



Paper to be presented at
DRUID-Asia, Singapore, February 23-25, 2016
Co-organized by DRUID, NUS Business School and SMU - Lee Kong Chian
School of Business.

Paving the path: Trade effects of standardization participation

Maximilian Von Laer
Technische Universität (TU) Berlin
Chair of Innovation Economics
maximilian.vonlaer@innovation.tu-berlin.de

Abstract

Several studies investigating the trade effects of standardization have found a positive impact of the number of standards that is applied in a country on its export figures. Using a novel panel dataset on the ISO participation of China, Japan and South Korea (Korea) we investigate how prior participation in standard setting institutions like the ISO can be a predictor for export growth. Using data on patent applications, we disentangle an innovation effect from the pure effect of standardization. We find that China, which has increased its activity in international standardization significantly in the last decade, exports more in the respective sectors in the years following the standardization participation. This may hint toward path dependencies in the standardization system and thus the strategic relevance of standardization participation. The results for Korea and Japan on the other hand are not significant.

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Working Paper version 01.2016 - 2

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¹ Many thanks to Hannah Kropla for excellent research assistance. I am also grateful for the many suggestions and discussions at seminars and with colleagues at the TU Berlin. Funding from the German Research Foundation (DFG) is gratefully acknowledged.

² TU Berlin

³ E.g. Mangelsdorf (2011), Blind and Ramel (2014)

⁴ Patstat data kindly provided by the World Intellectual Property Organization (WIPO)

Introduction

Standardization is an important factor for innovation and its dissemination, both within a country and internationally⁵. The trade effect of standardization and of the amount of standards active within a country or economy has already been investigated by several scholars and is mostly found to be positive for international standardization⁶.

Considering the importance of standards for the economy⁷, surprisingly little is known about motives to participate in standardization⁸. This paper tries to shed some light on this question by investigating the effect of standardization participation within the International Organization for Standardization (ISO) on the exports in the respective International Classification of Standards (ICS) classes. Using a novel panel data set on the standardization participation of three major Asian economies, namely China, Japan and Korea, we investigate whether holding one or several secretariats⁹ within one ICS class has a significant effect on exports within this class.

The recent surge in Chinese participation in international standardization is in line with its strategy formulated in 2005¹⁰ and provides a good setting for this investigation. In 2004, China held the secretariats of just nine committees or subcommittees within ISO. In 2014, this number had increased to 60¹¹. In this period, China also became a permanent member of ISO's governing council and won several prizes in international standardization¹². The number of secretariats held by Japan and Korea only grew from 59 to 72 and from 12 to 19 respectively in the same period, representing a much slower increase.

Data

The data used for our investigation was compiled from the following sources:

Data on export figures by Standardized International Trade Classification (SITC) classes was taken from the UN COMTRADE database. To render it comparable with data on standards it was matched with the International Classification of Standards (ICS, two digits)

⁵ Swann (2010)

⁶ E.g. Mangelsdorf et al. (2005)

⁷ Blind and Jungmittag, (2008)

⁸ Blind and Mangelsdorf (2016)

⁹ The country in charge of a secretariat at ISO takes care of organizational issues and usually chairs the committee meetings. Formally a secretariat does not provide any extra privileges or voting rights but there might be an informational advantage and chairing a committee certainly indicates a high interest in the subject matter of this committee's work.

¹⁰ Ma et al. (2005)

¹¹ EFI report (2015), page 101

¹² Ping et al. (2010)

categorization of ISO using Blind's¹³ concordance table. This table was also used to match the patstat data on patent applications with the ICS classification.

For the standardization participation we compiled data on ISO committee secretariats for the period 2008-2014 from the ISO website¹⁴ and created a fractional variable that contains the share of secretariats within one ICS class that were held by a country in a given year. The ISO committees were matched to ICS classes according to the information on each ICS class available on the ISO website. We thus have information on 31 ICS classes, the respective export figures and the fraction of Technical (Sub-) Committees that a country held in the respective ICS class for the years 2008-2014.

This dataset was then matched with patstat data on patent applications by applicants based in the respective countries. Because of the lack of a more detailed concordance table between ICS and International Patent Classification (IPC) classes this matching reduced the sample size from 31 to 24 ICS classes that could be investigated, potentially weakening the reliability of patent related results.

Model

As we are looking for an effect of standardization participation on exports we take advantage of the panel structure of our data. We regress export volume on the number of secretariats, lagged by one and two periods, controlling for total exports and GDP (model 2) and additionally for the number of patent applications by applicants within this ICS class lagged by one period (model 1) . We use the random effects model to allow for random variation of potentially unobserved factors within ICS classes to have an effect on exports. The Hausmann test to decide between the fixed effects and a random effects model also encourages this approach.

Findings

Figure 1 shows the summary of results for our regressions. The dependent variable is the export volume measured in million US\$. The independent variables are in model 1 (C1 for China, J1 for Japan, K1 for Korea) the fraction of secretariats lagged by one, respectively two

¹³ Blind 2006

¹⁴ www.iso.org

periods (secCfra) within an ICS class, the total exports within an ICS class (totalExp), the patent applications, lagged by one period (appQ) and the GDP of the country. In model 2, appQ is dropped, which increases the sample from 24 to 31 observed ICS classes. Total export is, as expected, positively and significantly correlated with exports within one sector. The effect of GDP is not significant. In all cases, the number of patent applications does not show a significant effect on exports either.

