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Export Patterns of the Chinese Wine Industry

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Abstract

This paper intends to examine the trade patterns of a novelty export good, namely that of Chinese wine. An econometric model will be constructed aiming to explain the trade patterns of this good. The paper further wishes to incorporate the Linder hypothesis which contradicts the traditional Heckscher-Ohlin theory on trade. We believe it to be of interest to examine a novelty export product with Linder's trade theory in mind. We will also try to develop the traditional Linder theory by not only incorporating total GDP data but also different income distribution variables. We will also make use of the relatively new FEVD estimation procedure, demonstrating how it is applicable when constructing models containing time-invariant or almost time-invariant variables.

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Contents

List of abbreviations

ASEAN	Association of Southeast Asian Nations
CEPII	Centre d'Etudes Prospectives et d'Information International
CIA	Central Intelligence Agency
FE	Fixed effect
FEVD	Fixed effect vector decomposition
GDP	Gross domestic product
H-O	Heckscher-Ohlin
IIT	Intra industry trade
IMF	International Monetary Fund
m	Millions
OECD	Organization for Economic Co-operation and Development
PCI	Per capita income
RCA	Real comparative advantage
RE	Random effect
STATA	STATA: Data analysis and statistical software
UN Comtrade	United Nations Commodity Trade Statistics Database
WDI	World Development Indicators
WTO	World Trade Organization

1. Introduction

1.1 Background

Many theories have been formulated attempting to explain international trade patterns. The most renowned is probably Heckscher-Ohlin's (H-O) comparative advantage model which predicts trade flows based on regions' factor endowments.

In the 1960's Staffan Burenstam Linder challenged existing models based on the H-O's framework by proposing a new theory. H-O models state that trade will arise between countries with different factor endowments, Linder instead argued that trade occur between similar countries due to similar preferences. This implies that a country will specialize in goods demanded by its domestic consumers, and due to similar demand in countries displaying similar factor endowment intra-industry trade will occur for these goods.

In order to investigate Linder's hypothesis a proxy for preferences must be used, levels of income has so far been the most popular choice. This is an efficient proxy since it is easy to measure. Cultural heritage is also believed to create different preferences for goods but is harder to distinguish and measure, illustrated by Alfred Kroeber and Clyde Kluckhohn's (1952) 164 definitions of the term "culture". Income levels have therefore continued to serve as the most important proxy when trying to depict similarities in preferences across the globe. In summary Linder discarded the notion that preferences are homogenous and independent of global income. He argued that the relationship between preferences and trade must be studied in more depth.

Another theory of importance when attempting to develop the traditional H-O framework is the notion of gravity models. Many versions of gravity models exist. What they all have in common is that they contain explanatory variables intended to describe trade flows between geographical locations. The most commonly used explanatory variable in these models is the

physical distance between two regions, theory suggesting that trade will decrease as physical distance increases.

Econometrics makes it possible to combine different economical theories and datasets in order to describe relationships between variables through linear regression. The gravity models mentioned above are examples of how econometrics is put into practice to obtain an explanatory model. Nowadays many statistical software-programs are readily available to facilitate the generation of linear regressions. However, it has in the past been problematic to measure the effects of time-invariant explanatory variables, in other words variables that are static during the examined time-period. This problem has been resolved through the introduction of a relatively new procedure called fixed effect vector decomposition (FEVD). FEVD allows us to deal with time-invariant variables and their effect on the dependent variable.

We will make use of the economic theories and models described above by examining the Chinese wine industry. The wine industry's maturity varies globally resulting in a division of the global market (Anderson 2004) as follows; the Old World (France, Italy, Spain, Portugal, Germany, The United Kingdom, The Nordic countries, Eastern Europe and the Former Soviet Union), the New World (North America, South America, Australia, South Africa, New Zealand) and emerging markets (Eastern Asia). Consequently a greater number of linear regression studies have been conducted on region in the old rather than in the New World due to better data availability (Carole), (Castaldi, Sengupta, and Silverman, 2003) and (Remaud and Couderc, 2006). The Chinese market is an emerging market and to our knowledge no study of the sort we intend to carry out has previously been made. The research we have found on the Chinese wine market has been more descriptive in nature, focusing on giving a historical overview of production, consumption and trade data, domestic preferences and potential future developments.

1.2 Purpose & Contribution

By combining the theories of the Linder hypothesis and gravity models we aim to create our own version of a gravity model explaining trade patterns. One good in specific will be studied when creating and evaluating our model; Chinese wine. This is a novelty export product and in addition to designing a model with high explanatory power we also aspire to find indications of how the Linder hypothesis can be applicable on a good of this sort.

We will make use of various databases and datasets to identify relevant explanatory variables. These variables will be included in a linear regression using the fairly novel FEVD procedure estimation. The statistical software-program STATA will be our tool to analyze all data. Finally we will compare the results obtained from FEVD to that of fixed effects (FE) and random effects (RE) by running the same model three times using the different estimation procedures, intended to prove that better results are obtained using FEVD in studies such as this one. The three aims of this paper are summarized below;

- We aim to construct a linear regression model expressing the relationship between the dependent variable *Chinese wine export* and relevant explanatory variables.
- We aim to identify explanatory variables that can give an indication of the relevance of the Linder hypothesis for a novelty product. We hope to examine both how trade is affected by per capita income (PCI) similarities as well as income distribution similarities.
- We aim to contrast our FEVD model with the results obtained using a FE model and a RE model to illustrate that FEVD is more appropriate in comparison.

