Trade in Information Technologies and Changes in the Demand for Occupations

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Abstract

I use data from the World Input-Output Database and show that trade in information technologies (IT) has a significant contribution to the growth in foreign intermediate goods in the 2001-2014 period. China has strongly contributed to the rise in trade in IT and has become one of the major foreign suppliers of IT. I merge these data with the EU KLEMS database and EU Labour Force Survey and obtain a dataset of 12 European countries and 2001-2007 period. I show that IT imports from China are associated with lower IT prices in European countries. The fall in IT prices has increased the demand for high wage occupations and reduced the demand for medium wage occupations. Nearly 25 percent of the variation in the demand for occupations can be attributed to the trade with China.

Keywords: Trade; Information Technologies; China; Demand for Occupations

JEL classification: F16; J23; J24; O33; L63

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1 Introduction

Information technologies (IT) are everywhere nowadays and affect the functioning of economies and markets (Röller and Waverman, 2001, Czernich, Falck, Kretschmer, and Woessmann, 2011, Jerbashian and Kochanova, 2017). A growing number of recent papers show that information technologies affect labor demand (e.g., Autor, Levy, and Murnane, 2003, Autor and Dorn, 2013, Jerbashian, 2019). Information technologies substitute for routine tasks, which tend to be readily automatable and are usually performed by middle wage occupations, such as stationary-plant operators. They complement nonroutine cognitive tasks, which are usually performed by high wage occupations, such as managers. A few papers also try to disentangle the effects of technological progress in IT and trade on labor demand (e.g., Autor, Dorn, and Hanson, 2013, 2015).

In this paper, I use the World Input-Output Database (Timmer, Dietzenbacher, Los, Stehrer, and de Vries, 2015) and establish stylized facts regarding the production origin and use of IT. To discipline the analysis, I focus on China, the EU, the US, and aggregate regions Asia-Pacific and the rest of the world. I show that IT exhibits small home-bias and foreign IT inputs are very common as compared to other manufacturing goods. Trade in information technologies has significantly contributed to the growth in foreign (intermediate) goods in 2001-2014 period. Trade in intermediate goods would be lower by about $600 billion in 2014 if trade in IT among Asia-Pacific, China, the EU, the US, and the rest of the world remained at the level it had in 2001. This would imply 6% lower trade in intermediate goods in 2014 and 13% growth in the share of foreign intermediate goods in 2001-2014 period, instead of 20%.

Information technologies produced in China have the strongest gains everywhere, and China has become a major supplier of IT products in sample years. The share of IT products imported from China out of total amount of IT inputs has steadily increased in sample countries and regions during the 2001-2014 period. It has increased from an average value of 2.5% in 2001 to 8.3% in 2007 and 14.1% in 2014. The imports of non-IT manufacturing products from China have also increased, though they have grown at a lower rate and are much more modest. The share of non-IT manufacturing goods imported from China out of total amount of non-IT manufacturing inputs has increased from 0.8% in 2001 to 3.2% in 2014. Trade in intermediate goods would be lower by $210 billion in 2014, if imports of IT from China remained at the level they had in 2001.

During the sample years, a major reason for the growth of IT imports from China has been the reallocation of production of IT from developed Western and Asian countries to China. Firms from these countries have reallocated their production plants, built new plants in China, and offshored production to Chinese firms to cut costs. Part of these cost reductions can be expected to be reflected in lower prices of IT, which would increase the demand for IT. An important question then is whether the production of IT in China has affected labor demand in countries importing IT from China.

I augment the data and methodology of Jerbashian (2019) in order to attempt delivering an answer to this question. Jerbashian (2019) uses data from European countries and shows that the fall in prices of information technologies is associated with a lower share of employment in middle wage occupations and a higher share of employment in high wage occupations. Jerbashian (2019) also shows that the decline in IT prices has no robust effect on the share of employment in the low wage occupations.

In the current paper, I merge the data of Jerbashian (2019) with the data from World Input-Output Database and obtain a database covering 12 European countries and 2001-2007 period. I provide evidence that a significant part of the fall in IT prices can be attributed to the rise of IT production in China, and this is over and above innovations in IT, which significantly improved it. Moreover, I show that nearly 50 percent of the variation in the demand for occupations stemming from the fall in IT prices can be attributed to trade with China. The fall in IT prices accounts for 50 percent of changes in the shares of employment in high and medium wage occupations. This implies that about 25 percent of the variation in the shares of employment in these occupation groups in sample European countries can be attributed to trade in IT with China.

The composition of world trade and Chinese exports have been analyzed in detail by a great number of papers (e.g., Xu, 2010, Amiti and Freund, 2010). These papers usually use product-level data and show that Chinese exports have gradually become more sophisticated. Agricultural goods and textile were a major part of Chinese exports in the early 90s, but they lost their dominant position in the early 2000s. They were replaced by electronics, telecommunication equipment, and office machinery. These papers also provide suggestive evidence that the rise of production of electronics, telecommunication equipment, and office machinery in China has put a pressure on prices of these goods in importing countries. Bai and Stumpner (2019) use barcode-level price data from the US and offer comprehensive evidence that Chinese imports reduce US prices and thus they can lead to consumer gains according to the new trade models (e.g., Arkolakis, Costinot, and Rodríguez-Clare, 2012).[1,2]

The current paper contributes to these studies in several ways. It uses industry-level data from the World Input-Output Database. In this database, information technologies, such as computers and their peripheral equipment, are produced in a single 2-digit ISIC Rev. 4 industry, Manufacture of Computer, Electronic and Optical Products. It shows that IT products are highly traded as compared to other manufacturing goods, which can imply a higher responsiveness of domestic prices to trade in IT products than in other manufacturing goods. Trade in IT has increased significantly and explains a large fraction of the growth in the trade of intermediate goods. China has become a major supplier of IT during the sample period, replacing the US and countries from Asia-Pacific and the EU. Imports of IT from China have reduced IT prices in European countries and have affected labor demand in these countries.

In this regard, this paper contributes to a large and growing debate about the effects of trade and technological progress on the demand for labor. The motivating observation of earlier studies, which contributed to this debate, was the rising wage premia in the US and other developed economies despite the rising supply of skills. For example, many studies have assessed how imports from low-cost and low-skill abundant countries affect

[1] Many analysts argue that recent trade disputes between the US and China can affect prices and consumer welfare in the US based on such analyses. The analysts also argue that these trade disputes will most likely affect trade in and the location of production of high-tech goods such as IT. For example, the US has effectively banned sales to and purchases from Huawei, a leading Chinese IT manufacturer. Huawei has shifted its supply chains to China and other Asian countries in response.

[2] There is also evidence that declining investment opportunities and rising savings in China increase Chinese property purchases in developed countries and affect real estate prices (Chang, Anderson, and Shi, 2018).

demand for labor and skills in developed countries. These studies have attempted to exploit the direct competition effect of imports from developing countries on industries in developed countries which produce these goods (e.g., Revenga, 1992, Berman, Bound, and Griliches, 1994). Autor et al. (2013, 2015) show that imports from China have reduced demand for labor, especially demand for low-skill workers, in local labor markets in the US which had industry composition exposing them to Chinese import competition. A few studies have also explored the effect of trade on the availability of intermediate inputs and how that affects labor demand in addition to competition (e.g., Amiti and Davis, 2011, Wang, Wei, Yu, and Zhu, 2018). In their recent important study, Wang et al. (2018) incorporate supply chains and trade in intermediate inputs in an empirical exercise closely resembling the empirical exercise of Autor et al. (2013). They also find that direct competition of Chinese imports reduces the demand for labor. However, trade with China makes intermediate inputs more abundant and that increases labor demand in sectors which use these inputs. They show that, all in all, trade with China can lead to gains in employment because of this.[3]

On the other hand, many earlier studies have explored the affects of technological change on the demand for skills (e.g., Goldin and Katz, 1998, Acemoglu, 1998). A more recent group of studies focuses on the demand for the types of skills and tasks, as represented by occupations and occupation groups. These studies explore how the automation of production affects the demand for occupations (e.g., Autor and Dorn, 2013, Goos, Manning, and Salomons, 2014, Jerbashian, 2019). They use the task content of occupations to rank occupations according to the expected effect of automation and use IT adoption to measure automation.

Similarly to these studies, this paper focuses on the demand for occupation groups and differentiates occupations according to the likely effects of IT on them. It focuses

[3]The results of Goldsmith-Pinkham, Sorkin, and Swift (2020) suggest that the instrumental variable estimator of Autor et al. (2013) is primarily identified from shocks to IT imports from China and shocks to other imports from China tend to be of a lower importance. IT Manufacturing industry is small. Changes in employment in this industry stemming from import competition cannot be responsible for large changes in US manufacturing employment. In this regard, the novelty of this paper is that it shows that IT imports from China matter for employment in (virtually) all industries because they are associated with lower IT prices.

on IT because trade in IT is common and has experienced a sharp increase recently. It contributes to this literature by showing that trade in IT with China has affected the demand for high and medium wage occupations in European countries by lowering the price of IT inputs. This evidence is complementary to the evidence of Wang et al. (2018) and, in the same vane, empirically uncovers a novel mechanism of how trade can affect labor demand. It also contributes to a growing debate about distributional effects of trade (e.g., Kanbur, 2015, Antràs, de Gortari, and Itskhoki, 2017).

2 Trade in IT and the Rise of China

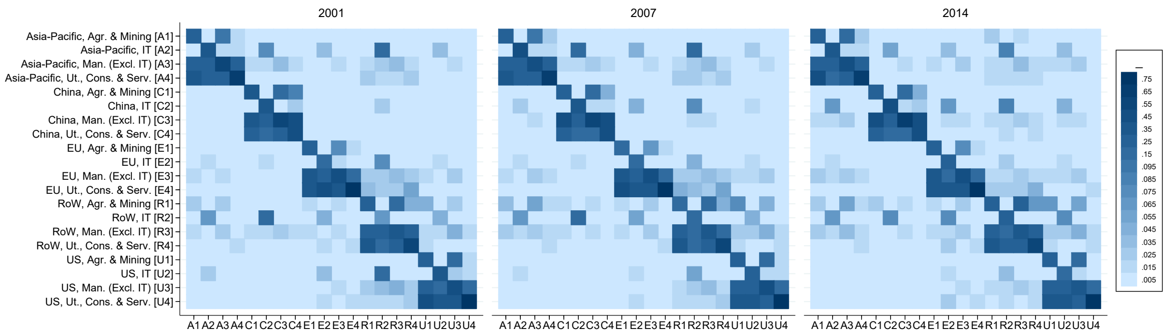
I use the 2016 version of the World Input-Output Database, which includes data for international input-output linkages of 2-digit ISIC Rev. 4 industries from 43 countries and the 2001-2014 period. This database also provides information for international input-output linkages of industries in the rest of the world, which is summarized as one country. The data are in real terms and previous year prices.

I illustrate the main results using data from mainland China, the EU, the US, and aggregate regions Asia-Pacific and rest of the world (RoW). The EU includes all European Union countries, Norway, and Switzerland, Asia-Pacific includes Australia, India, Indonesia, Japan, Russia, South Korea, Taiwan, and Turkey, and RoW includes all remaining countries except mainland China and the US. I also consider 4 industries/sectors: Agriculture & Mining, IT Manufacturing, Manufacturing which excludes IT, and Utilities, Construction & Services.

Figure 1 summarizes in a heatmap the shares of intermediate inputs in these industries in Asia-Pacific, China, the EU, RoW, and the US which originate from these industries and countries/regions out of total intermediate inputs. Clearly, the share of foreign intermediate goods has grown over time. It has grown by 20% in 2001-2014 period, from 0.094 to 0.113, according to the underlying data summarized in Panel A of Table 1.

IT Manufacturing industry has played an important role in the growth of the share of foreign intermediate goods according to Panel B of Table 1. The share of foreign

Figure 1: Share of Intermediate Inputs in and from Sample Industries, Countries, and Regions



Note: This figure illustrates the share of inputs in each column industry-country pair from each row industry-country pair out of total inputs. In columns, A corresponds to Asia-Pacific, C corresponds to China, E corresponds to the EU, R corresponds to the rest of the world (RoW), and U corresponds to the US. In turn, numbers following these letters correspond to industries, i.e., 1 is Agriculture & Mining (Agr. & Mining), 2 is IT Manufacturing (IT), 3 is Manufacturing which excludes IT [Man. (Excl. IT)], and 4 is Utilities, Construction & Services (Ut., Cons. & Serv.). Asia-Pacific includes Australia, India, Indonesia, Japan, Russia, South Korea, Taiwan, and Turkey, the EU includes all European Union countries, Norway and Switzerland, and RoW includes all remaining countries except mainland China and the US. IT Manufacturing industry is C26 industry in 2-digit ISIC Rev. 4 (Manufacture of Computer, Electronic and Optical Products).

intermediate goods would grow by only 13% between 2001 and 2014 if the amount of foreign inputs from IT Manufacturing industry remained at the level it had in 2001. Moreover, this would imply $600 billion (i.e., 6%) less foreign intermediate goods in 2014.

I also compute the shares of inputs from Agriculture & Mining, IT Manufacturing, Manufacturing excluding IT, and Utilities, Construction & Services industries in Asia-Pacific, China, the EU, RoW, and the US originating from these countries and regions. Figure 2 presents these shares for 2001, 2007, and 2014. On the diagonal elements tend to be the lowest for IT Manufacturing industry with an exception of Agriculture & Mining in Asia-Pacific, which confirms that foreign intermediate goods from IT Manufacturing industry are common and prevalent. On the diagonal elements for this industry also significantly fall during the sample period in Asia-Pacific, the EU, and the US. Chinese IT Manufacturing industry has the strongest gains everywhere. China has become a major supplier of IT products in sample years. The share of imports of IT products from China has increased from 2.5% in 2001 to 8.3% in 2007 and 14.1% in 2014, on average. The share of imports of non-IT manufacturing products from China has also increased, though at a more modest rate. It has increased from 0.8% in 2001 to 3.2% in 2014.

