficient of the interaction term with intermediate imports becomes negative and significant. But in all other specifications and in all other tables this coefficient remains non-significant. In contrast, the interaction term involving capital imports remains positive and significant in all specifications of the TER_n table, and in three out of five specifications of the TEC_n table. None of the interaction terms in the last two tables (for TER_m and TEC_m) turns out to be significant.

4.3 Grid Search Cutoff

In this study, we also consider the potential non-linearity of the interaction by introducing a cutoff of the absorptive capacity proxy below which complementarity effects are supposed to vanish altogether. Instead of defining an arbitrary cutoff level, we identify it by grid search, selecting the cutoff value which minimizes the sum of square residuals of the IV regression.

We apply the cutoff technique only to the most significant absorptive capacity proxy identified by this study i.e. the manufacturing share of tertiary educated people (*TER_n*). More precisely, we convert all values below the cutoff into the minimum of all reported *TER_n* values. The original sample values of *TER_n* range from 5.4% to 14.3%. The optimal cutoff value obtained is 12.5%.

The results where the control variables are introduced one at a time are reported in Table 3. As can be appreciated, all interaction terms involving capital imports turn out positive and with an increased significance level. Hence, the results obtained considering the potential non linearity of the interaction reinforce the findings obtained in the previous section.

4.4 Additional Tests

A number of alternative specifications and different variable definitions have been tested. We briefly describe them below without reporting detailed results, which are kept available upon request.

Running regressions where absorptive capacity is defined by combining educational attainment with occupational type did not lead to major changes. Defining instruments based on alternative criteria (e.g. averages between variables based on a common border criterion and imports or output criterion) or splitting the sample between euro and non-euro countries neither lead to major changes, essentially leading to a drop in significance without altering the signs. This remains true when output is replaced by value-added when calculating imports ratios.

Overall, our empirical investigation of complementarities between imports and absorptive capacity leads to two major conclusions. First, complementarities do emerge, but they depend on the type of imports, and how absorptive capacity is measured. Second, taking the best out of the available sample, the most robust and positive link is obtained for capital imports and when absorptive capacity is defined as the share of manufacturing in national employment of persons with tertiary education level. Moreover, this result is reinforced when the potential non-linearity of the interaction is taken into account.

	1	2	3	4	5
Ln (Tertiary Education - national share, Cutoff)	0.298**	0.294**	0.298**	0.332**	0.359**
	(0.121)	(0.123)	(0.121)	(0.150)	(0.146)
La (Capital Jacapata / Quitaut)	0 020***	0 0 2 0 ***	0 0 2 7 * * *	0 0 0 0 **	0.004***
En (Capital Imports / Output)	(0.289***	(0.207)	(0.200)	0.839**	0.884***
	(0.288)	(0.297)	(0.300)	(0.363)	(0.318)
Ln (Intermediate Imports / Output)	-0.709	-0.769**	-0.703	-0.956**	-0.855*
	(0.447)	(0.329)	(0.434)	(0.477)	(0.466)
In (Capital Imports / Output)x	በ 143***	በ 14በ***	በ 143***	በ 13በ***	0 134***
In (Tertiary Education - national share, Cutoff)	(0.042)	(0.046)	(0.044)	(0.045)	(0.048)
	(0.042)	(0.040)	(0.044)	(0.043)	(0.048)
Ln (Intermediate Imports / Output)×	-0.120	-0.112	-0.122	-0.056	-0.053
Ln (Tertiary Education - national share, Cutoff)	(0.103)	(0.120)	(0.119)	(0.137)	(0.141)
Ln (Consumption Imports / Output)		-0.107			0.299
		(0.575)			(0.551)
Ln (Raw Imports / Output)			-0.005		0.042
			(0.197)		(0.233)
Ln (real capital intensity)				0.191***	0.188***
				(0.064)	(0.061)
Constant	5.258***	4.832***	5.232***	4.194***	5.662**
	(1.279)	(1.750)	(1.746)	(1.510)	(2.251)
			,		
Country-Industry Effect	Yes	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes	Yes
Observations	1983	1983	1983	1947	1947
R ²	0.018	0.011	0.017	0.001	0.017

Table 3: Complementarities and Labour Productivity, Stepwise IV Results for Tertiary Education - national share (*TER_n*), grid-search cutoff

Notes: FE IV regressions with clustered standard errors in parenthesis. Fixed effects not reported but available upon request. The dependent variable in each regression is the natural logarithm of labour productivity.

