

The Trade Impact of ISO 9000 Certifications and International Cooperation in Accreditation

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Abstract

While it is widely acknowledged that international standards facilitate trade, much less is known about certification requirements and mutually recognition of certification results. In our paper, we examine the impact of ISO 9000 certifications and the multilateral recognition arrangement for international acceptance of ISO 9000 certificates of the International Accreditation Forum (IAF-MLA) on trade in manufacturing goods. Using a gravity model, we find that certification intensity- the percentage of ISO 9000 certificated establishments in the manufacturing sector- promotes trade. Signatories of the IAF-MLA significantly trade more with each other and the trade enhancing effect has about the same magnitude as regional trade agreements. Our analysis shows that IAF-MLA is most important for exporters from less developed countries aiming to access markets in developed countries. For policy makers, our results show the importance of technical assistance for accreditation services in developing countries.

Key Words: Standardization, Certification, Accreditation, International Trade, Gravity Mode

1. Introduction

When discussing international trade, economists put much importance on comparative advantage, network effects and the countries' factor endowment. However, the neo-classical and new-trade theories predict much higher volumes of trade than what is actually observed. Trefler (1995) labeled this phenomenon 'the mystery of missing trade' and McCallum (1995) provides seminal empirical evidence by showing that the volume intra-national trade exceed the volume of international trade. After controlling for trade barriers, he shows that Canadian provinces trade 12 to 20 times more with each other than with nearby U.S. states. Consecutive studies confirm the 'home market effect.' Domestic trade volumes are usually five to twenty times larger than international trade volumes (Chen 2004).

What can explain the missing trade volumes? Costs of international trade in developed countries are still high and represent 170% of the traded value (Anderson and van Wincoop 2004) but only a small part can be attributed to traditional barriers such as tariffs and quotas. Non-traditional trade barriers such as asymmetric or incomplete information (Akerlof 1970) regarding product quality or trustworthiness of trading partners lead to higher transaction costs and less trade. A lower level of trust is particularly burdensome for developing countries, because consumers associate product quality with income per capita of the country of origin (Hudson and Jones 2003). Recently, empirical research has put much emphasis on how increased levels of trust lowers transaction costs and increases international trade and collaborations (den Butter and Mosch 2003; Guiso, Sapienza, and Zingales 2009; Zaheer and Zaheer 2006).

How can we increase the level of trust between trading partners? The application of international standards may very well help to reduce transaction costs and increase trade (Hudson and Jones 2003; Blind and Jungmittag 2005; Swann 2010; WTO 2005; Mangelsdorf 2011; Clougherty and Grajek 2011, 2008; Potoski and Prakash 2009). International standards define common expectations on the product performance, and can increase trust regarding the compatibility of the partners' joint production (WTO 2005).

Our study concerns the most widely used international standard, the ISO 9000 standards family for quality management systems. We use the year 2000 version of the standard family which consists of several standards. ISO 9000:2000 defines fundamental terms of quality management. ISO 9001:2000 specifies requirements for a quality management system and ISO 9004:2000 provides guidelines for performance improvements. Of these standards, only ISO 9001:2000 is certifiable while ISO 9000:2000 and ISO 9004:2000 provide guidance and information (ITC 2001). For reasons of readability, we use the term 'ISO 9000 certificates' instead of 'ISO 9001:2000 certificates'.

We use an extended gravity model to show how the world-wide diffusion of ISO certificates affects bilateral trade. We hypothesize that increasing certification intensity is associated with increased trustworthiness and more bilateral trade. Moreover, we expect a positive trade effect when countries recognize the ISO 9000 certificates issued by foreign certification bodies. Mutual recognition is achieved when the accreditation bodies are signatories of the multilateral recognition arrangement (MLA) promoted by the International Accreditation Forum (IAF) -- the global organization of accreditation bodies.

The remainder of our paper is organized as follows. In the next section we present the system of standardization, certification and accreditation and how it impacts trade. In the third section we examine the impact of ISO 9000 certification and mutual recognition of certification results in a gravity model covering the trade in manufacturing goods from 2001 to 2008. In the fourth section we present and discuss our results. We conclude our analysis and give recommendations for future research in the fifth section.