Table 1: Domestic and Foreign Intermediate Goods

	Panel A: Intermediate Goods		*Panel B: IT Manufacturing in 2001*		*Panel C: Manufacturing (Excl. IT) in 2001*	
Year	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
2001	26.699	2.780	26.699	2.780	26.699	2.780
2002	27.339	2.895	27.366	2.892	27.258	2.834
2003	31.098	3.359	31.062	3.306	29.806	3.103
2004	35.713	4.122	35.540	3.978	32.848	3.531
2005	40.073	4.804	39.758	4.617	35.677	3.946
2006	44.298	5.631	43.915	5.356	38.328	4.433
2007	51.172	6.609	50.699	6.269	42.525	4.992
2008	57.572	7.775	57.024	7.415	46.329	5.748
2009	53.112	6.096	52.645	5.868	43.655	4.792
2010	59.284	7.510	58.462	7.095	47.273	5.536
2011	67.789	9.050	66.753	8.565	52.199	6.332
2012	69.971	9.294	68.808	8.812	53.397	6.495
2013	73.290	9.574	72.087	8.981	55.294	6.622
2014	75.868	9.682	74.573	9.076	57.109	6.659

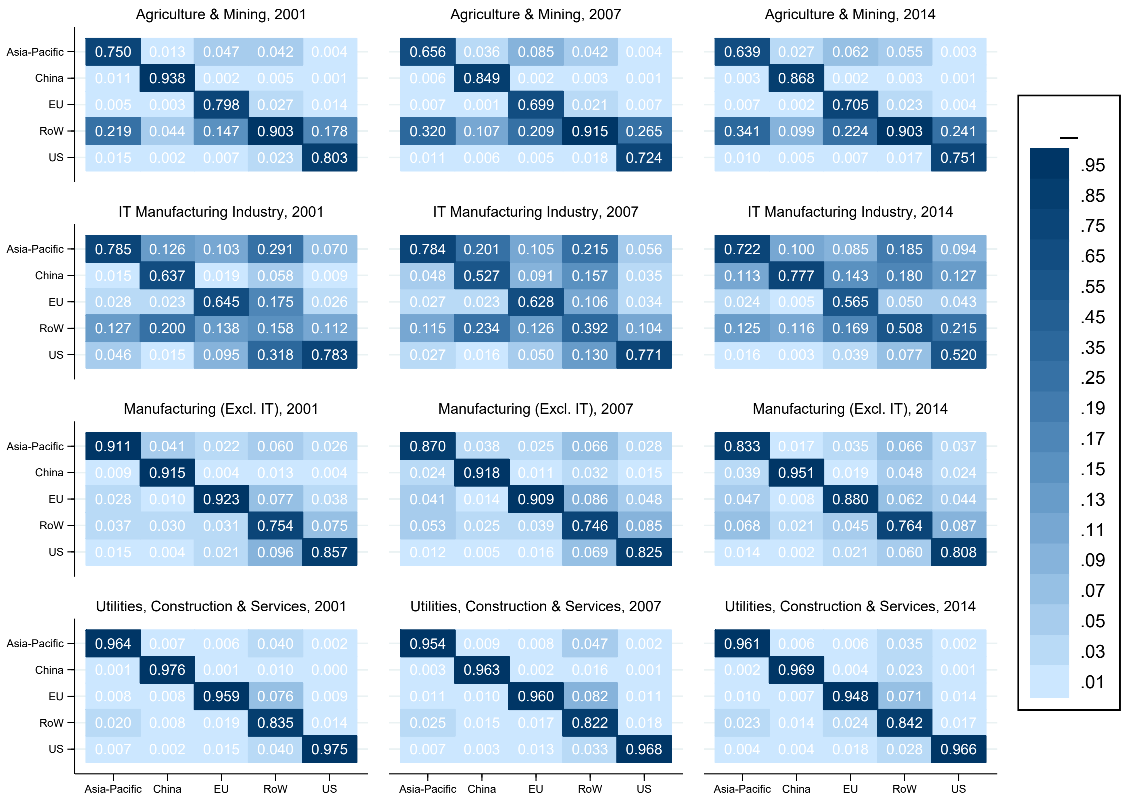
Note: Panel *A* of this table offers the total amount of domestic and foreign (intermediate) inputs in Asia-Pacific, China, the EU, RoW and the US in trillions of constant (previous-year) US Dollars for sample years. Panel *B* of this table offers the total amount of domestic and foreign (intermediate) inputs holding inputs from IT Manufacturing industry at the level they had in 2001. IT Manufacturing industry is C26 industry in 2-digit ISIC Rev. 4 (Manufacture of Computer, Electronic and Optical Products). Panel *C* of this table offers the total amount of domestic and foreign (intermediate) inputs holding inputs from Manufacturing industry which excludes IT at the level they had in 2001.

This evidence shows the importance of growth in IT manufacturing in China for the expansion of trade in intermediate goods and IT inputs worldwide. Trade in intermediate goods would be lower by $210 billion in 2014, if trade with China in IT products remained at its level in 2001, according to the underlying data.[4]

A major reason for the growth of IT production in China has been the reallocation of production of IT from developed Western and Asian countries to China. Firms from these countries have reallocated their production plants, built new plants in China, and offshored production to Chinese firms to cut costs. Chinese firms have also experienced reductions in production costs because of scale effects and automation of IT production. Part of these cost reductions can be expected to be reflected in lower prices of IT, which would increase the demand for these technologies.

[4]Table I in the Online Appendix - Tables and Figures offers the quantities of domestic and foreign inputs in Asia-Pacific, China, the EU, and the US fixing inputs from Chinese IT Manufacturing industry and Manufacturing industry excluding IT at the levels they had in 2001. In turn, Figure I shows that the growth in the share of IT inputs from China has been prevalent in all industries in sample countries and regions.

Figure 2: The Share of Inputs from Industries in and from Sample Countries and Regions



Note: This figure illustrates the share of (intermediate) inputs in each column country/region from Agriculture & Mining, IT Manufacturing, Manufacturing which excludes IT, and Utilities, Construction & Services industries in row countries/regions out of total (intermediate) inputs from these industries. IT Manufacturing industry is C26 industry in 2-digit ISIC Rev. 4 (Manufacture of Computer, Electronic and Optical Products). Asia-Pacific includes Australia, India, Indonesia, Japan, Russia, South Korea, Taiwan, and Turkey, the EU includes all European Union countries, Norway and Switzerland, and RoW includes all remaining countries except mainland China and the US.

3 The Effects of Trade in IT

A growing number of recent papers offer evidence that the use of information technologies affects labor demand (e.g., Autor et al., 2003, Autor and Dorn, 2013, Jerbashian, 2019). IT affects labor demand because it substitutes for routine tasks, which are usually performed by middle wage occupations. It complements nonroutine cognitive tasks, which are usually performed by high wage occupations. An important question then is whether the production of IT in China has affected labor demand in countries importing IT from China.

I augment the data and the methodology of Jerbashian (2019) in an attempt of delivering an answer to this question. Jerbashian (2019) uses data from European countries and shows that the fall in prices of information technologies is associated with a lower share of employment in middle wage occupations and a higher share of employment in high wage occupations. Jerbashian (2019) also shows that the decline in IT prices has no robust effect on the share of employment in the low wage occupations. I attempt to show that a significant part of the fall in IT prices can be attributed to the rise of IT imports from China. Moreover, I provide evidence that the fall in IT prices attributable to the rise of IT imports from China has non-negligible effect on the demand for high and medium wage occupations.

Jerbashian (2019) uses a difference-in-differences framework in the spirit of Rajan and Zingales (1998) to identify the effect of the rapid fall in IT prices on employment shares in high, middle and low wage occupations. Let Employment $\text{Share}_{c,i,t}$ be the share of employment in one of the occupation groups, country c, industry i, and year t. In turn, let IT Price be the measure for the price of information technologies, and IT Dependence be the measure of industries' technological dependence on IT. Jerbashian (2019) estimates the following specification for each occupation group:

$$\text{Employment Share}_{c,i,t} = \beta \left[\text{IT Dependence}_i \times \frac{1}{\text{IT Price}_{c,t}} \right] + \sum_{c,i} \zeta_{c,i} + \sum_{c,t} \xi_{c,t} + \eta_{c,i,t}, \quad (1)$$

where ζ and ξ are country-industry and country-year fixed effects, and η is an error term. The parameter of interest in this specification is β. It is identified from between industry variation of technological dependence on IT, the temporal variation of IT prices, and within country, time, and industry variation of the interaction term.

This test comes with trade-offs. An advantage of it is that it alleviates the endogeneity concerns because of omitted country- and industry-level variables. For example, country-industry and country-year fixed effects alleviate the potentially confounding effects of regulations, which affect the demand and supply of labor in occupation groups. These fixed effects also alleviate the potentially confounding effects of trends in relative wages. In turn, a potential drawback of this test is that it might not fully reveal the effects of the fall in IT prices on employment shares if there are economy-wide changes that are not different across industries.

I attempt to identify the effect of trade in IT with China on the variation in 1/IT Price and estimate the following specification for the supply of IT inputs:

$$\begin{aligned} \frac{1}{\text{IT Price}_{c,t}} &= \gamma_1 \text{Share of IT in Intermediates}_{c,t} + \gamma_2 \text{Share of IT from China}_{c,t} \qquad (2) \\ &+\Gamma X_{c,t} + \sum_c \theta_c + \upsilon^S_{c,t}, \end{aligned}$$

where Share of IT in Intermediates is the share of inputs from IT Manufacturing industries out of total inputs in country c and year t. Share of IT from China is the share of inputs from Chinese IT Manufacturing industry out of total inputs from IT Manufacturing industries (i.e., Chinese IT import penetration), X and θ are sets of control variables and country fixed effects, and υ^S is an error term. The main parameter of interest is γ_2. It is identified from within country temporal variation of the share of IT inputs originating from China.

The identification of the effect of trade with China on IT price might not be straightforward because of omitted variables and endogeneity issues. To alleviate these issues, I control in the specification (2) for the share of inputs from IT Manufacturing industries in Asia-Pacific, RoW, and the US to differentiate the effect of trade with China, a low cost country, from trade with other countries and regions. I control for the share of inputs from domestic IT Manufacturing industries to differentiate trade and domestic production. I also control for trends, which is a common procedure for controlling for technological progress (e.g., Goos et al., 2014). Arguably, this allows me to differentiate the effect of trade with China on IT prices from technological progress in IT.

The share of inputs from IT Manufacturing industries out of total inputs can be endogenous in the specification (2) since it can depend on IT prices. The share of inputs from Chinese IT Manufacturing industries can also be endogenous because Chinese IT exporters might want to enter into markets where the demand is expected to grow faster. I use instrumental variables for the Share of IT in Intermediates and the Share of IT from China to alleviate these endogeneity concerns.

I utilize two sets of instruments for the Share of IT in Intermediates. I use the share of inputs from electrical and machinery equipment industries in total inputs (Share of EME in Intermediates), which tend to be complementary to IT, and total revenue from industrial output (Total Revenue). These instruments can capture exogenous shifts in the demand for IT. I also create interactions between the shares of inputs from IT Manufacturing industries out of total inputs in Canada, Japan, South Korea, and the US (Share of IT in Intermediates in z) and the shares of imports from these countries in sample European countries (Share of Intermediates from z). The second set of instruments is comprised of these interactions. This set of instruments can be valid since if the growth in the use of IT in sample European countries is because of technological progress and the higher availability of IT, we should observe a corresponding increase in the use of IT in other developed countries as well. It is likely that the Share of IT in Intermediates, for example, in South Korea explains less of the variation in the Share of IT in Intermediates in sample European countries than the Share of IT in Intermediates in the US, a major trading partner of sample countries. I interact the shares of inputs from IT Manufacturing industries in Canada, Japan, South Korea, and the US with the shares of imports from these countries in sample European countries to take into account such differences.

In turn, I create interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US (Share of IT from China in z) and the shares of imports from these countries in sample European countries. I use these interactions as instruments for the share of inputs from Chinese IT Manufacturing industries in European countries. These instruments can be valid to the extent that IT imports from China in other developed countries should also increase if the growth of IT imports from China in sample European countries is because of reallocation of production to China, lower prices in China, and lower trade barriers. Similarly to the Share of IT in Intermediates, I use interactions to take into account potential differences in explanatory power of the Share of IT from China in these developed countries for the Share of IT from China in sample European countries.[5]

[5] Autor et al. (2013) and Bai and Stumpner (2019) utilize the shares of inputs from Chinese industries in European countries as instruments for the share of inputs from Chinese industries in the US. In contrast, I

I estimate the following instrumental variable equations for the share of IT inputs in intermediates and for the share of IT inputs from China in total IT inputs:

$$\begin{aligned}\text{Share } & \text{ of IT in Intermediates}_{c,t} = \lambda_1 \text{Share of EME in Intermediates}_{c,t} \\ & +\lambda_2 \log\left(\text{Total Revenue}_{c,t}\right) + \sum_z \lambda_z \text{Share of IT in Intermediates in } \mathrm{z}_t \\ & \times \text{Share of Intermediates from } \mathrm{z}_{c,t} + \sum_c \theta_c + \upsilon^D_{c,t},\end{aligned} \tag{3}$$

and

$$\begin{aligned}\text{Share } & \text{ of IT from China}_{c,t} = \sum_z \phi_z \text{Share of IT from China in } \mathrm{z}_t \\ & \times \text{Share of Intermediates from } \mathrm{z}_{c,t} + \sum_c \theta_c + \upsilon^C_{c,t},\end{aligned} \tag{4}$$

where $\upsilon^D_{c,t}$ and $\upsilon^C_{c,t}$ are error terms.

I need trends in IT prices to vary across sample countries in order to identify the effect of the fall in IT prices on employment shares in the specification (1). I attempt to show that a significant part of these trends can be attributed to the gradual rise in trade in IT with China using specifications (2)-(4). The rise in trade with China can be because of reduction in trade barriers and costs of IT production in China. Both these processes might be treated as common shocks in sample countries. I present a simple extension of the model of Jerbashian (2019) in the Online Technical Appendix, where I incorporate purchases of IT from China. I show in this model that changes in the supply of IT from China can have varying effects on IT prices in sample countries if production/demand elasticity to IT inputs from China varies across sample countries. This model also motivates the difference-in-differences design in the specification (1).[6]

The system of equations (2)-(4) attempts to identify the effect of changes in the supply of IT from China on IT prices in sample European countries by isolating this

utilize the interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US and import shares from these countries in sample European countries. These interactions create country-specific variation and aid the identification in the specification (2).

