Gains from Trade due to Within-Firm Productivity: Does Services Exporting Matter?

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Abstract: This paper focuses on gains from trade due to rising within-firm productivity in presence of services exporting. The complementarity between exporting and investing in productivity enhancements is investigated by using descriptive regressions using rich, firm-level data for the period 2003-2011 for Turkey. We use three productivity measures for robustness purposes. The results show that firms that export both goods and services throughout the sample have higher productivity compared to all other firms in the sample. Another important result of the paper is related to the firms that switch from being goods exporters to goods and services exporters, which exhibit higher productivity than firms that export only goods or firms that switch from services exporting to exporting both goods and services. Finally, within-firm gains from trade as measured by the productivity growth of firms is insensitive to the services exporting status. More importantly, we observe no effect of any of export status of firms considered in this paper on their productivity growth.

Keywords: *Services Trade, Productivity, Exporting Status*
JEL Codes: *F10, F14.*

1. Introduction

For more than two hundred years, economics discipline has produced theories to further our understanding of the reasons behind and the results of international trade using differences in technology, factor endowments, tastes or some combination of these. These theories resulted in regularities that apply to reasonably homogeneous groups of countries or industries. However, there exists considerable heterogeneity at every level. Consequently, in the recent decades, trade literature has shifted its focus to firm-level goods trade resulting in a diverse set of stylized facts.

At the same time it has become abundantly clear that international trade is not about hauling parceled merchandise from one country to another anymore. We have witnessed a constantly changing boundary between tradables and non-tradables due to technological progress, deregulation and trade liberalization. In other words, during this time period the set of tradables has been expanding because of a continuous transformation of once-nontradable services into tradables.

The rising prominence of services trade has altered the way economists think about trade. Do the same theories of goods trade apply to services trade as well? Do nations enjoy similar gains from trade when services trade is not ignored?

The answer to the first question is given by an excellent review of literature conducted by François and Hoekman (2010). The first theoretical studies in the literature are on the similarities of and differences between services trade and goods trade. On the empirical front, the initial studies mainly focus on the analyses that utilize country-sector specific datasets, possibly due to lack of firm-level data. Studies of services trade with firm-level data, on the other hand, are very recent. Most of these studies are descriptive in nature and highlight the characteristics of the firms that engage in services trade in different countries.[1]

In this paper, we are going to seek an answer to the second question using the firm-level data of Turkey for the period 2003-2011. In particular, we will focus on whether there exist gains from trade due to rising within-firm productivity in presence of services exporting.

The textbook gains from trade had its roots in comparative advantage (Ricardian or Heckscher-Ohlin type). In a recent literature review, Melitz and Trefler (2012), considering heterogeneity across industries and firms, categorized gains from trade into three: (i) love-of-variety gains; (ii) gains from reallocation at the firm level and (iii) gains from rising within-firm productivity.

[1] Walter and Dell'mour (2010), Austrian data; Tanaka (2011), Japanese data; Crozet, Milet ve Mirza (2011), French data; Grubljesic and Damijan (2011) Slovenian data; Federico and Tosti (2012), Italian data; Kelle (2012), German data; Uribe-Echevarria (2013), Spanish data; Malchow-Mollaer, Munch and Skaksen (2013), Danish data; Ariu (2015) Belgian data; Dincer and Tekin-Koru (2016), Turkish data.

The *first source of gains from trade* is intimately related to the intra-industry trade in differentiated products subject to increasing returns to scale. In this "New Trade Theory" pioneered by Krugman (1979, 1980) consumers love variety, producers offer niche products and fragment the market into smaller and smaller pieces which reduces the scale economies to be enjoyed. International trade offers a bigger marketplace where more firms can survive and offer a higher number of varieties to the consumers at lower prices.

The *second source of gains from trade* appears after the groundbreaking works of Melitz (2003) and Bernard, Eaton, Jensen and Kortum (2003) dubbed as "New New Trade Theory". The main result of this new line of literature is that in the face of declining trade costs, in narrowly defined industries, while high-productivity firms grow and export, low-productivity firms shrink and leave the market altogether. In other words, through a reallocation of resources within an industry the overall efficiency of the industry increases and that is gains from trade.

The *third source of gains from trade* and the one that constitutes the focus of this paper comes from the favorable impact of having access to larger markets on productivity growth. Productivity enhancements is a product of innovation and innovation is a costly process. By integrating into international markets firms can fund the development costs of innovation that leads to productivity enhancements and as a result trade acts as a catalyst to increase within-firm productivity.

The complementarity between exporting and investing in productivity enhancements is investigated by Atkeson and Burstein (2007), Bustos (2007, 2008), Aw, Roberts and Xu (2008, 2009), Constantini and Melitz (2008) and Lileeva and Trefler (2010) recently.

In this paper, in the same spirit with these papers, we investigate gains from exporting arising due to within-firm productivity enhancements. Differently though we examine if the firm's services exporter status matter for these type of gains.

Why should we care about the firm's services exporter status when quantifying the within-firm productivity gains due to goods exporting? In the literature, services have mostly been treated as speed highways of international trade. In other words, services are considered as inputs in the production of goods rather than objects of trade in themselves. However, as a natural result of globalization, an increasing number of firms consider producing and trading services with goods at one point in their lifespan. The order of entering into services or goods exporting business or switching from goods exporting to services exporting or vice versa matter for ponying up the development dollars for innovations necessary for within-firm productivity gains. While it is meaningless for a certain type of a firm in a certain industry to ever get into services exporting, it might be elemental for another firm with different characteristics to add services exporting to its business to enhance its productivity.

In the light of this motive, we start by investigating the relationship between exporting status and productivity through descriptive regressions using rich, firm-level data for the period 2003-2011 for Turkey. We use three productivity measures (labor productivity and two TFP measures) for robustness purposes. The results show that firms that export both goods and services throughout the sample have higher productivity compared to all other firms in the sample. Another important result of the paper is related to the firms that switch from being goods exporters to goods and services exporters, which exhibit higher productivity than firms that export only goods or firms that switch from services exporting to exporting both goods and services. Finally, in our investigations of the impact of this switch on productivity growth we find no meaningful difference between firms. In other words, within-firm gains from trade as measured by the productivity growth of firms is insensitive to the services exporting status. More importantly, we observe no effect of any of export status of firms considered in this paper on their productivity growth.

The map of the paper is as follows: Section 2 describes our data and methodology. Section 3 presents the results of our investigation. Finally, Section 4 concludes.