We argue that it is of interest to look at China and wine specifically as we want to examine the Linder framework for a novelty export good in a country with large income inequalities. China is known for battling high national economic inequality. The difference between PCI in

urban and rural areas is immense and often highlighted (Tubilewicz, 2005), but great income inequalities exist within regions as well (Tubilewicz, 2005). Industry analyses indicate that most wine consumption takes place in urban areas.[1] Market studies also indicate that wine is mostly demanded by the wealthier part of the Chinese population.[2] By examining a good where we have a relatively good knowledge about the domestic consumption structure, we stand a greater chance of applying the Linder framework. We wish to expand the traditional Linder framework which neglects income distributions. We will do so by making use of PCI and income equality similarities. Wine is a relatively novel, expanding product in China and other countries. Due to a Eurocentric view of the world many westerners tend to believe that the wine culture is as widespread in other parts of the world as it is in Europe and North America, this is certainly not the case. Wine consumption has changed rapidly in many countries during the 15 years covered by our study. We find it interesting to apply our Linder-gravity model on a good which has an old heritage in many countries with a high PCI while being a relatively novel good in many countries with lower PCI. Another aspect of this thesis is the massive GDP growth in China during the period studied which adds yet another dimension to the Linder hypothesis, namely whether we will be able to see how the trade patterns change as China's GDP becomes more similar to that of wealthier trade partners.

1.3 Disposition

In section two we give the theoretical background on which this paper is based. These theories are that of the H-O framework, the Linder hypothesis, and a general gravity model. We also describe the econometric estimation procedures used in this thesis consisting of FEVD, FE and RE. In section three we give an overview of the history and current state of the Chinese wine market. Section four describes the methodology and the explanatory variables

[1] China Wines Information website.
[2] Ibid.

identified. The empirical findings are presented in section five, a discussion of the results is given in section six, and a conclusion summarizing our findings is found in section seven.

2. Theory and Previous Research

2.1 The Heckscher-Ohlin framework

The H-O model based on David Ricardo's theory of comparative advantage is still the backbone of international trade theory (Behrens et al 2003). The basic foundation of the H-O model is that traded commodities are really bundles of factors, e.g. labor and capital. The exchange of commodities internationally is therefore indirectly a trade of factor components, transferring otherwise immobile factors of production from locations where these factors are abundant to locations where they are scarce (Leamer, 1995). The H-O model consists of two theorems; firstly that differences in relative factor endowments give rise to differences in the relative commodity prices, making international trade possible. Secondly that factor prices are also equalized or tend to be equalized through trade. Under some circumstances trade can completely eliminate factor price differences. An important implication of the H-O model is that the market for factors becomes global and the demand consequently more similar across countries.

Despite decades of empirical investigations, the empirical link is still somewhat weak. The H-O model in particular fails to explain the large proportion of intra-industry trade between countries with similar characteristics. Linder (1961) argues that the model is inadequate in explaining this specific trade phenomenon. In spite of this criticism the H-O model continues to be the most well-known framework to explain trade patterns, quoted in every textbook on international economics. Expressed in its most simplistic form it is used for pedagogical,

political and empirical purposes and can be employed both by scholars and the general public. (Leamer,1995).

2.2 The Linder Hypothesis

Linder (1961) presented a new trade theory differing from the traditional H-O framework. Linder maintains that while the H-O theory of trade is sufficient to explain patterns of trade in primary products, it cannot explain trade in manufactured goods. Instead of focusing on the supply-side and relative factor endowment causing differences in relative commodity prices, he emphasized how the demand side gives rise to international trade. The hypothesis states that countries with similar levels of PCI will have similar preferences and will produce similar but differentiated products, and will thus trade more with each other, i.e. the smaller the difference is between the average incomes of the respective countries the higher is the expected trade flow between those countries (Frankel, 1997). Linder explains his theory in the following fashion; in a world of imperfect knowledge; entrepreneurs will primarily produce goods for the domestic market as they are familiar with its demand structure. When sales increase to a certain limit, the entrepreneur will also desire to sell goods abroad. This is where Linder's propositions enter the stage. 1) The precondition for a good to be produced domestically is the presence of "domestic demand". If there is no domestic demand, the entrepreneur would be unsuccessful to launch the product abroad, since crucial information between the producer and consumers is lacking. 2) In order for an entrepreneur to export the good, the domestic demand for the good should be "representative". Representative demand is the demand that is necessary for a good to become a potential export product. Linder uses the example of luxury cars. Even though the demand for Cadillacs in Saudi-Arabia is not totally absent, the demand is not sufficient for Saudi-Arabia to produce and export this luxury car. 3) Since the representative demand pattern determines the range of goods that can be produced with comparative advantage, we would be able to forecast the pattern of production and trade

on the basis of domestic demand patterns of the trading countries (Linder, 1961), (Hong,1969).

Linder states that a lot of factors influence the demand structure of a country. But he argues that the level of average income is the most important factor and that it has, in fact, a dominating influence on the demand structure. Linder therefore uses similarities in income levels as an index of demand structure similarities. But Linder does not exclude trade between countries with large PCI differences. He states that other factors also affect the demand patterns, for instance; language, culture, religion and climate (Linder, 1961). The trade breaking forces like distance and tariffs not only make actual trade smaller than potential trade but it also creates distortions so that similar PCI countries do not trade most intensively with each other. According to Linder, product differentiation is the main reason why intra-industry trade among rich countries exists. Ships bringing European beer to Milwaukee take American beer back to Europe. This trade pattern can also be observed between countries with different levels of income. But the difference is that the demand overlaps will be fewer and the trade flows will therefore be smaller (Linder, 1961).

Linder states that his theory is more applicable on developed than developing countries and that the distance factor is especially distorting for underdeveloped countries. Linder argues that entrepreneurs in developing countries never raise their trade horizon very much above the local village market. Early research confirmed this Linder's argument. However, this was recently tested by Bernasconi (2009) who finds that the Linder hypothesis is especially applicable for poor countries whilst some results are ambiguous regarding rich countries. Arnon and Weinblatt (1998) also reach the same conclusion.