2. Standardization, Certification and Accreditation

Standardization and Certification

Before we start our empirical investigation on the role of certifications and multilateral recognition arrangement for ISO 9000 certifications, we briefly sketch the literature on standardization, certification and accreditation. ISO 9000 is the most successful international management standard issued by the International Organization for Standardization (ISO). By the end of 2008, almost one million certificates have been issued in 176 countries (ISO 2008). The standard codifies international management practices and is the foundation for certification. In order to obtain certification, firms require an audit by a certification body (King, Lenox, and Terlaak 2005).

Despite the wide diffusion of ISO 9000 certifications the trade impact received relatively little attention. Exceptions are the macro studies from Clougherty and Grajek (2011, 2008) and Potoski and Prakash (2009) and the firm level study from Martincus et al. (2010). Clougherty and Grajek (2008) focus on the effect of ISO 9000 diffusion on trade and foreign direct investment (FDI) for the period 1995-2002. They find that ISO 9000 has no effect on trade and FDI in developed nations but has a positive 'pull' effect for inwards FDI for developing countries. Moreover, the ISO 9000 certifications have a 'push' effect for exports from developing countries to developed countries. The 'push' effect for developing countries exports is also confirmed by Potoski and Prakash (2009) and in micro level study from Martincus et al. (2010). The latter use firm level data from Argentina in the period 1998 to 2006 and show that ISO 9000 certification leads to expand the volumes of exports and also in terms of the number of destination countries.

However, the macro level study from Clougherty and Grajek (2011) comes to contrary results. The authors study the effect of ISO 9000 adoptions on bilateral trade flows for 91 nations between 1995 and 2005 and find that ISO 9000 standards reduced exports from developing or transition countries to developed countries. The authors suggest that for those countries the certification costs outweigh trade promoting effects of certification. In fact, a recent survey of business from developing countries on non-tariff measures shows that a large part of the identified trade barriers are certification requirements imposed by the exporting country (Ferrantino 2012). Thus, it has to be kept in mind that adoption of international standards cannot be automatically translated into increased export performance.

Accreditation and International Cooperation in Accreditation

Besides the costly and time consuming certification process, the trade effect of ISO 9000 certifications also depends on the stringency and reputation of the certification body (Hudson and Jones 2003). The quality signaling effect of ISO 9000 is questioned when there is doubt about the auditing competencies of the certification body. This is problematic for countries with a reputation of low-quality performance.

One way to increase the trust in the certification body is the creation of accreditation bodies. An accreditation body is an organization that confirms the auditing competency of conformity assessment bodies (Busch 2010). In short, the accreditation body certifies the certifier. Monitoring and surveillance among accreditation bodies happens through a series of peer-evaluations. The network of accreditation bodies confirms their competencies to accredit certification bodies (WTO 2011). More than 60 national accreditation bodies exist today (Donaldson 2005). At the same time, two major international accreditation associations emerged to support the system of certification and accreditation. The International Accreditation Forum (IAF) is responsible for accreditors of certification bodies and the International Laboratory Accreditation Cooperation (ILAC) is the global network for accreditation of testing and calibration laboratories (Busch 2011). Both organizations seek to create multilateral recognition agreements among its members. IAF established together with a range of regional accreditation groups (e.g. EA – European Cooperation for Accreditation or PAC – Pacific Accreditation Cooperation) a ‘multilateral mutual recognition arrangement’ (MLA) for the ISO 9000 quality management system standard. Accreditation bodies can become signatories of the MLA when their operations are successfully evaluated by peer evaluation teams to ensure that signatories comply with relevant international standards and IAF rules (Sarin 2001).

The signatories of the MLA must recognize certificates issued by certification bodies accredited by other accreditation bodies of the MLA. For business it means that all certifications bodies operate on the basis of the same standard as those in their home country (WTO 2011). According to the WTO’s World Trade Report, mutual recognition of accreditation sys-

tems is an advanced form of trust building cooperation which lowers the costs of exports (WTO 2012).

In sum, the level of trust in ISO 9000 certifications is larger when the certification body is approved by an accreditation body which is a signatory of the IAF-MLA. It is reasonable to assume that certification bodies from signatory countries will increase their reputation for auditing competencies. Consequently, firms from less developed countries should benefit most from the MLA. In the next section we will examine the effect of ISO certification and the IAF-MLA in a gravity model.