2. Data and Methodology

The data used in this paper come from two sources: Annual Industry and Statistics Database and Foreign Trade Statistics Database. The former is based on a survey of firms encompassing manufacturing and services sectors administered by Turkish Statistical Institute (TURKSTAT) for the period 2003-2011. The Annual Industry and Statistics survey is composed of questions on employment, working hours, personnel costs, social security costs, expenses, income, inventories, turnovers, exports and imports of goods and services, depreciation, fixed capital investment, sales, and depreciation. In addition, the distribution of capital as foreign, private, and government owned is included in the survey. The data regarding the services export status of the firm is also provided by this database[2]. Foreign Trade Statistics Database, the latter one, includes information on trade values of export and import activities at product level in Turkey.

We merge these two datasets and focus on the firms that always exist throughout our sample. The aim is to consider only within-firm analysis and skip exit to and entry from the industry for 2003-2011 period. As a result, we end up with a balanced panel composed of 12,660 firms.

[2] The dataset does not include information on the exact nature of the services trade transactions, which makes it impossible to use separate GATS modes. For example, among the four modes of services supply defined by GATS, exports in terms of mode 3 are not available in our data. Also, some of the transactions can be carried out using different GATS modes simultaneously.

The focus of the paper is the relationship between productivity and exporting of the firms. Throughout the paper we use three different productivity measures. The first one is the log of simple labor productivity calculated as the log of the ratio of real value added to the number of employees of the firm (lp). The other two productivity measures are using Levinsohn and Petrin (2003)[3] in this study.

Assume that production technology is Cobb Douglas as below:

$$y_t = \beta_0 + \beta_k k_t + \beta_l l_t + \beta_m m_t + \phi_t + \gamma_k \quad (1)$$

where y_t is the firm's output; k_t indicates capital; l_t and m_t stands for labor and intermediate inputs, respectively.[4] All variables are used in logarithms. The error is composed of two variables; ϕ_t and γ_k where ϕ_t indicates transmitted productivity component and impacts the firm's input choices[5].

In both of the productivity measures, real value added is used as a proxy for firm's output,Y_{it}, total employee expenditure of the firm, in real terms, L_{it}, is used as the value of the labor and M_{it} is the real value of raw materials as a proxy to intermediate inputs.

The estimating equation of the second productivity measure, *TFP1*, is as follows:

$$y_{it} = \beta_0 + \beta_1 k_{it}^1 + \beta_2 l_{it} + \beta_3 m_{it} + \beta_4 e_{it} + \phi_{it} + \gamma_{it} \quad (2)$$

To derive *TFP1*, we use real depreciation as a proxy for capital, which is a common assumption. However, due to missing observations in the database, we lose 21 percent of our sample. The last explanatory variable E_{it} is the energy usage as a second proxy to intermediate inputs.

For robustness purposes we calculate a third productivity measure, *TFP2* as follows:

$$y_{it} = \beta_0 + \beta_1 k_{it}^2 + \beta_2 l_{it} + \beta_3 m_{it} + \phi_{it} + \gamma_{it} \quad (3)$$

Here, capital is proxied by electricity usage. In the survey, only 6 percent of the electric usage data is missing. As electricity usage is the sign of working machines, to gain more data we assume that it represents capital.

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[3] Olley and Pakes (1996) and Levinsohn and Petrin (2003) are the most commonly used two productivity approaches to control for unobserved correlation between error term and input levels. The former one uses the investment as a proxy while the latter develops an alternative estimator that uses intermediate inputs as proxies. Levinsohn and Petrin (2003) points out that using investment as a proxy could generate the problem of inconsistency when the share of positive investment values is quite low. Alternatively, intermediate inputs could also be used as a proxy to eliminate the problem of simultaneity bias.

[4] Variable definitions are provided in Table 1.

[5] Unlike ϕ_t, γ_k is assumed to be uncorrelated with input levels. The correlation between inputs and unobservable term, ϕ_t, indicates the simultaneity problem and estimators ignoring the correlation between inputs and unobservable term violate the condition of consistency. Demand for the intermediate input is assumed to depend on firm's state variables; m_t and ϕ_t.

The exporting status of the firms is represented by 16 exclusive dummy variables. The types of the firms that these dummy variables take the value 1 are as follows: *Never*, firms that do not export in both periods; *Always_g_X*, firms export only goods in both periods; *Always_s_X*, firms that export only services in both periods; *Always_both*, firms that export both goods and services in both periods; *Starter_g_X*, firms that do not export in the first period and start exporting only goods in the second period; *Starter_s_X*, firms that do not export in the first period and start exporting only services in the second period; *Starter_both*, firms that do not export in the first period and start exporting both goods and services in the second period; *Stopper_g_X*, firms that export only goods in the first period and stop exporting in the second period; *Stopper_s_X*, firms that export only services in the first period and stop exporting in the second period; *Stopper_both*, firms that export both goods and services in the first period and stop exporting both in the second period; *Switcher_both_2_g_X*, firms that export both goods and services in the first period and switch to exporting only goods in the second period; *Switcher_both_2_s_X*, firms that export both goods and services in the first period and switch to exporting only services in the second period; *Switcher_g_X_2_both*, firms that export only goods in the first period and switch to exporting both goods and services in the second period; *Switcher_s_X_2_both*, firms that export only services in the first period and switch to exporting both goods and services in the second period; *Jumper_g_X_2_s_X*, firms that export only goods in the first period and switch to exporting only services in the second period; and *Jumper_s_X_2_g_X*, firms that export only services in the first period and switch to exporting only goods in the second period. The matrix presentation of the exporting status dummy variables is given in Table 2.

3. Results

3.1. Productivity Level

By using descriptive regressions [6], we analyze the relationship between the exporting status and the level of productivity. We use a balanced panel of firms and do not consider entry to or exit from the industry because the main focus of this paper is not the reallocation of resources within an industry but within-firm productivity gains. Our main contribution here is to incorporate the impact of services exporter status on within-firm productivity.

We use the following estimating equation for our descriptive regression where we do not draw any conclusions about the causality.

[6] The term "descriptive regressions" is used to signify regressions that are conducted to observe correlation rather than causality. They are used frequently in heterogeneous firm literature (Bernard et al. 2007 and citations therein).

$$productivity_{it} = \beta_0 + \beta_{is} \sum_{s=1}^{15} X_{i,t,s} + \alpha_t + \delta_j + \varepsilon_{it} \quad (4)$$

In (Eq.4) $productivity_{it}$ stands for the log productivity of firm i in time t. Moreover, $X_{i,t,s}$ signifies the export status of the firm as defined in Table 2 and explained in the previous section. Finally, α_t and γ_j are time and sector fixed effects, respectively.