Linder never presented a formal model for his theory, which has led to several different studies, for instance Fortune (1971), and Sailor (1973). Researchers have tried to verify the

hypothesis using different methods. One approach has been to identify so called Linder goods - differentiated products with high income elasticity, characterized by two-way trade with trade primarily taking place between industrial countries - and study the demand patterns for these goods (Francois & Kaplan, 1996). But the most common approach as to examine the Linder hypothesis has been by making use of different gravity model constructions. A simplistic gravity model specifies the trade flow between two countries as a positive function of incomes of the countries and a negative function of the distance between them (Bergstrand, 1985) and (Thursby & Thursby, 1987). Arnon and Weinblatt (1998) confirm the Linder hypothesis and they discover that developing countries' trade also show signs of displaying a Linder effect. The Linder theory has suffered some criticism for not taking the income distribution into account. Two countries with the same average income level may display very different income distributions, and consequently differing demand structures. Francois and Kaplan (1996) and Bohman and Nilsson (2007) therefore look at the income distribution between countries instead of the average income level, and found a significant result for the Linder variable. There is also critiques against the confidence of the Linder hypothesis, Kennedy and McHugh (1980), argues that results favoring the Linder hypothesis should be interpreted with caution. The reason for authors' suspicion is the distance difficulty. Countries with the same income levels tend to be geographically clustered. The statistical correlation between distance and income levels can lead to a statistical problem of separating the effect of these two variables. Kennedy and McHugh (1980) use an inter-temporal method to circumvent the effect of distance and end up rejecting the Linder hypothesis.

2.3 Gravity Models

As the name indicates gravity models are based on the logic of Newton's gravitational concept advanced in the 17th century. In its broadest definition it refers to any exchange

occurring between social groups. Gravity models have been utilized in a wide range of empirical fields in order to explain different kinds of social phenomena, e.g. migration. Tinberg (1962) and Pöyhönen (1963) were the first to adapt gravity models to international trade.

Gravity models of international trade are based on physics where the law of gravity states that the gravitational force between two objects is proportional to the product of their masses divided by the square of the distance between them. To put it simply, a gravity model tells us that trade is an increasing function of the combined size of the two nations' economic size and a decreasing function of the physical distance between them (Frankel and Rose, 2002). The assumption of the gravity model of trade is that exports from country *i* to country *j* can be explained by their economic sizes (measured as GDP or GNP), their populations, the geographical distance between them and a set of dummy variables relevant for the particular trade flow examined (Martinez-Zarzoso and Nowak-Lehmann, 2002). Dummy variables should control for effects not captured by the basic variables of GDP and distance (Ceglowski, 2000). The basic gravity model of trade will hence include explanatory variables expressing distance and economic size. When more variables are included (e.g. GDP per capita, trade agreements, exchange rates, currency unions, language, colonial history and religion) we obtain a so called "augmented gravity model".

Gravity models explaining trade patterns were at first criticized for lacking more formal theoretical foundations but in recent years there have been a number of papers by empirical trade economists validating the soundness of such models (Rose, 2000, and Martinez et al., 2003). Linnemann (1966) commenced by developing a justification for the gravity model adopted in the works of many researchers following in his tracks. Anderson (1979) was the first attempting to develop a theoretical framework for the gravity model while assuming identical preferences across regions. Bergstrand (1985 and 1989) continued the development

in a series of papers where he explored bilateral trade by basing gravity models on monopolistic competition models. Deardorff (1995) managed to prove that the gravity equation is justified by standard theories of trade and that it can characterize many models. Researchers having developed the gravity model can generally be divided into two groups, the first being those having improved econometric specifications of gravity equations, e.g. Mátyás (1997), Chen and Wall (1999) and Egger (2000). Whilst the second group has focused on how to add and refine explanatory variables of gravity equations, e.g. Helpman (1987), Wei (1996) and Limao and Venables (1999) to mention a few.

By employing logarithms the basic gravity equation can be changed into a linear form for the purpose of econometric analyses. The basic linear form of a gravity model of trade would be as follows:

ln(Bilateral Trade Flow) = a+ßln(Gross Domestic Product of Country1)+ßln(Gross Domestic Product of Country2)-ßln(Distance)+e

In order to make an augmented gravity model adapted to the particular trade flow other variables will be added to this basic equation. If the study examines one specific good, these variables will include institutional characteristics of special relevance for the import and export of that particular good.

2.4 Econometric Model Estimation

In this paper we will run a regression on panel data to obtain an appropriate econometric model. A panel dataset is one where we have data on n units over t time periods. Panel datasets contains two pieces of information, the first one being cross-sectional (between) information reflected in changes between units, the second being the time-series (within) information reflected in changes within units.

In order to account for these different pieces of information in panel data we make use of more sophisticated estimation processes than those used in the most basic regression models. We can do so by estimating a fixed effect (FE) model or a random effect (RE) model.

The FE model controls for constant, unobserved variation across the cross-sectional units. It gives rise to the same effect as if a dummy was to be included for every unit in the dataset and allows us to use information about which observations that were recorded for which unit. When running a FE regression we allow for different intercepts for all units while assuming constant variance and identical slope in each unit group. FE regression takes into account unobservable, non-included variables that are correlated with variables in the model. As long as these omitted variables are time-invariant FE prevents the variable bias that would otherwise result.

The RE model is an average estimate of the results obtained from an FE regression combined with the results from a between effect (BE) model. In the FE model unit dummies were treated as part of the intercept, in the RE they instead act as an error term. We do not allow for changing intercepts in the RE regression but the error variance vary across groups and/or time unlike its behavior in the FE regression, imposing the constraint that the error term must be treated as random and normally distributed.