3. The Gravity Model

Data Sources and Descriptive Statistics

In this section, we describe our data and provide descriptive statistics for the main variables. Volumes of bilateral manufacturing exports for the years 2001-2008 are taken from United Nation Statistical Division's COMTRADE Database. The volumes of world manufacturing exports are increasing from 4.1 billion USD in 2001 to 9.1 in 2008 (Figure 1).

[Insert Figure 1 here]

Data on the number ISO 9000 certifications per country are compiled from the 2001 to 2008 issues of *The ISO Survey of Certifications*. The survey is published by the ISO secretariat on an annual basis and compiles data from ISO national member institutes, accreditation and certification bodies (ISO 2008). Instead of using the certification count data as in Clougherty and Grajek (2011) and Potoski and Prakesh (2009) we calculate the certification intensity per country by dividing the number of certifications by the number of establishments per country. The numbers of establishments are taken from the UNIDO Industrial Statistics Database. By using the intensity, we avoid that the absolute growth of ISO certifications is triggered by economic growth and increasing numbers of firms. Figure 2 depicts that average certification intensity in our sample is increasing from 0.52 percent in 2001 to 9.45 in 2007 and fell to 7.57 percent in 2008.

[Insert Figure 2 here]

The final variable of interest is the multilateral recognition of certification results for ISO 9000 certificates -- the IAF Multilateral Recognition Arrangement for Quality Management Systems (IAF-MLA). The arrangement was signed by 14 IAF members in January 1998 and by the end of 2008 40 members signed the MLA. Information on signatories of the IAF-MLA is available on the IAF homepage (www.iaf.nu). In Figure 3 we show the evolution of the number of signatories from 2001 to 2008.

[Insert Figure 3 here]

Empirical strategy

To test the trade effect of ISO 9000 certifications and the IAF-MLA, our empirical strategy consists of two steps. First, we examine the trade effect in a model that uses developed as well as less developed countries as exporters and importers. Then, in a second step, we segment the data into four sub-samples: a sample for developed countries (DC→DC), a sample for less developed countries (LDC→LDC), and two subsamples where the developed country is the exporter and the less developed country is the importer and vice versa (DC→LDC, LDC→DC). This approach is similar to Clougherty and Grajek (2008).

We base our empirical investigation on an extended gravity model widely used in the trade literature (Anderson and van Wincoop 2003). The gravity model has been used as ‘work-horse model’ to explain trade flows in many applications. It explains the magnitude of bilateral trade flows with the economic size and the geographical distance between them (van Bergeijk and Brakman 2010). More specifically, our extended gravity model looks as follows:

$$\begin{aligned} \ln X_{ijt} = & \beta_0 + \beta_1 \ln GDP_{jt} + \beta_2 \ln GDP_{it} + \beta_3 TARIFF_{ijt} + \beta_4 \ln DIS_{ij} \\ & + \beta_5 \ln CON_{ij} + \beta_6 \ln LAG_{ijt} + \beta_7 COL_{ijt} + \beta_8 SMC_{ijt} + \beta_9 RTA_{ijt} \\ & + \beta_{10} IAFMLA_{ijt} + \beta_{11} ISO9000_{jt} + \beta_{12} ISO9000_{it} \\ & + \delta_{it} + \delta_{jt} + \delta_t + \varepsilon_{ijt} \end{aligned} \quad (1)$$

where:

X_{ijt} is the value of exports from country i to country j in year t in U.S. dollars;

GDP_{it} and GDP_{jt} are the gross domestic products country i and country j in year t in U.S. dollars;

Tariff_{ijt} is the tariff imposed by country i on country j’s exports in year t;

DIS_{ij} is the geographical distance between country i and country j;

CON_{ij} is a dummy variable indicating whether country i and country j are contiguous;

LAG_{ij} is a dummy variable indicating whether country i and country j share a common language

COL_{ij} is a dummy variable indicating whether country i was a colony of country j;

SMC_{ij} is a dummy indicating whether country i and country j were/are the same country;

RTA_{ijt} is a dummy variable indicating whether country i and country j are in the same regional trade agreement in year t ;

$IAFMLA_{ijt}$ is a dummy variable indicating whether country i and country j are signatories of the IAF-MLA in year t ;

$ISO9000_{it}$ and $ISO9000_{jt}$ are ISO 9000 certification intensities, i.e. the ratio of certifications and the number of establishments per country in year t ;

δ_{it} , δ_{jt} and δ_t are importer-year dummies, exporter-year dummies and time dummies;

\mathcal{E}_{ijt} is an error term.