[6] I obtain the main results estimating the specification (1) separately from the specifications (2) $-$ (4). I jointly estimate specifications (1)$-$(4) and report the results in the Online Appendix - Further Robustness Checks and Results. These results are virtually the same as the main results.

variation from changes in the demand for IT and potential confounding factors. It is a useful starting point and, admittedly, it might not fully alleviate endogeneity concerns. An ideal experiment identifying the changes in the supply of IT from China might focus on changes in trade barriers, such as the accession of China to the WTO, and natural disasters, such as the earthquake and tsunami in 2011 in Asia, which affected computer memory prices. Utilizing such an experiment seems hardly feasible in the context of this study since significant changes in occupational structure happen over long periods of time and events, such as those described in the ideal experiment, are rare and isolated. On the other hand, the estimates of γ_1 and γ_2 in the specification (2) are attenuated in the least-squares estimation since the demand for IT implies a positive relationship between 1/IT Price and the Share of IT in Intermediates and a negative relationship between 1/IT Price and the Share of IT from China. In that respect, the absolute values of the least-squares estimates of γ_1 and γ_2 can be treated as the lower bounds for the true values of these parameters.[7]

3.1 Data for Employment Shares and IT Price and Dependence

I use the extended sample of Jerbashian (2019), which includes data from 12 European countries for the period of 1993–2007. I add to these data information about production in IT Manufacturing industry and IT imports from the 2016 version of the World Input-Output Database. The data from this database are available starting from 2001. The analysis of this paper focuses on the period of 2001–2007 instead of 1993–2007 because of that. I briefly describe these data below.

The data for employment in high, medium and low wage occupations in industries are from the harmonized, individual-level EU Labour Force Survey. Occupations have ISCO-88 coding and are at 2-digit aggregation levels, and industries are 1-digit NACE Rev. 1. Jerbashian (2019) assigns occupations into high, medium and low wage groups according to the classification of Goos et al. (2014) and computes the number of weekly

[7]Processing trade can pose additional identification challenges in the specification (2). The Online Appendix - Further Robustness Checks and Results offers evidence showing that this is not likely to be a major concern.

hours worked in these occupation groups in each sample country, industry, and year. Employment shares in occupation groups are derived from the number of hours worked.[8]

Panels A and B of Table 2 list the sample countries and industries and present the sample period. Panel $B.1$ of Table 2 offers the averages of employment shares in high, medium and low wage occupations in sample industries.[9]

The data for information technologies are from the EU KLEMS database (O'Mahony and Timmer, 2009). The measure for industries' dependence on information technologies (IT Dependence) is defined as the share of IT capital compensation in industrial value added in US industries, averaged over the period 2001-2007. After the pioneering work by Rajan and Zingales (1998), it is common to use US data for measuring technological differences across industries (e.g., see Barone and Cingano, 2011). The motivation for using data from US industries is that US is arguably the closest to the *laissez faire* and US industries are the world leaders in terms of investments in IT and the level of IT capital. Therefore, the confounding variation in the share of IT capital compensation in industrial value added because of government intervention, differences in factor input levels, and temporary shocks is likely to be the smallest in US industries.[10]

The measure of IT Price is defined as the price of information technology capital inputs normalized by the price of value added and averaged across industries. The price of IT capital inputs is hedonically adjusted. It and its normalized counterpart display a large variation over time, relatively little variation across countries, and almost no industry-level variation. The over time variation can be largely attributed to the significant innovations in IT that occurred over the sample years and to the rise of IT production in China. The country-level variation is likely to be stemming from institutional and structural features that affect the access to and adoption of IT and purchases

[8]Goos et al. (2014) and Jerbashian (2019) exclude from the sample some of the occupations and industries because of sample imperfections and potentially large state involvement. These occupations and industries are also excluded from the analysis in this paper.

[9]Table 7 in the Data Appendix offers the assignment of occupations into high, medium and low wage groups. Figure II in the Online Appendix - Tables and Figures illustrates the trends of employment shares in high, medium and low wage occupations.

[10]This measure would be valid if there are no significant structural differences across countries and time in terms of industries' dependence on information technologies. The Online Appendix - Further Robustness Checks and Results offers tests for the validity of this measure.

Table 2: Sample Countries and Industries, Basic Statistics for IT Price, Share of IT from China, Employment Shares and IT Dependence

Panel A		*A.1: Basic Statistics for IT Price*					*A.2: Basic Statistics the Share of IT from China*					*A.3: Correlation*
Country	Sample Period	Mean	SD	Min	Max	Δ IT Price	Mean	SD	Min	Max	Δ IT Share	
Austria	2001-2007	0.162	0.046	0.103	0.235	-0.027	2.457	1.684	0.586	5.696	0.428	-0.818
Czechia	2001-2007	0.122	0.039	0.072	0.181	-0.023	11.368	7.133	2.921	22.935	3.336	-0.965
Denmark	2001-2007	0.132	0.038	0.083	0.188	-0.022	2.797	1.933	0.858	5.491	0.772	-0.950
Finland	2001-2007	0.128	0.041	0.077	0.190	-0.024	6.499	3.558	3.080	12.513	1.572	-0.927
Germany	2001-2007	0.209	0.095	0.094	0.366	-0.050	6.579	3.656	2.394	11.663	1.545	-0.946
Italy	2001-2007	0.135	0.039	0.086	0.193	-0.023	2.447	1.298	1.069	4.303	0.539	-0.934
Netherlands	2001-2007	0.140	0.039	0.096	0.206	-0.024	0.817	0.420	0.385	1.614	0.205	-0.828
Portugal	2001-2005	0.154	0.029	0.122	0.194	-0.024	0.616	0.481	0.192	1.329	0.264	-0.875
Slovenia	2001-2006	0.436	0.086	0.340	0.572	-0.055	1.384	0.777	0.593	2.505	0.382	-0.902
Spain	2001-2007	0.198	0.053	0.128	0.280	-0.031	4.416	3.934	1.116	12.394	1.880	-0.861
Sweden	2001-2007	0.420	0.180	0.226	0.668	-0.080	2.542	1.347	1.060	4.267	0.535	-0.925
UK	2001-2007	0.154	0.049	0.100	0.241	-0.034	5.252	2.133	2.593	8.017	0.756	-0.911

Panel B		*B.1: Average Employment Shares*				*B.2:Value of IT Dependence*
Industry Name	Code	Obs	High Wage	Medium Wage	Low Wage	
Manufacturing	D	81	0.293	0.625	0.082	0.010
Electricity, Gas and Water Supply	E	81	0.430	0.515	0.055	0.008
Construction	F	81	0.197	0.725	0.079	0.004
Wholesale and Retail Trade; Repair of Goods	G	81	0.375	0.273	0.352	0.016
Hotels and Restaurants	H	81	0.253	0.078	0.669	0.003
Transport, Storage, and Communication	I	81	0.251	0.641	0.109	0.019
Financial Intermediation	J	81	0.623	0.359	0.018	0.046
Real Estate, Renting, and Business Activities	K	81	0.668	0.174	0.158	0.013
Health and Social Work	N	81	0.555	0.090	0.356	0.006
Other Community and Personal Service Activities	O	81	0.448	0.210	0.342	0.005

Note: Columns 1-2 of panels *A* and *B* list the sample countries, industries, and period. Panels *A*.1 and *A*.2 offer basic statistics for IT Price and the Share of IT from China. Columns 5 in panels *A*.1 and *A*.2 offer the average change in IT Price and in the Share of IT from China over the sample period in each country (Δ IT Price and Δ IT Share). Panel *A*.3 offers the pairwise correlations of IT Price and the Share of IT from China. All correlations are significant at least at the 5% level. Panels *B*.1 and *B*.2 offer the averages of employment shares in high, medium and low wage occupations and the values of IT Dependence in sample industries. See Table 7 in the Data Appendix for complete descriptions and sources of variables. See also Table XI and Figure III in the Online Appendix - Tables and Figures for additional basic statistics and the evolution of the inverse of IT Price and the Share of IT from China.

of IT from China and elsewhere. In turn, the near absence of industry-level variation suggests that the law of one price holds in sample countries.[11]

Table 2 offers basic statistics for the price of information technologies in Panel $A.1$. The price of information technologies has fallen everywhere. Panel $A.2$ of Table 2 offers basic statistics for the share of IT inputs from China. This share has greatly increased everywhere. Finally, Panel $A.3$ of this table reports the pairwise correlations between the price of information technologies and the share of IT inputs from China in sample European countries. These correlations are very strong and negative, which warrants the investigation of causal effect of the share of IT inputs from China on the price of information technologies. Panel $B.2$ of Table 2 reports the values of the measure for the dependence on IT in sample industries. Table 7 in the Data Appendix offers the detailed descriptions of all variables used in this paper.

The specification (1) uses the inverse of IT Price. According to the theoretical model of Jerbashian (2019), β is then expected to be positive for high wage occupations and negative for medium wage occupations as IT Price declines and its inverse increases. It can be expected to be nil for low wage occupations since information technologies are not likely to directly affect employment in these occupations (Autor et al., 2003, Autor and Dorn, 2013). In turn, γ_2 can be expected to be positive since it is likely that IT prices decline and their inverse increases with the share of IT inputs from China.[12]

3.2 Estimation and Results

I start from estimating the specification (2), which identifies the effect of trade in IT with China on 1/IT Price and utilizes country-year-level variation. I control solely for the Share of IT from China and country fixed effects and present the correlation between 1/IT Price and the Share of IT from China in column 1 of Table 3. This correlation is positive and strongly significant. The last row of the table offers the R-squared of the

[11] I assume that the prices of IT capital inputs, such as computers and peripheral equipment, and the supply of intermediate IT inputs, such as printed circuit boards and micro processors, are highly correlated. I discuss this assumption in detail and offer a test for it in the Online Appendix - Further Robustness Checks and Results.

[12] The Online Technical Appendix offers a simple extension of the model of Jerbashian (2019), which incorporates purchases of IT from China.

regression, which excludes the variation explained by country fixed effects. The Share of IT from China explains a significant fraction in the variation in prices of information technologies in sample countries according the R-squared of this regression.

Table 3: Simple Correlations and Results for IT Price and the Share of IT from China

	Correlations			IV for the Share of IT from China		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of IT from China	0.681***	0.278***	0.284***	0.838***	0.304***	0.494***
	(0.062)	(0.047)	(0.053)	(0.065)	(0.041)	(0.063)
Trend	N	Y	N	N	Y	N
Country-specific Trends	N	N	Y	N	N	Y
Obs	81	81	81	81	81	81
R2 (Partial)	0.735	0.915	0.978	0.720	0.909	0.966
Hansen J Statistic (P-Value)				0.000	0.006	0.058

Note: This table offers the results from the estimation of the specification (2). The dependent variable is 1/IT Price. The variation in the data are at the country-year-level. Columns 2 and 5 include time trend, which is common for all sample countries. Columns 3 and 6 include country-specific time trends. The Share of IT from China is instrumented using the interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries in columns 4-6. See Table 7 in the Data Appendix for complete definitions and sources of variables. Regressions in columns 1-3 use the least-squares method and 2-stage generalized method of moments in columns 4-6. All regressions include country fixed effects. Robust standard errors are in parentheses. R2 is the R-squared of the model where country fixed effects have been partialled out. The last row offers the p-value of Hansen J statistic for the validity of exclusion restrictions. ** indicates significance at the 1% level, * at the 5% level, and at the 10% level.

It can be important to control for trends in this estimation in order to differentiate the effect of the rising supply of IT from China from technological progress in IT and the raising demand for it. Nevertheless, trends might absorb some part of the variation in IT prices attributable to the raising supply of IT from China if reductions in trade barriers and costs of IT production have been gradual and have benefited production of IT in China more than anywhere else. Columns 2 and 3 of Table 3 present the results where I control additionally for a trend common to all countries and country-specific trends, respectively. The magnitudes of the estimated coefficients on the Share of IT from China in these columns are about 2.5 times lower than in the first column though the estimated coefficients remain positive and highly significant.

I instrument the Share of IT from China in columns 4-6 of Table 3. The instruments are the interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries. As expected, the instrumented estimates appear to be larger than the estimates in columns 1-3, although they are not statistically significantly different.

The results in Table 3 can be confounded by omitted variables. In an attempt to alleviate such concerns, I control for the share of IT in intermediates, the share of IT imports from Asia-Pacific, US, and the rest of the world, and the share of domestic IT production in Table 4. Columns 1-3 report the least-squares estimates from the specification (2). I instrument the Share of IT in Intermediates and jointly estimate specifications (2) and (3) in columns 4-6. I instrument the Share of IT in Intermediates and the Share of IT from China and jointly estimate specifications (2), (3), and (4) in columns 7-9. Again, the instrumented estimates appear to be larger than the least-squares estimates, but they are not statistically significantly different.

The coefficient on the Share of IT from China is positive and highly significant in all regressions. The sign of the coefficient on the Share of IT in Intermediates should be negative if the specification (2) corresponds to the supply of IT. In this sense, the results in columns 1, 2, 4, 5, 7, 8, and 9 carry higher credibility than the results in columns 3 and 6. The results in columns 3 and 6 should not be completely discounted, however. Regressions in these columns control for trends, which can potentially fully take into account the rising supply of IT. In turn, the coefficients on the share of IT imports from Asia-Pacific, the US and RoW (Share of IT from APUSROW) is hardly significant anywhere. I treat the results in column 9 as the baseline. I report results from additional robustness check exercises in the Online Appendix - Further Robustness Checks and Results. All in all, these results suggest that IT prices have declined with the rising share of IT imports from China.