The above mentioned models display some drawbacks, such as estimating time-invariant variables in panel data analyses with effects. Another drawback is their inefficiency regarding variables with very little within variance. We call these time-invariant variables and almost time-invariant variables. A typical example of a time-invariant variable is the distance between two countries. An example of an almost time-invariant variable is family income, which typically changes very little for the period analyzed. Whether to treat a variable as time-variant or not depends on the ratio of the between variance and the within variance and

on the correlation between the unit effects and the rarely changing variables. So far the problem of slow-changing variables in panel data with unit effects has received very little attention. Since the FE model can compute coefficients for almost time-invariant regression many researchers have quite simply accepted the inefficiency of these estimates. This approach only overlooks the problem since if a variable changes over time, but slowly, the fixed effects will make it hard for such variables to appear either substantively or statistically significant (Beck, 2001). The inefficiency of the FE model results from the fact that it disregards the between variation (the variance across units), solely using the within variance (the variance over time) for the estimation. Thus, the FE model does not take all the available information into account. Plümper and Troeger suggest a model that is superior to the FE model in this respect. They use a three-stage procedure in order to estimate time-invariant and almost time-invariant variables; first a FE model is run to obtain the unit effects, secondly the unit effect is broken down into a part explained by time-invariant or almost time-invariant variables and an error term, thirdly the first stage is re-estimated by pooled ordinary least squares (OLS) including the time-invariant variables and the error term obtained in stage two. The above procedure gives rise to what is called a fixed effects vector decomposition (FEVD) model, since the estimator decomposes the unit FE into time-invariant variables and an error term (Plümper & Troeger, 2007). By making use of Monte Carlo simulations Plümper and Troeger proves that the FEVD model obtains better finite sample properties when estimating models including time-invariant and rarely changing variables correlated with unit effects than other available estimators.

3. The Wine Industry

3.1 The Global Wine Industry

Globalization is a process of crucial inputs and know-how movements from established to new areas (Anderson et al. 2003). This pattern is especially noticeable for wine as we can trace how the production has moved from region to region for a period of several millennia. The first systematic cultivation is believed to have take place between the Black and Caspian seas approximately 6,000 years ago. By 2,500 BC it had spread to Egypt, Greece and possible Spain. Cultivation in Italy took place before the 8th century BC and the Romans introduced it in France around 600 BC (Anderson et al. 2003). The practice of wine grape cultivation is hence believed to have been well established in the Old World as early as the 4th century AD (Robinson, 1994). As consumption and production increased in these regions with time it declined in the Middle East due to Prophet Mohammed's declaration against alcoholic beverage in the 7th century AD (Johnson, 1989). The trend of globalization once again picked up pace with the exploration of the New World. Europeans brought wine cultivation to South America and Mexico in the 16th century and to South Africa in the 17th century while North America, California was introduced to wine cultivation in the early 19th century (Anderson et al. 2003). Australia and New Zealand were also regions affected by globalization around this time as British settlers brought grape cultivation to the oceanic region during the late 18th and early 19th century (Robinson, 1994)

Even though wine production dates back to 6,000 BC in many ancient societies, actual wine trade began to take place around the 1700th century and ramped up after the Second World War. The wine industry of today is significantly larger and more complex, with much more varieties. This has favored producers from the "New World" such as Australia, South Africa and the United States, on behalf of European producers. On the demand side there have been

changes in preferences, with a trend of many consumers wanting to try new and different products competing with traditional European wine. Despite the changes in the last decades the largest producers are still European with France and Italy competing to be the largest producer in the world. There was a great break in the trend of wine trade in the 1980s. Up until then Europe had accounted for 96 percent of global wine exports and 75 percent of total wine imports, after the late 1980's major structural changes have taken place (Anderson et al, 2003). The New World has started to challenge European dominance, countries of particular importance during the 1990's were the US, Australia, New Zealand, Argentina, Chile, South Africa and Uruguay. These countries are nowadays well-known wine regions, and you can see similarities in China's wine industry development, the main difference being that China lags behind by approximately a decade.

Anderson et al. (2003) identifies some trends of particular significance for wine trade as they studied the globalization of the world's wine markets. They formulated a model to forecast the developments on the market up till 2005. In their model they included trends in income, demand preferences, population, wine acreage and productivity on the supply side. They draw the conclusions that the "Old World" defined as France, Italy, Spain, Portugal, Greece, Bulgaria, Hungary and Romania will face great challenges in the future as they continue to lose large shares of the global export shares to the "New World" consisting mainly of Argentina, Australia, Canada, Chile, New Zealand, South Africa, the United States, Uruguay and Asia. Their other significant conclusion is that all New World countries attempt to improve the quality of their wine with varying results, Australia being an example of a country succeeding relatively well (Anderson et al. 2003)

Even though trade on the international wine market has changed significantly during the last three decades production is still rather concentrated with the top ten producers accounting for about 90 percent of the total world wine production; even though the New World expands fast

in production there is still a big difference in absolute figures between the old and New Worlds' production capacity. The largest wine importers by value according to Comtrade are the UK, the US and Germany, with China on the twelfth place. The largest exporters are France followed by Italy and Australia, with China on the forty-second place.

When examining consumption in more depth it appears as if wine consumption shrunk somewhat globally during the 1990's due to declining per capita consumptions in the Old World not being balanced completely by rising consumption per capita in non-producing countries in Europe and Asia. However, the pattern of the total period was that of wine consumption spreading fast in regions where it had been very low or non-existing earlier in history. The global consumption has picked up once again during the 21st century but there are still great variances between regions' per capita consumptions.