Figure 1: Summary of results.

	C1 b/se	C2 b/se	J1 b/se	J2 b/se	K1 b/se	K2 b/se
L.secCfra	465.521*** (50.87)	450.010*** (62.57)				
L2.secCfra	336.274** (132.01)	438.550*** (110.50)				
L.appQC	0.094 (0.15)					
totalExpC	0.040** (0.02)	0.037*** (0.01)				
GDP C	-0.005 (0.00)	-0.005 (0.00)				
L.secJfra			-79.042 (167.70)	103.534 (77.46)		
L2.secJfra			-350.735 (256.87)	-171.187 (140.50)		
L.appQJ			0.041 (0.04)			
totalExpJ			0.036*** (0.01)	0.032*** (0.01)		
GDP J			0.005* (0.00)	0.000 (0.00)		
L.secKfra					87.095 (88.82)	144.125 (120.40)
L2.secKfra					-31.701 (26.12)	-6.598 (26.72)
L.appQK					0.082 (0.06)	
totalExpK					0.025** (0.01)	0.033** (0.02)
GDP K					0.005* (0.00)	-0.001 (0.01)
_cons	13225.884 (10159.12)	10211.369 (9114.02)	-21648.126 (13809.87)	-1569.174 (17091.27)	-5152.591 (4224.05)	403.803 (5349.57)

Significance levels are shown as: *~ significant at 10% level, **~5% level, ***~ 1% level

Innovation effect

We also used the patent data to investigate, whether patent applications had an effect on standardization participation. In this case, the effect of patent applications on exports would have been absorbed by the standardization variable in the above regression. We thus regressed standardization participation on lagged patent applications, controlling for both lagged GDP

and lagged exports. There was no significant effect of patenting on standardization participation observable in our data. In the case of China, the effect of exports and GDP were positive and highly significant, while they remained insignificant for both Japan and Korea.

Discussion

At present there are two possible lines of reasoning to explain the results:

1. The increase in the number of secretariats held by China is accompanied by an increase in exports in these sectors which is not driven by R&D (proxied by patent applications). This could hint towards a strategic positioning within the ISO in sectors whose exports are about to increase.
2. Holding an ISO secretariat itself has a positive and significant effect for the respective exports in the case of China, but not so in the case of Korea and Japan, which would raise questions about the effectiveness of the respective standardization strategies and the global standardization system in general.

With the data currently available it is not possible to definitely state which reasoning will eventually prevail.

Shortcomings

This paper is work in progress and it has several shortcomings that will be addressed in the coming months.

Firstly, the patent data needs to be reviewed for potentially systematic problems that lead to a bias when matching with the ICS data.

Secondly, the matching on the ICS basis is rather rough and needs refinement. Soon there will be a more detailed concordance table available¹⁵ that will make it possible to broaden the analysis and split it into more detailed units of observation.

Thirdly, leaving the Asian context and broaden the analysis to further countries would certainly enrich the analysis but will be left for future research.

¹⁵ A joint project of Northwestern Law, IPLytics and DINSoftware GmbH

Conclusion

This paper investigated the trade effects of standardization participation at the International Organization for Standardization for China, Japan and Korea. While the exports of countries that have been technological leaders for many years do not seem to be influenced by standardization participation, for China, which is only recently modernizing and closing the gap in technological knowhow, standardization participation has a highly significant impact on its trade figures.

References

Blind, K., "The economics of standards", Edward Elgar Books, 2004. Appendix IV

Blind, K., Jungmittag, A., 2008. The impact of patents and standards on macroeconomic growth: a panel approach covering four countries and 12 sectors. *J. Prod. Anal.* 29, 51–60

Blind, K., Mangelsdorf, A., Motives to standardize: Empirical evidence from Germany. *Technovation* (2016),

Expertenkommission Forschung und Innovation (EFI) Report 2015, „Gutachten zu Forschung, Innovation und technologischer Leistungsfähigkeit Deutschlands“, p.101

ISO-Membership, http://www.iso.org/iso/home/about/iso_members.htm

ISO-Standards/ICS, http://www.iso.org/iso/home/store/catalogue_ics.htm

Ma Limin, Jiang Xiangqian, Xu Zhengao and Li Zhu, "An Investigation on the Technical Standard Strategy for China's Manufacturing Industry", *Journal of Physics: Conference Series* 13 (2005) 389–393

Mangelsdorf, A., "The role of technical standards for trade between China and the European Union, *Technology Analysis & Strategic Management*", Vol. 23, No. 7, August 2011, 725–743

Ping, W., Yiyi, W., Hill, J., "Standardization Strategy of China – Achievements and Challenges", *East-West Center Working Papers, Economic series No. 107*, 01.2010

Ramel, F., Axel M., Knut B., "The Effects of Standards on Value Chains and Trade in Europe." *ETSG working paper*, 2014

Swann, P., "International Standards and Trade", *OECD Trade Policy Working Papers No.97*, 2010

UN COMTRADE, <https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx>