DETERMINANTS OF SOUTH AFRICA'S EXPORTS OF LEATHER PRODUCTS

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Abstract

This paper analysed the determinants of South African exports of raw hides and skins (other than fur skins) and leather (H41) using annual data covering the period 1999 to 2008 for 32 main trading partners. The results show that importer's GDP, South Africa's GDP, infrastructure of the importing country, real effective exchange rate and some regional trade agreements are the main determinants of raw hides and skins (other than fur skins) and leather exports. The paper then investigated if there is unexploited trade potential. The investigation revealed that among the sample countries, Australia, France, India, Indonesia, Italy, Japan, Mexico, Singapore, South Korea, Turkey, UAE, United Kingdom and the United States of America have unexploited export potential. It is important from a policy perspective to focus efforts on the unexploited trade potential (in the above-mentioned trading partners) to accelerate growth and alleviate poverty in South Africa.

JEL: C01, C23, F10, F17**,** F47

Keywords: gravity model, fixed effects, export potential

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1. Introduction

The issue of how a country can achieve high economic growth is one of the fundamental economic questions. An export-led growth hypothesis which states that exports are one of the keys to achieving high economic growth provides a possible answer to this fundamental question. Export of goods and services is an important source of foreign exchange reserves and can reduce balance of payments problems, and creates employment opportunities. According to Abou-Sait (2005), an export-led growth strategy aims to provide producers incentives to export their goods through various policies. The strategy also aims at increasing the capability of producing goods that can compete in the world market using advanced technology and earning foreign exchange needed to import capital goods. Exports can help the country to integrate into the world economy and help to reduce the impact of external shocks on the domestic economy. It allows domestic production to achieve a high level of economies of scale. Studies such as Tsen (2006) stated that the experiences of East Asian economies provide good examples of the importance and contribution of the export sector to economic growth and development. This indicates the role of exports as an engine of economic growth.

The importance of exports in economic growth led to many countries such as South Africa to adopt an export-led growth strategy, known as the Growth Employment and Redistribution (GEAR) strategy in 1996 (Naude, Oostendorp and Serumaga-Zake, 2005: 1). Various measures were introduced under this strategy in 1996 in order to promote exports. In 2005, under the Accelerated Shared Growth Initiatives – South Africa (ASGISA) the South African government indicated that it wants to accelerate growth and halve poverty by 2014 (The Presidency Republic

of South, 2005). The promotion of exports could contribute in accelerating growth and reducing poverty. Various sectors were identified as key priorities for achievement of this objective. Among these, the leather was identified as a sector that can be developed to accelerate growth, generate the much needed jobs and alleviate poverty.

Although the leather sector accounted for less than one percent (0.3 percent) of South African exports during the period 1997 to 2006 (according to data from Trade and Industrial Policy Strategies or TIPS website), its development and promotion may contribute towards achieving the objective of halving poverty and reducing unemployment by means of high levels of economic participation and income generation. Given its expected significance and role in the South African export sector, it is important to determine its trade potential between South Africa and its trading partners. A gravity model is a useful tool in determining the trade or export potential of a country. The model has its foundations in physical sciences and had proven to be very important in the analysis of bilateral trade flows. Tinbergen (1962) and Pöyhönen (1963) pioneered the idea of explaining trade flows in analogy to Newton's law of gravity by the attraction of two countries' masses, weakened by distance between them and enforced by preferential trade agreements they belong to. The masses of countries are measured by GDP or population and distance between countries measures transport costs. As in physical sciences, the bigger and the closer the units are to each other, the stronger the attraction. The comparison with gravity derives from GDP being a proxy for economic mass and distance as a proxy for resistance.

The gravity model is used to analyse the relationship between volume and direction of international trade and the formation of regional trade agreements where members are in different stages of development. The basic gravity model is augmented with a number of variables to test whether they are relevant in explaining trade between countries (Martinnez-Zarzoso and Nowak-Lehmann, 2003). These variables include GDP, distance, infrastructure, differences in per capita income and exchange rates.

The objective of this paper is to analyse the factors determining exports of raw hides and skins (other than fur skins) and leather (H41) using a gravity model approach. The paper then investigates whether there is any unexploited trade potential between South Africa and its trading partners within this sector. The rest of the paper is organised as follows. Section 2 discusses the gravity model. Section 3 discusses the estimation methodology, while Section 4 presents univariate characteristics of the data. The estimation results for the gravity model are presented in Section 5 while Section 6 discusses potential trade. The conclusion is provided in section 7.