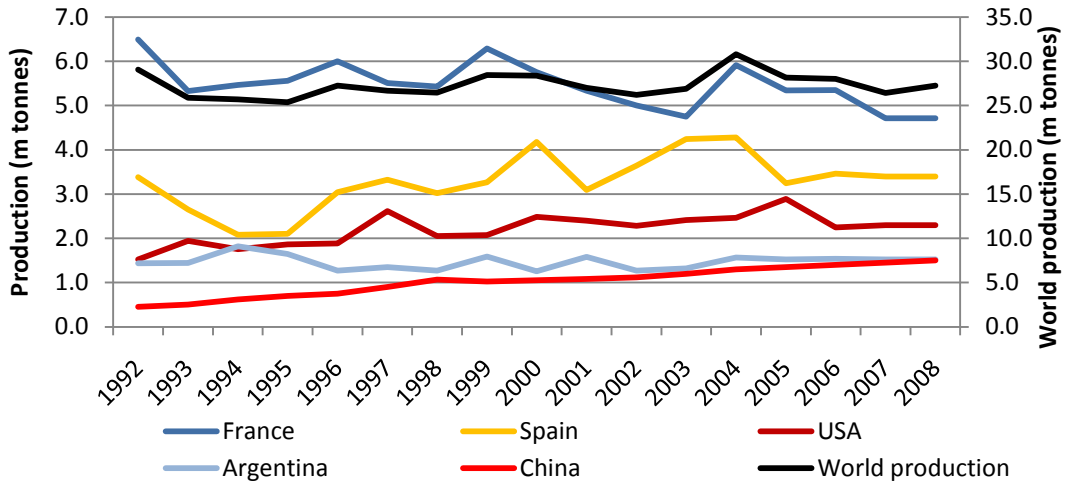
Jumpoth Boriraj (2008) chose to focus on the New World country Australia's wine export patterns and found that the world wine industry is more likely to be characterized by inter-industry trade rather than intra-industry trade. A high inter-industry trade is defined as a high export to import proportion for a trading country. Boriraj only look at Australia and the country's most important trading partner during the period 1980-2004, whether IIT increased or decreased differ greatly between countries and China was not included in the study. Boriraj also found that the extent of intra-industry between major wine producing countries is statistically and positively related to the ratio of capital to labor, trade openness, common culture, and regional trade agreements.

3.2 The Chinese Wine Industry

The Chinese wine production has according to the Food and Agriculture Organization of the United Nations (FAOSTAT) increased substantially during previous years. China went from

accounting for 1.5 percent in 1992 to 5.5 percent of total wine production in 2008 making the nation the sixth largest producer in the world.

Chart 1. Global *production of wine and by country (m tonnes)1992-2008.*



Source: FAOSTAT Food and Agriculture Organization of the United Nations

The Chinese wine industry is not yet very renowned in the western world but the history of Chinese wine production stretches far back in history. Even though the culture of wine production is assumed to have started 6,000 years ago, residue from the earliest wine believed ever to have been made was recently found in the Henan province in Northern China, dating 9,000 years back in time (McGovern et al. 2004). The modern history of Chinese wine production on a large scale is on the other hand relatively short. 1980 was an important landmark as Rémy Martin started up a joint-venture known as the Dynasty Wine Ltd. in Tianjin. The production was almost exclusively exported abroad as the income level of Chinese consumers was still too low to offer an attractive market. This started to change at the start of the 21st century as the Chinese economy continued to expand. Higher wealth among the urban population increased purchasing power and exposure to Western lifestyle, including wine consumption. Western style bars and restaurants are opening at a rapid pace in China causing higher levels of consumption and production. Nowadays 90 percent of all wine

consumed in the country is produced locally.[3] Red wine is preferred over white wine, due to perceived health benefits and the fascination of the red color which symbolizes celebration. Two other prominent wine brands from China are; China Great Wall Wine Co. and Changyu. The three brands mentioned above controlled 80 percent of the Chinese market in 2003.[4] Yearly consumption of wine varies somewhat depending on the source, but it appears to be around 0.3 – 0.5[5] liters per person, which is well below the world average, suggesting that domestic demand is still mostly untapped as wine only amounted to 1 percent of the total Chinese alcoholic consumption in 2003.[6] A fact supporting this is market surveys reporting that Chinese domestic sales increased by 68 percent between 2001 and 2006 with a forecasted future growth of 40 percent throughout 2011.[7]

Liz Thach, professor in Management and Wine Business at Sonoma State University briefly commented on the opportunities and challenges faced by the Chinese market highlighted during the *International Conference on the Wine Market in China in 2007*.[8] The advantages were listed as; the large domestic market and governmental support for increased consumption, the rising consumption of wine among the urban young population, future growth prospects and recent reduction of taxes and tariffs. Disadvantages facing the industry are; lacking regulation of labeling and production, inadequate infrastructure for distribution, the tradition of "gan bei" (the custom of empting the glass when toasting in rice wine) which impedes the Chinese consumers from learning about wine quality since many transfer this way of toasting to wine drinking as well, and finally translation issues when dealing with foreign markets since all varietal names of Chinese grapes has not yet received a proper English name.

[3] China wines information website.
[4] Wine business monthly website: *Who Can Change Chinese People's Consumption Patterns?*
[5] Ibid.
[6] Ibid.
[7] China wines information website.
[8] Chinese Wine Marketing Conference 2007.

Foreign wine has so far had a difficult time competing with local Chinese brands and according to M. David Levin, the American wine columnist for *Beverage Media* magazine, the foreign import is mostly a result of local demand growing faster than local supply can satisfy.[9] In 2003 foreign wine only represented five percent of the market, increasing to 17 percent in 2007.[10] This is partly due to lack of wine culture in China. The concept of how to drink and appreciate wine has only been known by the general public a couple of decades. Wine is still consumed in a manner similar to that of beer and stronger spirits, making it hard for foreign wine to compete based on price since the quality of these are often better than their Chinese counterparts. When present on the market, these foreign brands are mainly found in major cities such as Beijing and Shanghai and are mostly consumed at nightclubs, bars and high-class hotels.[11] High tariffs has historically also been a reason to why foreign brands fail to reach the market but the situation is slowly improving with more liberal trade, an example being that the duty rate for imported wine was lowered by 25-30 percent in 2005.[12] On top of the current state of foreign imports it is not even certain that much of the imported wine is actually consumed as such. Due to the loose regulation of labeling some producers in China blend their Chinese brewed wine with imported foreign brands, creating a hybrid blend not accounted for on the actual label.[13]

Mass-media, professionals and foreign brands are all trying to address the problem of lacking wine culture by promoting a more western-inspired consumption, contributing to better knowledge among consumer, quality among producers and hopefully tighter regulation on labeling and production.

[9] Wine business monthly website: *China wants wine.*
[10] China wines information website.
[11] Ibid.
[12] Ibid.
[13] Ibid.