Data sources for bilateral exports, ISO 9000 certification intensities and IAF-MLA are stated above. Data on GDP comes from the World Bank's World Development Indicators (WDI) Database and tariffs are from the World Integrated Trade Solution (WITS) TRAINS Database. Geographical distance, contiguity, common language, colony, and same country are provided by the *Centre d'Etudes Prospectives et d'Information Internationales* (CEPII). Information on regional trade agreements come from the World Trade Organization's Regional Trade Agreements Information System (RTA-IS). Table 1 shows descriptive statistics for our model variables.

We estimate equation (1) using ordinary least square (OLS) with standard errors robust to heteroskedasticity. The interaction of importer-year dummies control for characteristics specific to an importer a given year, such as political shocks, and the interaction of exporter-year dummies control for shocks at the exporter-year level, such as export subsidies. Year dummies control for importer and exporter invariant macroeconomic shocks.

[Insert Table 1 here]

4. Results

Estimation results of the baseline model are reported in Table 2. Our preferred estimation is presented in column 4 where we include importer-time dummies, exporter time dummies and time dummies. From the R^2 statistics, we can see that our model performs well since we can explain 78 percent of the variation in bilateral trade. The coefficients have the expected signs: Gross Domestic Products of the importing and exporting country have a positive influence and are statistically significant at the 1 percent level. The coefficients for tariff and distance are negative, while contiguity, a common language, former colonial ties and same country are positive and highly significant. Belonging to the same regional trade agreement

increases trade. With regard to our variables of interest, the results confirm our expectations. The variable that captures the effect of the IAF-MLA positively effects trade and is statistically significant at the one percent level. Interestingly, the magnitude of the estimated coefficient for the IAF-MLA and the regional trade agreement are similar. Obviously, signatories of the IAF-MLA enjoy increased levels of trust in the auditing competences of domestic certification bodies which in turn increases the signaling effect of the ISO 9000 certifications. Regarding the certification intensity of the importing country and the exporting country, our results can confirm the expected positive influence on bilateral exports. When comparing the relative impact, the results show that exporter intensity is larger than importer intensity. The result makes perfect sense since the exporting certification intensity is associated with the signaling effect of ISO 9000 whereas this effect is missing for the importing country. The trade effect of certification intensity is limited to the common language properties of the ISO 9000 standard.

[Insert Table 2 here]

Now we turn to the Country Model in Table 3. We segmented the data and created four subsamples: One sample for developed countries (DC→DC), one sample for less developed countries (LDC→LDC), and two subsamples where the developed country is the exporter and the less developed country is the importer and vice versa (DC→LDC, LDC→DC). We use the World Bank Atlas method to divide the countries into developed and less developed countries. The World Bank Atlas method uses the Gross National Income per capita to create four income groups: low-income, lower middle income, upper middle income, and high income. For our purposes we define all high-income countries as developed countries and the remaining countries as less-developed countries.

The results in all four models shown in Table 2 are qualitatively similar to the baseline model of Table 3, but show interesting differences with regard to the variables of main interest. The coefficients for the economic mass variables (i.e. GDP of the importing and exporting countries) are positive and statistically significant and close to unity. Tariff and geographical distance have a negative effect on bilateral exports. The negative effects of tariffs and distance are largest for trade between less developed countries (column 2). The other gravity variables (contiguity, a common language, former colonial ties and same country) are qualitatively similar to the baseline model but colony has no impact for trade between developed countries. Regional trade agreements have a positive and statistically significant effect except for developed countries exports to less developed countries. The trade agreement effect is largest for exports from less developed countries to developed countries.

