Vertical integration and export orientation: a first empirical assessment

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Abstract

In this paper we wish to assess the relationship between the degree of vertical integration (VI) of firms belonging to the manufacturing sectors and their export orientation. We first go through a statistical description of the phenomenon. Then, we investigate the dependence of the degree of VI upon the level of exports. Our prior belief is that the more firms export the less VI they should display, since they need to be more flexible. Therefore, they show less VI and are more oriented towards vertical disintegration (VD), in order to better cushion the effects of international markets shocks. Our belief seems to be confirmed in a large set of econometric tests, at the sectoral level on a time series basis. Moreover, in time-cross sectional investigation it appears that VI depends heavily upon export orientation over the years between 1988 and 2003. In other words, the globalized economy has pushed firms to vertically disintegrate. This was not the case before the 1990’s.

*JEL* Classification: F120, F190, L220

*Keywords*: Vertical Integration, Disintegration, Export orientation.
1. Introduction

Vertical integration (VI) or its opposite vertical disintegration (VD) are the object of strategic decisions by firms and they set the border of corporate control of the vertical chain of production. The extent of VI measures the amount of “internal making” by a firm. This activity may be entirely located within a country or scattered crossborder (Antras and Helpman, 2004).

VI and VD are, by and large, associated to several kinds of externalities within firms and in the markets for inputs and are affected by economic and institutional factors.

A VI firm operating in a non perfectly competitive market is going to benefit both shareholders and consumers. Profits are higher and prices are lower than in the case of two VD firms operating respectively in the upstream section (U) and in the downstream (D) section or final stage of the production chain. With VD a negative externality arises due to ”double marginalization” (Spengler, 1951). When the D firm raises the price of its final good the profits of U are reduced, as “two monopolies are worse than one”. On the contrary, in the case of VI, there is no market for the input produced by U. The intermediate good is simply transferred internally at its opportunity cost, i.e. the marginal cost (Perry, 1989;
Another externality is produced by the decision of a firm to go \(VD\). As a consequence of this action the incumbent \(U\) firms enjoy wider choice of \(D\) customers (McLaren, 1999, 2000; Grossman and Helpman, 2002). There occurs a weakening of the the “hold up” constraint that arises from exclusive or semi exclusive vertical dealings. A bandwagon effect may then lead to the disappearance of heterogeneous levels of \(VI\) within the same industry.

Recent contributions (Acemoglu, Johnson and Mitton, 2005; Spencer, 2005) have emphasized the role of these last factors -heterogeneity - in the explanation of geographical differences in \(VI\). Since countries should all share the same technology - a very anti - Ricardo assumption - the difference in their degree of \(VI\) should be made to depend mainly on the “working” of institutions such as markets \(a)\) for intermediate goods - entry barriers, ease to start up a new venture and so on - and \(b)\) for credit. Contracting costs for stipulation and enforcement (Grossman and Hart, 1986) and regulation also play a crucial role (Spencer, 2005). It appears (Acemoglu, Johnson and Mitton, 2005) that countries with poor institutions concentrate in industries where the current technology requires highly vertically integrated firms.

Other factors affect \(VI\) and sometimes they are even able to neutralize or
reverse external effects (Nemoto and Goto, 2004; Pepall and Norman, 2001).

When we introduce trade new determinants emerge of VI and VD. As for crossborder VD - or outsourcing - costs differentials seem to push firms either to geographically distribute the production process on both a VI basis or VD buying inputs abroad, most often in the country of destination of exports.

To closer scrutiny, it seems that most VD, on a domestic, yet mostly on a crossborder basis, may be dictated by the need to be more flexible as uncertainty unravels (Moretto and Rossini, 2005). Uncertainty is higher for firms operating in foreign markets. Or, to be more precise, these firms have to be more flexible and reactive as compared to firms operating only or prominently on the domestic market.

In a recent empirical investigation (Rossini and Ricciardi, 2005) the role of trade seems to emerge as a driving force of VI. As firms are more export oriented their degree of vertical integration seems to go down so as to be more efficient.

In this paper we wish to go deeper into this issue and investigate the role of export orientation on the degree of VI within some specified sectors on a sample of developed and emerging countries.