All absorptive capacity values below a critical cutoff level are converted into the minimal reported value.

The critical cutoff level is determined by grid-search to minimize the sum of squared residuals.

* p < 0.1, ** p < 0.05, *** p < 0.01

5 Conclusion

Do complementarities between imports and absorptive capacity contribute to enhance the productivity of domestic manufacturing industries? The empirical evidence reported in this paper suggests that this is the case, but only provided the considered imports are capital imports (not intermediate) and the manufacturing sector captures a sufficiently high share of people with tertiary education (rather than alternative measures of absorptive capacity). Based on a panel of 18 manufacturing industries for 16 European countries and covering the 2008-2014 period, our study tests for the significance of complementarities between different types of imports and absorptive capacity proxies. The results confirm the relevance of the approach. After controlling for endogeneity, we find that complementarities between capital imports and education related absorptive capacity proxies are positive and significant while no such evidence is found for intermediate imports. These findings are robust to the utilization of different specifications or alternative measures and even reinforced when the potential non - linearity of the interaction is considered.

Further research questions on the impact of complementarities on domestic productivity still need to be explored. In this study, we focus on European countries. However, performing this empirical analysis for countries at different stages of development, such as Latin American or African countries, would be of particular interest. Indeed, testing whether the types of complementarities impacting productivity are similar or differ to the ones in Europe in less developed countries could enhance a more global understanding of the phenomenon and sustain better-informed development policies. Moreover, while this study is performed at the industry level, further research could be conducted at the firm level to identify the mechanisms that might be hidden at a more aggregated level. This could lead to findings on additional conditions under which complementarities between different types of imports and absorptive capacity proxies might positively and significantly impact productivity.

The most promising research avenue is probably to combine the two above-mentioned points. Thus, a firm level investigation on the impact of complementarities between different types of imports and absorptive capacity proxies on productivity in a Latin American or an African context would be most welcome in the future.

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Appendix

A.1 Sample Structure

A.1.1 Countries and Periods

Table A1: Countries (2008-2014)				
Belgium	Croatia	Czech Republic	Denmark	
Finland	France	Hungary	Italy	
Lithuania	Netherlands	Poland	Portugal	
Slovenia	Spain	Sweden	Switzerland*	

* For Switzerland, the time period is 2009-2014.

A.1.2 Manufacturing Industries

Inductor	Industry Description
muustry	
C10 & C11 & C12	Manufacture of food products, beverages and tobacco products
C13 & C14 & C15	Manufacturing of textiles, wearing apparel and leather and related products
C16	Manufacture of wood and of products of wood and cork except furniture
C17	Manufacture of paper and paper product
C18	Printed and reproduction of recorded media
C20	Manufacture of chemicals and chemical products
C21	Manufacture of basic pharmaceutical products and pharmaceutical
	preparations
C22	Manufacture of rubber and plastic products
C23	Manufacture of other non-metallic mineral products
C24	Manufacture of basic metals
C25	Manufacture of fabricated metal products, except machinery and equipment
C26	Manufacture of computer electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment
C29	Manufacture of motor vehicles, trailers and semitrailers
C30	Manufacture of other transport equipment
C31 & C32	Manufacture of furniture, other manufacturing
C33	Repair and installation of machinery and equipment