Table 3 presents the productivity regressions where the explanatory variables are the dummy variables for the exporting status of the firms. We consider the exporting status of the firms in two periods to observe the change in the status. The benchmark category that is not shown in the table is the firms that do not export throughout the sample, namely *Never*. For robustness purposes we use three different productivity measures: labor productivity, *LP*; and two total factor productivity measures, *TFP1* and *TFP2* where depreciation and electricity usage are used as proxies of capital, respectively. Columns 1-3 of Table 3 are the results of the pooled regressions, whereas Columns 4-6 show the regressions with year and sector fixed effects.

In all of the specifications, firms that engage in both goods and services exporting throughout the sample, *Always_both*, have a positive and significant coefficient which is higher than all of the other coefficients. The implication of this is that firms that export both goods and services throughout the sample is more productive compared to all other export status of the firms. This result is consistent with Dincer and Tekin-Koru (2016).

Scrutinizing Table 3, the second highest coefficient belongs to *Switcher_g_X_2_both*, implying higher productivity premiums for the firms under this exporting status. These firms export only goods in the first period and then switch exporting both goods and services in the second period. Another point that is worth mentioning is that the coefficient of this export status is higher than the coefficient of the firms that engage only in services exporting in the first period and then switch to exporting both goods and services in the second period, *Switcher_s_X_2_both*. In other words, although the firms under both exporting status end up exporting both goods and services in the second period, it makes a difference if they were exporting goods or services in the first period in terms of their level of productivity.

This result might have an important policy implication: If the aim is to increase the productivity of the firms in a country, firms should be encouraged to export both goods and services exporting. However, it might make a difference if these firms start as goods exporters or services exporters. If they start as goods exporters, they build up an institutional structure. When these firms switch to exporting both goods and services they use the structure they built for goods exporting in services exporting, which increases the productivity of the firms. Indeed, the coefficient of the firms that export goods only is higher that the firms

that export only services throughout the sample, implying the higher productivity premium for the former. This fact is consistent with the literature (Breinlich and Criscuolo, 2011).

The firms that start exporting and stop exporting during the sample do not have significant productivity differences compared to the firms that never export throughout the sample, in Columns 1-3 of Table 3. However, once we control for the year and sector fixed effects, this result disappears. Columns 4-6 indicate that firms that engage in exporting either goods or services have higher productivity premia than the firms that never export throughout the sample. In other words, engaging in exports always make a difference in productivity.

For robustness purposes we rerun the regressions with only sector fixed effects and with only year fixed effects. The results are presented in Appendix.

3.2. Productivity growth

The results of the previous section show that firms with highest productivity level belong to the group of firms that export goods and services in consecutive years, namely *always_both*. Moreover, firms that switch from exporting only goods to exporting both goods and services, *switcher_g_X_2_both,* exhibit higher productivity premia compared to firms that switch from services exporting to both, *switcher_s_X_2_both*. Therefore, we can hypothesize that there would be a higher productivity growth for *switcher_g_X_2_both* in comparison to *switcher_s_X_2_both* from period t to t+1 as these firms become *always_both* in period t+2.

We start testing this hypothesis by estimating a productivity change equation for three different time periods using the log of labor productivity.

$$\Delta_k productivity_i = \beta_0 + \beta_1 gX_{i,t} both_{i,t+k} + \beta_2 sX_{i,t} both_{i,t+k} + \beta_3 Other_{i,t+k} + \beta_4 Large_{it} + \beta_5 Medium_{it} + \beta_6 NX_{it} + \beta_7 DX_{it} + \alpha_t + \gamma_j + \varepsilon_{it} \quad (5)$$

The productivity change for firm i for different periods is defined as follows:

$$\Delta_k productivity_i = productivityp_{i,t+k} - productivity_{i,t} \qquad for\ k = \{1,2,3\} \quad (6)$$

We consolidate the export status of the firms considering our main focus, as follows: $X_{i,t} both_{i,t+k}$, $sX_{i,t} both_{i,t+k}$ and $Other_{i,t+k}$. The first variable $gX_{i,t} both_{i,t+k}$ represents the firms that exports good at time t and start exporting both goods and services at time t+1 until time t+k. The second export status variable is $sX_{i,t} both_{i,t+k}$ which takes the value 1 if the firm is a services exporter at time t and becomes exporter of goods and services for the period t+1 to t+k. Final variable is the consolidation of all the other export status other than the first two. The remaining group of the firms are non-exporters which are the reference group and do not appear in the regressions.

We use firm characteristics to control for the other possible determinants of the productivity change. To represent firm size we use *large* and *medium* dummies, where the former represent firms with employees greater than 100 and the latter represent the firms with employees more than 50 and less than 100. The reference group is the small firms with less than 50 employees. The other two independent variables that are used as control variables are related to goods exporters: *NX* and *DX*. The former is the number of products that the firm exports whereas the latter represents the number of destinations that the goods are exported.

Table 4 reports the results of Eq.(5), where the dependent variable in columns 1-2 is the one-period productivity change (t to t+1), i.e k is 1; in columns 3-4 the two-period productivity change (t to t+2) i.e. k is 2; and in columns 5-6 the three-period productivity change (t to t+3) i.e. k is 3.

The results presented in Table 4 suggest that the export status of the firm is not a determinant of the productivity change. This is a very robust result in longer periods and with different control variables.

Based on the differences in the productivity levels of the firms with different exporting status, namely *always_both*, *switcher_g_x_2_both* and *switcher_g_x_2_both* in Table 3, our expectation was to observe the increase in the productivity of the firms in their transition from the export status from *switcher_g_x_2_both* and *switcher_g_x_2_both* to *always_both* exporting status. We consider the time for the firms to increase their productivity and we repeated the analyses to observe the productivity change in 3 years. The results do not change. Exporting status is not a determinant of the productivity change of the firms.

It may be argued that the regressions that we estimate may suffer from the endogeneity problems or the limited sample size of some of the exporting categories. To crosscheck our results, we draw basic kernel densities of the change in productivity for different export status of the firms. To be consistent with the regressions in Table 4, we again consider different lengths of time periods of productivity change, as presented in Figures 1 to 3, where time k increases from 1 to 3, respectively. As the tails of the Kernel densities are long, we restricted the productivity change between 1 and -1, to prevent the outliers from making our Figures fuzzy.