4. Methodology & Data

4.1 Methodology

In order to identify variables of importance when explaining the Chinese wine export we have to make a multiple regression analysis. A problem for previous studies was that the effect of time-invariant and almost time-invariant variables could not be properly measured. The method described by Plümper and Troeger (2007) takes both between and within variance information into account. The primary software for running the procedure, known as FEVD, is STATA[14]. We also use STATA to run regressions of a FE model and a RE model to compare the results to one another. The data covers the period 1992-2007, with the exception for *Chinese Market share* which is lagged by one year. The reason for the period 1992-2007 was both lacking of data for the years previous to 1992 and that following the collapse of the Soviet Union in 1991 a new set of countries was created. The countries of our choice are the countries with a population over 1.5 million in 1992 according to IMF World Economic Outlook Database, resulting in a dataset consisting of 132 countries. By limiting the study in this manner small countries where data is less readily available are excluded. The variables *Wine Export, Gross Domestic Product (GDP), Revealed Comparative Advantage (RCA), Marketshare, Distance, Temperature, Consumption, Gini,* PCI_{high} and PCI_{low} are all measured in log terms. Hence, our preliminary model includes the variables making the foundation of the gravity theory i.e. economic sizes of trading countries as well as physical distance between them. We will construct an augmented gravity model as we also include other variables we believe to be of particular interest for the wine industry. The equation which we will run a linear regression on is labeled as equation one.

[14] By STATAcorp LP, Collage Station TX 77845 USA.

Equation 1:

$$Wineexport = \alpha + \beta 1GDP + \beta 2RCA + \beta 3Marketshare + \beta 4Distance + \beta 5Temperature + \beta 6TWTO + \beta 7Islam + \beta 8Gini + \beta 9Consumption + \beta 10PCI_{high} + \beta 11PCI_{low} + \beta 12ASEAN + \beta 13Ten + \varepsilon + \delta$$ [15]

A multicolliniarity test will be carried out to judge whether there exists any problem of strong colliniarity between any pair of variables. After having evaluated this test and the significance of individual variables in the regression we will decide whether the equation is to our satisfaction or whether it should be adjusted by adding or removing explanatory variables.

4.2 Data

4.2.1 Chinese Wine Export

Chinese wine export is the dependent variable in the model. The data is collected from the United Nations Commodity Trade Statistics Database (UN Comtrade) for 132 countries from 1992 until 2007. The data is expressed in annual trade value in US dollars. In two cases the countries are presented as unions, Belgium-Luxemburg and the South African trade union, which consists of Botswana, Lesotho, Namibia, South Africa and Swaziland, this has been adjusted for in all of the explanatory variables. The variable is labeled as *Wineexport* in models and outputs.

4.2.2 Gross Domestic Product

Gross domestic product of a country is according to the gravity model one of the most important variables to consider. The variable is the best proxy for the size of the market and therefore the economic attraction of goods. The data is collected from IMF World Economic Outlook October 2008 for all the 132 countries for the period 1992- 2007 and are based on

[15] ε is a leftover from the second stage of the three stage procedure and can be ignored for the analysis.

1992 prices. The data is converted by taking the logarithm. The variable is labeled as *GDP* in models and outputs.

4.2.3 Revealed Comparative Advantage

Revealed Comparative Advantage is a measure created by Balassa (1965), it is used to capture the relative advantage of a specific country concerning a specific good. In our case we use it to calculate all the 132 countries' relative advantage regarding wine production. We believe that a larger comparative advantage in wine would lead to less wine imports from China since they have less need for importing. The data is collected from the UN Comtrade for the period 1992-2007. We calculate the Revealed Comparative Advantage as;

$$RCA = \frac{(Export_{ki}/Export_i)}{(Export_{kw}/Export_w)}$$

Where:

$Export_{ki}$ is the value of a country's export of wine.

$Export_i$ is the value of a country's total export.

$Export_{kw}$ is the value of world exports of wine.

$Export_w$ is the total value of world exports.

The variable is labeled as *RCA* in models and outputs.

4.2.4 Chinese Market Share on Foreign Markets

Total Chinese market share on a foreign market is calculated as Chinese export to a specific country divided by the total import of that country. The data is collected from the UN Comtrade. The data is expressed in US dollars and ranges from 1991 until 2006 since we believe that the previous year's market share has a larger explanatory power than the current year's total export. This is because a high market share the previous year should result in partnerships and better communication with importers that can be taken advantage of the

following year, in other words accumulated market knowledge. The variable is labeled as *Marketshare* in models and outputs.

4.2.5 Distance

The distance variable measures the distance in kilometers between Beijing and all of the capital cities included in the study. A few exceptions are made when the capital is not the same as the economic center of the country, e.g the US, South Africa and Brasilia. In these cases we have measured the distance between Beijing and the major economical centre of the other country. The source of the distance variable is the Centre d'Etudes Prospectives et d'Information International, Bilateral Distance (CEPII). Distance is a variable of great importance in gravity models due to transportation costs rising with distance. The variable is labeled as *Distance* in models and outputs.

4.2.6 Temperature

The temperature variable measures the average annual temperature in each country in 1995. It is included to examine whether countries with climate similar to China has a higher demand for Chinese wine. The data is collected from the website www.temperatureworld.com. It is possible that beverages produced to suit the domestic Chinese climate will be in higher demand in countries with similar climate. The variable is labeled as *Temperature* in models and outputs.

4.2.7 Trade agreements

If a trade agreement is created between China and one or a group of other countries this could affect the export of wine to these countries. Trade agreements are expressed as dummy variables. They are sub grouped into two separate variables since they have different effect on Chinese trade. These subgroups are; agreements included in the Association of Southeast

Asian Nations (ASEAN) which agreed on a free trade area with China in 2002[16] and WTO agreements following China joining the WTO in 2001[17]. We chose not to include bilateral agreements in our study to keep our dummy variables to a minimum. The dummy variables are labeled as *ASEAN* and *WTO* in models and outputs.