3.2.1 The Fall in IT Prices and Employment in Occupation Groups

Next, I estimate the effect of the fall in IT prices on employment shares in high, middle and low wage occupations using specification (1), which utilizes country-industry-year-level variation. Table 5 presents the results. The estimates of the coefficient β are significant

Table 4: Results for IT Price and the Share of IT from China with Additional Controls

	Least-Squares Estimates			IV for the Share of IT in Intermediates			IV for the Share of IT in Intermediates the Share of IT from China		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of IT in Intermediates	-1.606***	0.268	0.288*	-2.649***	0.555	0.826**	-3.049***	-0.471	0.241
	(0.458)	(0.288)	(0.160)	(0.605)	(0.513)	(0.358)	(0.590)	(0.401)	(0.232)
Share of IT from China	0.723***	0.262***	0.277***	0.770***	0.269***	0.285***	0.906***	0.452***	0.536***
	(0.070)	(0.067)	(0.058)	(0.064)	(0.075)	(0.060)	(0.060)	(0.062)	(0.052)
Share of IT from APUSROW	-0.066**	0.015	-0.012	-0.031	0.012	-0.021	0.028	0.024	-0.026**
	(0.031)	(0.020)	(0.017)	(0.033)	(0.022)	(0.018)	(0.040)	(0.020)	(0.013)
Share of Own IT	0.041	0.095***	0.002	0.081**	0.095***	-0.032	0.157***	0.120***	-0.009
	(0.038)	(0.022)	(0.024)	(0.040)	(0.026)	(0.030)	(0.042)	(0.017)	(0.024)
Trend	N	Y	N	N	Y	N	N	Y	N
Country-specific Trends	N	N	Y	N	N	Y	N	N	Y
Obs	81	81	81	81	81	81	81	81	81
R2 (Partial)	0.801	0.937	0.979	0.785	0.935	0.976	0.753	0.923	0.967
Hansen J Statistic (P-Value)				0.000	0.046	0.008	0.032	0.092	0.055

Note: This table offers the results from the estimation of the specification (2). The dependent variable is 1/IT Price. The variation in the data are at the country-industry-year level. The baseline results are reported in column 9. Columns 2, 5, and 8 include time trend, which is common for all sample countries. Columns 3, 6, and 9 include country-specific time trends. Columns 4-6 instrument the Share of IT in Intermediates using the logarithm of Total Revenue, the Share of EME in Total Intermediates, and the interactions between the shares of inputs from IT Manufacturing industries out of total inputs in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries. Columns 7-9 jointly instrument the Share of IT in Intermediates and the Share of IT from China. The instruments for the Share of IT in Intermediates are the same as those used in columns 4-6. The instruments for the Share of IT from China are the interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries. See Table 7 in the Data Appendix for complete definitions and sources of variables. Regressions in columns 1-3 use the least-squares method and 2-stage generalized method of moments in columns 4-9. All regressions include country fixed effects. Robust standard errors are in parentheses. R2 is the R-squared of the model where country fixed effects have been partialled out. The last row offers the p-value of Hansen J statistic for the validity of exclusion restrictions. ** indicates significance at the 1% level, * at the 5% level, and at the 10% level.

and positive for the share of high wage occupations and significant and negative for the share of medium wage occupations. These estimates imply that the fall in the price of information technologies is associated with higher demand for high wage occupations and lower demand for medium wage occupations in industries which depend more on these technologies as compared to industries which depend less. Conversely, the estimate of the coefficient β is not significant for the share of employment in low wage occupations. This result suggests that, on average, information technologies are not likely to have direct effects on the share of employment in low wage occupations.

Table 5: Results for Employment Shares in High, Medium and Low Wage Occupations

	High Wage	Medium Wage	Low Wage
IT Dependence	0.192***	-0.213***	0.021
× 1/IT Price	(0.032)	(0.029)	(0.023)
Obs	810	810	810
R2 (Partial)	0.034	0.067	0.001

Note: This table offers the results from the estimation of the specification (1) for the shares of employment in high, medium and low wage occupations in sample industries. The variation in the data are at the country-industry-year-level. See Table 7 in the Data Appendix for complete descriptions and sources of variables. All regressions include country-industry and country-year dummies and use the least squares estimation method. Standard errors are in parentheses. Standard errors are bootstrapped and two-way clustered at industry- and country-year-level. R2 is the R-squared of the model where country-industry and country-year dummies have been partialled out. *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level

3.2.2 Quantification of Results

What is the effect of the fall in IT prices on employment shares during 2001–2007 period in sample European countries and how much of it can be attributed to the rise in IT trade with China? One way to gauge the magnitude of these effects is as follows. I take the industries with IT Dependence higher than the median IT Dependence (High Dependence) and compute the average of IT Dependence for these industries. I also compute the average of IT Dependence for industries with lower than median IT Dependence (Low Dependence), and take the difference between these averages. Further, I compute the difference between the average values of the inverse of IT Price in 2007 and 2001 and the difference between the average values of the Share of IT from China in 2007 and 2001.

Finally, I compute

$$\text{The Effect of the Fall in IT Price} = \hat{\beta} \times \Delta\text{IT Dependence} \times \Delta 1/\text{IT Price}, \tag{5}$$

$$\begin{aligned} \text{The Effect of the Rise in IT Trade with China} = \hat{\beta} \times \Delta\text{IT Dependence} \\ \times \hat{\gamma}_2 \times \Delta\text{Share of IT from China}, \end{aligned} \tag{6}$$

where Δ stands for the difference operator.

Table 6 reports the results focusing on statistically significant estimates of β. Panel A summarizes the effect of the fall in IT prices during 2001–2007 period on employment shares. The computed effect for the share of high wage occupations is 0.017 and -0.019 for medium wage occupations. Next, I use the baseline estimate of γ_2 from column 9 of Table 4 to compute the effect of the rise in IT trade with China on employment shares. I also use the minimum and the maximum of the estimates of γ_2 from Table 3 and Table 4 to present a range for this effect. Panel B of Table 6 presents these results. The magnitude of the effect of the rise in IT trade with China on high wage occupations is 0.008 and -0.009 on medium wage occupations according to the baseline results. In turn, the magnitude of this effect on high wage occupations is at least 0.004 and -0.004 on medium wage occupations, and at most 0.014 and -0.015 for high and medium wage occupations, correspondingly.

These numbers correspond to the effects of the fall of IT prices and the rise in IT trade with China during 2001–2007 period in industries with high IT dependence as compared to industries with low IT dependence. In order to assess their magnitudes, I start with computing the averages of employment shares in high and medium wage occupations in industries with high IT dependence in 2001 and 2007. I compute the averages of employment shares also for the industries with low IT Dependence in 2001 and 2007. Panel C of Table 6 offers these averages. Finally, I compute for each occupation group the difference between these averages in 2007 and 2001, and the difference between these differences in industries with high IT dependence and industries with low IT dependence. Panel D of Table 6 offers the results. The share of high wage occupations has increased

Table 6: The Effects of the Fall in IT Price and Rise in IT Trade with China on Employment Shares

Panel A		High Wage	Medium Wage				
The Effect of the Fall in IT Price		0.017	-0.019				
Panel B		*B.1 Baseline*		*B.2 Minimum*		*B.3 Maximum*	
		High Wage	Medium Wage	High Wage	Medium Wage	High Wage	Medium Wage
The Effect of the Rise in IT Trade with China		0.008	-0.009	0.004	-0.004	0.014	-0.015
Panel C		*C.1 High Dependence*		*C.2 Low Dependence*			
		High Wage	Medium Wage	High Wage	Medium Wage		
Average Employment Shares in Occupations	*2001*	0.409	0.416	0.388	0.347		
	2007	0.450	0.378	0.397	0.340		
Panel D		High Wage	Medium Wage				
Change in Occupation Shares		0.032	-0.031				
Variation due to the Fall in IT Prices, %		0.523	0.603				
		D.1 Baseline		*D.2 Minimum*		*D.3 Maximum*	
		High Wage	Medium Wage	High Wage	Medium Wage	High Wage	Medium Wage
Variation due to the Rise in IT Trade with China, %		0.251	0.289	0.123	0.142	0.423	0.489

Note: Panels A and B utilize equations (5) and (6) to compute the effects of the fall in IT prices and the rise in IT trade with China during 2001–2007 period on employment shares in high and medium wage occupations. Panel B.1 offers the effect of the rise in IT trade with China on employment shares using the baseline estimate of γ_2 from column 4 of Table 4. Panels B.2-B.3 offer a range for the effect of the rise in IT trade with China on employment shares using the minimum and the maximum values of the estimates of γ_2 from Table 3 and Table 4. Panel C offers the average employment shares in high and medium wage occupations in 2001 and 2007 in industries with above median level of dependence on IT (High Dependence) and industries with below median IT dependence (Low Dependence). Panel D offers the total change in the shares of employment in high and medium wage occupations in industries with high dependence on IT relative to industries with low IT dependence during 2001–2007 period. It also offers the percentage of that change explained by the fall in IT prices and the rise in IT trade with China. The results for low wage occupations are not reported because parameter β is insignificant for low wage occupations. See Table 7 in the Data Appendix for complete descriptions and sources of variables. See also Table XI in the Online Appendix - Tables and Figures for the values of 1/IT Price and the Share of IT from China in 2001 and 2007.

by 3 percentage points and the share of medium wage occupations has declined by 3 percentage points during 2001–2007 period in industries with high IT dependence as compared to industries with low IT dependence. This implies that the fall in IT prices explains about 50 percent of these changes in employment shares. In turn, the rise in IT trade with China explains nearly 50 percent of the variation in the demand for occupations stemming from the fall in IT prices according to the baseline results. Therefore, nearly 25 percent of changes in employment shares can be attributed to the rise in IT trade with China.[13] Taken together, these results suggest that trade in IT with China has had a strong effect on the labor markets in European countries.

4 Conclusions

I use data from the World Input-Output Database and show that trade in IT has a significant contribution to the growth in foreign intermediate goods. China has become one of the major suppliers of IT and has strongly contributed to the rise of trade in IT. The share of IT imported from China out of total IT inputs has steadily grown in the EU and the US, as well as in the rest of the world, in the 2001-2014 period and this has happened at the expense of domestic IT production and imports of IT from other destinations. The share of IT imported from China has increased from 2.5% in 2001 to 8.3% in 2007 and 14.1% in 2014. In comparison, the share of non-IT manufacturing inputs imported from China out of total non-IT manufacturing inputs is much more modest in these countries and regions and has grown less in the same period.

I make an attempt to show the effect of the rise in the share of IT imported from China on labor demand and augment the data and empirical specification of Jerbashian (2019). I combine the data of Jerbashian (2019) and the data from the World Input-Output Database and obtain a dataset comprised of 14 European countries and with a timespan 2001-2007 and endogenize IT prices. I show that the growth in IT imports from China is associated with lower IT prices in sample countries. Corroborating the

[13]The reported minimum and maximum effects in Panel B of Table 6 imply that at least 12 percent and at most 42 percent of changes in employment shares can be attributed to the rise in IT trade with China.

results of Jerbashian (2019), I find that the fall in IT prices is associated with a higher demand for high-wage occupations and a lower demand for medium-wage occupations. My baseline results imply that about 50 percent of the variation in the demand for occupations stemming from the fall in IT prices can be attributed to trade with China. This implies that imports of IT from China explain nearly 25 percent of changes in employment shares in high and medium wage occupations in sample European countries and the 2001-2007 period.

A Data Appendix

Table 7: Definitions and Sources of Variables

Variable Name	Definition and Source
Employment Share	Employment Share in an occupation group. Employment share in an occupation group is computed as the usual number of weekly hours worked in the occupation group out of total number of weekly hours worked. Occupation groups are high, medium, and low wage. Source: Jerbashian (2019) using data from the EU Labour Force Survey.
IT Dependence	The share of IT capital compensation out of value added in US industries averaged over the 2001-2007 period. Source: The EU KLEMS Database.
IT Price	The price of IT capital inputs relative to the price of value added in sample industries. It is averaged across industries, in each country and year. The inverse of this measure is used in estimations. Information technologies include computers and machines which use and depend on computers. Source: The EU KLEMS Database.
Share of EME in Intermediates	The share of inputs from Electrical and Machinery Equipment industries out of total intermediate goods. Source: Author's calculations using data from the World Input-Output Database.
Share of Intermediates from z	The share of intermediate goods from a country z out of total intermediate goods. Countries are Canada, Japan, South Korea, and the US. Source: Author's calculations using data from the World Input-Output Database.
Share of IT from China	The share of inputs from IT Manufacturing industry in China out of inputs from all IT Manufacturing industries. Source: Author's calculations using data from the World Input-Output Database.

Table 7 – (Continued)

Variable Name	Definition and Source
Share of IT from China in z	The share of inputs from IT Manufacturing industries in China out of inputs from all IT Manufacturing industries in a country z. Countries are Canada, Japan, South Korea, and the US. Source: Author's calculations using data from the World Input-Output Database.
Share of IT from APUSROW	The share of inputs from IT Manufacturing industries in Asia-Pacific, the US and RoW out of inputs from all IT Manufacturing industries. Source: Author's calculations using data from the World Input-Output Database.
Share of IT in Intermediates	The share of inputs from IT Manufacturing industries out of total intermediate goods. Source: Author's calculations using data from the World Input-Output Database.
Share of IT in Intermediates in z	The share of inputs from IT Manufacturing industries out of total intermediate goods in a country z. Countries are Canada, Japan, South Korea, and the US. Source: Author's calculations using data from the World Input-Output Database.
Share of Own IT	The share of inputs from domestic IT Manufacturing industries out of inputs from all IT Manufacturing industries. Source: Author's calculations using data from the World Input-Output Database.
Total Revenue	Total revenues from industrial output. The natural logarithm of total revenues is used in estimations. Source: The World Input-Output Database.

Industries and Groups	Description
Agriculture & Mining	Agriculture & Mining industry is comprised of A01, A02, A03 and B industries of 2-digit ISIC Rev. 4.
Electrical and Machinery Equipment	Electrical and Machinery Equipment industry is comprised of C27 and C28 industries of 2-digit ISIC Rev. 4.