Figures 1-3 presenting the kernel densities of the productivity change according to export status are in line with the results of Table 4. Productivity change of the firms in Turkey is indifferent to the export status we consider in this study. Indeed, what we observe is that the change in productivity variable in 1 to 3 years have mean of 0 and not determined by the export status as there is no obvious domination of one distribution over the other.

4. Conclusion

International trade literature points out to three sources of gains from trade (i) love-of-variety gains; (ii) gains from reallocation at the firm level and (iii) gains from rising within-firm productivity.

The third source of gains from trade, which comes from the favorable impact of having access to larger markets on productivity growth, constituted the focus of this paper. Different from the current literature we sought an answer to the question that whether the firm's services exporter status matter for these type of gains.

In the literature, services were traditionally considered as inputs in the production of goods rather than objects of trade in themselves. However, due to globalization, there appeared an increasing number of firms that consider producing and trading services with goods at one point in their lifespan. We hypothesized that the order of entering into services or goods exporting business or switching from goods exporting to services exporting or vice versa would matter for within-firm productivity gains.

We investigated the relationship between exporting status and productivity (level and growth) through descriptive regressions using rich, firm-level data for the period 2003-2011 for Turkey. We employed three productivity measures (labor productivity and two TFP measures) for robustness purposes.

Our results showed that firms that exported both goods and services throughout the sample had higher productivity compared to all other firms in the sample. Moreover, firms that switched from being goods exporters to goods and services exporters exhibited higher productivity than firms that exported only goods or firms that switched from services exporting to exporting both goods and services.

Finally, in our investigations of the impact of this switch on productivity growth we found no meaningful difference between firms. This is a very robust results in longer periods and with different control variables.

Even though there are meaningful differences in the productivity levels between the firms with different export status, we found export status of these firm have no effect on productivity growth, ergo no effect on within-firm gains from trade for a sample of Turkish firms between 2003-2011.

References

Ariu, A. (2015). Services versus Goods Trade: A Firm Level Comparison?, *Review of World Economics*, forthcoming.

Atkeson, A. and Burstein, A. (2007). Innovation, Firm Dynamics, and International Trade. NBER Working Paper No. w13326.

Aw, B.Y., Roberts, M.J., Xu, D.Y. (2008). R&D Investments, Exporting, and the Evolution of Firm Productivity, *American Economic Review Papers and Proceedings*, 98(2), 451–456.

Aw, B.Y., Roberts, M.J., Xu, D.Y. (2009). R&D Investment, Exporting, and Productivity Dynamics. NBER Working Paper No. w14670R&D.

Bernard, A.B., Eaton J., Jensen, B., Kortum S. (2003). Plants and Productivity in International Trade, *American Economic Review*, 93(4), 1268–1290.

Bernard, A. B., Jensen, J. B., Redding, S. J. and Schott, P.K., 2007. Firms in International Trade. Journal of Economic Perspectives 21 (3), 105-130.

Bustos, P. (2007). The Impact of Trade on Technology and Skill Upgrading: Evidence from Argentina. CREI Working Paper.

Bustos, P. (2008). Trade Liberalization, Exports and Technology Upgrading: Evidence on the Impact of MERCOSUR on Argentinean Firms. CREI Working Paper.

Constantini, J.A. and Melitz, M.J. (2008). The Dynamics of Firm-Level Adjustment to Trade. In E. Helpman et al. (Ed.), The Organization of Firms in a Global Economy. Cambridge, MA: Harvard University Press.

Crozet, M., Milet, E. and Mirza, D. (2013). The Discriminatory Effect of Domestic Regulations on International Trade in Services: Evidence from Firm-Level Data. Available at SSRN 2337410.

Dincer, N. and Tekin-Koru, A. (2016). A League of Their Own: Services Exporters, *Journal of International Trade and Economic Development*, forthcoming.

Federico, S. and Tosti, E. (2012). Exporters and Importers of Services: Firm-level Evidence on Italy. Bank of Italy Working Paper No.877.

François, J. and Hoekman, B. (2010). Services Trade and Policy. *Journal of Economic Literature* 48(3), 642-692.

Grublješič, T. and Damijan, J.P. (2011). Differences in Export Behavior of Services and Manufacturing Firms in Slovenia. *Economic and Business Review* 13(1-2), 77-105.

Imbens, G.W. and Angrist, J.D. (1994). Identification and Estimation of Local Average Treatment Effects, *Econometrica*, 62(2), 467–475.

Jensen, J. B. (2011). Global Trade in Services: Fear, Facts, and Offshoring, Washington, DC, Peterson Institute for International Economics Press.

Kelle, M. (2012). Crossing Industrial Borders: German Manufactures as Services Exporters. Centro Studi Luca D'agliano Development Studies Working Papers 329.

Krugman, P. (1979). Increasing Returns, Monopolistic Competition, and International Trade, *Journal of International Economics* 9(4), 469-479.

Krugman, P. (1980). Scale Economies, Product Differentiation, and the Pattern of Trade, *American Economic Review* 70(5), 950-959.

Levinsohn, J., and Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *The Review of Economic Studies*, *70*(2), 317-341.

Lilieva, A. and Trefler, D. (2010). Improved Access to Foreign Markets Raises Plant-Level Productivity... for Some Plants, *The Quarterly Journal of Economics*, 125(3), 1051-1099.

Malchow-Moller, N., Munch, J. R., Skaksen, J. R. (2013). Services Trade, Goods Trade and Productivity Growth: Evidence from a Population of Private Sector Firms. CEBR Discussion Paper, Center for Economic and Business Research, Copenhagen.

Melitz, M.J. (2003). The Impact of Trade on Intra-industry Reallocations and Aggregate Industry Productivity, *Econometrica*, 71(6), 1695–1725.

Melitz, M.J. and Trefler, D. (2012). Gains from Trade when Firms Matter, *Journal of Economic Perspectives* 26(2), 91-118.

Olley, G. S., and Pakes, A. (1996). The Dynamics of Productivity in the Telecommunications Equipment Industry. *Econometrica*, *64*(6), 1263-1297.

Tanaka, A. (2011). Multinationals in the Services and Manufacturing Sectors: A Firm-Level Analysis using Japanese Data. RIETI Discussion Paper 11-E-059, Research Institute of Economy, Trade & Industry, Japan.