4.2.8 Religion

Religion is expressed as a dummy variable in our study, the rationale being that religion affect consumption patterns proved among others by Heiman et. al (2004). Alcoholic beverages are also a controversial good and banned in some religions and prohibited by laws in several countries. At first all countries were separated into five groups; Islam, Christianity, Buddhism, Hinduism or local practices. When running a preliminary test we noticed that multicolliniarity existed between some of these variables, particularly between Islam and Christianity. To avoid this we created a religion dummy where only a distinction between Islam and all other religions was made; this is due to the strict Islamic rules against alcoholic consumption. Both Buddhism and Hinduism have some rules against consumption of alcoholic beverages but these rules are not as strong or as distinct as the ones in Islam. The information is derived from the CIA World Fact Book. We are aware that this kind of dummy variable poses some problems, we divide countries into respective groups based on the nation's official religion which does not take into account the country's degree of secularization. This method also fails to show the proportion of the population practicing the official religion; for example if there are many other religions in a country very few citizens may actually belong to the officially stated religion. The dummy variable is labeled as *Islam* in models and outputs.

[16] The official website of the ASEAN.
[17] The website of the WTO.

4.2.9 Gini Coefficient

The study will look at different measures of income inequality to examine the effect on Chinese wine export. The Gini coefficient of a country is included, measuring the income inequality in a country; it ranges from zero to one. Zero indicates perfect equality while higher values indicate a more unequal distribution. The Gini coefficient is not measured for every country each year so we do not have observations for the entire dataset. The data is collected from the World Bank's World Development Indicators (WDI) for the period 1992-2007 when available. The Linder hypothesis has been criticized for only looking at PCI levels and not the income distribution, which will affect the national consumption patterns as well. The Gini coefficient is therefore useful when investigating the Linder hypothesis. The variable is labeled as *Gini* in models and outputs.

4.2.10 Wine consumption

The wine consumption variable is expressed in per capita consumption of wine in liters annually. The data was obtained from Nationmaster World statistics for all 132 countries but was only available from 1992 until 2003 so we are missing values for the last four years of our study. The variable's effect on Chinese wine export is ambiguous, we believe that one the one hand if everything else is equal a higher wine consumption would lead to a higher wine export on a pro rata basis. But on the other hand with increased wine consumption people may learn more about wine labels and quality, wanting to substitute lower quality Chinese brands for more well-renowned brands produced in more historically well-known wine countries. The variable is labeled as *Consumption* in models and outputs.

4.2.11 Gross domestic product per capita, PCI_{high} and PCI_{low}

The PCI variable is used as a proxy for the national income. This annual inflation adjusted data was collected from IMF for the period 1992 to 2007. We took each country's PCI as a percentage of China's and divided the data in two groups, one with countries displaying a

higher PCI than China and the other displaying a lower PCI. In that way we created two variables, PCI_{low} including countries with lower PCI than China and PCI_{high} including countries with higher PCI, we also took the logarithm of this data. The PCI variable is interesting when considering the Linder hypothesis which states that countries with similar levels of GDP per capita will trade more. By dividing the PCI variable in two variables we are able to see if there is any difference between rich and poor countries. The variables are labeled as PCI_{high} and PCI_{low} in models and outputs.

4.2.12 Wealth Held by the Richest Ten Percent of the Population

In addition to the Gini coefficient we test the income inequality by including a variable of the total assets held by the richest 10 % of the population. The data is collected from the World Bank's World Development Indicators (WDI) for the period 1992-2007 when available. We argue that we can have both this variable as well as the Gini variable in our dataset since the ten percent variable offers another dimension than the Gini coefficient. This variable tells us more about how the wealth is distributed in the country, not only if it is equal or not. Economies with similar Gini coefficients may have very different income distributions. The variable is labeled as *Ten* in models and outputs.

5. Empirical Findings

5.1 Results

We begin by designing an equation (equation 1) containing the variables deemed most likely to affect the wine export from China and then proceeded by running a multicolliniarity test. A high degree of multicolliniarity is detected for two pairs of variables; GDP and PCI_{high} as well as Gini and the tenth percentile display strong multicolliniarity of above 0.7 (see appendix, table 3). The multicolliniarity data also indicate some colliniarity to exist between the following variable pairs; RCA and consumption, distance and the tenth percentile,

temperature and consumption, temperature and the tenth percentile. However, all values are below 0.7 and the nature of the variables is that they ought to have different predictive properties for our dependent variable, leading us to conclude that the pairs can be run in the same regression. The following regressions are made with time dummies to account for external factors not incorporated in the model.

Equation 1:

$$Wineexport = \alpha + \beta 1GDP + \beta 2RCA + \beta 3Marketshare + \beta 4Distance + \beta 5Temperature + \beta 6TWTO + \beta 7Islam + \beta 8Gini + \beta 9Consumption + \beta 10PCI_{high} + \beta 11PCI_{low} + \beta 12ASEAN + \beta 13Ten + \varepsilon + \delta$$[18]

We run the regressions in STATA using Plümper and Troeger's FEVD procedure since some of the variables are time-invariant or almost time-invariant in the dataset. The variables which are treated as invariant are; WTO, Distance, Temperature, Islam, ASEAN, Consumption and Gini. The results from the regression of equation 1 are presented in table 1.

[18] ε is a leftover from the second stage of the three stage procedure and can be ignored for the analysis.

Table 1. *FEVD procedure for Equation 1.*

Variable	Coefficient	Std. Err.	T	P>t
GDP	0.381	0.092	4.15	0.000***
RCA	-0.199	0.040	-4.95	0.000***
Marketshare	0.264	0.099	2.66	0.010**
Distance	-4.544	0.295	-15.42	0.000***
Temperature	2.036	0.345	5.90	0.000***
WTO	-0.539	0.550	-0.98	0.331
Islam	-1.384	0.320	-4.33	0.000***
Gini	-0.180	0.468	-0.38	0.702
Consumption	0.794	0.128	6.21	0.000***
PCI_{high}	-0.104	0.198	-0.52	0.602
PCI_{low}	0.224	0.619	0.36	0.719
ASEAN	-5.22	0.754	-6.92	0.000***
Ten	3.486	0.735	4.74	0.000***
Eta	1	0.033	30.07	0.000***
Constant	24.682	2.037	12.12	0.000***
R-squared	0.970			
Adj.R-squared	0.918			

* Statistically significant at 10% level, ** statistically significant at 5% level, *** statistically significant at 1% level.