Table A2: Manufacturing Industries

A.2 Variables

A.2.1 Description

Variable	Description	Source
Core Variables		
Labour Productivity (<i>PROD</i>)	Real value added per worker	CompNet Database 8 th Vintage
Tertiary Education – national share _(<i>TER_n</i>)	Employees with tertiary education in the manufacturing sector over employees with tertiary education at the national level	Eurostat database
Science and Technology – national share (<i>TEC</i> _n)	Employees in science and technology in the manufacturing sector over employees in science and technology at the national level	Eurostat database
Tertiary Education – manufacturing share (<i>TER_m</i>)	Employees with tertiary education in the manufacturing sector over total employees in the manufacturing sector	Eurostat database
Science and Technology – manufacturing share (TEC _m)	Employees in science and technology in the manufacturing sector over total employees in the manufacturing sector	Eurostat database
Capital Imports (<i>KIMP</i>)	Imports of capital goods over output	World Input-Output Tables
Intermediate Imports (IIMP)	Imports of intermediate goods over output	World Input-Output Tables
Control Variables		
Raw Imports (<i>RIMP</i>)	Imports of raw material over output	World Input-Output Tables
Consumption Imports (<i>CIMP</i>)	Imports of consumption goods over output	World Input-Output Tables
Real Capital Intensity (<i>KINT</i>)	Value of real capital over labour	CompNet Database 8 th Vintage

Table A3: Variables Description

Notes: Imports are summed up across all partners to account for indirect technology spillovers as argued by Lumenga-Neso et al. (2005). In the original WIOT capital and consumption imports are available at the country level only, so we implement a procedure based on simple proportionality rules to infer their value at the industry level.

A.2.2 Summary Statistics

	count	mean	sd	min	max
Core Variables					
Labour Productivity	1983	3.479	0.722	0.721	5.339
Tertiary Education - national share	1989	0.099	0.021	0.054	0.143
Science and Technology - national share	1989	0.110	0.028	0.056	0.179
Tertiary Education - manufacturing share	1989	0.196	0.086	0.054	0.375
Science and Technology - manufacturing share	1989	0.210	0.079	0.064	0.375
Capital Imports	1989	0.042	0.044	0.003	0.398
Intermediate Imports	1989	0.250	0.115	0.025	0.743
Control Variables					
Consumption Imports	1989	0.067	0.048	0.014	0.363
Raw Imports	1989	0.012	0.023	0.000	0.175
Real Capital Intensity	1951	3.378	0.618	1.282	4.929

Table A4: Summary Statistics

A.2.3 Capital and Consumption Imports

In the original WIOT database the capital/consumption imports are only available at the country level. We implement a procedure to impute the imports at the industry level using information available in the original database. In order to illustrate the procedure, let us consider an importer country X and an exporter country Y.

In a first step, we construct the following coefficients:

$$\alpha_{j_1,Y_{j_2}} = \frac{X \text{ imports in industry } j_1 \text{ from } Y' \text{s industry } j_2}{X \text{ imports in all 56 industries (not only manufacturing) from } Y' \text{s industry } j_2}$$

$$\beta_{j_1} = \frac{\text{Industry } j_1 \text{ value added in } X}{\text{Value added of all 56 industries in } X}$$

$$\gamma_{j_1,Y_{j_2}} = \frac{\alpha_{j_1,Y_{j_2}} + \beta_{j_1}}{2}$$

In a second step we impute the capital/consumption imports of X in industry j_1 coming form Y's j_2 industry by multiplying the capital/consumption imports of X coming from Y's j_2 industry times $\gamma_{j_1,Y_{j_2}}$.

A.3 Stepwise IV Results

A.3.1 National Shares as Absorption Capacity Proxies

Table A5: Complementarities and Labour Productivity, Stepwise IV Results for Tertiary Education - national share (*TER*_n)

	1	2	3	4	5
Ln (Tertiary Education - national share)	1.161	1.146	1.084	1.579	1.718
	(0.917)	(0.800)	(0.753)	(1.511)	(1.174)
Ln (Capital Imports / Output)	1.649	1.641*	1.397	1.855	2.031*
	(1.031)	(0.906)	(0.879)	(1.271)	(1.175)
Ln (Intermediate Imports / Output)	-2.063*	-1.862*	-1.577	-2.107*	-1.791
	(1.217)	(1.073)	(1.158)	(1.247)	(1.583)
		. ,	. ,		
Ln (Capital Imports / Output)* ×	0.447**	0.461**	0.387**	0.509*	0.574*
Ln (Tertiary Education - national share)	(0.219)	(0.202)	(0.190)	(0.265)	(0.305)
Ln (Intermediate Imports / Output) ×	-0.408	-0.430*	-0.332	-0.255	-0.269
In (Tertiary Education - national share)	(0.271)	(0.239)	(0.277)	(0.462)	(0.441)
	(0.27 _)	(01200)	(0.277)	(01.02)	(0)
Ln (Consumption Imports / Output)		0.227			0.578
		(0.594)			(0.680)
Ln (Raw Imports / Output)			-0.070		0.038
			(0.161)		(0.253)
				0.187***	0.181***
Lh (Real Capital Intensity)				(0.070)	(0.002)
				(0.070)	(0.063)
Constant	6.534**	7.424**	6.042**	6.482	9.388**
	(3.027)	(3.078)	(2.649)	(4.710)	(4.740)
Country Industry Effort	Vac	Vac	Vac	Vac	Vac
Time Effect	Yes	Yes	Yes	Yes	Yes
Observations	1092	1092	1092	1047	1047
	1983	1202	TA93	1947	1947
π-	0.018	0.030	0.009	0.005	0.027