Table 7 – (Continued)

Variable Name	Definition and Source
IT Manufacturing	IT Manufacturing industry is C26 industry in 2-digit ISIC Rev. 4 (Manufacture of Computer, Electronic and Optical Products). It produces printed circuit boards, micro processors, memory chips, assembled computers and peripheral equipment, as well as instruments and appliances for measuring, testing and navigation, and watches and clocks.
Manufacturing (Excl. IT)	Manufacturing excluding IT industry includes of all manufacturing industries except IT Manufacturing industry. It is comprised of C10-C33 industries of 2-digit ISIC Rev. 4 excluding C26.
Utilities, Construction, & Services	Utilities, Construction, & Services industry is comprised of D35, E36-E39, F, G45-G47, H49-H53, I, J58-J63, K64-K66, L68, M69-M75, N, O84, P85, Q, R-S, T, U industries of 2-digit ISIC Rev. 4.
Occupation (Wage) Group	Occupations are grouped into three wage groups: high, medium and low wage. High wage occupations are ISCO-88 12, 13, 21, 22, 24, 31, 32 and 34. Medium wage occupations are ISCO-88 41, 42, 71, 72, 73, 74, 81, 82 and 83. Low wage occupations are ISCO-88 51, 52, 91 and 93. This grouping is according to the classification of occupations used by Goos et al. (2014).

Data Sources: 2016 release of the World Input-Output Database; December 2015 release of the EU Labour Force Survey; March 2011 update of November 2009 release of the EU KLEMS database (and March 2008 release of the EU KLEMS database for Portugal).

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References

Acemoglu, D. (1998). Why do new technologies complement skills? Directed technical change and wage inequality. *Quarterly Journal of Economics 113*(4), 1055–1089.

Amiti, M. and D. R. Davis (2011). Trade, firms, and wages: Theory and evidence. *Review of Economic Studies 79*(1), 1–36.

Amiti, M. and C. Freund (2010). The anatomy of China's export growth. In R. C. Feenstra and S.-J. Wei (Eds.), *China's Growing Role in World Trade*, pp. 35–56. University of Chicago Press.

Antràs, P., A. de Gortari, and O. Itskhoki (2017). Globalization, inequality and welfare. *Journal of International Economics 108*, 387–412.

Arkolakis, C., A. Costinot, and A. Rodríguez-Clare (2012). New trade models, same old gains? *American Economic Review 102*(1), 94–130.

Autor, D. H. and D. Dorn (2013). The growth of low skill service jobs and the polarization of the U.S. labor market. *American Economic Review 103*(5), 1553–1597.

Autor, D. H., D. Dorn, and G. H. Hanson (2013). The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review 103*(6), 2121–2168.

Autor, D. H., D. Dorn, and G. H. Hanson (2015). Untangling trade and technology: Evidence from local labour markets. *Economic Journal 125*(584), 621–646.

Autor, D. H., F. Levy, and R. J. Murnane (2003). The skill content of recent technological change: An empirical exploration. *Quarterly Journal of Economics 118*(4), 1279–1333.

Bai, L. and S. Stumpner (2019). Estimating US consumer gains from Chinese imports. *American Economic Review: Insights 1*(2), 209–224.

Barone, G. and F. Cingano (2011). Service regulation and growth: Evidence from OECD countries. *Economic Journal 121*(555), 931–957.

Berman, E., J. Bound, and Z. Griliches (1994). Changes in the demand for skilled labor within US manufacturing: Evidence from the annual survey of manufacturers. *Quarterly Journal of Economics 109*(2), 367–397.

Chang, Y. Y., H. Anderson, and S. Shi (2018). China and international housing price growth. *China Economic Review 50*, 294–312.

Czernich, N., O. Falck, T. Kretschmer, and L. Woessmann (2011). Broadband infrastructure and economic growth. *Economic Journal 121*(552), 505–532.

Goldin, C. and L. F. Katz (1998). The origins of technology-skill complementarity. *Quarterly Journal of Economics 113*(3), 693–732.

Goldsmith-Pinkham, P., I. Sorkin, and H. Swift (2020). Bartik instruments: What, when, why, and how. *American Economic Review 110*(8), 2586–2624.

Goos, M., A. Manning, and A. Salomons (2014). Explaining job polarization: Routine-biased technological change and offshoring. *American Economic Review 104*(8), 2509–2526.

Jerbashian, V. (2019). Automation and job polarization: On the decline of middling occupations in Europe. *Oxford Bulletin of Economics and Statistics 81*(5), 1095–1116.

Jerbashian, V. and A. Kochanova (2017). The impact of telecommunication technologies on competition in services and goods markets: Empirical evidence. *Scandinavian Journal of Economics 119*(3), 628–655.

Kanbur, R. (2015). Globalization and inequality. In A. B. Atkinson and F. Bourguignon (Eds.), *Handbook of Income Distribution*, Volume 2, pp. 1845–1881. North-Holland:

Elsevier B.V.

O'Mahony, M. and M. P. Timmer (2009). Output, input and productivity measures at the industry level: The EU KLEMS database. *Economic Journal 119*(538), F374–F403.

Rajan, R. G. and L. Zingales (1998). Financial dependence and growth. *American Economic Review 88*(3), 559–586.

Revenga, A. L. (1992). Exporting jobs? The impact of import competition on employment and wages in U.S. manufacturing. *Quarterly Journal of Economics 107*(1), 255–284.

Röller, L.-H. and L. Waverman (2001). Telecommunications infrastructure and economic development: A simultaneous approach. *American Economic Review 91*(4), 909–923.

Timmer, M. P., E. Dietzenbacher, B. Los, R. Stehrer, and G. J. de Vries (2015). An illustrated user guide to the World Input–Output Database: The case of global automotive production. *Review of International Economics 23*(3), 575–605.

Wang, Z., S.-J. Wei, X. Yu, and K. Zhu (2018). Re-examining the effects of trading with China on local labor markets: A supply chain perspective. *NBER Working Paper No. 24886*.

Xu, B. (2010). The sophistication of exports: Is China special? *China Economic Review 21*(3), 482–493.

Online Appendix to "Trade in Information Technologies and Changes in the Demand for Occupations"

Vahagn Jerbashian*

I Online Technical Appendix

In this section, I present a minimalist deterministic model based on the model by Jerbashian (2019). This model rationalizes the specification (1) and shows how trade with China can reduce IT prices.

In an industry, the producers use abstract and routine task inputs, T_A and T_R, and information technologies, IT, to produce homogeneous goods, Y. They have a CES production technology, which is given by

$$Y = \left(\alpha_{IT} IT^{\frac{\varepsilon-1}{\varepsilon}} + \alpha_{T_R} T_R^{\frac{\varepsilon-1}{\varepsilon}}\right)^{\frac{\varepsilon}{\varepsilon-1}\alpha} T_A^{1-\alpha}, \tag{I.1}$$

where $\alpha_{IT} > 0$, $\alpha_{T_R} > 0$, $\alpha \in (0,1)$, and $\varepsilon > 1$. In this production function, a higher α_{IT} implies higher share of compensation for IT and, in that sense, α_{IT} measures the technological dependence on IT. Meanwhile, ε is the elasticity of substitution between routine tasks and information technologies, and the elasticity of substitution between abstract tasks and information technologies is equal to 1, by construction. Since $\varepsilon > 1$, information technologies are more complementary to abstract tasks than to routine tasks.

The usual profit maximization implies the following conditions

$$IT = \alpha \frac{\alpha_{IT} IT^{\frac{\varepsilon-1}{\varepsilon}}}{\alpha_{IT} IT^{\frac{\varepsilon-1}{\varepsilon}} + \alpha_{T_R} T_R^{\frac{\varepsilon-1}{\varepsilon}}} \frac{1}{p_{IT}} Y, \tag{I.2}$$

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$$T_R = \alpha \frac{\alpha_{T_R} T_R^{\frac{\varepsilon-1}{\varepsilon}}}{\alpha_{IT} IT^{\frac{\varepsilon-1}{\varepsilon}} + \alpha_{T_R} T_R^{\frac{\varepsilon-1}{\varepsilon}}} \frac{1}{p_{T_R}} Y, \tag{I.3}$$

$$T_A = (1-\alpha) \frac{1}{p_{T_A}} Y, \tag{I.4}$$

where p_{IT}, p_{T_R}, and p_{T_A} are the prices of information technologies and task inputs, and the price of Y is normalized to 1.

I assume that information technologies input can be represented as $IT = \lambda \tilde{IT}$, where λ represents the quality/productivity of information technologies and it grows over time because of technological progress. In turn, $\tilde{IT}$ is the supply of information technologies of a given quality/productivity. In a country, the supply of these technologies includes goods produced domestically, in China and elsewhere. For simplicity, I assume that $\tilde{IT}$ is a CES aggregate of the following form:

$$\tilde{IT} = \left(\alpha_{IT}^{Own} \tilde{IT}_{Own}^{\frac{\varepsilon_{IT}-1}{\varepsilon_{IT}}} + \alpha_{IT}^{China} \tilde{IT}_{China}^{\frac{\varepsilon_{IT}-1}{\varepsilon_{IT}}} + \alpha_{IT}^{Else} \tilde{IT}_{Else}^{\frac{\varepsilon_{IT}-1}{\varepsilon_{IT}}} \right)^{\frac{\varepsilon_{IT}}{\varepsilon_{IT}-1}}, \tag{I.5}$$

where $\alpha_{IT}^{Own}, \alpha_{IT}^{China}, \alpha_{IT}^{Else} > 0$ and $\varepsilon_{IT} > 1$. The latter assumption implies that information technologies produced domestically, in China and elsewhere are gross substitutes.

This supply function implies that the price of information technologies is a weighted basket of prices of IT produced at home $\left(p_{IT}^{Own}\right)$ and import prices of IT from China $\left(p_{IT}^{China}\right)$ and elsewhere $\left(p_{IT}^{Else}\right)$. It is given by

$$\begin{aligned} p_{IT} = \frac{1}{\lambda} \Big[\left(\alpha_{IT}^{Own}\right)^{\varepsilon_{IT}} \left(p_{IT}^{Own}\right)^{1-\varepsilon_{IT}} + \left(\alpha_{IT}^{China}\right)^{\varepsilon_{IT}} \left(p_{IT}^{China}\right)^{1-\varepsilon_{IT}} \\ + \left(\alpha_{IT}^{Else}\right)^{\varepsilon_{IT}} \left(p_{IT}^{Else}\right)^{1-\varepsilon_{IT}} \Big]^{\frac{1}{1-\varepsilon_{IT}}}. \end{aligned} \tag{I.6}$$

According to this equation, the price of information technology declines because of technological progress in IT (i.e., growth in λ). It can also decline because of trade with China if p_{IT}^{China} declines. The prices of information technologies imported from China can decline because of reductions in trade barriers, as well as productivity gains in IT production in China. These productivity gains can stem from scale effects and automation of production, for example.

I endogenize the supply of tasks and assume that workers are endowed with labor hours, which need to be converted into abstract and routine tasks in order to earn market income. I assume that the conversion function of task $k = T_A, T_R$ is given by $\alpha_{L,k}\left(u_k L\right)^{\gamma}$, where $\alpha_{L,k} > 0$, u_k is the share of labor hours L converted to task k, and $\gamma \in (0,1)$.[2] I normalize the value of α_{L,T_A} to 1.

This setup implies that the supply of abstract tasks relative to the supply of routine tasks is given by

$$\frac{p_{T_A}}{p_{T_R}} = \alpha_{L,T_R}\left(\frac{u_{T_R}}{u_{T_A}}\right)^{\gamma-1}, \tag{I.7}$$

and the share of employment in abstract tasks is given by

$$\frac{u_{T_A}}{1-u_{T_A}} = \frac{1-\alpha}{\alpha}\left(\frac{\alpha_{IT} IT^{\frac{\varepsilon-1}{\varepsilon}}}{\alpha_{T_R}\left\{\alpha_{L,T_R}\left[\left(1-u_{T_A}\right)L\right]^{\gamma}\right\}^{\frac{\varepsilon-1}{\varepsilon}}} + 1\right). \tag{I.8}$$

The fall in p_{IT} increases the demand for IT and the use of IT grows in production. This increases the share of employment in abstract tasks u_{T_A} and it has a stronger effect in industries which have a higher α_{IT}:

$$\frac{\partial}{\partial \alpha_{IT}}\frac{\partial u_{T_A}}{\partial p_{IT}} > 0. \tag{I.9}$$

The differential changes in T_A and T_R in industries which depend more on IT than in industries which depend less on IT should be observed in the data as differential changes in the employment in high and medium wage occupations which perform these tasks. I look exactly for such disparities and differential changes in the empirical specification (1).

Trends in IT prices and in the Share of IT from China are different across sample countries according to the data, and these differences are important for the identification of parameter β in the specification (1). Sample countries have common trade policy. The variation in import prices of IT from China stemming from the gradual improvements in productivity in IT production in China is also common for sample countries. This implies the sources of variation in p_{IT}^{China} should be shared in sample countries. Nevertheless,

[2] Parameters α_{L,T_A} and α_{L,T_R} can admit a range of interpretations since they can represent both supply and demand side factors.

this simple model can provide a justification of how common shocks to p_{IT}^{China} can have varying effects on p_{IT} in sample countries. According to the model, this will happen if the production/demand elasticity to IT inputs from China, α_{IT}^{China}, is different across countries. I assume that α_{IT}^{China} is different across sample countries. I also allow trends in λ to be different across countries.

II Online Appendix - Further Robustness Checks and Results

This section presents the results from robustness check exercises and offers additional results. I conduct robustness checks with respect to the measures, identifying assumptions, and variation in the data.

II.1 The Measure of IT Dependence

The measure of industries' dependence on information technologies (IT Dependence) needs to identify the technological differences across industries, i.e., α_{IT} in equation ($I.1$). I follow Jerbashian (2019) and Rajan and Zingales (1998) and use the share of IT capital compensation in industrial value added in US industries averaged over the 2001-2007 period as a measure of IT Dependence.

The motivation for using data from US industries is that these industries are the world leaders in terms of investments in IT and the level of IT capital and that US is arguably the closest to the *laissez faire*. Therefore, the measurement error in this proxy can be the smallest provided that there are no significant structural differences across countries and time in terms of industries' dependence on information technologies.

To test this and the validity of this measure, I exploit time and industry variation in the share of IT capital compensation in US industries over the period 2001-2007 and the variation of the share of IT capital compensation in industries in the sample European countries. The industry-level variation of the share of IT capital compensation in US industries accounts for nearly 100 percent of the total variation according to Table II.

