The Relationship between Exporting and Productivity
--An analysis of China’s case

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I. Motivation

- In the past 30 years, China enjoyed higher growth rate in trade;
- One of contribution factors is to the productivity;
- But the effect of learning by exporting shows some change in different periods;
- We should explain why and what factors to make it;
- Our conclusion is that the effect of learning by exporting exist but declining as the policy changes;
- We will give some analysis in details.
II. Outline of the Paper

I. Introduction
II. Review of the literature
III. Description of the model & data
IV. Sample selection & empirical test
V. Robustness Test
VI. Conclusion
III. Review of the literature

- New–new trade theory: “self-selection effect” (Clerides et al. (1998), Melitz (2003), Bernard et al. (2003)) means the firm which has high productivity could survive in exporting market;

- New-new trade theory: “learning by exporting”. It means export could improve export capacity and lead to more export (Greenaway and Kneller (2004));

- It is true for developing countries and region such as Korea, Taiwan, Chile and Salvia tested by Aw et al. (2000), Van Biesebroeck (2003, 2005), De Loecker (2007) and Alvarez and López (2005) respectively.
III. Review of the literature

- There are some Chinese scholars who did the research on the relationship between trade and productivity (such as Yu Miaojie, etc.);
- This paper will make a comparison of the effect during two periods: from 1998-2001, and from 2002-2005 because of data limitation;
- The cut-off point is pro-post China’s entry into WTO;
IV. Modeling

Basic thinking or logic:

- We are going to estimate the change of learning by exporting in different periods;
- $\gamma$ means the change of total factor productivity;
- Since we could not get the data of export firms in case they do not export, we use counterfactual method to solve this problem;
- Then we give the regression equation—relationship between trade and productivity;
- We find this process of the relationship between export and productivity is changing.
IV. Modeling

\[ \gamma = E(r_i \mid d_{ui} = 1) = E(\Delta tfp_{i1} \mid d_{ui} = 1) - E(\Delta tfp_{i0} \mid d_{ui} = 1) \]  

- \( d_{ui} = \{0,1\} \) stands for dummy variables, \( d_{ui} = 1 \) means firm \( i \) as export firm which has exportation, \( d_{ui} = 0 \) means firm \( i \) as non–export;
- Variable \( dt = \{0,1\} \), shows time, \( dt = 0 \) stands for the year before policy adjustment, \( dt = 1 \) stand for the year after policy adjustment;
- \( tfp_{it} \) stands for firm \( i \)’ the change total factor productivity (\( \Delta tfp_i \)) in \( t \) time.
IV. Modeling

\[ r = E(r_i \mid du_i = 1) = E(\Delta tfp_i^1 \mid du_i = 1) - E(\Delta tfp_i^0 \mid du_i = 0) \tag{2} \]

- counterfactual method:
  \[ E(\Delta tfp_i^0 \mid du_i = 1) = E(\Delta tfp_i^0 \mid du_i = 0) \]

Replace by the samples of non export firm;
IV. Modeling

\[ tfp_{it} = \beta_0 + \beta_1 du + \beta_2 dt + \gamma du dt + \sum_j \beta_j CV_{itj} + \varepsilon_{it} \quad (4) \]

- \( CV \) stands for control variables, which includes average wage, the ratio of capital to labor, nature of ownership, location for firms;
- Among them \( \varepsilon_{it} \) is error term, which stands for the productivity error for firm \( i \) in year \( t \);
- \( du*dt \) is estimating value on the DID (difference in difference), it reflects the real impact of export on firm’s productivity (learning by exporting);
- In other words, we focus on learning by exporting through \( du*dt \).
V. Data description

- We use 45222 firms in 1998-2001 and 50529 firms in 2002-2005, and the data is from NBS;(some firms information are not completed)

- Firstly, all samples are the firms which last in continuing four year in two periods. We use panel data to get what we want;

- Secondly, this data gives all samples which we need in two periods, and it means that there exists some firms who didn’t export before but export now. There are 2341 firms of that kind in 1998-2001, and the number of such firms is 4016 in 2002-2005.
V. Data description