Notes: FE IV regressions with clustered standard errors in parenthesis. Fixed effects not reported but available upon request. The dependent variable in each regression is the natural logarithm of labour productivity. *p < 0.1, **p < 0.05, ***p < 0.01

	1	2	3	4	5
Ln (Science and Technology – national share)	0.980*	0.989*	0.969**	1.151	1.148*
	(0.505)	(0.542)	(0.466)	(0.741)	(0.653)
Ln (Capital Imports / Output)	0.912	0.920	0.885	0.960	0.982*
	(0.570)	(0.681)	(0.568)	(0.642)	(0.587)
Ln (Intermediate Imports / Output)	-0.643	-0.664	-0.572	-0.859	-0.699
	(0.687)	(0.889)	(0.888)	(0.768)	(1.225)
Ln (Capital Imports / Output) ×	0.214*	0.215	0.209*	0.222*	0.215
Ln (Science and Technology - national share)	(0.122)	(0.133)	(0.121)	(0.130)	(0.141)
Ln (Intermediate Imports / Output) ×	-0.022	-0.022	-0.012	0.047	0.073
Ln (Science and Technology - national share)	(0.205)	(0.206)	(0.244)	(0.336)	(0.384)
Ln (Consumption Imports / Output)		-0.018			0.333
		(0.590)			(0.555)
In (Pow Imports (Output)			0.014		
			-0.014		(0.216)
			(0.207)		(0.220)
Ln (Real Capital Intensity)				0.184***	0.180***
				(0.064)	(0.061)
Constant	6.244***	6.193***	6.153***	5.553**	7.113**
	(1.729)	(1.886)	(1.837)	(2.433)	(2.872)
Country-Industry Effect	Yes	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes	Yes
Observations	1983	1983	1983	1947	1947
R ²	0.018	0.016	0.015	0.001	0.021

Table A6: Complementarities and Labour Productivity, Stepwise IV Results for Science and Technology - national share (*TEC*_n)

Notes: FE IV regressions with clustered standard errors in parenthesis. Fixed effects not reported but available upon request. The dependent variable in each regression is the natural logarithm of labour productivity. *p < 0.1, **p < 0.05, ***p < 0.01

A.3.2 Manufacturing Shares as Absorption Capacity Proxies

	1	2	3	4	5
Ln (Tertiary Education - manufacturing share)	-0.323	0.022	0.140	-0.666	-0.215
	(2.490)	(0.741)	(0.453)	(2.935)	(0.769)
Ln (Capital Imports / Output)	1.113	0.693	0.701	1.078	0.737
	(4.003)	(1.510)	(1.283)	(3.929)	(1.257)
In (Intermediate Imports / Output)	-3 380	-1 455	-1 603	-3 953	-1 797
	(12 936)	(3 750)	(2 785)	(13 091)	(2 903)
	(12.550)	(3.750)	(2.705)	(10.001)	(2.505)
Ln (Capital Imports / Output) ×	0.081	0.050	0.069	0.026	0.011
Ln (Tertiary Education - manufacturing share)	(0.431)	(0.196)	(0.229)	(0.341)	(0.202)
In (Intermediate Imports / Output) x	-0 71/	-0 313	-0 325	-0 775	-0 318
In (Tertiany Education - manufacturing share)	(3 202)	(1 100)	(0.823)	(3.258)	(0.855)
	(3.292)	(1.109)	(0.882)	(3.238)	(0.855)
Ln (Consumption Imports / Output)		0.381			0.742
		(0.777)			(0.848)
Ln (Raw Imports / Output)			-0.111		0.042
			(0.339)		(0.318)
				0 1 0 1 **	0 170***
Ln (Real Capital Intensity)				0.181**	0.176***
				(0.088)	(0.066)
Constant	3.012	5.359**	3.525*	1.282	5.531**
	(4.860)	(2.516)	(1.825)	(5.683)	(2.547)
Country-Industry Effect	Yes	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes	Yes
Observations	1983	1983	1983	1947	1947
R ²	0.002	0.008	0.001	0.001	0.016