2. The Gravity Model

The gravity model was the first applied to international trade in the early 1960s by Tinbergen (1962) and Pöyhönen (1963). The model has been used in the latter half of the nineteenth century to explain migration and other social flows in terms of gravitational forces of human interaction. As in physical science, the bigger and the closer the units are to each other, the stronger the attraction. The comparison with gravity results from GDP being a proxy for economic mass and distance as a proxy for resistance. Although the gravity model performed very well in analysing

trade flows in the 1960s, its strong theoretical foundations were not produced until the end of the 1970s. This led to many studies modifying the original Newtonian gravity equation. Anderson (1979) and Bergstrand (1985, 1989) made it clear that the gravity model is a good representation irrespective of the structure of product markets. Bergstrand (1985, 1989) included the population size, while Oguledo and Macphee (1994) included a measure of the price variable.

Although the gravity model has been considered successful empirically in explaining different flows such as migration, tourism and other trade flows, its theoretical foundation has been found to be weak. Studies such Anderson (1979) and Bergstrand (1985; 1989) developed the theoretical foundations of the gravity model. These studies were the first attempt to strengthen the theoretical foundations of the gravity model. Oguledo and Macphee (1994) also contributed to the development of the theoretical foundations of the gravity model. Oguledo and Macphee (1994) derived the gravity equation from the linear expenditure system, in an attempt to answer criticisms that the theoretical foundation of the gravity model was weak. Their analysis assumed a weakly separable utility function from which a linear expenditure function could be derived.

The basic gravity equation explains the size of exports from country i to country j by three factors. The first indicates the total potential supply of the exporting country (i), and the second one indicates the potential demand of the importing country (j), and the third includes factors which represents the resistance to trade flow between countries. In its basic form, exports from country i to country j are determined by their economic sizes (GDP), population, geographical distances and a set of dummies which incorporate some kind of institutional characteristics common to specific flows. The gravity model is generally specified as (Martinez-Zarzoso and

Nowak-Lehmann, 2003: 296; Jakab, Kovacs and Oszlay, 2001: 280; Breuss and Egger, 1999: 83):

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 \ln DIS_{ij} + \beta_6 \ln A_{ij} + u_{ij} \qquad (1)$$

where X_{ij} is exports of goods from country *i* to country *j*, Y_i and Y_j are the GDP of the exporter and importer, POP_i and POP_j are the populations of the exporter and importer, DIS_{ij} is the distance in kilometres between the two countries, A_{ij} represents any factor that influence trade between the countries, and u_{ij} is the error term.

A high level of GDP indicates a high level of production in the exporting country and can be interpreted as a proxy for the range of product varieties available, which increases the availability of exports. It represents potential supply of exports. The importer's GDP represents potential demand for imports. A high level of GDP or income in the importing country suggests high imports. The coefficients β_1 and β_2 are expected to have positive signs. The population variables can influence export in two ways. A large population indicates a large domestic market and a high level of domestic consumption and thus less to export (Nilsson, 2000). Large populations also encourage division of labour and this means that there will be economies of scale in production, and therefore more opportunities to export a variety of goods. For the exporting country, a large population can increase or decrease exports depending on whether domestic consumption or economies of scale is dominant. For the importing country a large population can also increase or decrease trade for the same reasons. Thus, the effects of

population for both the exporting and importing countries can be positive or negative. That means β_3 and β_4 are expected to have ambiguous signs (Oguledo and MacPhee, 1994). The coefficient of distance, β_5 is expected to be negative because it is a measure of transport costs. The negative coefficient of the distance variable is supported by several studies (such Feenstra, 2002); Feenstra, Markusen and Rose, 2001).

Several studies (such as Longo and Sekkat, 2004; Bougheas, Demetriades and Morgenroth, 1999) extended the gravity equation to examine the impact of infrastructure on exports. Mátyás (1997) and Tri Do (2006) also extended the gravity model by including the real effective exchange rate. Equation (1) is then re-specified as:

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 \ln DIS_{ij} + \beta_6 \ln INFRA_i + \beta_7 \ln INFRA_j + \beta_8 \ln RER_{ij} + \beta_9 \ln A_{ij} + u_{ij} \quad (2)$$

where, $INFRA_i$ and $INFRA_j$ are measures of the infrastructure in countries *i* and *j*, and RER_{ij} is the real effective exchange rate between countries *i and j*. Good infrastructure in both the exporting and importing countries are associated with an increase in trade. A depreciation of the real effective exchange rate generally causes an increase in exports. The coefficients β_6 and β_7 are expected to be positive, while β_8 is positive because an increase in real effective exchange rate in this study is defined as a depreciation.