Uribe-Echevarría, A. M. (2013). Trading Firms in the Spanish Service Sector, *Revista de Economía Aplicada* 21(63), 5-28.

Walter, P. and Dell'Mour, R. (2010). Firm Level Analysis of International Trade in Services (No. 4). IFC Working Papers.

Table 1. Variable Definitions

Name	Definition
Output, Y_{it}	Value Added at Factor Costs divided by Industry level PPI.
Capital Stock 1, K_{it}^1	Depreciation divided by investment PPI.
Capital Stock 1,K_{it}^2	Electricity usage divided by energy PPI.
Labor, L_{it}	Total expenditures of employees divided by CPI.
Intermediate Inputs, M_{it}	Raw material divided by
Energy, E_{it}	Energy usage divided by energy prices.
Large	Dummy variable that takes the value 1 if number of employees of the firm is over 100, takes the value 0, otherwise.
Medium	Dummy variable that takes the value 1 if number of employees of the firm is between 51 and 100, takes the value 0, otherwise.
NX	Number of the products that the firm exports.
DX	Number of destinations that the firm exports.

Table 2. Export Status Dummy Variables

Name of the dummy variable	Matrix Presentation $\begin{bmatrix} g\_X_t & g\_X_{t+1} \\ s\_X_t & s\_X_{t+1} \end{bmatrix}$	Name of the dummy variable	Matrix Presentation $\begin{bmatrix} g\_X_t & g\_X_{t+1} \\ s\_X_t & s\_X_{t+1} \end{bmatrix}$
Never	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$	*Stopper_s_X*	$\begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}$
Always_g_X	$\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$	*Stopper_both*	$\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$
Always_s_X	$\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$	*Switcher_both_2_g_X*	$\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$
Always_both	$\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$	*Switcher_both_2_s_X*	$\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$
Starter_g_X	$\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$	*Switcher_g_X_2_both*	$\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$
Starter_s_X	$\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$	*Switcher_s_X_2_both*	$\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$
Starter_both	$\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$	*Jumper_g_X_2_s_X*	$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
Stopper_g_X	$\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$	*Jumper_s_X_2_g_X*	$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

Table 3. Regressions of Firm-Level Productivity on Trading Status

	Without fixed effects			*With sector and year fixed effects*		
	(1)	(2)	(3)	(4)	(5)	(6)
	LP	TFP1	TFP2	LP	TFP1	TFP2
Always_g_X	0.040***	0.045***	0.052***	0.185***	0.226***	0.219***
	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)
Always_s_X	0.037**	0.011	0.021	0.111***	0.078***	0.085***
	(0.017)	(0.017)	(0.016)	(0.023)	(0.022)	(0.021)
Always_both	0.091***	0.106***	0.108***	0.232***	0.267***	0.259***
	(0.015)	(0.015)	(0.015)	(0.019)	(0.019)	(0.019)
Starter_g_X	-0.016**	-0.019**	-0.010	0.082***	0.101***	0.098***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)	(0.010)
Starter_s_X	0.024	0.011	0.013	0.089***	0.066***	0.064***
	(0.018)	(0.018)	(0.018)	(0.021)	(0.021)	(0.020)
Starter_both	0.022	-0.024	-0.017	0.124***	0.075*	0.078**
	(0.035)	(0.037)	(0.037)	(0.039)	(0.040)	(0.040)
Stopper_g_X	0.007	0.010	0.015*	0.092***	0.113***	0.108***
	(0.008)	(0.008)	(0.008)	(0.010)	(0.010)	(0.010)
Stopper_s_X	0.039**	0.028*	0.036**	0.095***	0.078***	0.085***
	(0.017)	(0.017)	(0.017)	(0.019)	(0.020)	(0.019)
Stopper_both	0.026	0.013	0.011	0.123***	0.089**	0.084**
	(0.041)	(0.043)	(0.043)	(0.043)	(0.043)	(0.042)
Switcher_both_2_g_X	0.054***	0.063***	0.069***	0.200***	0.223***	0.218***
	(0.013)	(0.013)	(0.013)	(0.016)	(0.016)	(0.016)
Switcher_both_2_s_X	0.051*	0.021	0.022	0.143***	0.102***	0.097***
	(0.030)	(0.032)	(0.032)	(0.032)	(0.035)	(0.034)
Switcher_g_X_2_both	0.066***	0.087***	0.088***	0.212***	0.258***	0.247***
	(0.012)	(0.012)	(0.011)	(0.015)	(0.015)	(0.015)
Switcher_s_X_2_both	0.035	-0.022	-0.011	0.124***	0.065*	0.067*
	(0.031)	(0.032)	(0.031)	(0.034)	(0.036)	(0.036)
Jumper_g_X_2_s_X	0.078*	0.065	0.074	0.193***	0.176***	0.179***
	(0.047)	(0.048)	(0.047)	(0.048)	(0.049)	(0.045)
Jumper_s_X_2_g_X	-0.005	0.017	0.022	0.128***	0.137***	0.137***
	(0.042)	(0.043)	(0.044)	(0.046)	(0.049)	(0.050)
Constant	10.97***	9.695***	8.529***	10.73***	9.473***	8.287***
	(0.009)	(0.010)	(0.009)	(0.174)	(0.193)	(0.202)
Observations	113859	111609	111609	88546	86296	86296
Number of id	12660	12660	12660	12660	12660	12660

Note: Standard errors are reported in brackets. ***, ** and * denotes significance at 1%, 5% and 10%, respectively. The dependent variables are three different productivity measures: Labor productivity, LP; total factor productivity based on capital proxied by depreciation, *TFP1*; and productivity based on electricity usage utilized as a proxy to capital, *TFP2*. Columns 1-3 is estimated by using pooled regressions whereas Columns 4-6 are estimated by year and sector fixed effects.