With regard to the variables of main interest, i.e. the IAF-MLA and ISO 9000 certification intensities in the importing and exporting country, we see from column 1 and 4 that the IAF-MLA has no statistically significant effect for exports of developed countries. In contrast, the variable for IAF-MLA membership is highly significant when the less developed country is the exporter (column 2 and 3). Comparing the magnitude of the IAF-MLA variable reveals that

the effect is larger for exporters from less developed countries aiming to access markets in developed countries. Obviously, buyers from developed countries are more suspicious regarding the quality of the auditing competencies of certification bodies from less developed than buyers from less developed countries. Signatories of the IAF-MLA increase the levels of trust of their certification bodies and are better able to access markets in less developed and developed countries. We interpret the insignificant effect of the IAF-MLA for exporters from developed countries with the absence of distrust in the auditing competencies of their certification bodies.

The variables for ISO 9000 certification intensities show different 'push' and 'pull' effects. The ISO 9000 certification intensity in the importing country is positive and statistically significant in columns 1 and 3. In other words, we only observe a 'pull' effect of ISO 9000 certifications when the importing country is developed. In contrast, ISO 9000 certification intensity for the exporting countries is positive and statistically significant in all four models. There is always a 'push' effect.

[Insert Table 3 here]

In sum, our results confirm the trade enhancing potential of ISO 9000 certifications. We find in our empirical analysis that ISO 9000 certification intensity in the exporting country signals quality performance of firms to potential buyers. The results confirm that ISO 9000 can lower information asymmetries between sellers and buyers, lower transaction cost and increase trade. Our results are in line with previous studies from Clougherty and Grajek (2008) and Potoski and Prakesh (2009) who could also find a positive trade effect especially for developing countries aiming to access markets in developed countries. Our results cannot confirm that ISO 9000 represents a barrier to trade as for developing countries as in Clougherty and Grajek (2011). Moreover, our model provides -- for the first time -- empirical evidence on the trade effect of mutual acceptance of certification results. We show that becoming a signatory of the IAF-MLA is particularly important for less developed countries. Our results reveal that signatories of the IAF-MLA from less developed countries enjoy better market access to developed as well as less developed countries through increased levels of trust in the auditing competences of local certification bodies.

5. Conclusion

The international trade literature has identified that missing trust between trading partners leads to less trade (Guiso, Sapienza, and Zingales 2009; den Butter and Mosch 2003) and that the use international standards can increase trust between trading partners (WTO 2005). In particular, the most widely used international standard the ISO 9000 standards family for quality management system can reduce information asymmetries, signal quality, and increase trust between trading partners. However, previous empirical studies also found that

cost of certification with the standard prevents firms from developing countries to access markets in developed countries (Clougherty and Grajek 2011) or that reputation problems of the auditing competencies of the certification bodies in developing countries undermine the quality signaling effect of ISO 9000 certifications (Hudson and Jones 2003).

Building on these studies, our analysis presents new empirical evidence on how trading partners can increase levels of trust. The focus of our study is the effect of ISO 9000 certification diffusion in the importing and exporting country on the one hand and the mutual acceptance of certification results through membership of the IAF-MLA on the other. Methodically, we extend previous approaches by not relying on simply counting data of ISO 9000 certifications -- as in Clougherty and Grajek (2008, 2011) or Potoski and Prakesh (2009) -- by using the certification intensity, i.e. percentage of ISO 9000 certified firms, and by taking the effects of international cooperation in accreditation into account.

Our results confirm that ISO 9000 certification has a positive effect on bilateral exports both through 'pull' and 'push' effects. Obviously, ISO 9000 certifications are able to reduce information asymmetries between potential buyers and sellers which leads to more trade. The segmentation of our dataset in sub-samples for exporters from developed and less developed countries reveals that the ISO 9000 signaling effect is independent from the per capita income of the source and destination countries. In other words, firms both from developed and less developed countries profit from ISO 9000 certification. Our results show that especially less developed countries benefit from signing the IAF-MLA. The country model shows that exporters from less developed countries significantly export more to developed as well as less developed countries when both trading partners are signatories of the IAF-MLA. Obviously, signatories of the IAF-MLA enjoy increased levels of trust in the auditing competencies of domestic certification bodies which increases the trust in the ISO 9000 certifications.

From a policy perspective, our results imply that the implementation of international standards -- and ISO 9000 in particular -- in less developed countries helps to reduce reputation problems and is therefore a policy tool to overcome less developed countries structural disadvantages. However, it is not enough for firms to signal quality performance through ISO 9000 application. It is also important to increase the trust in the auditing competences of the certification body. The international network of accreditation bodies has developed an agreement (the IAF-MLA) that verifies equivalent accreditation programs through peer-evaluation among members. Joining the MLA leads to world wide acceptance of certification results and market access. Policy makers have to take into account that it is not only the harmonization of standards, but also that harmonization of requirements for accreditation bodies that affects trade. For developing countries our results imply that technical assistance for accreditation bodies is useful when it leads to technical competent institutions ready to become members of the IAF-MLA.

Finally, we discuss the limitations of our study and point to future applications. We find in our analysis that the variable capturing the effects of the IAF-MLA is insignificant for trade between developed countries. However, it does not mean that the IAF-MLA has no trade effect for developed countries at all. Instead, we propose to perform analyses based on more sectoral disaggregated trade and certification data that takes different relevance of trust intensiveness of sectors into account.

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Tables & Figures

Table 1: Descriptive Statistics

Variable	Observations	Mean	Standard De- viation	Min	Max
Log of Exports	59819	8.06	3.83	-7.83	19.12
Log of GDP importing country	59819	24.8	1.98	19.89	30.09
Log of GDP exporting country	59819	24.94	1.84	21.04	30.09
Tariff	59819	-2.81	1.42	-20.11	0.92
Log of Distance	59819	8.67	0.82	4.09	9.9
Contiguity	59819	0.03	0.16	0	1
Common language	59819	0.15	0.36	0	1
Colony	59819	0.02	0.14	0	1
Same country	59819	0.01	0.1	0	1
RTA	59819	0.12	0.32	0	1
MLA for ISO 9000	59819	0.11	0.31	0	1
ISO 9000 Imp	59819	-6.04	3.5	-13.17	0.35
ISO 9000 Exp	59819	-5.88	4.75	-13.23	10.13

Table 2: Baseline Model

	1	2	3	4
	Baseline	Baseline	Baseline	Baseline
Log of GDP importing country	0.886 (149.04)***	0.898 (150.37)***	0.912 (71.48)***	0.966 (63.79)***
Log of GDP exporting country	1.225 (180.01)***	1.214 (178.30)***	1.203 (178.36)***	1.211 (66.37)***
Tariff	-0.137 (25.99)***	-0.145 (27.43)***	-0.149 (26.54)***	-0.057 (8.53)***
Log of Distance	-1.509 (123.13)***	-1.507 (123.37)***	-1.691 (131.15)***	-1.652 (128.12)***
Contiguity	0.892 (16.34)***	0.895 (16.30)***	0.774 (13.78)***	0.75 (12.85)***
Common language	0.573 (22.24)***	0.557 (21.72)***	0.239 (8.86)***	0.803 (30.02)***
Colony	0.701 (12.61)***	0.681 (12.30)***	0.694 (11.95)***	0.553 (10.41)***
Same country	0.494 (5.43)***	0.492 (5.39)***	0.549 (5.87)***	0.643 (6.32)***
RTA	0.527 (19.24)***	0.501 (18.31)***	0.398 (13.86)***	0.344 (12.49)***
MLA for ISO 9000	1.091 (40.65)***	1.100 (41.14)***	1.043 (35.26)***	0.328 (11.84)***
ISO 9000 Imp	0.030 (10.37)***	0.036 (12.36)***	0.070 (6.64)***	0.060 (5.48)***
ISO 9000 Exp	0.093 (33.37)***	0.101 (35.89)***	0.121 (42.36)***	0.146 (14.35)***
Constant	-31.326 (135.81)***	-30.906 (133.73)***	-28.967 (76.23)***	-30.541 (58.97)***
Observations	59819	59819	59819	59819
R-squared	0.66	0.66	0.70	0.78
Exporter-Year Dummies	No	No	No	Yes
Importer-Year Dummies	No	No	Yes	Yes
Year Dummies	No	Yes	Yes	Yes