A number of studies (Carrère, 2006; Silva and Tenreyro, 2006; Jakab, Kovács and Oszlay, 2001; Rose and Wincoop, 2001) used the gravity model as a useful tool in assessing the trade creating

and trade diverting effects that are associated with trade agreements. These studies also used language as an additional variable to explain trade flows between countries. This paper introduces dummy variables (included in A_{ij}) to represent various regional trade agreements and English language. The dummy variables take the value one for membership of trade agreements or where English is the official language, and zero otherwise. The introduction of dummy variables modifies Equation (2) as:

$$\begin{aligned}\ln X_{ij} = {} & \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 \ln DIS_{ij} + \\ & \beta_6 \ln INFRA_i + \beta_7 \ln INFRA_j + \beta_8 \ln RER_{ij} + \beta_9 ASEAN + \beta_{10} EU + \\ & \beta_{11} NAFTA + \beta_{12} MERC + \beta_{13} LANG + u_{ij}\end{aligned} \qquad (3)$$

where ASEAN is for countries which are members of ASEAN, EU is the dummy variable for membership of the European Union, NAFTA is the dummy variable for membership of North America Free Trade Agreement, MERC is the dummy variable for membership of Mercusor countries and LANG is for countries with a common language (in this case English). A common language between countries is associated with an increase in trade between countries (Rose and Wincoop, 2001). Since membership of trade agreements can results in either trade creation or trade diversion, the coefficients can be positive or negative. Common language may also be expected to promote trade, and therefore its coefficient is expected to have a positive sign.

3. Estimation Methodology

Different models can be estimated in panel data regressions, which include pooled, fixed and random effects. The pooled model assumes that countries are homogeneous, while fixed and

random effects introduce heterogeneity in the estimation. The pooled model is restricted and assumes a single intercept and same parameters over time and across countries and country specific effects are not estimated. Since the regressions include individual country effects, the pooled model is omitted and the decision then has to be made whether the random or fixed effects is the appropriate model. When estimating the trade flows between a randomly drawn sample of trading partners from a large population, a random effect model is more appropriate, while a fixed effects model is more appropriate when estimating the flows of trade between an ex ante predetermined selection of countries (Egger, 2000: 26; Martinez-Zarzoso and Nowak-Lehmann, 2003: 299). To check the poolability of the data, the F-test is performed and the results show that the null hypothesis of equality of the individual effects or homogeneity for all countries is rejected. This confirms that a model with individual country effects (fixed effects) is the preferred model. This paper analyses the trade between South Africa and 32 main trading partners in the leather sector, and therefore the fixed effects will be employed. The 32 main trading partners were selected based on the trade statistics of raw hides and skins (other than fur skins) and leather (H41) for the period 1999 to 2008.

However, the fixed effects model has a problem as it does not estimate directly variables that do not change over time because inherent transformation wipes out such variables. This problem was addressed by Martinez-Zarzoso and Nowak-Lehmann (2003) which suggested that these variables can be estimated in a second regression by running the pooled model. This second step estimation uses the individual effects as the dependent variable and distance and dummy variables as explanatory variables. This is elucidated as:

$$IE_{ij} = \gamma_0 + \gamma_1 DIS_{ij} + \gamma_2 LANG + \gamma_3 ASEAN + \gamma_4 EU + \gamma_5 NAFTA + \gamma_6 MERC + \mu_{ij} \qquad (4)$$

where IE_{ij} is individual effects (originating from the fixed effects model), and other variables are as defined before.

4. Univariate Characteristics of Variables

The paper analysed the univariate characteristics of the variables which entails panel unit root tests prior to the estimation of Equation (3). This is the first step in determining a potentially cointegrated relationship between the variables. If all variables are stationary, then the traditional estimation method can be used to estimate the relationship between variables. The detailed data source and description are provided in Appendix B. If the data are nonstationary, a cointegration test should be performed. There are two different types of panel unit root tests applied in this study. The first test is that of Levin, Lin and Chu (2002). This test assumes that the autoregressive parameters are common across cross sections and uses the null hypothesis of a unit root. According to Levin et al. (2002), the LLC test is more relevant when the size of the panels is moderate. Standard multivariate computational techniques may not be feasible if the size of the panels is small or moderate, and the LLC test is appropriate in this case. Since the size of the panel in this study is moderate, the LLC test is appropriate. The second panel unit root test allows the autoregressive parameters to vary across cross sections as well as for individual unit root processes. The test was developed by Im, Pesaran and Shin (2003) and is referred to as

the IPS test. It combines individual countries' unit root tests in order to come up with the result which is specific to the panel. According to Yigit and Straus (2003: 309), IPS has more power than the single equation Augmented Dickey Fuller (ADF) by averaging N independent ADF regressions. The specifications of the ADF tests can include an intercept but no trend or can include an intercept and a time trend. Under the IPS, the null hypothesis is that all series contain a unit root and the alternative hypothesis is that at least one series in the panel contain a unit root. IPS is a one-tailed or lower-tailed test and is based on N(0,1) distribution. The results of the unit root tests are presented in Table 1.

Table 1. Panel unit root tests

Variable	LLC	IPS
Export	-5.920 (0.000)***	-2.045 (0.020)*
Importer's GDP	-9.042 (0.000)***	-3.145 (0.000)***
South Africa's GDP	-10.987 (0.000)***	-2.186 (0.014)**
Importer's Infrastructure	-7.757 (0.000)***	-2.091 (0.018)**
South Africa's Infrastructure	-10.760 (0.000)***	-1.362 (0.086)*
Importer's population	-7.719 (0.000)***	-0.903 (0.183)
South Africa's population	-59.972 (0.000)***	-7.364 (0.000)***
Real exchange rate	-4.569 (0.000)***	-1.323 (0.093)*

Note: */**/*** Denote rejection of the null hypothesis at 10%/5%/1% significance level

Probabilities are in parentheses.

The results of the unit root test in Table 1 indicate that all variables are stationary according to the LLC test. The IPS statistic elucidate that export, importer's GDP, South Africa's GDP, importer's infrastructure, South Africa's infrastructure, South Africa's population and real

exchange rate are stationary, but importer's population are non stationary. Since the size of the panel in this study is small to moderate, the LLC test was used as appropriate to determine whether the variables are stationary. This paper uses at least one test to conclude that the variables are stationary. Since the variables are all stationary according to the LLC test, it is accepted that there is no need to test for cointegration, and Equation (3) can be estimated using the traditional OLS estimation method.

5. Discussion of Results

The Hausman test is executed within the random effects model in order to detect misspecification or to ensure that the X-regressors and individual effects are not correlated. The results show that the Hausman specification test [0.000 (1.000)] accepts the null hypothesis of no misspecification. This result therefore indicates exogeneity of the X-regressors and thus no correlation between the individual effects and the X-regressors. The estimation results for the fixed effect model are presented in Table 2.

Table 2. Estimation results

Dependent variable: Export

Variables	Fixed effects model
Constant	-35.436 (-0.796)
Importer's GDP	1.107 (3.895)***
South Africa's GDP	-1.697 (-1.746)*
Importer's population	-0.353 (-0.289)
South Africa's population	7.809 (0.504)
Importer's infrastructure	0.410 (1.839)*
South Africa's infrastructure	-0.027 (-0.015)
Real exchange rate	3.803 (2.049)**
Adjusted R-squared	0.874
F-test	50.197***

Notes: */**/***/ significant at 10%/5%/1% level.

The t-statistics are in parentheses.

The results show that an increase in importer's GDP, South Africa's population, importer's infrastructure and the real effective exchange rate causes the export of leather products to increase. South Africa's GDP and infrastructure and importer's population is associated with a decrease in leather export. A depreciation of the real effective exchange rate results in an increase of leather exports. Importer's population and South Africa's population and infrastructure are not statistically significant. All other coefficients are statistically significant.

The country specific effects are presented in Table A in Appendix A. The country specific effects show the effect of factors that are unique to each trading partner but not included in the

estimation of the model. They indicate that export of leather products between South Africa and its trading partners differs from country to country and each trading partner has unique features. It is shown in Table A in the Appendix that there are unique features in some trading partners that promote South Africa's export of leather products to the Czech Republic, Hong Kong, Italy, Mexico, Mozambique, South Korea, Singapore, Thailand, Uruguay, Zambia and Zimbabwe (countries shaded). The Table also show that there are unobservable country features that discourage trade to Australia, Austria, Belgium, Brazil, Canada, China, France, Germany, Greece, India, Indonesia, Japan, Netherlands, Pakistan, Portugal, Spain, Switzerland, Turkey, United Arab Emirates, United Kingdom and the United States of America (countries not shaded). This requires that trade policy analyst and policy makers should do an analysis of factors that discourage South Africa's export of leather products to countries with negative effects. This analysis will help to identify constraints to export of leather products to these countries.

The second stage regression results are presented in Table 3. This regression includes some factors which potentially explain the fixed effects in Table A of the Appendix. The results show that distance has a positive and significant effect on the export of leather products, contrary to what is expected. Membership of ASEAN has a positive effect on exports, while membership of the EU, NAFTA and MERC is associated with a decrease in export of leather products. South Africa exports less leather products to countries where English is the official language, and this is not consistent with theoretical expectation. All coefficients are statistically significant.