Table 4. Regressions of Firm-Level Productivity Change on Trading Status

	k-period change in labor productivity: $\Delta_k lp$					
	k=1		*k=2*		*k=3*	
	(1)	(2)	(3)	(4)	(5)	(6)
$gX_t both_{t+k}$	-0.001	0.005	-0.015	-0.007	0.016	0.028
	(0.009)	(0.009)	(0.015)	(0.015)	(0.022)	(0.022)
$sX_t both_{t+k}$	0.008	0.009	-0.041	-0.041	0.058	0.059
	(0.026)	(0.026)	(0.043)	(0.043)	(0.061)	(0.061)
OtherX	-0.002	0.002	0.000	0.005	0.000	0.007
	(0.002)	(0.002)	(0.003)	(0.003)	(0.005)	(0.005)
Large	0.008***	0.011***	0.009***	0.013***	0.028***	0.036***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
Medium	0.004	0.004*	0.006*	0.007**	0.014***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
NX		0.000		0.000		-0.000*
		(0.000)		(0.000)		(0.000)
DX		-0.001***		-0.001***		-0.001***
		(0.000)		(0.000)		(0.000)
Constant	0.114	0.112	0.023	0.023	-0.010	-0.013
	(0.092)	(0.092)	(0.097)	(0.097)	(0.035)	(0.035)
Observations	83792	83792	82384	82384	69642	69642
Number of id	12580	12580	12579	12579	12574	12574

Note: Standard errors are reported in brackets. ***, ** and * denotes significance at 1%, 5% and 10%, respectively. The dependent variables are k-period change in labor productivity.

Figure 1. Kernel Density of One-Period Productivity Change by Exporting Status, cropped tails

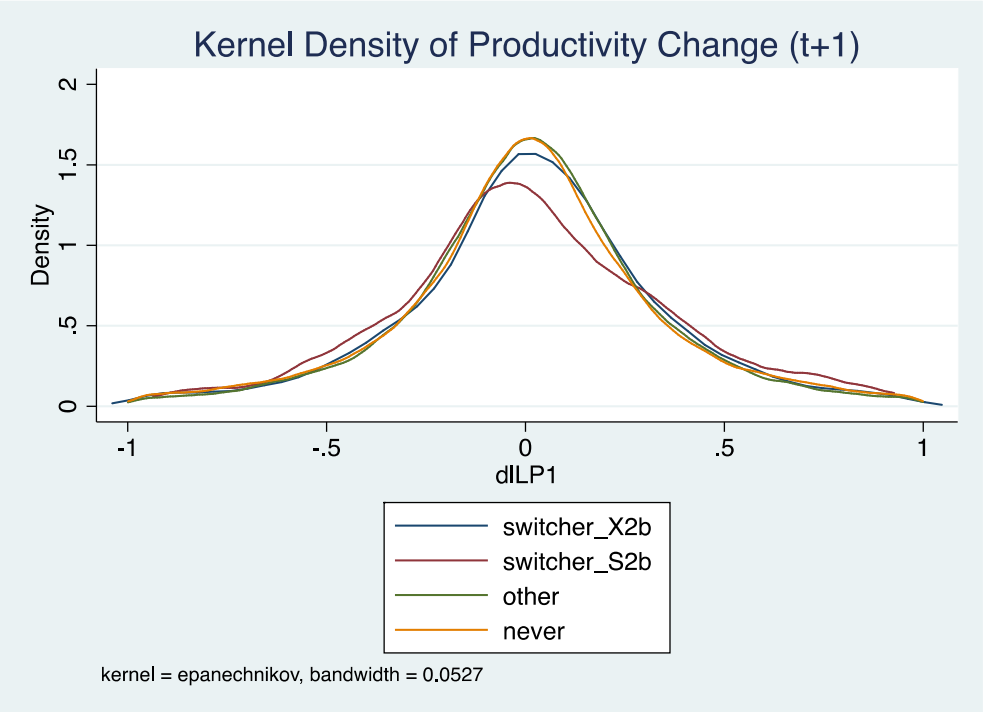


Figure 2. Kernel Density of Two-Period Productivity Change by Exporting Status, cropped tails

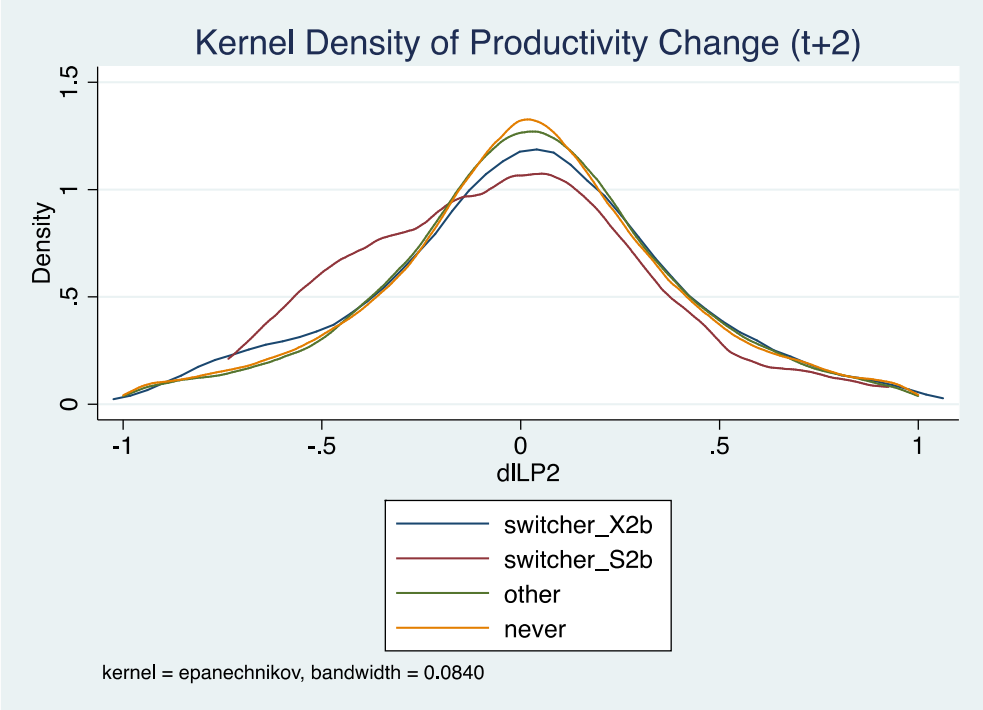


Figure 3. Kernel Density of Three-Period Productivity Change by Exporting Status, cropped tails