In turn, the industry-level variation of the share of IT capital compensation in sample European countries (Share of IT Compensation) accounts for more than 50 percent of the total variation according to Table III. The remainder of the variation in the Share of IT Compensation is mostly at the country-level and yearly variation is negligible.

Panel A of Table IV presents the values of share of IT compensation in industries of ample European countries averaged over the sample period together with the value of IT Dependence. Panel B of Table IV offers the pairwise correlations between IT Dependence and the shares of IT compensation in industries of sample European countries. These correlations tend to be large and are statistically significant at least at the 5% level.

These observations suggest that the dependence measure used in this paper is likely to identify the technological differences across industries but not the variation in factor input levels and potential temporary shocks. Nevertheless, I estimate specification (1) using two alternative measures for IT dependence in industries to rule out measurement concerns. Panel A of Table V reports the results when I use the shares of IT compensation in industries of sample European countries (Share of IT Compensation) as a measure of IT dependence. The variation in the Share of IT Compensation is at country-industry-year-level. Panel B of Table V reports the results when I use the shares of IT compensation in industries of sample European countries averaged over sample period. The estimated coefficients on the interaction terms in both panels have the same signs as the main results reported in Table 5. These estimates are also statistically significant for high and medium wage occupations and are not significant for low wage occupations similarly to the main results. However, the estimates in these panels have smaller magnitude than the main results. Such differences can arise because of measurement errors stemming from temporary shocks and variations in the factor input levels that attenuate the estimates. Evidence supporting this argument is that the estimated coefficients for high and medium wage occupations in Panel B are larger than the estimated coefficients in Panel A.

II.2 Processing Trade

Some part of the rise of IT imports from China can be because of processing trade which can pose additional identification challenges in the specification (2). There could be endogeneity concerns if China had significant IT imports from the sample European countries. Moreover, there can be measurement concerns if processing trade is for reasons other than cost and price cutting. When the latter would attenuate the estimate of γ_2, the former is not likely since the imports of IT from European countries in Chinese IT Manufacturing industry are small as compared to the domestic production. According to Figure 2, the share of inputs from European IT Manufacturing industries in Chinese IT Manufacturing industry is about 2 percent.

I make an attempt to test whether processing trade can have significant effects on the results. In particular, I adjust the Share of IT from China by the imports of IT from the sample European countries in Chinese IT Manufacturing industry. I define the Share of IT from China (Adjusted) as the ratio of the difference between inputs from Chinese IT Manufacturing industry in European countries and the inputs from European IT Manufacturing industries in Chinese IT Manufacturing industry and inputs from all IT Manufacturing industries:

$$\begin{aligned}\Delta_{c,t} &= \text{Inputs from Chinese IT Manufacturing Industry}_{c,t} \\ &\quad -\text{IT Inputs from the Sample European Countries} \\ &\quad\ \ \text{in Chinese IT Manufacturing Industry}_{c,t}\end{aligned}$$

and

$$\text{Share of IT from China (Adjusted)}_{c,t} = \frac{\Delta_{c,t}}{\text{Inputs from all IT Manufacturing Industries}_{c,t}}$$

I use this measure in the specification (2) and present the results in Table VI and Table VII. These results are very close to the results presented in the main text. There are some differences in magnitudes but these are not statistically significant.

II.3 Country Fixed Effects

I present the results when I estimate specifications (2), (3), and (4) without country fixed effects in Table VIII and Table IX. These results are similar to the results presented in the main text, with an exception that the signs of the coefficients on the Share of IT in Intermediates and the Share of IT from APUSROW are negative in all estimations in Table IX. The negative sign of the coefficient on the Share of IT in Intermediates is consistent with specification (2) representing the supply of IT. In turn, the coefficient on the Share of IT from APUSROW is negative but barely significant in all columns. Its negative sign is consistent with China being a low-cost producer of IT relative to other countries.

II.4 Joint Estimation using 3SLS

It is possible to jointly estimate the system of equations $(1) - (4)$ using the 3-stage least-squares method. To implement this method, I create interactions of all variables in specifications (2), (3), and (4) with IT Dependence and use these interactions instead of the variables and country-industry fixed effects instead of country fixed effects. I estimate

$$\begin{aligned} \text{Employment Share}_{c,i,t} &= \beta \left[\text{IT Dependence}_i \times \frac{1}{\text{IT Price}_{c,t}} \right] \\ &+ \sum_{c,i} \zeta_{c,i} + \sum_{c,t} \xi_{c,t} + \eta_{c,i,t}, \end{aligned} \tag{II.1}$$

and

$$\begin{aligned} \text{IT Dependence}_i \times \frac{1}{\text{IT Price}_{c,t}} &= \\ &\gamma_1 \text{IT Dependence}_i \times \text{Share of IT in Intermediates}_{c,t} \\ &+ \gamma_2 \text{IT Dependence}_i \times \text{Share of IT from China}_{c,t} \\ &+ \Gamma \text{IT Dependence}_i \times X_{c,t} + \sum_{c,i} \zeta_{c,i} + \upsilon^S_{c,i,t}, \end{aligned} \tag{II.2}$$

together with

$$\begin{aligned}
\text{IT Dependence}_i \times \text{Share of IT in Intermediates}_{c,t} = & \qquad \text{(II.3)} \\
& \lambda_1 \text{IT Dependence}_i \times \log\left(\text{Share of EME in Intermediates}_{c,t}\right) \\
& + \lambda_2 \text{IT Dependence}_i \times \text{Total Revenue}_{c,t} \\
& + \sum_z \lambda_z \text{IT Dependence}_i \times \text{Share of IT in Intermediates in z}_t \\
& \times \text{Share of Intermediates from z}_{c,t} \\
& + \Lambda \text{IT Dependence}_i \times X_{c,t} + \sum_{c,i} \zeta_{c,i} + \upsilon^D_{c,i,t}
\end{aligned}$$

and

$$\begin{aligned}
\text{IT Dependence}_i \times \text{Share of IT from China}_{c,t} = & \qquad \text{(II.4)} \\
& \sum_z \phi_z \text{IT Dependence}_i \times \text{Share of IT from China in z}_t \\
& \times \text{Share of Intermediates from z}_{c,t} \\
& + \Phi \text{IT Dependence}_i \times X_{c,t} + \sum_{c,i} \zeta_{c,i} + \upsilon^C_{c,i,t},
\end{aligned}$$

Table X reports the results. The estimated coefficients β and γ_2 are statistically and economically indistinguishable from the estimated coefficients presented in the main text.

II.5 Intermediate IT Inputs and the Prices of IT Capital Inputs

The prices of IT capital inputs in the EU KLEMS database are end-user prices and are at the industry-level. IT capital inputs include computers and machines using and connected to computers. The prices of IT capital inputs vary strongly by countries and years, though they have very little variation among industries. I construct the series for IT Price by computing the ratio of IT capital input and value added prices in each industry and taking the average across industries in each country and year. I use IT Price as a measure of IT availability at country-year-level in the specification (1).

The specification (2) models the supply of IT in sample countries and describes the evolution of IT Price. The main variable of interest in this specification is the share of intermediate IT inputs from China (Chinese IT input penetration). It is constructed as the share of inputs from Chinese industry Manufacture of Computer, Electronic and Optical Products out of total inputs from Manufacture of Computer, Electronic and Optical Products industries. This industry produces printed circuit boards, micro processors, memory chips, assembled computers and peripheral equipment, as well as instruments and appliances for measuring, testing and navigation, and watches and clocks.

This analysis can be justified if the prices of IT capital inputs and the supply of intermediate IT inputs are highly correlated, which I assume is the case. Such an assumption does not seem to be very strong since the output of the Manufacture of Computer, Electronic and Optical Products industry fully encompasses almost all types of IT capital inputs. This industry also produces products which are not directly related to IT, such as mechanical optical measurement devices. The inclusion of these products is likely to introduce a measurement error in the specification (2), which attenuates the parameters of interest.

One way to test the robustness of this assumption is to use data for intermediate IT inputs in industries together with data for the final use of IT at the country level. I carry all empirical exercises using these augmented data and obtain results which are very similar to the results reported in the text. An exception arises for the results which use country-specific trends and do not instrument variables in the specification (2). The estimated coefficients on the Share of IT from China in these results have the correct sign but are insignificant. I prefer using data for intermediate IT inputs in industries and excluding data for the final use of IT in the analysis because the final use data are measured at country-level and include investments by the households and government. Meanwhile, IT prices are originally measured at industry-level and correspond to IT capital inputs of producers.

A seemingly appealing alternative method for measuring IT prices uses the prices of value added of Manufacture of Computer, Electronic and Optical Products industry in sample European countries. This is problematic because these are producer prices and can be influenced by varying levels of substitutability with competing foreign products and subsidies to IT production in sample European countries. I prefer using the prices of IT capital inputs in the EU KLEMS database because these are end-user prices and better reflect availability of IT to the end-user and opportunities to substitute it for labor.

II.6 An Interpretation and a Non-Parametric Test for β

The difference-in-differences estimator in the specification (1) basically divides the sample into four groups according to the fall in IT prices and the dependence on these technologies. In each sample year, these four groups are composed of country-industry pairs with high fall in IT prices and high IT dependence (HFITP&HITD), country-industry pairs with high fall in IT prices and low IT dependence (HFITP&LITD), pairs with low fall in IT prices and high dependence (LFITP&HITD), and pairs with low fall in prices and low dependence (LFITP&LITD). The coefficient β represents the difference in the trends of employment in occupation groups between HFITP&HITD country-industry pairs relative to HFITP&LITD country-industry pairs and LFITP&HITD pairs relative to LFITP&LITD pairs. It is positive for an occupation group if employment in that group grows at a higher rate in HFITP&HITD country-industry pairs relative to HFITP&LITD country-industry pairs than in LFITP&HITD pairs relative to LFITP&LITD pairs. It is negative if employment in that occupation group grows at a lower rate in HFITP&HITD country-industry pairs relative to HFITP&LITD pairs than in LFITP&HITD pairs relative to LFITP&LITD pairs.

To illustrate the existence of such differential trends, I demean the shares of employment in occupation groups regressing these shares on country-industry and country-year dummies and taking the residuals from these regressions. Figure IV summarizes the results for the demeaned shares of employment in occupation groups. According to Panels A and B, employment has increased in high wage occupations and declined in medium wage occupations with the fall in IT prices in industries with high IT dependence and in industries with low IT dependence. Moreover, the trends in employment shares are different between these industries. Panels A and B show that employment has increased more rapidly in high wage occupations in industries with high IT dependence relative to industries with low IT dependence, with the fall in IT prices. In turn, employment has declined more rapidly in medium wage occupations in industries with high IT dependence relative to industries with low IT dependence. Panel C of Figure IV shows that there are almost no trends in low wage occupations, which suggests that, on average, employment in low wage occupations is likely to be not affected by the fall in IT prices, at least directly.

II.7 Not Reported Robustness Checks and Results

I continue performing robustness checks, but do not report the results for brevity. I use the March 2011 update of the November 2009 release of the EU KLEMS database for all countries except Portugal. For Portugal, I use the March 2008 release of the EU KLEMS database. I exclude Portugal from the sample of counties and obtain results which are similar to the main results. The main sample utilized by Jerbashian (2019) excludes Czechia and Slovenia. I obtain somewhat weaker but qualitatively similar results when I exclude these countries.

The 2016 version of the World Input-Output Database contains data for the nominal values of the variables starting from 2000 and real quantities of the variables in previous year prices starting from 2001. I add the nominal values of the variables from World Input-Output Database for 2000 to the analysis and obtain results which are similar to the main results. I also obtain results which are similar to the main findings when I use the nominal values of variables from the World Input-Output Database for all available years.

It is possible to use year fixed effects instead of trends common to sample countries in columns 2 and 4 of Table 3 and in columns 2, 5, and 8 in Table 4. These fixed effects can control for any time varying shocks which are common to sample countries. I re-estimate the specifications corresponding to these columns and obtain virtually the same results. It is also possible to estimate specifications (2)-(4), which include time trends, in first differences. I use the first differences estimator and obtain results which are very similar to the results reported in the main text.

There might be concerns with omitted variables in the specification (2) which are related to either technological change or trade and are correlated with the share of IT inputs from China. I attempt to alleviate the concerns with omitted variables related to technological progress and control for prices of communication technologies, equipment, and non-ICT capital in the specification (2). I obtain the data for these price series from the EU KLEMS database and construct them in the same way as the series for IT prices. I obtain results which are almost identical with the results presented in the text when I control for these price series. In turn, I attempt to alleviate the concerns with omitted variables related to trade and control for the share of manufacturing inputs excluding IT and originating from China, Asia-Pacific, the US, and the RoW, and domestic industries. I obtain the data for manufacturing inputs from the World Input-Output Database and construct the series for the shares in much similar way to the series of Share of IT from China, Share of IT from APUSROW, Share of IT in Intermediates, and Share of Own IT. I obtain results which are very similar to the results presented in the text when I control for these shares.

Online Appendix - Tables and Figures

Table I: Domestic and Foreign Intermediate Goods when IT Manufacturing and Manufacturing Excluding IT are at 2001 Level in China

	Panel A: IT Manufacturing in China in 2001		*Panel B: Manufacturing (Excl. IT) in China in 2001*	
Year	Domestic	Foreign	Domestic	Foreign
2001	26.699	2.780	26.699	2.780
2002	27.337	2.889	27.300	2.881
2003	31.079	3.340	30.833	3.316
2004	35.644	4.087	35.171	4.030
2005	39.940	4.753	39.119	4.674
2006	44.138	5.557	42.817	5.439
2007	51.011	6.519	48.767	6.345
2008	57.372	7.670	54.072	7.431
2009	52.872	6.009	49.007	5.856
2010	58.813	7.371	54.318	7.155
2011	67.171	8.895	61.221	8.571
2012	69.260	9.136	62.310	8.787
2013	72.467	9.378	64.306	9.002
2014	74.994	9.472	66.279	9.046

Note: Panel *A* of this table offers the total amount of domestic and foreign (intermediate) inputs in Asia-Pacific, China, the EU, RoW and the US holding inputs from IT Manufacturing industry in China at the level they had in 2001. IT Manufacturing industry is C26 industry in 2-digit ISIC Rev. 4 (Manufacture of Computer, Electronic and Optical Products). Panel *C* of this table offers the total amount of domestic and foreign (intermediate) inputs in Asia-Pacific, China, the EU, RoW and the US holding inputs from Manufacturing industry in China excluding IT at the level they had in 2001. All quantities are in trillions of constant (previous-year) US Dollars.