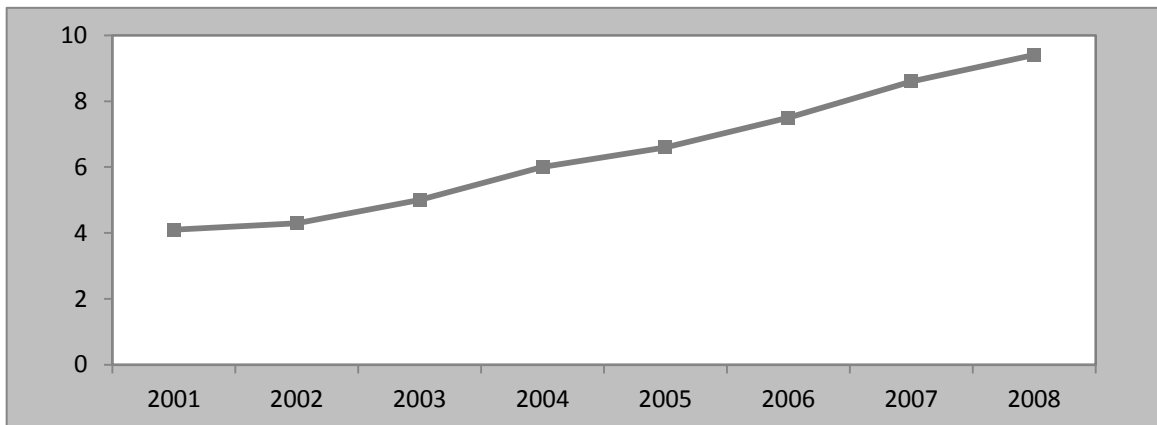
Notes: The dependent variables are bilateral exports. The asterisks represent the level of significance: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in brackets.

Table 3: Country Model

	1	2	3	4
	DC →DC	LDC→LDC	LDC→DC	DC→ LDC
Log of GDP importing country	0.966 (28.58)***	0.900 (28.62)***	0.969 (35.06)***	1.248 (35.88)***
Log of GDP exporting country	1.055 (27.94)***	1.251 (35.07)***	1.228 (34.84)***	1.204 (30.28)***
Tariff	-0.088 (5.95)***	-0.136 (7.24)***	-0.084 (7.37)***	-0.039 (1.69)*
Log of Distance	-1.284 (34.71)***	-1.773 (80.62)***	-1.698 (53.36)***	-1.714 (62.83)***
Contiguity	0.675 (6.61)***	0.616 (8.27)***	0.281 (1.27)	0.622 (3.84)***
Common language	0.301 (4.19)***	1.076 (23.32)***	0.221 (4.06)***	0.586 (11.21)***
Colony	0.004 (0.04)	0.998 (7.95)***	0.869 (10.79)***	0.973 (11.09)***
Same country	0.834 (6.71)***	0.44 (3.36)***	1.972 (6.22)***	0.485 (1.39)
RTA	0.815 (12.01)***	0.611 (14.26)***	0.936 (8.01)***	0.41 (4.16)***
MLA for ISO 9000	0.048 (0.72)	0.22 (3.11)***	0.422 (6.45)***	-0.032 (-0.54)
ISO 9000 Imp	0.106 (4.83)***	0.027 -1.10	0.087 (3.98)***	0.006 (0.30)
ISO 9000 Exp	0.158 (6.84)***	0.207 (10.60)***	0.053 (3.14)***	0.289 (12.17)***
Constant	-27.856 (22.50)***	-29.005 (28.25)***	-29.526 (21.86)***	-36.277 (32.32)***
Observations	8751	21430	12875	16763
R-squared	0.85	0.72	0.82	0.80