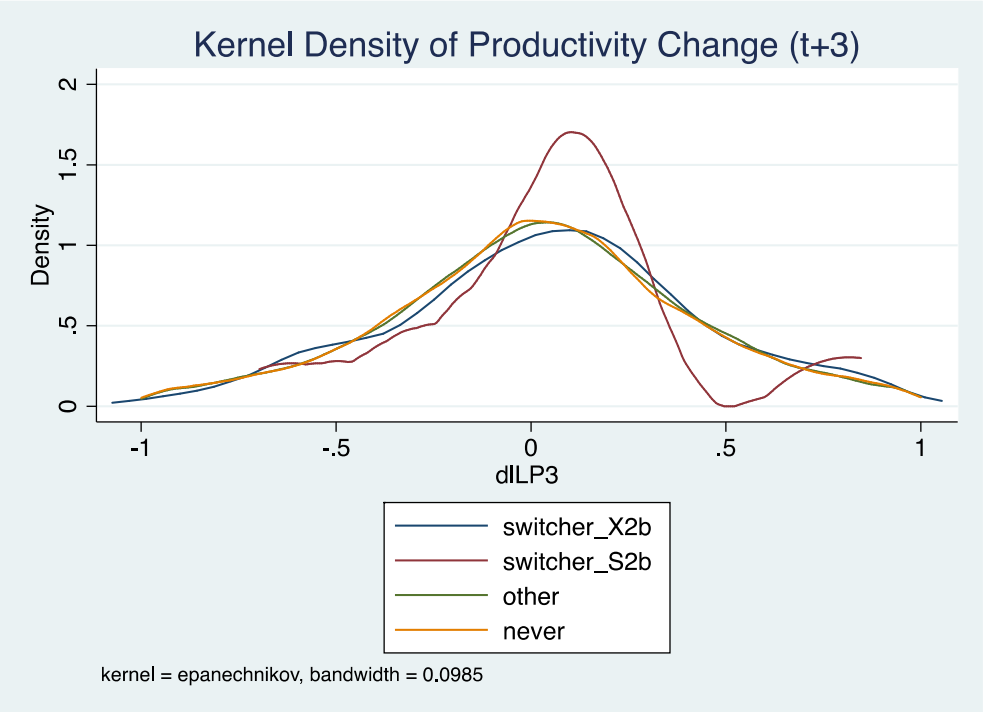


Table A1. Regressions of Firm-Level Productivity on Trading Status

	With year fixed effects			*With sector fixed effects*		
	(1)	(2)	(3)	(4)	(5)	(6)
	LP	TFP1	TFP2	LP	TFP1	TFP2
Always_g_X	0.105***	0.134***	0.130***	0.189***	0.237***	0.226***
	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)
Always_s_X	0.080***	0.066***	0.071***	0.120***	0.101***	0.102***
	(0.017)	(0.017)	(0.017)	(0.022)	(0.022)	(0.021)
Always_both	0.149***	0.177***	0.172***	0.246***	0.305***	0.287***
	(0.015)	(0.016)	(0.016)	(0.019)	(0.019)	(0.019)
Starter_g_X	0.0314***	0.051***	0.049***	0.083***	0.102***	0.098***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)	(0.010)
Starter_s_X	0.065***	0.058***	0.055***	0.090***	0.083***	0.077***
	(0.019)	(0.018)	(0.018)	(0.021)	(0.021)	(0.020)
Starter_both	0.069**	0.023	0.031	0.130***	0.101**	0.098**
	(0.036)	(0.037)	(0.037)	(0.039)	(0.040)	(0.040)
Stopper_g_X	0.051***	0.073***	0.069***	0.094***	0.118***	0.111***
	(0.008)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
Stopper_s_X	0.077***	0.069***	0.073***	0.098***	0.098***	0.101***
	(0.017)	(0.017)	(0.017)	(0.019)	(0.020)	(0.019)
Stopper_both	0.071*	0.063	0.056	0.130***	0.120***	0.107**
	(0.041)	(0.043)	(0.042)	(0.043)	(0.043)	(0.043)
Switcher_both_2_g_X	0.113***	0.131***	0.129***	0.212***	0.262***	0.249***
	(0.013)	(0.014)	(0.013)	(0.016)	(0.016)	(0.016)
Switcher_both_2_s_X	0.101***	0.080**	0.075**	0.154***	0.135***	0.122***
	(0.031)	(0.032)	(0.032)	(0.032)	(0.035)	(0.035)
Switcher_g_X_2_both	0.128***	0.162***	0.155***	0.221***	0.290***	0.271***
	(0.013)	(0.012)	(0.012)	(0.015)	(0.015)	(0.015)
Switcher_s_X_2_both	0.088***	0.047	0.050	0.133***	0.089**	0.086**
	(0.031)	(0.032)	(0.031)	(0.034)	(0.036)	(0.035)
Jumper_g_X_2_s_X	0.129***	0.126***	0.127***	0.200***	0.202***	0.199***
	(0.047)	(0.048)	(0.047)	(0.049)	(0.049)	(0.049)
Jumper_s_X_2_g_X	0.044	0.076*	0.074*	0.134***	0.160***	0.155***
	(0.042)	(0.045)	(0.044)	(0.046)	(0.049)	(0.049)
Constant	10.90***	9.573***	8.440***	10.76***	9.543***	8.323***
	(0.010)	(0.011)	(0.010)	(0.174)	(0.195)	(0.203)
Observations	113859	111609	111609	88546	86296	86296
Number of id	12660	12660	12660	12660	12660	12660

Note: Standard errors are reported in brackets. ***, ** and * denotes significance at 1%, 5% and 10%, respectively. The dependent variables are three different productivity measures: Labor productivity, LP; total factor productivity based on capital proxied by depreciation, *TFP1*; and productivity based on electricity usage utilized as a proxy to capital, *TFP2*. Columns 1-3 is estimated by using year fixed effects, whereas Columns 4-6 are estimated by sector fixed effects.