- There are three principles to process the data:
- Firstly, the firms did not export in original year, which means they only sell product within home market and do not have any exportation in 1998 or 2002;
- Secondly, firms have export value since 1999 or 2000, and since 2003 or 2004;
- Finally, firms will last their exportation and no inverse;
- Firms in controlling group are those who do not have any exportation in the period of 1998 to 2001 and in the period of 2002 to 2005.
V. Data description

- On the base of the above principles:
- In two sub-samples, there are 2341 export firms in 45222 processing group from 1998 - 2001, there are 42881 firms in controlling group which is 18.3 times of processing group.
V. Data description

- From the angle of ownership, there are 846 foreign firms and 1477 domestic firms in processing group; There are 4637 foreign firms and 40585 domestic firms in the controlling group in 1998-2001;
- The ratio of foreign firms or domestic firms is, 1/1.746 in processing group and 1/8.752 in controlling group respectively;
- There are 4016 of 50529 firms in processing group in 2002-2005, and there are 46263 firms in controlling group. The number of controlling firms is 11.5 times of processing firms; Among them there are 1452 foreign firms and 2564 domestic firms in processing group; and there are 4869 foreign firms and 41394 domestic firms in controlling group;
- Namely the ratio of foreign firms to domestic ones is 1/16.144 in processing group and 1/3.353 in controlling group respectively.
V. Data description

- We could get specific conclusions easily from the classification of nature of firm`s ownership:
- The propensity to export for foreign firms in China is larger than domestic firms;
- It shows that foreign firms have higher propensity to export than domestic firms;
- Generally, foreign firms have more significant propensity to export than domestic firms and the firms intended to export;
- And, it seems that the propensity to export is increasing for both foreign firms and domestic firms.
V. Data description

- We consider 1998 and 2002 as starting year, namely \( dt_0 \) and \( dt_1 \) separately relating to two periods 1998—2002 (before exporting), 2001—2005 (after exporting);
- we use semi-parameter method (LP) induced by Levinsohn & Petrin (2003) to calculate all factor productivity.
VI. Data description and result

- By calculating, we could get the conclusions easily: the productivity has a growth trend in both 1998—2001 and 2002—2005 periods. The average rate is 0.36% and 1.51% separately. That means there is higher rate after entry to WTO than before.

- And export firms have higher growth speed than non-export firms. The growth rate of export firms is 1.26% in 1998—2001 comparing with 0.3% for non-export firms; Although the growth rate of non-export firms is 1.48% in 2002—2005, the growth rate of export firm is still higher which is 1.82%.

- The productivity shows a trend of convergence for the two kinds of firms with the opening of Chinese market;
VI. Data description and result

In addition, foreign firms show declining in the growth rate of productivity while domestic firms have speed up. Their growth rate change from 7.01% and 0.324% separately in the period of 1998—2001 to 1.06% and 1.62% in 2002-2005. It shows that the effect of innovation and reform is better for domestic firms than foreign firms. This kind of firm narrows its difference in productivity with foreign firm gradually.
VII. The choice of samples and empirical test

(1) PSM and Mahalanobis distance matching. The choice of samples and empirical test;

- The co-efficiency of DID in the model depends on how to avoid endogenous effect;
- Some papers take matching method to control this;
- We use propensity score matching (PSM) to control the problem of samples with distance method.
VII. The choice of samples and empirical test

- Firstly, we use PSM method to estimate the possibility of firm`s export and then match the samples based on the distance method (MDM);
- We could get controlling group samples as opposed to the samples in processing group;
- All of these processing is to keep reliable samples and relative scientific result;
- Wagner (2002) analyzed the impact of export on firm size and productivity by using PSM method.
VII. The choice of samples and empirical test

- How to get the variables which we chosen:
- Firm size (lnscale): We use the number of employee to index firm size (yearly average number of employment). A lot of papers show that the number of employee in firms plays a very important role in the change of firms’ productivity and export;
- Level of wage(lnwage): Level of wage in firms has significant impact on firms’ productivity and behavior of export; Davidson(2007) points out that the firm which has lower wage tends to export because of lower labor cost while the firm which has higher wage tends to continue its export since it has higher productivity.
VII. The choice of samples and empirical test

- Firm’s financial situation (leverage): the financial situation has impact not only on firm’s productivity, but also on whether or not to export;

- Age of firm (age): Xiao wang(2011) finds out that the older the firm, the more it will export;

- Region dummy variable (region): according to new geographic economics, the location of firm has impact on its making-decision on export and on improving productivity (Liu Zhibiao & Zhang Jie, 2009).