Table II: ANOVA for the Share of IT Compensation in US Industries

Source	Partial SS	df	MS
Total	0.011	69	0.000
Industry	0.010	9	0.001
Year	0.000	6	0.000
Year × Industry	0.000	54	0.000

Note: This table reports the results from an ANOVA exercise for the share of IT compensation of US industries out of value added. The variation in the data are at industry-year level, and I perform ANOVA along each of these dimensions. The number of observations is 70, RMSE = 0.

Table III: ANOVA for the Share of IT Compensation in Industries of Sample Countries

Source	Partial SS	df	MS
Total	0.145	809	0.000
Industry	0.077	9	0.009
Country	0.021	11	0.002
Industry × Country	0.037	99	0.000
Year	0.002	6	0.000
Year × Industry	0.001	54	0.000
Year × Country	0.002	63	0.000
Year × Industry x Country	0.004	567	0.000

Note: This table reports the results from an ANOVA exercise for the share of IT compensation in industries of the sample European countries out of value added. The variation in the data are at industry-country-year-level, and I perform ANOVA along each of these dimensions. The number of observations is 810, RMSE = 0.

Table IV: The Shares of IT Compensation in Industries of Sample Countries and Correlations with IT Dependence

Panel A	*The Shares of IT Compensation and IT Dependence*												
Industry Code	Austria	Czechia	Denmark	Finland	Germany	Italy	Netherlands	Portugal	Slovenia	Spain	Sweden	UK	IT Dependence
D	0.012	0.011	0.016	0.006	0.005	0.006	0.009	0.009	0.017	0.008	0.017	0.014	0.010
E	0.005	0.021	0.012	0.006	0.007	0.004	0.008	0.008	0.014	0.004	0.001	0.029	0.008
F	0.001	0.006	0.005	0.001	0.003	0.005	0.007	0.001	0.016	0.006	0.000	0.004	0.004
G	0.025	0.025	0.025	0.007	0.013	0.008	0.017	0.016	0.024	0.010	0.026	0.022	0.016
H	0.008	0.010	0.015	0.001	0.003	0.003	0.005	0.009	0.015	0.002	0.014	0.008	0.003
I	0.006	0.023	0.023	0.004	0.012	0.006	0.015	0.026	0.022	0.011	0.023	0.032	0.019
J	0.017	0.063	0.046	0.045	0.026	0.032	0.040	0.031	0.073	0.031	0.043	0.052	0.046
K	0.020	0.024	0.025	0.001	0.026	0.005	0.011	0.028	0.012	0.009	0.018	0.026	0.013
N	0.001	0.009	0.017	0.003	0.010	0.007	0.008	0.020	0.009	0.014	0.002	0.003	0.006
O	0.010	0.014	0.039	0.008	0.011	0.011	0.015	0.050	0.023	0.013	0.008	0.006	0.005
Panel B	*Correlations*												
Industry-Level	0.471	0.968	0.701	0.911	0.732	0.890	0.953	0.314	0.924	0.866	0.884	0.892	
Industry-Year-Level	0.498	0.931	0.637	0.887	0.714	0.894	0.925	0.331	0.913	0.857	0.864	0.887	

Note: Panel *A* of this table offers the values of the shares of IT capital compensation out of value added in industries of sample European countries averaged over the 2001-2007 period. It also offers the values of IT Dependence in sample industries. The names of sample industries can be found in Table 2. Panel *B* offers the pairwise correlations of the shares of IT capital compensation in industries of sample European countries with the shares of IT capital compensation in US industries. I average the data over the sample period in the first row of this panel (i.e., pairwise correlations are with IT Dependence measure). The variation in the data is at the industry-year-level in the second row. All correlations are significant at least at the 5% level.

Table V: Further Results - Measures for IT Dependence

	High Wage	Medium Wage	Low Wage
Panel A			
Share of IT Capital Compensation × 1/IT Price	0.118***	-0.070***	-0.048
	(0.032)	(0.025)	(0.029)
Obs	810	810	810
R2 (Partial)	0.012	0.007	0.003
Panel B			
Share of IT Capital Compensation (Average) × 1/IT Price	0.160***	-0.138***	-0.022
	(0.026)	(0.022)	(0.021)
Obs	810	810	810
R2 (Partial)	0.023	0.028	0.001

Note: This table offers the results from the estimation of the specification (1) for the shares of employment in high, medium and low wage occupations in sample industries and two alternative measures of IT dependence. In Panel *A*, the measure of IT dependence is the share of IT compensation in industries of sample European countries, Share of IT Capital Compensation. The variation in the Share of IT Compensation is at country-industry-year-level. In Panel *B*, the measure of IT dependence is the share of IT compensation in industries of sample European countries averaged over the sample period, Share of IT Capital Compensation (Average). The variation in the Share of IT Compensation (Average) is at country-industry-level. See Table 7 in the Data Appendix for complete descriptions and sources of variables. All regressions include country-industry and country-year dummies and use the least squares estimation method. Standard errors are in parentheses. Standard errors are bootstrapped and two-way clustered at industry- and country-year-level. R2 is the R-squared of the model where country-industry and country-year dummies have been partialled out. *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level.

Table VI: Results for IT Price and the Adjusted Share of IT from China

	Correlations			IV for the Share of IT from China		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of IT from China (Adjusted)	0.673***	0.244***	0.182***	0.995***	0.441**	0.651**
	(0.062)	(0.047)	(0.052)	(0.076)	(0.197)	(0.297)
Trend	N	Y	N	N	Y	N
Country-specific Trends	N	N	Y	N	N	Y
Obs	81	81	81	81	81	81
R2 (Partial)	0.669	0.905	0.973	0.517	0.878	0.935
Hansen J Statistic (P-Value)				0.043	0.016	0.051

Note: This table offers the results from the estimation of the specification (2). The dependent variable is 1/IT Price. The variation in the data are at the country-year-level. Columns 2 and 5 include time trend, which is common for all sample countries. Columns 3 and 6 include country-specific time trends. The Share of IT from China (Adjusted) is defined as the ratio of the difference between inputs from Chinese IT Manufacturing industry in European countries and the inputs from IT Manufacturing industries of the sample European countries in Chinese IT Manufacturing industry and inputs from all IT Manufacturing industries. It is instrumented using the interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries in columns 4-6. See Table 7 in the Data Appendix for complete definitions and sources of variables. Regressions in columns 1-3 use the least-squares method and 2-stage generalized method of moments in columns 4-6. All regressions include country fixed effects. Robust standard errors are in parentheses. R2 is the R-squared of the model where country fixed effects have been partialled out. The last row offers the p-value of Hansen J statistic for the validity of exclusion restrictions. ** indicates significance at the 1% level, * at the 5% level, and at the 10% level.

Table VII: Results for IT Price and the Adjusted Share of IT from China with Additional Controls

	Least-Squares Estimates			IV for the Share of IT in Intermediates			IV for the Share of IT in Intermediates and the Shares of IT from China		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of IT in Intermediates	-1.362***	0.466	0.441**	-2.053***	0.966*	1.181***	-2.813***	0.493	0.788***
	(0.479)	(0.295)	(0.196)	(0.630)	(0.515)	(0.369)	(0.682)	(0.539)	(0.298)
Share of IT from China	0.682***	0.224***	0.204***	0.692***	0.206***	0.224***	0.908***	0.256**	0.459***
(Adjusted)	(0.071)	(0.065)	(0.058)	0.065	0.071	0.055	(0.075)	(0.124)	(0.077)
Share of IT from APUSROW	-0.133***	-0.018	-0.044***	-0.105***	-0.024***	-0.051***	-0.062**	-0.02	-0.074***
	0.028	0.02	0.014	(0.025)	(0.021)	(0.016)	(0.031)	(0.019)	(0.014)
Share of Own IT	-0.004	0.073***	-0.029	0.021	0.070**	-0.069**	0.104***	0.084***	-0.078***
	(0.036)	(0.024)	(0.022)	(0.037)	(0.028)	(0.029)	(0.038)	(0.024)	(0.026)
Trend	N	Y	N	N	Y	N	N	Y	N
Country-specific Trends	N	N	Y	N	N	Y	N	N	Y
Obs	81	81	81	81	81	81	81	81	81
R2 (Partial)	0.779	0.931	0.976	0.771	0.927	0.970	0.719	0.928	0.961
Hansen J Statistic (P-Value)				0.000	0.037	0.005	0.076	0.055	0.084

Note: This table offers the results from the estimation of the specification (2). The dependent variable is 1/IT Price. The variation in the data are at the country-industry-year level. The Share of IT from China (Adjusted) is defined as the ratio of the difference between inputs from Chinese IT Manufacturing industry in European countries and the inputs from IT Manufacturing industries of the sample European countries in Chinese IT Manufacturing industry and inputs from all IT Manufacturing industries. Columns 2, 5, and 8 include time trend, which is common for all sample countries. Columns 3, 6, and 9 include country-specific time trends. Columns 4-6 instrument the Share of IT in Intermediates using the logarithm of Total Revenue, the Share of EME in Total Intermediates, and the interactions between the shares of inputs from IT Manufacturing industries out of total inputs in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries. Columns 7-9 jointly instrument the Share of IT in Intermediates and the Share of IT from China (Adjusted). The instruments for the Share of IT in Intermediates are the same as those used in columns 4-6. The instruments for the Share of IT from China (Adjusted) are the interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries. See Table 7 in the Data Appendix for complete definitions and sources of variables. Regressions in columns 1-3 use the least-squares method and 2-stage generalized method of moments in columns 4-9. All regressions include country fixed effects. Robust standard errors are in parentheses. R2 is the R-squared of the model where country fixed effects have been partialled out. The last row offers the p-value of Hansen J statistic for the validity of exclusion restrictions. ** indicates significance at the 1% level, * at the 5% level, and at the 10% level.

Table VIII: Results for IT Price and the Share of IT from China without Country Fixed Effects

	Correlations			IV for the Share of IT from China		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of IT from China	0.499***	0.299***	0.215***	0.584***	0.444***	0.284***
	(0.046)	(0.058)	(0.052)	(0.065)	(0.076)	(0.106)
Trend	N	Y	N	N	Y	N
Country-specific Trends	N	N	Y	N	N	Y
Obs	81	81	81	81	81	81
R2 (Partial)	0.424	0.572	0.960	0.404	0.547	0.960
Hansen J Statistic (P-Value)				0.064	0.079	0.042

Note: This table offers the results from the estimation of (2). The dependent variable is 1/IT Price. The variation in the data are at the country-year-level. Columns 2 and 5 include time trend, which is common for all sample countries. Columns 3 and 6 include country-specific time trends. The Share of IT from China is instrumented using the interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries in columns 3-6. See Table 7 in the Data Appendix for complete definitions and sources of variables. Regressions in columns 1-3 use the least-squares method and 2-stage generalized method of moments in columns 4-6. Robust standard errors are in parentheses. The last row offers the p-value of Hansen J statistic for the validity of exclusion restrictions. ** indicates significance at the 1% level, * at the 5% level, and at the 10% level.

Table IX: Results for IT Price and the Share of IT from China with Additional Controls but without Country Fixed Effects

	Least-Squares Estimates			IV for the Share of IT in Intermediates			IV for the Share of IT in Intermediates and the Shares of IT from China		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of IT in Intermediates	-0.481**	-0.165	-0.260	-0.930***	-0.640**	-0.176	-0.860***	-0.667***	-0.461**
	(0.204)	(0.190)	(0.179)	(0.284)	(0.282)	(0.245)	(0.257)	(0.250)	(0.215)
Share of IT from China	0.636***	0.383***	0.275***	0.718***	0.569***	0.273***	0.798***	0.620***	0.224*
	(0.077)	(0.094)	(0.053)	(0.069)	(0.082)	(0.051)	(0.087)	(0.099)	(0.116)
Share of IT from APUSROW	-0.041*	-0.015	-0.023	-0.037	-0.015	-0.020	-0.034	-0.022	-0.009
	(0.024)	(0.020)	(0.016)	(0.023)	(0.019)	(0.014)	(0.024)	(0.020)	(0.014)
Share of Own IT	0.019	0.013	0.007	0.039**	0.039***	0.009	0.047***	0.040***	0.022**
	(0.017)	(0.015)	(0.012)	(0.017)	(0.013)	(0.012)	(0.016)	(0.013)	(0.010)
Trend	N	Y	N	N	Y	N	N	Y	N
Country-specific Trends	N	N	Y	N	N	Y	N	N	Y
Obs	81	81	81	81	81	81	81	81	81
R2 (Partial)	0.496	0.584	0.966	0.466	0.541	0.965	0.453	0.536	0.963
Hansen J Statistic (P-Value)				0.009	0.005	0.061	0.017	0.025	0.031

Note: This table offers the results from the estimation of (2). The dependent variable is 1/IT Price. The variation in the data are at the country-year-level. Columns 2 and 5 include time trend, which is common for all sample countries. Columns 3 and 6 include country-specific time trends. Columns 4-6 instrument the Share of IT in Intermediates using the logarithm of Total Revenue, the Share of EME in Total Intermediates, and the interactions between the shares of inputs from IT Manufacturing industries out of total inputs in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries. Columns 7-9 jointly instrument the Share of IT in Intermediates and the Share of IT from China. The instruments for the Share of IT in Intermediates are the same as those used in columns 4-6. The instruments for the Share of IT from China are the interactions between the shares of inputs from Chinese IT Manufacturing industries in Canada, Japan, South Korea, and the US and the shares of imports from these countries in sample European countries. See Table 7 in the Data Appendix for complete definitions and sources of variables. Regressions in columns 1-3 use the least-squares method and 2-stage generalized method of moments in columns 4-6. Robust standard errors are in parentheses. The last row offers the p-value of Hansen J statistic for the validity of exclusion restrictions. ** indicates significance at the 1% level, * at the 5% level, and at the 10% level.