Figure A1. Kernel Density of One-Period Productivity Change by Exporting Status

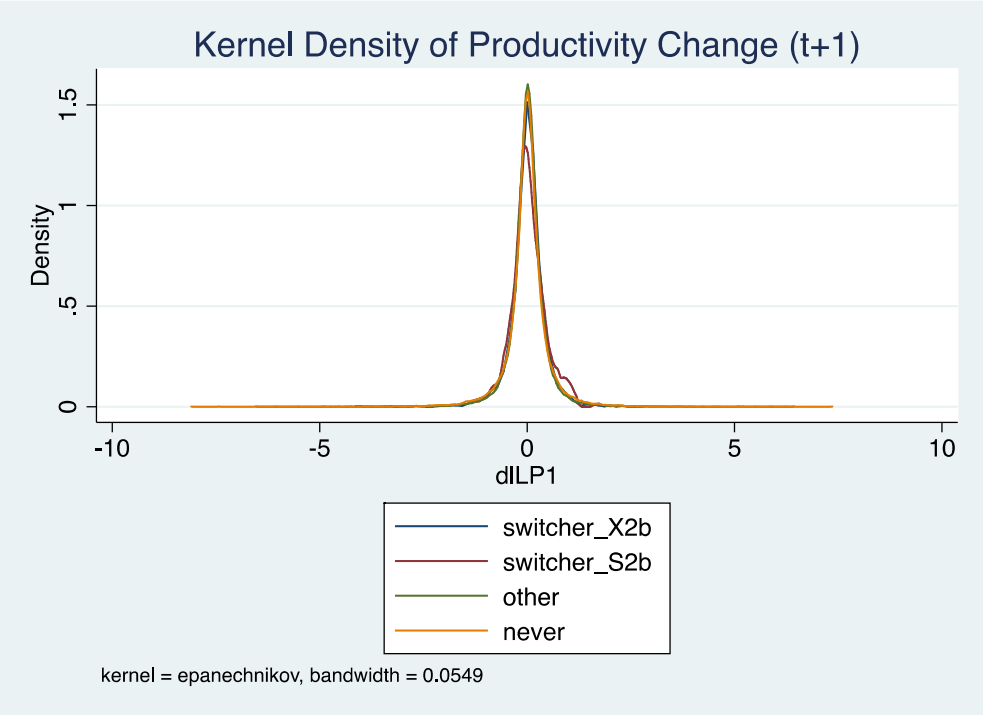


Figure A2. Kernel Density of Two-Period Productivity Change by Exporting by Exporting Status

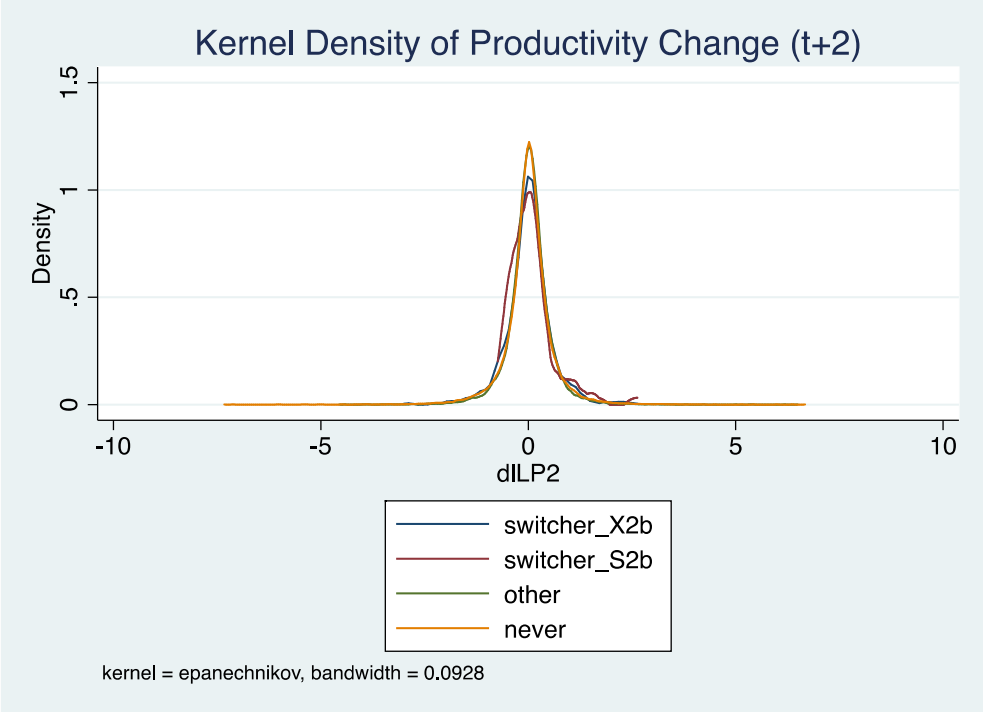
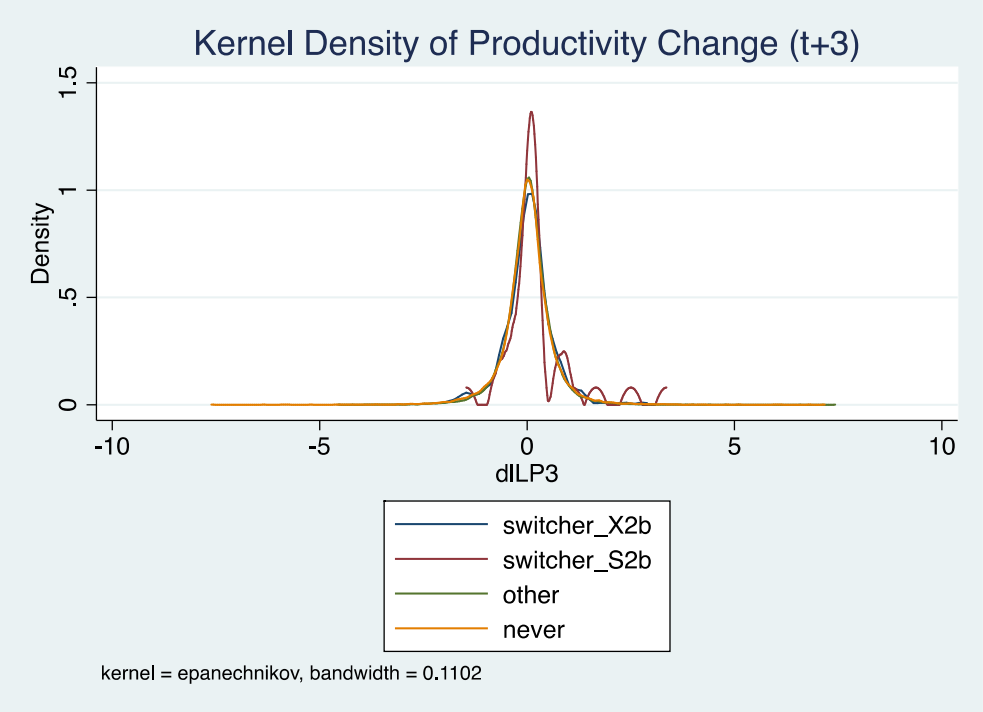


Figure A3. Kernel Density of Three-Period Productivity Change by Exporting Status


Kernel Density of Productivity Change (t+3)
Density
0
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1
1.5
-10
-5
0
5
10
dlLP3
switcher_X2b
switcher_S2b
other
never
kernel = epanechnikov, bandwidth = 0.1102