- Table 1 shows the regression of matching variables result;
<table>
<thead>
<tr>
<th>Matching variables</th>
<th>1998-2001</th>
<th>2002-2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>scale</td>
<td>0.2</td>
<td>(0.010)***</td>
</tr>
<tr>
<td>lnwage</td>
<td>0.257</td>
<td>(0.015)***</td>
</tr>
<tr>
<td>leverage</td>
<td>-0.018</td>
<td>(0.007)***</td>
</tr>
<tr>
<td>age</td>
<td>-0.016</td>
<td>(0.001)***</td>
</tr>
<tr>
<td>region</td>
<td>0.187</td>
<td>(0.021)***</td>
</tr>
</tbody>
</table>
VII. The choice of samples and empirical test

- In this paper we take ratio of the matching as 1:4, namely 1 processing group firm and 4 controlling group firms;
- There are 2341:7353 in 1998-2001 and 4015:11731 in 2002-2005 in processing group and controlling group;
- We have controlled endogenous by using PSM and MDM, avoiding endogenous of self-selection effect;
- On the base of this we could estimate the effect of learning by exporting and further the impact of export on productivity in different economic development stages.
(2) Basic result of regression:

We do regression to processing group with matching controlling group and do some analysis by general DID, basic results are shown on table 2.

It shows that firms’ export behavior, level of wage, factor intensity, regional choice as well as ownership of firms has significant effect in enhancing productivity from our regression result.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
<td>6.568 (0.013)***</td>
<td>6.2655 (0.009)***</td>
</tr>
<tr>
<td>du</td>
<td>0.085 (0.028)***</td>
<td>0.0128 (0.018)*</td>
</tr>
<tr>
<td>dt</td>
<td>0.1088 (0.019)***</td>
<td>0.3352 (0.014)*</td>
</tr>
<tr>
<td>dudt</td>
<td>0.2324 (0.039)***</td>
<td>0.0936 (0.026)***</td>
</tr>
<tr>
<td>lnwage</td>
<td>0.4873 (0.011)***</td>
<td>0.5646 (0.009)***</td>
</tr>
<tr>
<td>lnkl</td>
<td>0.0823 (0.007)***</td>
<td>0.1829 (0.004)***</td>
</tr>
<tr>
<td>foreign</td>
<td>0.1137 (0.019)***</td>
<td>-0.0014 (0.013)</td>
</tr>
<tr>
<td>Region</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>samples</td>
<td>19388</td>
<td>19333</td>
</tr>
<tr>
<td>R2</td>
<td>0.0120</td>
<td>0.1067</td>
</tr>
<tr>
<td>F statistics</td>
<td>78.3</td>
<td>577.28</td>
</tr>
</tbody>
</table>
VII. The choice of samples and empirical test

- We find that the impact of exportation on firm’s productivity is significant in 1998-2001 and 2002-2005, meaning that the impact of export on improving productivity is obvious. Many scholars did the same work before.

- The contribution in our paper is to describe the change of learning by exporting in developing stages; we could see the co-efficiency (by DID) is smaller in 2002-2005 compared with 1998-2001.
VII. The choice of samples and empirical test

- Chinese firms could not get more productivity gains from export expansion;
- The impact of export on productivity shows declining trend as time goes;
- There are two reasons in our paper;
- Growth of productivity for non-export firms is further higher than export firms after entry to WTO; and there is a trend that the difference in productivity become narrow.
VII. The choice of samples and empirical test

- Secondly, there are less and less gain to learn by export for firms since the firm has got a lot through understanding foreign market, improving technological enhancing after entry to WTO;

- In short, the export firms transformed from domestic firms could get little productivity gains from exporting, which is the inevitable result of China`s high speed economic growth, high level of income, as well as slow upgrading of industrial structure.
VII. The choice of samples and empirical test