Table A7: Complementarities and Labour Productivity, Stepwise IV Results for Tertiary Education - manufacturing share (*TER*_m)

Notes: FE IV regressions with clustered standard errors in parenthesis. Fixed effects not reported but available upon request. The dependent variable in each regression is the natural logarithm of labour productivity. *p < 0.1, **p < 0.05, ***p < 0.01

	1	2	3	4	5
Ln (Science and Technology - manufacturing share)	0.444	0.445	0.462*	0.201	0.238
	(0.383)	(0.364)	(0.242)	(0.869)	(0.444)
Ln (Capital Imports / Output)	0.617	0.609	0.559	0.710	0.592
	(1.629)	(1.669)	(1.005)	(2.128)	(1.145)
Ln (Intermediate Imports / Output)	-0.939	-0.912	-0.750	-1.700	-1.226
	(3.640)	(3.609)	(1.759)	(5.189)	(2.325)
In (Capital Imports / Output) x	0.050	0 0 1 9	0.047	0 030	-0.005
Ln (Science and Technology - manufacturing share)	(0.226)	(0.239)	(0.178)	(0.252)	(0.214)
In (Intermediate Imports / Output) ×	-0.083	-0.077	-0.044	-0.235	-0.098
Ln (Science and Technology - manufacturing share)	(1.047)	(1.060)	(0.628)	(1.502)	(0.787)
Ln (Consumption Imports / Output)		0.007			0.316
		(0.522)			(0.611)
Ln (Raw Imports / Output)			-0.018		0.054
			(0.215)		(0.316)
Ln (Real Capital Intensity)				0.182***	0.180***
				(0.069)	(0.063)
Constant	4.8/8***	4.90/***	4.811***	3.527**	5.004**
Country Inductor Effort	(1.564)	(1.782)	(1.368)	(1.087)	(2.154)
Country-Industry Effect	res	res	res	Tes	Tes Voc
	1002	1002	1002	1047	1047
Observations	1983	1983	1983	1947	1947
R ²	0.002	0.002	0.003	0.005	0.0001

Table A8: Complementarities and Labour Productivity, Stepwise IV Results for Science and Technology - manufacturing share (*TEC_m*)

Notes: FE IV regressions with clustered standard errors in parenthesis. Fixed effects not reported but available upon request. The dependent variable in each regression is the natural logarithm of labour productivity.* p < 0.1, ** p < 0.05, *** p < 0.01

A.4 First Stages F-Statistics

A.4.1 First Stages F-Statistics	, Complementarities and I	Labour Productivity, IV Results
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				- //
	Absorption: TER _n	Absorption: <i>TEC</i> _n	Absorption: <i>TER</i> _m	Absorption: <i>TEC_m</i>
Ln (Capital Imports / Output)	56.22	51.23	45.60	51.29
Ln (Intermediate Imports / Output)	37.81	43.63	48.25	42.60
Ln (Capital Imports / Output)× Ln (Absorption Capacity)	113.59	121.92	347.05	449.12
Ln (Intermediate Imports / Output)× Ln (Absorption Capacity)	52.79	101.15	172.65	212.30
Ln (Consumption Imports / Output)	14.21	13.41	16.39	14.77
Ln (Raw Imports / Output)	42.87	50.75	48.12	47.96

Table A9: First Stages F-Statistics, Complementarities and Labour Productivity, IV Results

Notes: The table reports the corresponding F-Statistics for each first stage regression

A.4.2 First Stages F-Statistics, Stepwise IV Results

Table A10:First Stages F-Statistics, Complementarities and Labour Productivity, Stepwise IVResults for Tertiary Education - national share (*TER_n*)