Table X: Results for IT Price and the Share of IT from China using 3SLS

Dependent Variable: Employment Share	No Trends			Common Trend			Country-Specific Trends		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	High Wage	Medium Wage	Low Wage	High Wage	Medium Wage	Low Wage	High Wage	Medium Wage	Low Wage
IT Dependence	0.213***	-0.223***	0.010	0.219***	-0.234***	0.015	0.201***	-0.223***	0.022
× 1/IT Price	(0.037)	(0.028)	(0.033)	(0.036)	(0.028)	(0.033)	(0.036)	(0.028)	(0.032)
R2	0.975	0.992	0.985	0.975	0.992	0.985	0.975	0.992	0.985
Obs	810	810	810	810	810	810	810	810	810
Dependent Variable: IT Dependence x 1/IT Price									
IT Dependence	-1.636***	-1.635***	-1.635***	0.225***	0.227***	0.069	0.389***	0.390***	0.390***
× Share of IT in Intermediates	(0.110)	(0.110)	(0.110)	(0.081)	(0.081)	(0.085)	(0.075)	(0.075)	(0.075)
IT Dependence	0.837***	0.837***	0.837***	0.394***	0.393***	0.398***	0.389***	0.388***	0.389***
× Share of IT from China	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)	(0.016)	(0.016)	(0.016)	(0.016)
IT Dependence	-0.003	-0.003	-0.003	0.001	0.001	0.012	-0.016***	-0.016***	-0.017***
×Share of IT from APUSROW	(0.008)	(0.008)	(0.008)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
IT Dependence	0.055***	0.055***	0.055***	0.088***	0.087***	0.086***	0.005	0.005	0.005
× Share of Own IT	(0.009)	(0.009)	(0.009)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
R2	0.964	0.964	0.964	0.989	0.989	0.989	0.996	0.996	0.996
Obs	810	810	810	810	810	810	810	810	810

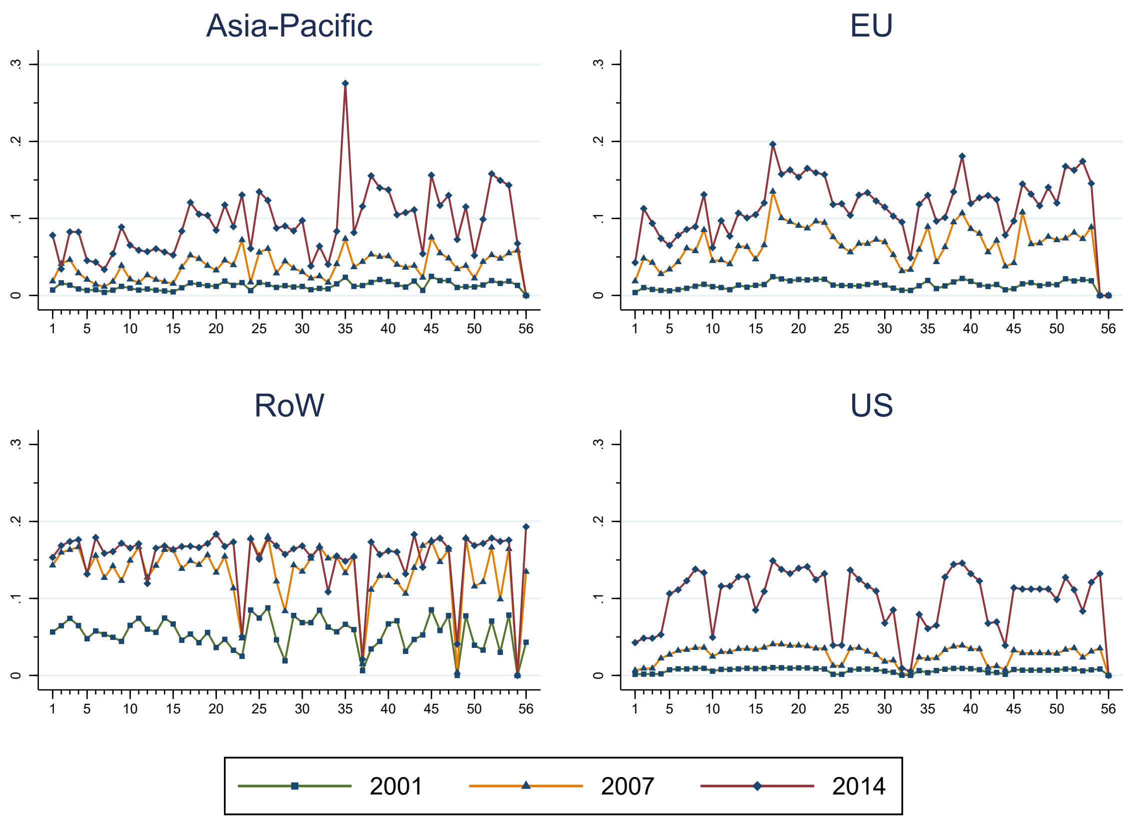
Note: This table offers the results from equations $(II.1)$ and $(II.2)$ when I jointly estimate the system of equations $(II.1)-(II.4)$. The variation in the data are at the country-industry-year-level. Columns 4-6 include time trend, which is common to all sample countries, and columns 7-9 include country-specific trends. See Table 7 in the Data Appendix for complete definitions and sources of variables. The estimation method is the 3-stage least-squares in all regressions. ** indicates significance at the 1% level, * at the 5% level, and at the 10% level.

Table XI: Additional Basic Statistics

	Obs.	Mean	SD	Min	Max	2001	2007
1/IT Price	81	6.924	3.156	1.530	15.871	4.221	11.183
Share of IT in Intermediates	81	2.188	1.367	0.997	6.422	2.469	2.120
Share of IT from China	81	4.045	4.119	0.192	22.935	1.411	7.638
Share of IT from APUSROW	81	22.964	13.567	4.717	60.226	24.802	21.339
Share of Own IT	81	31.106	21.561	3.714	82.671	34.140	28.237

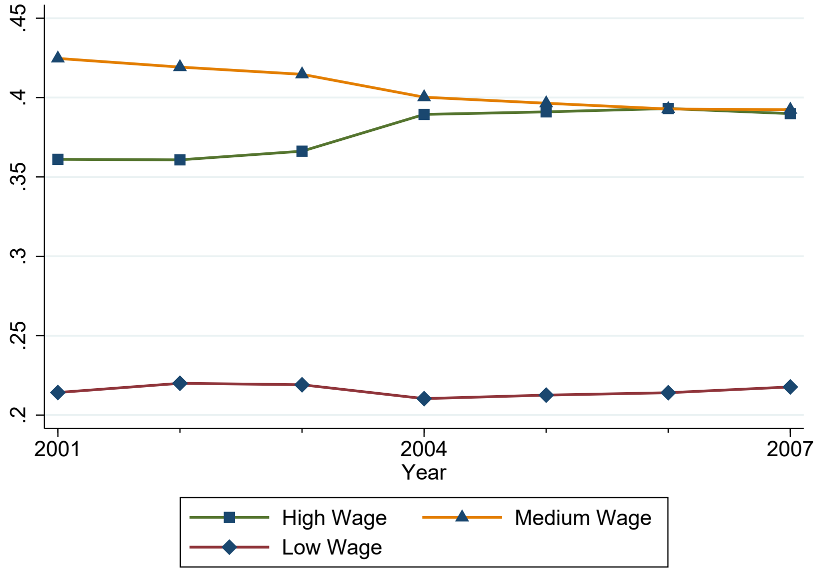
Note: This table reports additional basic statistics for country-level variables. See Table 7 in the Data Appendix for complete descriptions and sources of variables.

Figure I: The Share of IT Inputs from China in Industries of Sample Countries and Regions



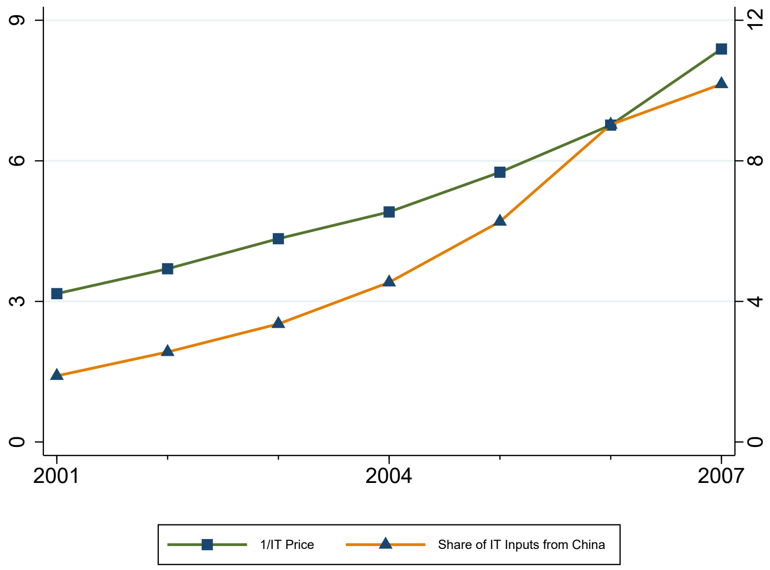
Note: This figure illustrates the share of inputs from IT Manufacturing industry in China out of inputs from all IT Manufacturing industries in each 2-digit ISIC Rev. 4 industry in sample countries and regions. Asia-Pacific includes Australia, India, Indonesia, Japan, Russia, South Korea, Taiwan, and Turkey, the EU includes all European Union countries, Norway and Switzerland, RoW includes all remaining countries except mainland China and the US.

Figure II: Employment Shares in High, Medium and Low Wage Occupations in Sample Countries



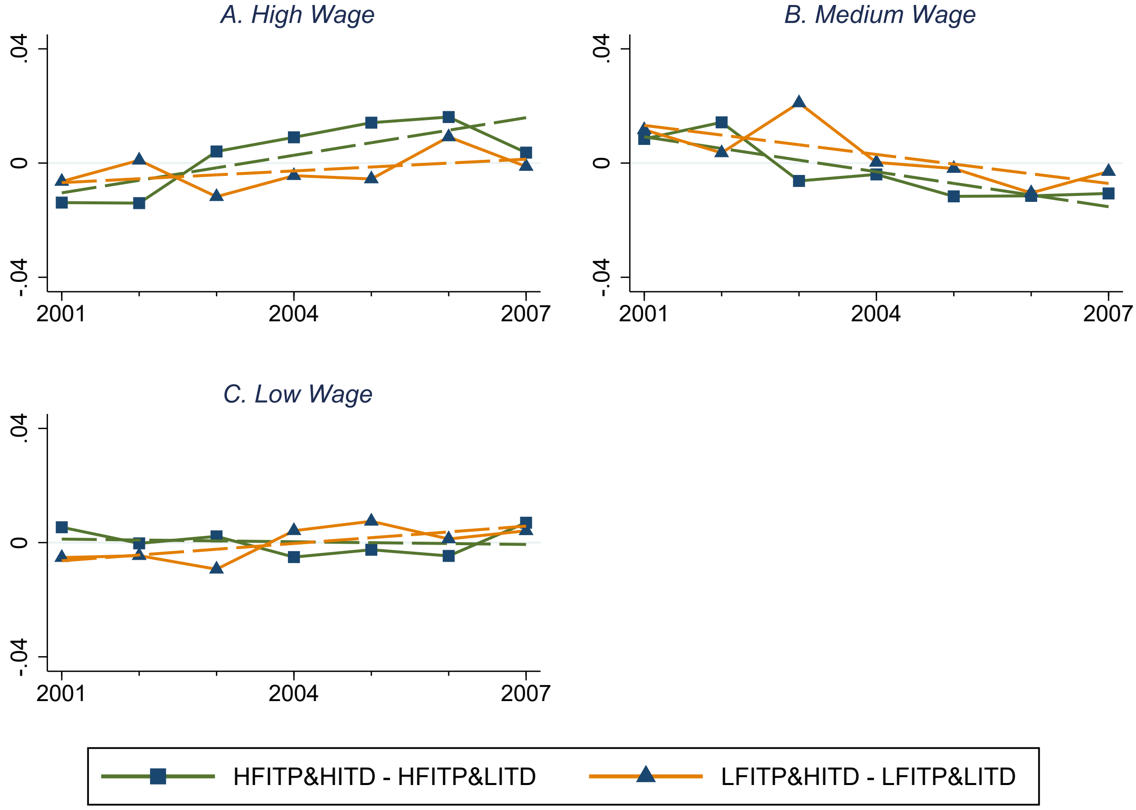
Note: This figure illustrates the trends in the shares of employment in high, medium and low wage occupation groups. These employment shares are averaged over the sample countries. See Table 7 in the Data Appendix for the assignment of occupations into high, medium and low wage groups.

Figure III: The Inverse of the Price of Information Technologies and the Share of IT Inputs from China



Note: This figure illustrates the evolutions of the inverse of IT Price (1/IT Price) and the Share of IT from China. Both variables are averaged across sample countries. See Table 7 in the Data Appendix for complete descriptions and sources of variables.

Figure IV: Employment Shares in High, Medium and Low Wage Occupations in High and Low IT Dependence Industries



Note: This figure presents the differences in trends in the shares of employment in high, medium and low wage occupations in country-industry pairs with high and low fall in IT prices and high and low dependence on IT. The curves with square tick symbols are the difference between the shares of employment in industries with high IT Dependence and industries with low IT Dependence in country-year pairs where the fall in IT Price is relatively high (HFITP&HITD - HFITP&LITD). The curves with triangle tick symbols are the difference between the shares of employment in industries with high IT Dependence and industries with low IT Dependence in country-industry paors where the fall in IT Price is relatively low (LFITP&HITD - LFITP&LITD). The shares of employment are demeaned using an OLS regression of shares of employment on country-industry and country-year dummies. In each of the four groups, these shares are averaged over countries and industries. An industry has high dependence on IT if its IT Dependence is above the median IT Dependence across industries and low dependence on IT otherwise. For a given year, the fall in IT Price in a country-year pair is relatively high (low) if the fall in IT Price (relative to its previous level) in that pair is lower (higher) than the median change in IT Price across countries in that year. It is sufficient to compare to the change because IT Price has declined everywhere. See Table 7 in the Data Appendix for complete descriptions and sources of variables and for the assignment of occupations into high, medium and low wage groups.