- So, it is not possible for China to get effect of leaning by exporting from high technical product;
- The declining of gains from learning by exporting is bound to the reflection to Chinese high speed growth, improvement of income level as well as lower upgrade of industrial structure of china’s development of export, firm’s changing from domestic to outside market, as Chinese export development, market exploitation from domestic market to foreign market;
- Blalock & Gertler (2004) once pointed out that the effect of learning by exporting is significant when the income level of the country is relative lower. It will be weaker or disappear as income level increases.
VII. The choice of samples and empirical test

- Table-2 gives our result;
- Obvious, the co-efficiency of the $d_{udt}$ is smaller from first period to second period;
- In controlling variables, the increase in wage should enhance productivity. It keep almost constant in two periods (marginal effect is about 0.4 to 0.5);
- Secondly, the improvement in condition of factor intensity is good to productivity for firms, and the trend is strengthened, positive effect changes from 0.07 before entry WTO to 0.17 after, namely more than 2 times;
VII. The choice of samples and empirical test

- $du$ is become smaller after entry to WTO, which shows it becomes narrow in productivity between export firms and non-export firms;
- $dt$ gives us a trend of productivity as time being; $dt$ shows both positive in two periods, and $dt$ tends to be faster in 2002-2005;
- Finally, the form of ownership shows its significant impact on productivity; domestic firm’s productivity shows its advantage comparing with foreign firm’s after entry to WTO; It shows positive but not significant in foreign firm during the 1998-2001; It shows further that ownership play less and less role to firm’s productivity as trade liberalization.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
<td>4.998 (0.047)***</td>
<td>4.192 (0.018)***</td>
<td>5.31 (0.076)***</td>
<td>4.227 (0.053)***</td>
</tr>
<tr>
<td>du</td>
<td>0.21 (0.032)**</td>
<td>0.258 (0.02)***</td>
<td>-0.014 (0.047)</td>
<td>0.018 (0.032)</td>
</tr>
<tr>
<td>dt</td>
<td>0.034 (0.021)</td>
<td>0.163 (0.007)***</td>
<td>0.064 (0.035)*</td>
<td>0.078 (0.022)***</td>
</tr>
<tr>
<td>dudt</td>
<td><strong>0.193 (0.068)</strong>*</td>
<td><strong>0.134 (0.02)</strong>*</td>
<td><strong>0.199 (0.064)</strong>*</td>
<td><strong>0.099 (0.044)</strong>*</td>
</tr>
<tr>
<td>lnwage</td>
<td>0.554 (0.015)***</td>
<td>0.536 (0.006)***</td>
<td>0.501 (0.021)***</td>
<td>0.561 (0.015)***</td>
</tr>
<tr>
<td>lnkl</td>
<td>0.022 (0.007)***</td>
<td>0.099 (0.003)***</td>
<td>0.05 (0.011)***</td>
<td>0.141 (0.007)***</td>
</tr>
<tr>
<td>region</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>samples</td>
<td>13441</td>
<td>87870</td>
<td>5892</td>
<td>12634</td>
</tr>
<tr>
<td>R2</td>
<td>0.1347</td>
<td>0.1768</td>
<td>0.1285</td>
<td>0.1888</td>
</tr>
<tr>
<td>F statistics</td>
<td>62.51</td>
<td>554.96</td>
<td>26.99</td>
<td>88.87</td>
</tr>
</tbody>
</table>
VII. The choice of samples and empirical test

Regression results for domestic and foreign firms:

- Firstly, Chinese export is typical dual-economy, namely foreign firm has been playing an more important role;

- On one hand, foreign firm has some advantage in technology, understanding the international market, stronger capacity in learning by something comparing with domestic firm;

- On the other hand, it is possible for domestic firm to learn something from international market in order to get new technology, changing it into higher productivity because of backward; And it offers a big room to enhance its productivity and form the trend and bigger difference in productivity comparing with other firms. We give that in table-4.
VII. The choice of samples and empirical test