	1	2	3	4	5
Ln (Capital Imports / Output)	49.05	48.46	45.84	59.82	56.22
Ln (Intermediate Imports / Output)	51.26	47.58	46.91	43.56	37.81
Ln (Capital Imports / Output) × Ln (Tertiary Education - national share)	82.76	78.67	76.72	126.36	113.59
Ln (Intermediate Imports / Output) × Ln (Tertiary Education - national share)	69.96	65.70	64.39	59.14	52.79
Ln (Consumption Imports / Output)		16.13			14.21
Ln (Raw Imports / Output)			46.72		42.87

Notes: The table reports the corresponding F-Statistics for each first stage regression

Table A11: First Stages F-Statistics, Complementarities and Labour Productivity, Stepwise IV Results for Science and Technology - national share (*TEC*_n)

	1	2	3	4	5
Ln (Capital Imports / Output)	52.03	50.22	47.98	54.92	51.23
Ln (Intermediate Imports / Output)	57.78	54.04	53.34	49.72	43.63
Ln (Capital Imports / Output) × Ln (Science and Technology - national share)	85.11	82.05	78.77	132.02	121.92
Ln (Intermediate Imports / Output) × Ln (Science and Technology - national share)	128.32	118.61	118.26	115.27	101.15
Ln (Consumption Imports / Output)		15.25			13.41
Ln (Raw Imports / Output)			56.37		50.75

Notes: The table reports the corresponding F-Statistics for each first stage regression

Table A12:	First Stages F-Statistics, Complementarities and Labour Productivity, Stepwise IV
Results for T	Fertiary Education - manufacturing share (TER _m)

	1	2	3	4	5
Ln (Capital Imports / Output)	49.96	52.36	47.38	46.85	45.60
Ln (Intermediate Imports / Output)	60.98	55.77	56.55	56.34	48.25
Ln (Capital Imports / Output) × Ln (Tertiary Education - manufacturing share)	295.82	278.07	276.25	370.46	347.05
Ln (Intermediate Imports / Output) × Ln (Tertiary Education - manufacturing share)	213.27	196.32	197.31	200.60	172.65
Ln (Consumption Imports / Output)		17.05			16.39
Ln (Raw Imports / Output)			55.57		48.12

Notes: The table reports the corresponding F-Statistics for each first stage regression

Table A13:First Stages F-Statistics, Complementarities and Labour Productivity, Stepwise IVResults for Science and Technology - manufacturing share (*TEC_m*)

	1	2	3	4	5
Ln (Capital Imports / Output)	57.65	58.58	54.00	53.97	51.29
Ln (Intermediate Imports / Output)	55.99	50.97	51.63	50.90	42.60
Ln (Capital Imports / Output) × Ln (Science and Technology - manufacturing share)	390.05	363.66	362.55	479.74	449.12
Ln (Intermediate Imports / Output) × Ln (Science and Technology - manufacturing share)	255.07	232.62	235.60	248.23	212.30
Ln (Consumption Imports / Output)		15.97			14.77
Ln (Raw Imports / Output)			54.86		47.96

Notes: The table reports the corresponding F-Statistics for each first stage regression

A.4.3 First Stages F-Statistics, Absorption Capacity Proxy with a Grid-Search Cutoff

Table A14:First Stages F-Statistics, Complementarities and Labour Productivity, Stepwise IVResults for Tertiary Education - national share (*TER_n*), grid-search cutoff

	1	2	3	4	5
Ln (Capital Imports / Output)	64.06	61.35	60.05	62.40	57.29
Ln (Intermediate Imports / Output)	49.22	44.72	45.02	41.77	35.45
Ln (Capital Imports / Output)× Ln (Tertiary Education - national share, Cutoff)	446.85	413.95	413.06	419.87	370.75
Ln (Intermediate Imports / Output)× Ln (Tertiary Education - national share, Cutoff)	95.99	88.48	87.84	82.05	70.74
Ln (Consumption Imports / Output)		19.39			17.22
Ln (Raw Imports / Output)			62.68		54.46

Notes: The table reports the corresponding F-Statistics for each first stage regression