What we find is that in the sectors which are more export oriented the degree of VI decreases. Moreover VI has decreased mostly over the 1990’s as trade
integration has soared. This adds another piece to the determinants of VI across sectors and countries.

The paper is organized as follows. In the next section we provide a statistical description of the phenomenon of VI in our sample. In the third section we go through some econometric testing of our thesis. Conclusions are in section 4.

2. The data base and the description of VI and export orientation

Data come from the "OECD STAN data base for industrial analysis"\(^1\) covering 27 countries\(^2\) from 1970 to 2003. We have used these data to compute two indices. The first one is an index of the degree of VI in an industry, while the second is an index of the export orientation of an industry.

2.1. The indices of VI

The index of VI we adopt is given by the ratio of the Value Added over the value of production. This index is labeled V and is a proxy to measure the average

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\(^1\)www.oecd.org/stan
\(^2\)Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, UK, US.
degree of VI within an industry as it provides the proportion of net production by firms over the value of gross production, or, in other words, how much of the value of a product is made by a firm.

In our preliminary analysis we consider only 10 industries. We leave out agriculture, services and production of goods (like electricity and water) which are mostly non traded (like some utilities such as electricity that became a relevantly traded good only in the 1990’s).

We briefly comment on the the level of the index in different industries and countries over the last 33 years. The table with the indices is available at

www.dse.unibo.it/rossini/statistics

since it is too large to be published in this paper.

2.1.1. Mining and quarrying

This is an industry which is usually fairly vertically integrated. In 1970 in most countries the index V was ranging between .75 of Italy and Netherlands and .46 of Korea. After 33 years Italy had decreased to .71 and Korea had increased to .61. For most of other countries there is a downward trend in VI in this sector. Japan goes from .64 to .48, while US drops a little from .57 to .55.
2.1.2. Food, beverages and tobacco

Here we face an industry whose evolution along the last 33 years is not one of further vertical fragmentation but the opposite. Only in US the V index has dropped from .30 to .26 along the 33 years time span. For other countries it has increased. For Canada it grew from .28 to .29; France from .26 to .28, Germany from .25 to .29, Italy from .20 to .27, Japan from .34 to .38, Korea from .12 to .21 and, finally, UK from .26 to .35.

2.1.3. Textiles products, leather and footwear

In this sector the VI index shows two different patterns. In some countries it drops between 1970 and 2003. In other it grows. In the first group we put Australia (.39 - .35), Germany (.43 -> .32), Italy (.40 -> .32) Mexico (.36 -> .32), US (.38 -> .34). In the second group we have Canada (.40 -> .42), France (.30 -> .33), Japan (.28 -> .43), Korea (.26 -> .33).

2.1.4. Wood and wood products

A similar divergent pattern applies in this sector. The countries where it drops are: Australia (.45 -> .36), Germany (.38 -> .35), Italy (.50 -> .36), US (.46 -> .36). Those where it increases are France (.31 -> .36) and Japan (.26 -> .34). In
Canada it stays almost constant at .36.

2.1.5. Pulp, paper

In this sector it seems that almost all countries show a drop in the index (France .41 -> .38; Germany .45 -> .40, Italy .40 -> .37, Korea .30 -> .27, Us .46 -> .41) except Japan (.34 -> .44). Only Canada stays unchanged:.44 -> .44.

2.1.6. Chemical rubber, plastics and fuel products

In this sector Canada (.32 -> .26), France (.38 -> .29), Germany (.38 -> .33), Italy (.30 -> .25) show a decrease in VI, while Japan (.38 -> .40), Korea (.23 -> .23) and US (.33 -> .33) display stability or an increase.

2.1.7. Basic metal products machinery and equipment

In this sector almost all countries show a decrease of VI except Japan (.31 -> .34). Canada (.36 -> .28), France (.36 -> .29), Germany (.44 -> .34), Italy (.44 -> .31), Korea (.28 -> .25), Mexico (.29 -> .26), Us (.44 -> .39).
2.1.8. Basic metals and fabricated metal products

Here we see a mixed trend since in some countries VI decreases while in others it increases: Canada (.45 -> .33), France (.44 -> .32), Germany (.48 -> .39), Italy (.45 -> .33), Japan (.38 -> .37), Korea (.30 -> .26), Mexico (.47 -> .41), Us (.26 -> .19).

2.1.9. Transport equipment

All countries see a decrease in VI: Canada (.29 -> .23), France (.27 -> .21), Germany (.42 -> .26), Italy (.40 -> .27), Japan (.33 -> .30), Korea (.42 -> .21), Mexico (.29 -> .27), Us (.45 -> .35).

2.1.10. Manufacturing nec.

Here again we have a mixed picture: Canada (.46 -> .43), France (.35 -> .38), Germany (.43 -> .38), Italy (.44 -> .31), Japan (.33 -> .35), Korea (.22 -> .30), Mexico (.44 -> .36), Us (.45 -> .47).
2.2. The indices of export orientation

The index of export orientation is the ratio of the value of exports of an industry over the value of its production and it is labelled XP.

2.2.1. Mining and quarrying (MQ)

This is an industry with very low levels of exports over production. For some advanced countries such as Japan (.01), Italy (.09) and US (.02) stayed low until 2003. Other countries such as Mexico had levels of exports much larger. However, almost all developed countries had low levels of exports.

2.2.2. Food, beverages and tobacco (FB)

In most countries we have seen an increase of the ratio of export on production over the last 33 years. (Australia .19 -> .22, Canada .08 -> .22; France .09 -> .23, Italy .04 -> .14, Us .02 -> .04. The important country that has experienced a decrease has been Japan (from .02 to .01).

2.2.3. Textiles products, leather and footwear (TX)

Here the picture is very close to that seen in the previous sector. In almost all countries we observe an increase in the export portion. (Australia (.04 -> .26),
Canada (.07 -> .36), France (.16 -> .50), Italy (.24 -> .42), Portugal (.20 -> .54),
UK (.15 -> .45), Us (.02 -> .13). As above Japan experienced a decrease (from .13
to .10).

2.2.4. Wood and wood products (WO)

Again we observe an increase for most countries (Australia (.01 -> .10), Canada
(.40 -> .60), France (.06 -> .17), US (.02 -> .04)) except Japan (.02 -> .00) and
Italy (.07 -> .07).

2.2.5. Pulp, paper (PP)

Here again all grow (Australia .01 -> .04; Canada .38 -> .41; France .07 -> .16;
Italy .07 -> .13, Us .03 -> .06) except Japan (.02 -> .02).

2.2.6. Chemical rubber, plastics and fuel products (CH)

Almost all countries show an increase in the index (Australia (.10 -> .19), Canada
(.11 -> .39), France (.12 -> .42), Italy (.15 -> .33), Japan (.06 -> .12), US (.00 ->
.14).
2.2.7. Basic metal products machinery and equipment (BM)

In this sector all countries show an increase of the ratio. Australia (.11 - .29), Canada (.40 - .70), France (.19 - .46), Italy (.23 - .42), Japan (.11 - .27), Us (.09 - .26).

2.2.8. Basic metals and fabricated metal products (BF)

Again all countries raise their ratio: Australia (.19 - .30), Canada (.30 - .40), France (.16 - .26), Italy (.09 -.21), Japan (.07 - .10), Us (.04 - .09).

2.2.9. Machinery and equipment (ME)

Again all countries raise the index: Australia (.04 - .35), Canada (.28 - .75), France (.18 - .57), Italy (.33 - .52), Japan (.13 - .34), Us (.11 - .34).

2.2.10. Transport equipment (TE)

All countries see an increase: Australia (.06 - .21), Canada (.66 - .83), France (.25 - .47), Italy (.26 - .55), Japan (.15 - .31), Us (.12 - .24).
2.2.11. Manufacturing nec (MEC)

Here most countries see a growth of the index (Australia (.05 -> .12), Canada (.06 -> .43), Italy (.13 -> .41), Us (.04 -> .15)) except Japan (.10 -> .07).
3. The econometric test

The purpose of this section is to test the hypothesis that a larger export orientation (index XP) of an industry pushes firms to adopt a leaner production organization that implies lower levels of VI (index V).

3.1. Over sectors

The first part of test is performed on single sectors and is reported in Table 1 below. The estimated equation is

\[ V_t = \alpha_i + \beta_i X P_t. \]

for \( t \in [1970, 2003] \) and \( i \in [1, 10] \).
<table>
<thead>
<tr>
<th>Sectors</th>
<th>Estimation</th>
<th>by sectors (i)</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta_i$ - s.d. - t</td>
<td>$\alpha_i$ - s.d. - t</td>
<td></td>
</tr>
<tr>
<td>BF</td>
<td>-.04 (.01)(-5.55)</td>
<td>34.98 (.40)(78.15)</td>
<td>-.06, -.01; 34.20, 35.76</td>
</tr>
<tr>
<td>BM</td>
<td>-.06 (.01)(-6.76)</td>
<td>36.78 (.43)(86.44)</td>
<td>-.07, -.04; 35.95, 37.62</td>
</tr>
<tr>
<td>CH</td>
<td>-.04 (.01)(-4.27)</td>
<td>30.60 (.40)(78.23)</td>
<td>-.06, -.02; 29.81, 31.38</td>
</tr>
<tr>
<td>FB</td>
<td>-.03 (.01)(-2.31)</td>
<td>25.86 (.29)(89.49)</td>
<td>-.05, -.00; 25.29, 26.43</td>
</tr>
<tr>
<td>ME</td>
<td>-.06 (.01)(-7.55)</td>
<td>41.24 (.49)(84.29)</td>
<td>-.08, -.05; 40.29, 42.21</td>
</tr>
<tr>
<td>MEC</td>
<td>-.11 (.01)(-9.12)</td>
<td>41.85 (.46)(90.48)</td>
<td>-.13, -.08; 40.94, 42.76</td>
</tr>
<tr>
<td>MQ</td>
<td>-.01 (.00)(-2.17)</td>
<td>59.11 (.87)(68.24)</td>
<td>-.02, -.00; 57.40, 60.81</td>
</tr>
<tr>
<td>PP</td>
<td>-.12 (.01)(-10.88)</td>
<td>40.77 (.28)(146.43)</td>
<td>-.14, -.10; 40.22, 41.32</td>
</tr>
<tr>
<td>TX</td>
<td>-.03 (.01)(-5.39)</td>
<td>36.93 (.34)(108.92)</td>
<td>-.05, -.02; 36.26, 37.59</td>
</tr>
<tr>
<td>TE</td>
<td>-.07 (.01)(-6.81)</td>
<td>33.17 (.58)(57.11)</td>
<td>-.09, -.05; 32.03, 34.31</td>
</tr>
<tr>
<td>WO</td>
<td>-.09 (.01)(-7.17)</td>
<td>36.19 (.38)(96.00)</td>
<td>-.12, -.07; 35.55, 36.93</td>
</tr>
</tbody>
</table>
As we can see from Table 1 in all sectors examined there is a negative and significant relationship between the degree of export orientation of a sector and its average degree of VI. If firms export more, relatively to production, they will be less vertically integrated, no matter whether this disintegration takes place on a domestic or an international basis.

This result applies for sectors that produce manufactured goods and also for the MQ sector which produces mostly raw materials. We do not analyze services since in most of them the export production is low or they have a short history of export orientation.

3.2. Over time

In this second part we go through the same relationship over time. We estimate the same coefficients on cross-sections relative to each year starting from 1970 and ending in 2003.

\[ V_i = \alpha_t + \beta_t X P_i. \]

The results are in a series of 4 Tables (Table 2A, 2B, 2C, 2D) since we have split the period 1970-2003 in 4 subperiods: 1970-73 (Table 2A), 1974-1980 (Table 2B), 1981-1987 (Table 2C), 1988-2003 (Table 2D).
TABLE 2A

<table>
<thead>
<tr>
<th>years</th>
<th>$\beta_t$ - s.d. - t</th>
<th>$\alpha_t$ - s.d. - t</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>-.02 (.05)(-.39)</td>
<td>36.18 (1.29)(27.96)</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>-.04 (.05)(-.88)</td>
<td>37.21 (1.26)(29.40)</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>-.02 (.04)(-.40)</td>
<td>36.93 (1.26)(29.36)</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>-.01 (.04)(-.26)</td>
<td>36.01 (1.20)(30.05)</td>
<td></td>
</tr>
</tbody>
</table>

As it can be seen from the above table, in this first period the coefficient $\beta$ has the expected sign. Unfortunately the degree of significance is insufficient - we do not report the figures for the "95% Confidence interval" since the interval contains zero making for non significantly different from zero coefficient. We may conclude that along this period the dependence of the degree of VI upon the export orientation tends to show the right sign even though it is totally insignificant. The period 1970-73 is a period of relatively scarce openness of markets. The EU is still made of six founding countries and has just completed (on the paper) the process of eliminating custom duties, since the third phase should terminate in 1969.
**TABLE 2B**

<table>
<thead>
<tr>
<th>Year</th>
<th>β</th>
<th>t</th>
<th>β</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>.02</td>
<td>.04</td>
<td>.49</td>
<td>33.44</td>
</tr>
<tr>
<td>1975</td>
<td>.03</td>
<td>.04</td>
<td>.82</td>
<td>33.87</td>
</tr>
<tr>
<td>1976</td>
<td>.04</td>
<td>.04</td>
<td>1.08</td>
<td>33.29</td>
</tr>
<tr>
<td>1977</td>
<td>.04</td>
<td>.04</td>
<td>1.15</td>
<td>32.91</td>
</tr>
<tr>
<td>1978</td>
<td>.04</td>
<td>.04</td>
<td>1.07</td>
<td>33.45</td>
</tr>
<tr>
<td>1979</td>
<td>.02</td>
<td>.04</td>
<td>.63</td>
<td>33.04</td>
</tr>
<tr>
<td>1980</td>
<td>.02</td>
<td>.04</td>
<td>.49</td>
<td>32.26</td>
</tr>
</tbody>
</table>

In this second period we have that β has the wrong sign, even though it is insignificantly different from zero - which belongs to the confidence interval. This is a period of gradual opening of economies even though it appears that the internal organization of firms is not liable to change that much as a result of that. Most firms innovate their production process, for instance by introducing automated processes, i.e. by doing quite a lot of process innovating R&D. Yet the degree of control of the vertical chain of production remains quite unaffected by trade.
<table>
<thead>
<tr>
<th>Year</th>
<th>β Structure</th>
<th>β Value (S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>-.00 (.03) (-.05)</td>
<td>32.70 (1.22) (26.78)</td>
</tr>
<tr>
<td>1982</td>
<td>-.02 (.03) (-.48)</td>
<td>33.34 (1.20) (27.89)</td>
</tr>
<tr>
<td>1983</td>
<td>-.02 (.03) (-.65)</td>
<td>33.65 (1.19) (28.24)</td>
</tr>
<tr>
<td>1984</td>
<td>-.03 (.03) (-.92)</td>
<td>33.65 (1.19) (28.25)</td>
</tr>
<tr>
<td>1985</td>
<td>-.04 (.03) (-1.29)</td>
<td>34.12 (1.16) (29.33)</td>
</tr>
<tr>
<td>1986</td>
<td>-.04 (.03) (-1.65)</td>
<td>35.79 (1.06) (33.62)</td>
</tr>
<tr>
<td>1987</td>
<td>-.03 (.03) (-1.31)</td>
<td>35.43 (1.02) (34.68)</td>
</tr>
</tbody>
</table>

In Table 2C we have another period of increasing openness where the β coefficient has the right sign but it is not significantly different from zero. As it can be seen the significance of the coefficient grows from 1985 onwards. This proves that the coefficient is becoming significantly different from zero and we are going towards a sort of confirmation of our hypothesis. The years between 1981 and 1987 are a period of increasing openness. The EU gets larger and the last round of Gatt, the Uruguay round (1986-1994) is on and will shortly give rise to the WTO in January 1995.
<table>
<thead>
<tr>
<th>Year</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>-.12 (.03)(-3.53)</td>
<td>39.45 (1.28)(30.81)</td>
<td>-.18, -.05; 36.92, 41.98</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>-.12 (.03)(-3.95)</td>
<td>39.37 (1.24)(31.89)</td>
<td>-.19, -.06; 36.93, 41.81</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>-.12 (.03)(-4.12)</td>
<td>39.33 (1.16)(32.80)</td>
<td>-.18, -.06; 37.04, 41.63</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>-.14 (.03)(-4.99)</td>
<td>40.59 (1.11)(36.47)</td>
<td>-.20, -.09; 38.40, 42.79</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>-.13 (.03)(-5.20)</td>
<td>40.75 (1.05)(38.75)</td>
<td>-.18, -.08; 38.68, 42.83</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>-.13 (.02)(-5.15)</td>
<td>40.34 (1.02)(39.25)</td>
<td>-.18, -.08; 38.31, 42.37</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>-.11 (.02)(-4.68)</td>
<td>39.22 (1.02)(38.29)</td>
<td>-.16, -.06; 37.20, 41.24</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>-.13 (.02)(-5.39)</td>
<td>39.96 (1.05)(37.80)</td>
<td>-.18, -.09; 37.88, 42.05</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>-.12 (.02)(-5.38)</td>
<td>39.71 (1.01)(39.31)</td>
<td>-.16, -.08; 37.71, 41.70</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>-.11 (.02)(-5.37)</td>
<td>38.98 (.99)(39.19)</td>
<td>-.15, -.07; 37.02, 40.94</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>-.11 (.02)(-5.71)</td>
<td>39.29 (.98)(40.19)</td>
<td>-.15, -.07; 37.36, 41.21</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>-.10 (.02)(-5.41)</td>
<td>39.05 (.97)(40.08)</td>
<td>-.14, -.06; 37.13, 40.97</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>-.10 (.02)(-5.93)</td>
<td>38.05 (.98)(38.95)</td>
<td>-.14, -.07; 36.13, 39.98</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>-.10 (.02)(-5.78)</td>
<td>38.07 (1.02)(37.20)</td>
<td>-.14, -.07; 36.05, 40.09</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>-.09 (.02)(-5.01)</td>
<td>37.71 (1.05)(36.08)</td>
<td>-.12, -.05; 35.65, 39.78</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>-.08 (.02)(-3.64)</td>
<td>37.13 (1.41)(26.28)</td>
<td>-.12, -.04; 34.33, 39.93</td>
<td></td>
</tr>
</tbody>
</table>
The above Table 2D covers the years of hype of the Second Great Globalization. Some crucial events took place during those years. The establishment of the single market in the EU, the starting of the UEM, the birth of the WTO. During this period it seems that the relationship gets quite significant and confirms totally our prior that larger export orientation boosts the degree of vertical disintegration in manufacturing sectors. In other words trade influences strongly the degree of control of the vertical process.

4. Conclusions

Few conclusions seem to be required to sum up the results of our simple preliminary tests of the dependence of VI on the degree of export orientation of firms. Our analysis has gone through 10 individual sector time series and cross sections over the last 33 years.

In the first set of tests we have seen that in all manufacturing sectors a higher export orientation tends to induce lower levels of VI. This result was also confirmed in qualitative analysis of data. The most clear case was provided by Japan, where the sectors which decreased the proportion of export over production over time saw also an increase in VI.

In the second set of tests we saw that the evolution of the relationship between
export orientation and VI can be split in 4 phases according to the sign and significance of the coefficient that shows the dependence of VI upon export over production.

In the first phase (1970-73) there is an inverse yet not significant relationship. VI seems to slightly react inversely to export orientation but the confidence of this statement is quite low.

In the second phase (1974-1980) the relationship stays non significant and shows even a wrong "sign" to witness that the vertical organization of firms follows patterns unrelated to export orientation.

In the third phase (1981-1987) the sign turns again the right direction but it is still insignificant, even though at the end of the period the degree of significance increases.

In the fourth and last phase (1988-2003) the coefficient is negative and significant. The hype of globalization seems to be there to explain the change in the vertical organization of firms in our 27 country sample.
References


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