- The effect of learning by exporting in both firms is declining, the foreign firm is more significant than domestic firm after entry to WTO;
- In addition, there are some obvious differences between foreign and domestic firms. Firstly, the productivity of export firm is much higher than non-export firm; it doesn’t change whether decrease in trade cost or trade development in term of du;
- In terms of foreign firms, there is no difference in productivity whether it export or not;
- Secondly, domestic firms keep higher growth speed in productivity in 2002-2005, and it is from 0.034 to 0.163. But foreign firms keep constant, almost no change;
- In addition, wage and k/l both play very important role in improving the productivity, even though they have much more power for foreign firms; generally, changes of productivity gap between domestic and foreign firms presents a trend of convergence.
- It is almost same as regression in total samples.
VIII. Robustness Test

1. The distribution of productivity and quantitle regression

- We use quantitle regression for the distribution of productivity to estimate the effect of learning by exporting, which is conditional contribution given by Koenker and Bassett in 1978;

- The result which re-testing is in table -4.
<table>
<thead>
<tr>
<th>Time</th>
<th>Variables</th>
<th>p1</th>
<th>p25</th>
<th>p50</th>
<th>p75</th>
<th>p90</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-2001</td>
<td>Constant</td>
<td>4.254</td>
<td>4.58</td>
<td>4.875</td>
<td>5.258</td>
<td>5.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.066)*****</td>
<td>(0.057)*****</td>
<td>(0.049)*****</td>
<td>(0.057)*****</td>
<td>(0.056)*****</td>
</tr>
<tr>
<td></td>
<td>du</td>
<td>0.068</td>
<td>0.064</td>
<td>0.109</td>
<td>0.201</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.034)*</td>
<td>(0.036)*****</td>
<td>(0.031)*****</td>
<td>(0.026)*****</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dt</td>
<td>-0.111</td>
<td>0.001</td>
<td>0.065</td>
<td>0.121</td>
<td>0.088</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.027)*****</td>
<td>(0.017)</td>
<td>(0.018)*****</td>
<td>(0.025)*****</td>
<td>(0.026)*****</td>
</tr>
<tr>
<td></td>
<td>dudt</td>
<td>0.3179</td>
<td>0.1876</td>
<td>0.1448</td>
<td>0.0725</td>
<td>0.1116</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.049)*****</td>
<td>(0.049)*****</td>
<td>(0.042)*****</td>
<td>(0.05)</td>
<td>(0.067)*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.05)*****</td>
<td>(0.033)*****</td>
<td>(0.023)*****</td>
<td>(0.052)*****</td>
<td>(0.072)*****</td>
</tr>
<tr>
<td></td>
<td>du</td>
<td>0.037</td>
<td>0.073</td>
<td>0.097</td>
<td>0.106</td>
<td>0.139</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.021)*</td>
<td>(0.019)*****</td>
<td>(0.014)*****</td>
<td>(0.023)*****</td>
<td>(0.035)*****</td>
</tr>
<tr>
<td></td>
<td>dt</td>
<td>0.028</td>
<td>0.104</td>
<td>0.133</td>
<td>0.162</td>
<td>0.192</td>
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<tr>
<td></td>
<td></td>
<td>(0.021)</td>
<td>(0.015)*****</td>
<td>(0.025)*****</td>
<td>(0.015)*****</td>
<td>(0.027)*****</td>
</tr>
<tr>
<td></td>
<td>dudt</td>
<td>0.158</td>
<td>0.082</td>
<td>0.045</td>
<td>0.006</td>
<td>-0.031</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.448)*****</td>
<td>(0.027)*****</td>
<td>(0.021)*****</td>
<td>(0.021)</td>
<td>(0.0450)</td>
</tr>
</tbody>
</table>
VIII. Robustness Test

- Generally, the firm could enhance its productivity greatly from exporting during the periods of 1998-2001 and 2002-2005;
- There are some differences (as DID) in the effect of learning by exporting in different quantitle, it is bigger in low quantitle and smaller in high quantitle;
- It shows that the effect of learning becomes less and less as firm’s productivity line move from lower to higher;
- It also shows the higher in technology level, the greater of the effect of learning by exporting, because it is easier for firm to get opportunity to learning and to have room.
VIII. Robustness Test

- In addition, we find its declining in every quantitle point after comparing the co-efficiency of \( du^*dt \) in different periods (1998-2001 and 2002-2005);
- It shows that the impact of export on improvement of productivity really become little.
VIII. Robustness Test

