

The Issue of Intellectual Property Rights

What can be learned?

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Abstract

This study explores the issue of intellectual property rights and attempts to provide an answer to an intuitive question concerning whether there are any discrepancies in the effect of level of intellectual property rights (IPRs) protection on inter versus intra-industry trade and their effects. Gravity equations of total and intra-industry trade are estimated in the context of a constant coefficient approach by means of OLS and a random effects approach by means of GLS. The principal finding suggests that the presence of IPRs protection is important for both inter- and intra-industry trade; however, it is more important in the case of intra-industry trade relative to total trade.

Introduction

The issue of IPRs protection is of growing worldwide importance as economies move increasingly towards knowledge-based activities (Fink & Braga, 1999). Indeed, the attention paid by trade economists to IPRs issues has recently increased, especially after the inclusion of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) in the current system of the World Trade Organization (WTO). In particular, there are a number of studies that have analysed the links between IPRs and economic welfare, economic growth, innovations, FDI, and technology transfer.¹ However, *to the best of my knowledge*, no study to date has specifically attempted to investigate the affect of IPRs protection on intra-industry trade (IIT) compared with its affect on inter-trade or total trade (TT).

It is to be expected that the relationship between IPRs protection and IIT flows will be quite different from that when inter-industry trade is conducted. The reason for such difference is that IIT involves exchanging products within the same industry, whereas inter-industry trade does not. Therefore, the existence of bilateral IIT between two trading partners implies that the two trading partners have the same or similar industrial pattern and base. In this regard, the intellectual piracy, unauthorized use of technology, and other IPRs-related issues become more important when the two trading partners merely conduct intra-industry trade.

In view of the fact that the existing trade literature on IPRs and trade has neglected the possible discrepancies between the effect of IPRs protection on IIT and its effect on total trade (TT), this study aims to bridge this gap in the trade literature by providing an answer to the empirical question of whether the level of intellectual property rights affect inter-intra industry trade differently. The empirical investigation is based on pooled South African data

¹ For theoretical studies of IPRs and trade refer to Schwartz (1991), and Taylor (1993). For studies of IPRs and innovation, refer to Helpman (1993), and Taylor (1994). Literature on IPRs, innovation, and economic growth include studies by Romer (1990), and Mankiw et al. (1992).

and takes advantage of the recent theoretical underpinning of the relationship between bilateral trade flows and the intellectual property rights. The study proceeds as follows: Section II presents data and methodology. Section III reports the results and discussion. The conclusion is presented in Section IV.

Data and Methodology

The analyses in this study utilize cross-sectional data of 50 countries for two years, 1995 and 2000,² using gravity models of trade as in Choudhry et al. (2000), Subhash and Chua (2000), and Thornton and Goglio (2002). The dependent variable(s) is bilateral intra-industry trade flow (and total trade flows) between country *i* (South Africa) and country *j* (South Africa's trading partner) at time *t* (i.e., year 1995 and 2000). The study measures intra-industry trade using the methodology of Kandogan (2003) which is based on Grubel and Lloyd (1975). Data for the dependent variables (IIT and TT) cover the South African trade data and are measured in terms of US dollars at constant 1995 prices. The data were obtained from the UN International Trade Data.

The basic gravitational variables³ that appear as independent variables in this study are economic size ($GDP_i * GDP_j$), market size ($POP_i * POP_j$) and geographical distance (Dis_{ij}). The first two variables are measured in US dollars at constant 1995 prices and were obtained from the World Bank, World Development Indicators (2003). Geographical distance data (Dis_{ij}) were obtained from Rose (2000). Other independent (control) variables are trade intensity (TI) and trade barriers (TB). The IIT and TT data were obtained from the UN International Trade Data. The trade barriers variable is measured by the average tariff rate and was obtained from the Trade Analysis and Information System (TRAINS) database. The strength of IPRs protection in different countries was measured by the updated version of the Ginarte and Park (1997) index.

The econometric analysis of the pooled data by default commences with an estimation of the constant coefficient approach by means of pooled Ordinary Least Squares (OLS). However, to control for the possibility of omitted variables without observing them, this study also employs estimation techniques of fixed effects and random effects. Because the test results of Breusch-Pagan (1980) and Hausman (1978) favour random effects, the latter is of use. The above discussion leads us to estimate the following two augmented gravity models of trade⁴:

$$\ln (IIT_{ijt}) = \beta_0 + \beta_1 \ln (GDP_{it} * GDP_{jt}) + \beta_2 \ln (POP_{it} * POP_{jt}) + \beta_3 \ln (Dis_{ij}) + \beta_4 \ln (TI_{ijt}) + \beta_5 \ln (TB_{jt}) + \beta_6 (IPR_{Sjt}) + e_{ijt} \quad (1)$$

$$\ln (TT_{ijt}) = \beta_0 + \beta_1 \ln (GDP_{it} * GDP_{jt}) + \beta_2 \ln (POP_{it} * POP_{jt}) + \beta_3 \ln (Dis_{ij}) + \beta_4 \ln (TI_{ijt}) + \beta_5 \ln (TB_{jt}) + \beta_6 (IPR_{Sjt}) + e_{ijt} \quad (2)$$

The first equation regresses IIT on three basic gravity variables, two control variables and a IPRs variable, whereas the second equation is a re-estimation of the first one taking total trade (TT) as a dependent variable.

² The choice of the years was based on the data viability of IPRs as measured by an updated version of the Ginarte and Park (1997) index.

³ For theoretical basis for the gravity model refer to: Anderson (1979); Bergstrand (1985, 1990); Deadorff (1984, 1998); Helpman and Krugman (1985); Evenett and Keller (1998, 2002); Anderson and Wincoop (2001); Harrigan (2001); Hansson and Xiang (2002); and Cheng and Wall (2004).

⁴ The potential of an endogeneity between dependent variable(s): intra-industry trade (and total trade) and the measure of IPRs protection may exist because IPRs laws and their enforcement are probably influenced by other factors such as economic development. However, to get rid of the possible endogeneity, this study has lagged the IPRs variable such that if the dependent variable is *y* (*t*), the IPRs variable is *IPRs* (*t-5*), where *t* refers to time.

To ensure the robustness of the estimates, several diagnostic tests on the above models are performed including tests for: heteroskedasticity using the Breusch-Pagan and Cook-Weisberg tests; multicollinearity using correlation matrix and variance inflation factor (VIF); normality using skewness/kurtosis test and normality graphs; model specification using link specification test; and omitted variables using Ramsey RESET test. All results show that the chosen models of intra-industry trade and total trade are well specified except for heteroskedasticity, which has been rectified by using robust standard errors.⁵

Results and Discussion

The overall performances of the basic gravity variables for dependent variables (IIT and TT) are quite satisfactory in terms of statistical significance and econometric interpretation. While geographical distance reduces both IIT and TT, a greater market size and higher standard of living expand them.

The main interest of this paper is to determine whether the level of intellectual property rights affects intra-industry trade differently than total trade (TT). This has been achieved by analysing (IPRs) variable in both equations. The following table (Table 1) presents the empirical results for Equation (1) and Equation (2)

Table 1: Estimation Results

	Equation (1) Intra-Industry Trade (IIT)		Equation (2) Total Trade (TT)	
	Default OLS estimation	GLS Random Effect Estimation	Default OLS estimation	GLS Random Effect Estimation
Constant	6.32 (3.98)*	0.753 (4.29)*	1.34 (2.11)*	3.23 (2.97)*
GDP_{it}*GDP_{it}	3.24 (1.05)	4.13 (1.13)*	3.00 (1.00)	6.21 (2.45)*
POP_{it}*POP_i	4.24 (0.43)	3.24 (1.96)*	5.24 (3.15)*	8.21 (2.52)*
Dis_{ij}	-5.78 (-3.86)*	-7.92 (-4.45)*	-3.76 (-0.01)	-5.76 (-2.99)*
TI_{ji}	7.24 (2.45)*	6.85 (4.86)*	2.94 (1.35)*	-5.86 (2.11)*
TB_{jt}	.012- (-2.34)*	.143- (-3.76)*	.323- (-1.99)*	.456- (-2.26)*
IPRs jt	9.34 (3.56)*	6.34 (2.45)*	.413 (2.87)*	2.12 (1.97)*
R-square	.87	.83	.90	.86

Notes: t-statistics for the OLS and the corresponding z-statistics for the Random Effects Model are given in the parentheses. The Asterisk (*) indicates the given variable is statistically significant up to 10 % level of significance; otherwise, the variable is statistically insignificant. Estimation uses White's heteroskedasticity-consistent covariance matrix estimator.

The empirical results of the first equation reveal that in the case of the intra-industry trade (IIT), the level of intellectual property rights affect IIT positively and it is statistically significant. This implies that a higher level of intellectual property rights leads to a higher level of IIT. On the other hand, the result of the second equation reveals that the level of intellectual property rights (IPRS) also affects total trade (TT) positively and it is also

⁵ All test results are available from the author upon request.

statistically significant. Similarly, this also indicates that a higher level of IPRs leads to a higher level of bilateral total trade (TT); however, the magnitude (coefficient) of IPRs variable in the case of the TT is relatively smaller than in the case of the former (IIT). This result supports the pre-expected notion that the level of intellectual property rights affects IIT differently than TT and the level of IPRs has a relatively stronger effect in the case of IIT. This might be explained by the fact that conducting IIT implicitly implies that the trading partners share a similar industrial base and thus the presence of IPRs in a destination country is "relatively" more important. This result provides guideposts for policy makers in an exporting country as an exporting country might need to demand a higher level of IPRs protection in a destination country when conducting IIT.

Conclusion

The study has presented an explicit econometric testing of the possibility of any discrepancies of the effect of intellectual property rights (IPRs) on intra-industry trade (IIT) versus total trade (TT). The principal finding is that the presence of IPRs protection is important for both inter- and intra-industry trade; however, it is more important in the case of intra-industry trade. Furthermore, the results of the random effects estimation imply that the obtained results could be generalized beyond the employed dataset to a certain extent. Several econometrical testings have been used to check the robustness of the results and it was determined that the results are satisfactory in terms of theoretical setting and econometrical specifications.

Finally, a future research is needed to replicate this analysis on data for other countries. This would help to verify whether the results of the present study are representative.

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