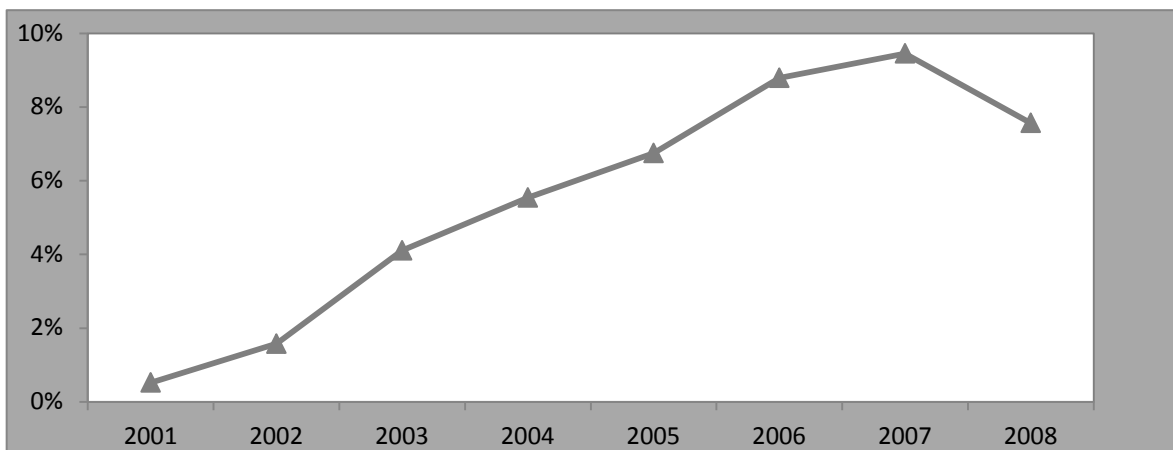
Notes: The dependent variables are bilateral exports. All estimates include exporter-year dummies, importer-year dummies and year dummies. The asterisks represent the level of significance: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in brackets.

Figure 1: World Manufacturing Exports 2001-2008



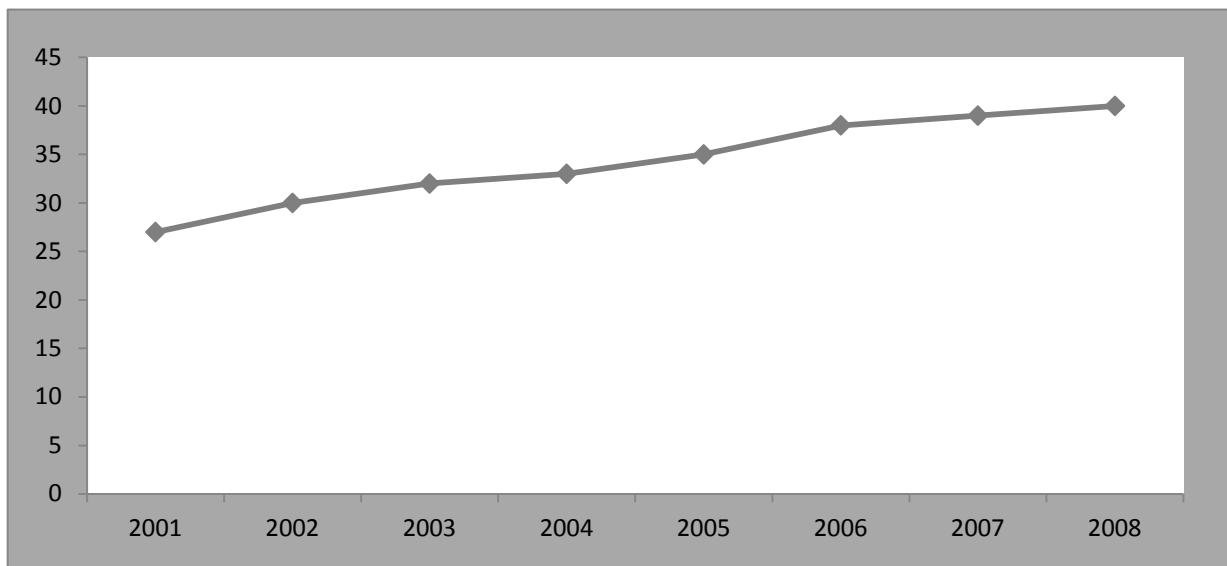
Source: COMTRADE Database

Figure 1: ISO 9000 Certification Intensity 2001-2008



Source: Authors calculation based on ISO Survey of Certifications and UNIDO Industrial Statistics Databases

Figure 3: Number of IAF-MLA Signatories 2001-2008



Source: www.iaf.nu