Table 3. Second stage regression: Dependent variable is fixed effects

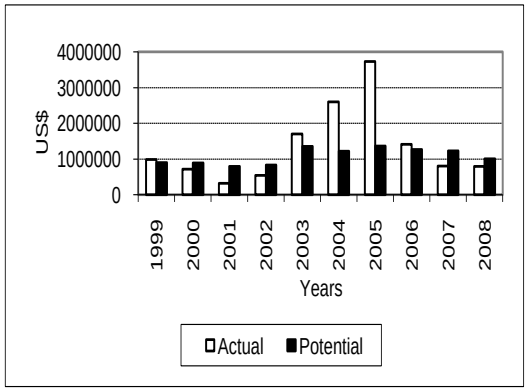
Independent Variable	Coefficient (t-statistics)
Constant	-18.248 (-10.827)***
Distance	1.981 (10.641)***
English language dummy	-0.495 (-6.041)***
ASEAN dummy	0.635 (8.399)***
European Union dummy	-0.263 (-3.262)***
NAFTA dummy	-1.244 (-32.893)***
Mercusor dummy	-1.402 (-3.221)***
Adjusted R-squared	0.966

Note: */**/***/ significant at 10%/5%/1% level

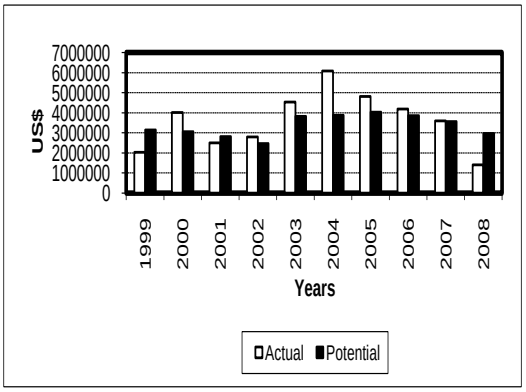
6. Export Potential

The fixed effects model of Equation (3) is simulated in order to determine the export potential of leather products. The estimated export is then compared to actual export in order to check if there is export potential which is not exploited. The results are presented in Figure 1 which shows that among the sample countries, Australia, France, India, Indonesia, Italy, Japan, Mexico, Singapore, South Korea, Turkey, UAE, United Kingdom and the United States of America have unexploited export potential at least during 2008. The potential exports for these countries exceed the actual exports. This suggests that it is important to promote export of leather products to these countries in order to exhaust the unexploited trade potential. An analysis of factors that discourage export potential of leather products is very important.

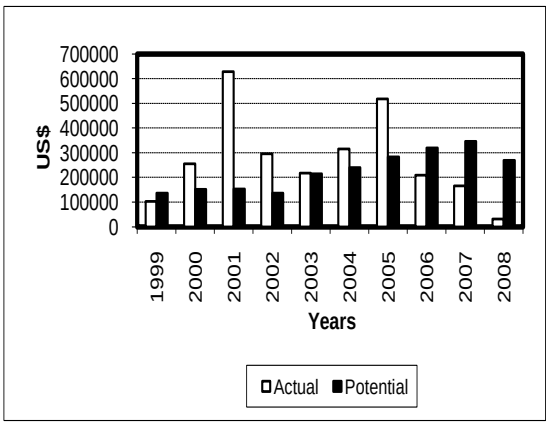
Australia



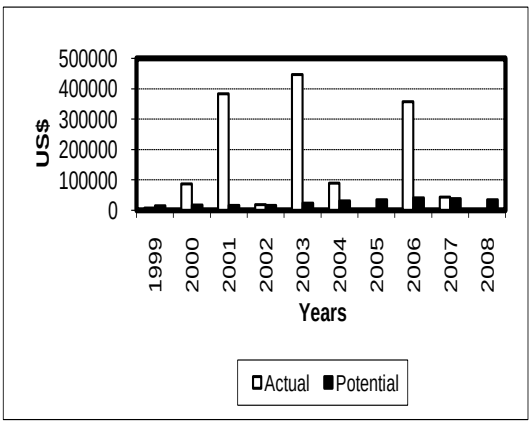
France



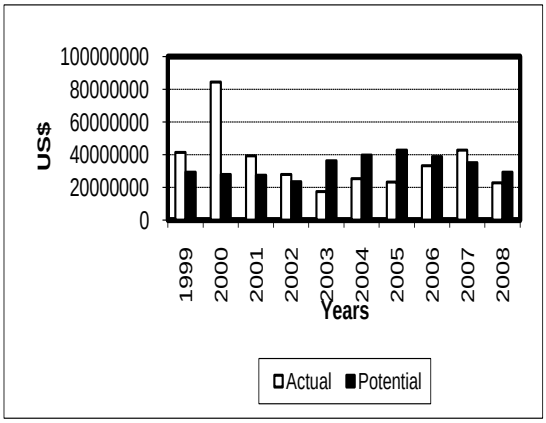
India



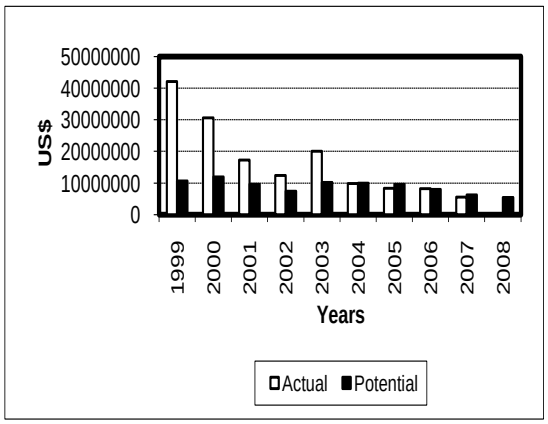
Indonesia



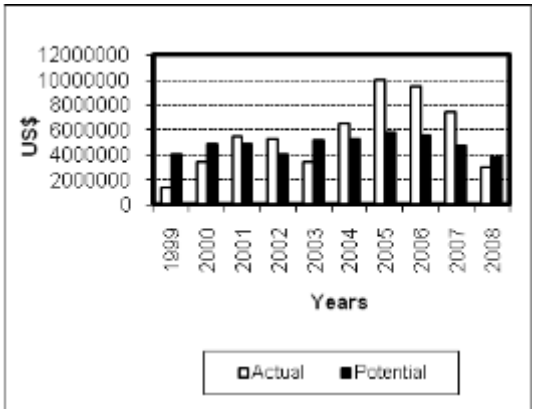
Italy



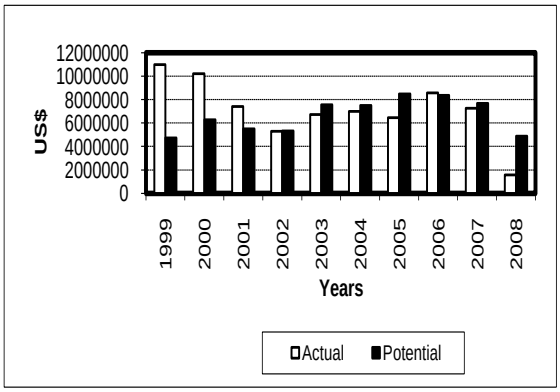
Japan



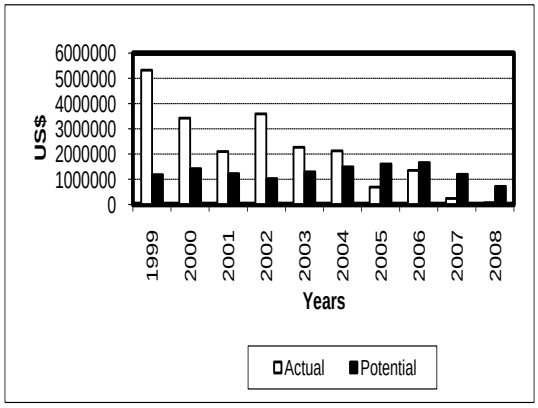
Mexico



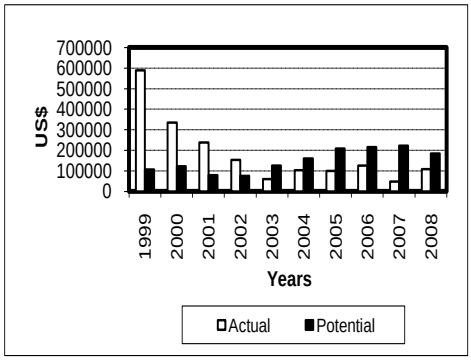
South Korea



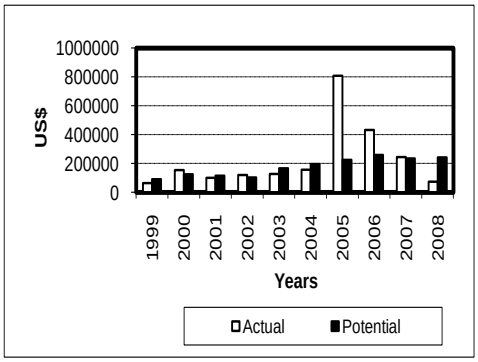
Singapore



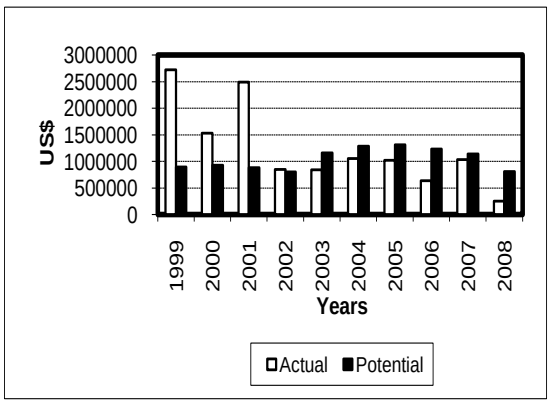
Turkey



United Arab Emirates



United Kingdom



United States of America

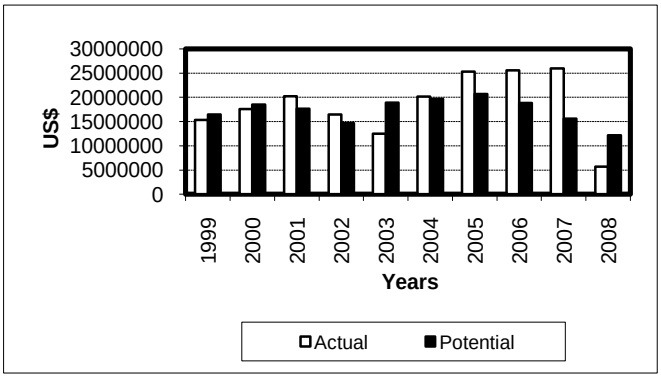


Figure 1. Export potential

6. Conclusion

Using a gravity model approach, this study analysed the determinants of South African exports of leather products using annual data for the period 1999 to 2008. It then investigated if there is unexploited trade potential in the leather sector. The model was estimated for 32 trading partners in leather products. The analysis revealed that importers' GDP, South Africa's population and infrastructure of the importing country have a positive impact on the export of leather products. As South Africa's GDP increases, the export of leather products decreases and this may suggests that the domestic market is expanding and consuming more of these products while less is exported. As expected, a depreciation of the real exchange rate encourages exports. It seems as if distance does not discourage exports whereas the English language does not necessarily enhance exports of leather products. Membership of the EU, NAFTA and MERC is associated with a decrease in the export of leather products, while ASEAN membership encourages exports.

The estimated fixed effects model was simulated to determine if there is unexploited trade potential. The determination of export potential is of importance especially in uncertain markets. The investigation shows that Australia, France, India, Indonesia, Italy, Japan, Mexico, Singapore, South Korea, Turkey, UAE, United Kingdom and the United States of America have unexploited export potential at least for 2008. These results are important for trade analysts and policymakers to ensure that South Africa exports leather products to its potential level to the countries identified in order to accelerate growth and alleviate poverty.

8. REFERENCES

Abou-Stait, F. 2005. Are Exports the Engine of Economic Growth? An Application of Cointegration and Causality Analysis for Egypt, 1977-2003. *Economic Research Working Paper Series*, Tunis: African Development Bank.

Anderson, J.E.1979. A theoretical Foundation for the Gravity Equation. *American Economic Review* 69(1): 106-116.

Bergstrand, J.H. 1985. The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence. *Review of Economics and Statistics* 67(3): 474-480.

Bergstrand, J.H. 1989. The Generalised Gravity Equation, Monopolistic Competition and the Factor-Proportions Theory in International Trade. *Review of Economics and Statistics* 71(1): 143-153.

Bougheas, S., Demetriades, P.O. and Mongernroth, E.L.W. 1999. Infrastructure, Transport Costs and Trade. *Journal of International Economics* 47:469-189.

Breusch, F. and Egger, P. 1999. How Reliable are Estimations of East-West Trade Potentials Based on Cross-section Gravity Analyses. *Empirica* 26(2): 81-99

Carrère, C. 2006. Revisiting the Effects of Regional Trade Agreements on Trade Flows with Proper Specification of the Gravity Model. *European Economic Review* 50: 223- 247.

Egger, P. 2000. A Note on the Proper Econometric Specification of the Gravity Equation. *Economic Letters* 66: 25-31.

Im, K.S., Pesaran, M.H. and Shin, Y. 2003. Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics* 115: 53-74.

Feenstra, R.C. 2002. Border Effects and the Gravity Equation: Consistent Method for Estimation. *Scottish Journal of Political Economy* 49(5): 491 -506.

Feenstra, R.C., Markusen, J.R. and Rose, A.K. 2001. Using the Gravity Equation to Differentiate Alternative Theories of Trade. *Canadian Journal of Economics* 34(2): 430-447.

Jakab, Z.M. Kovacs, M.A. and Oszlay, A. 2001. How Far has Regional Integration Advanced?: An Analysis of the Actual and Potential Trade of Three Central and European Countries. *Journal of Comparative Economics* 29: 276-292.

Levin, A., Lin, C.F. and Chu, C. 2002. Unit Roots Tests in Panel Data: Asymptotic and Finite Sample Properties. *Journal of Econometrics*, 108: 1-24.

Longo, R. and Sekkat, K. 2004. Economic Obstacles to Expanding Intra-African Trade. *World Development* 32(8): 1309-1321.

Martinez-Zarzoso, I. and Nowak-Lehmann, F. 2003. Augmented Gravity Model: An Empirical Application to Mercosur-European Union Trade Flows. *Journal of Applied Economics* 6(2): 291-316.

Mátyás, L. 1997. Proper Econometric Specification of the Gravity Model. *World Economy* 20(3): 363-368.

Naude, W.A., Oostendorp, R. and Serumaga-Zake, P. 2005. Determinants of Manufacturing Exports: Results from a Regional Firm-Level Survey in South Africa. *Journal of Studies in Economics and Econometrics* 29(2): 108-116.

Nilsson, L. 2000. Trade Integration and the EU Economic Membership Criteria. *European Journal of Political Economy* 16: 807-827.

Oguledo, V.I. and Macphee, C.R. 1994. Gravity Models: A Reformulation and an Application to Discriminatory Trade Arrangements. *Applied Economics* 26: 107-120.

Pöyhönen, P. 1963. A Tentative Model for the Volume of Trade Between Countries. *Weltwirtschaftliches Archiv* 90: 93-99.

Presidency Republic of South Africa .2006. *Accelerated and Shared Growth Initiative – South Africa (ASGISA)*. Pretoria: Presidency Republic of South Africa.

Rose, A.K. and Van Wincoop, E. 2001. National Money as a Barrier to International Trade: The Real Case for Currency Union. *American Economic Review* 91(2): 386 - 390.

Sapir, A. 1981. Trade Benefits Under EEC Generalised System of Preferences. *European Economic Review* 15(3): 339-355.

Silva, J.M.C and Tenreyro, S. 2006. The Log of Gravity. *Review of Economics and Statistics* 88(4): 641-658.

Strauss, J. and Yigit, T. 2003. Shortfalls of Panel Unit Root Testing. *Economic Letters* 81: 309-313.

Tinbergen, J. 1962. *Shaping the World Economy. Suggestion for an International Economic Policy*. New York.

Tri Do, T. 2006. A Gravity Model for Trade Between Vietnam and Twenty-Three European Countries. Unpublished Doctorate Thesis, Department of Economics and Society. Hogskolana Dalarna.

Tsen, W.H. 2006. Granger Causality Tests Among Openness to International Trade, Human Capital Accumulation and Economic Growth in China: 1952-1999. *International Economic Journal* 20(3): 285-302.

Appendix A

Table A. Countries used in the estimation and their specific effects

AUSTRALIA	-0.33802
AUSTRIA	-2.67203
BELGIUM	-2.05261
BRAZIL	-3.92604
CANADA	-2.99558
CHINA	-0.20158
CZECH	1.125509
FRANCE	-0.39215
GERMANY	-0.13261
GREECE	-1.83734
HONG KONG	3.119831
INDIA	-0.62895
INDONESIA	-2.1292
ITALY	2.354449
JAPAN	-0.05094
MEXICO	1.511452
MOZAMBIQUE	5.226755
NETHERLANDS	-0.32459
PAKISTAN	-3.83788
PORTUGAL	-1.16001
SOUTH KOREA	1.789122
SINGAPORE	1.85081
SPAIN	-0.97033
SWITZERLAND	-0.88643
THAILAND	0.421966

TURKEY	-0.99445
UNITED ARAB EMIRATES	-0.1861
UNITED KINGDOM	-1.72172
UNITED STATES OF AMERICA	-1.21951
URUGUAY	0.181715
ZAMBIA	4.930958
ZIMBABWE	10.14918

Appendix B

Data description and sources

The study covers the period 1997 to 2004 and uses annual data. Thirty two main trading partners in raw hides and skins (other than fur skins) and leather (H41) were included in the estimation. The data for exports were obtained from the website of Trade and Industrial Policy Strategies (TIPS): http://www.tips.org.za. The data for populations were sourced from the World Bank's World Development Indicators. The data for GDP were obtained from the IMF's International Financial Statistics Yearbook. Distance is a proxy for transport costs and was computed as distance in kilometers between Pretoria and trading partners' capital cities. They were taken from http://www.timeanddate.com. Infrastructure for both South Africa and the importing countries were proxied by the number of aircraft departures and were taken from the World Bank's World Development Indicators. Although it may not be an appropriate proxy for infrastructure, it is the only variable with complete data. The data for other variables such as roads, railways are not available or are incomplete. The English language dummy variable was sourced from Silva and Tenreyro (2006).