2. Impact of industrial sector and industrial regression:
   - The location of productivity distribution for the firm depends on the characteristics of the industry, such as factor intensity, life cycle of products, and so on;
   - So, we think industrial difference may have impact on learning by exporting;
   - Table 5 shows that result.
<table>
<thead>
<tr>
<th>variable</th>
<th>Labor intensive industries</th>
<th>Capital intensive industries</th>
<th>Resources intensive industries</th>
<th>Hi-tech intensive industries</th>
<th>Low-tech intensive industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
<td>5.547</td>
<td>8.813</td>
<td>4.461</td>
<td>3.619</td>
<td>4.122</td>
</tr>
<tr>
<td></td>
<td>(0.072)***</td>
<td>(0.152)***</td>
<td>(0.096)***</td>
<td>(0.101)***</td>
<td>(0.077)***</td>
</tr>
<tr>
<td>du</td>
<td>0.084</td>
<td>0.0004</td>
<td>0.159</td>
<td>0.223</td>
<td>0.127</td>
</tr>
<tr>
<td></td>
<td>(0.047)*</td>
<td>(0.084)*</td>
<td>(0.06)*</td>
<td>(0.067)*</td>
<td>(0.067)*</td>
</tr>
<tr>
<td>dt</td>
<td>0.144</td>
<td>0.314</td>
<td>-0.057</td>
<td>0.19</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>(0.035)***</td>
<td>(0.314)***</td>
<td>(0.056)***</td>
<td>(0.041)***</td>
<td>(0.041)***</td>
</tr>
<tr>
<td>dudt</td>
<td>0.021</td>
<td>0.023</td>
<td>0.184</td>
<td>0.103</td>
<td>0.172</td>
</tr>
<tr>
<td></td>
<td>(0.066)</td>
<td>(0.046)</td>
<td>(0.083)</td>
<td>(0.093)*</td>
<td>(0.065)*</td>
</tr>
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<td>lnwage</td>
<td>0.322</td>
<td>-0.32</td>
<td>0.641</td>
<td>0.674</td>
<td>0.442</td>
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<tr>
<td></td>
<td>(0.025)***</td>
<td>(0.011)***</td>
<td>(0.039)***</td>
<td>(0.032)***</td>
<td>(0.03)***</td>
</tr>
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<td>(0.011)</td>
<td>(0.008)***</td>
<td>(0.021)***</td>
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<td>(0.026)*</td>
<td>(0.063)</td>
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<td>(0.046)***</td>
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<tr>
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Table 5
VIII. Robustness test

- Firstly, we divide all industries into five types, namely labor intensive, capital intensive, resource intensive, hi-tech intensive as well as low-tech intensive industries;
- Table 5 gives the result on the base of DID regression;
- The regression result show that export really has different impact on firms’ productivity in different industries.
VIII. Robustness Test

- The co-efficiency of $du*dt$ shows that there exist some differences in learning by exporting in different industries;
- There are no significant effect on labor intensive industry and capital intensive industry, but there are significant effect in resource, hi-tech as well as low-tech industry.
VIII. Robustness Test

Secondly, the effect is stable in resource intensive industry, but it drops greatly in hi-tech and middle and low-tech industries in both period of 1998-2001 and 2002-2005. The co-efficiency of DID drops from 0.299 to 0.092.

Our understanding is that not all firms could get benefit from exporting, only the firms which can reach the technological intensity level could improve its productivity through exporting.
VIII. Robustness Test

- So, we must upgrade our structure of industry and strengthen our innovation by ourselves in order to escape the strap of lower stage in global value chain;
- We should adjust our structure of products in export by lowering the share of labor intensive, resource intensive as well as lower–tech intensive products;
- Creating the ability to innovate in industry technology;
- Finally, wage and k/l ratio play very important role in enhancing the productivity through export; export will play less and less role in improving productivity.
IX. Conclusion

- There is an effect of learning by exporting on the base of DID in the periods of 1998-2005;
- This effect become less and less as China join WTO; there is obervious change before and after;
- Both domestic and foreign firms in China show that the benefit from export on productivity is declining, especially for foreign firms;
- In term of industry, there are different effects on five kinds of industries;
- We must strengthen our innovation, upgrade industrial structure to escape lower stage of globe value chain.
Thank you very much