We decide to only continue with the variables which are significant at the 10% level and which make logical sense. We chose to remove the PCI_{high}, PCI_{low}, WTO and Gini variables since they are insignificant and PCI_{high} and Gini showed large values of multicolliniarity in our previous multicolliniarity test. We also exclude the ASEAN variable because we believe that the variable display the wrong sign and does thus not make logical sense. We run a new regression with the remaining eight variables. This second model is expressed in equation 2 below;

Equation 2:

$$Wineexport = \alpha + \beta 1GDP + \beta 2RCA + \beta 3Marketshare + \beta 4Distance + \beta 5Temperature + \beta 6Islam + \beta 7Consumption + \beta 8Ten + \varepsilon + \delta$$

Once again we run a FEVD procedure and treat Temperature, Distance, Islam and Consumption as time-invariant variables. The obtained results from the regression are presented in table 2. All variables in equation 2 are significant on a ten percent level. As none of the variables are insignificant or appear to have the wrong sign we do not make any further

changes in the model but choose to have equation 2 as our model to explain Chinese wine export. We also run the same regression without time dummies and receive to a large extent the same result, with the difference of the variable Marketshare turning insignificant (0.825).

Table 2. *Fevd procedure Equation 2*

Variable	Coefficient	Std. Err.	T	P>t
GDP	0.255	0.062	4.08	0.000***
RCA	-0.121	0.044	-2.73	0.008***
Marketshare	0.322	0.097	3.31	0.001***
Distance	-4.465	2.198	8.83	0.000***
Temperature	1.096	0.348	3.15	0.002***
Islam	-1.038	0.342	-3.03	0.003***
Consumption	0.824	0.138	5.97	0.000***
Ten	5.468	0.711	7.69	0.000***
Eta	1	0.038	25.83	0.000***
Constant	19.422	2.198	8.83	0.000***
R-squared	0.949			
Adj.R-squared	0.880			

* Statistically significant at 10% level, ** statistically significant at 5% level, *** statistically significant at 1% level.

We use STATA to evaluate the FEVD performance as compared to FE and RE, the result is found in the appendix. Table 4 gives the output when running equation 2 with time dummies using the FE estimation, table 5 gives the output when running equation 2 with time dummies using the RE estimation and table 6 displays the STATA output obtained when performing a Hausman-test.

We begin by looking at the Hausman-test, it is used to evaluate one estimator against another, in this case FE against RE. It is conducted by formulating a null hypothesis where both estimators are consistent with one being more efficient, we run the test setting the RE estimation as more efficient. The alternative hypothesis is that one or both estimators are inconsistent.

FE regression is always a reasonable choice for panel data as they statistically produce consistent results but unfortunately it may not be the most efficient model. RE on the other

hand can by producing better P-values be a more efficient estimator. In summary RE should be used on panel data if statistically justifiable. This is where the Hausman-test comes in handy as it tests the null hypothesis that coefficients produced by the efficient RE estimator are the same as coefficients produced by the consistent FE estimator. After having run the test in STATA we get an output telling us whether to reject the null hypothesis or not. An output where Prob>chi2 is larger than 0.05 indicate an insignificant P-value and the null hypothesis is not rejected. RE estimation is then safe to use while FE estimation should be used if the P-value turns out to be significant.

When running the test we received an output of Prob>chi2= 0.0043. This is smaller than 0.05 giving us a significant P-value which tells us that the RE estimation is not appropriate to use on our panel data.

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6. Discussion

The thesis main purpose was to examine the factors that shape the export pattern of Chinese wine. To do so we begun by formulating an equation were all variables of interest were included. These variables consisted of GDP, RCA, market share, distance, temperature, WTO, Islam, Gini, Consumption, ASEAN and the tenth percentile. By using the FEVD procedure developed by Plümper and Troeger we were able to treat some of these variables as time-invariant or almost time-invariant. We found some signs of multicolliniarity among the included variables. The multicolliniarity was particularly high between GDP and PCI_{high}, and Gini and the tenth percentile, this posed no further problem since PCI_{high} and Gini were both excluded in equation 2. We also found four other variable pairs were the multicolliniarity level demanded a closer examination, these were; RCA and consumption, temperature and consumption, distribution and the tenth percentile, and temperature and the tenth percentile. We concluded that all contributed with important individual explanatory power in our final

model and that the multicolliniarity values were not high enough to motivate direct exclusion. We consequently ran equation 2 as a regression. If problems due to insignificance arose for any of the variables displaying some multicolliniarity some of them would have to be dropped. This was not necessary as all variables in equation 2 displayed expected signs, were all significant on at least a ten percent level and the model displayed a high R-value. Thus all variables were maintained as we concluded that no risk of serious miscalculations due to multicolliniarity existed, making equation 2 our final model to explain Chinese wine export.

We found a positive relationship between wine export and the GDP variable expressed as the importing country's total GDP. Since we consider GDP a measure of market size according to the gravity model, we can conclude that the larger the market of the importing country the more wine they import. This variable together with other income variables in relation to the Linder hypothesis will be further discussed later on in this section.

As expected the RCA variable carried a negative sign, indicating that Chinese wine export to a country decreases when the country's comparative advantage in wine production increases. As a country's ratio of wine export to total export increases compared to the world's wine export to total export, the need for imported wine decreases. This might also suggest that the quality of Chinese wine is still comparatively low. We base this on the argument that as the RCA increases, a country specializes more in the wine industry, which will lead to more industry knowledge and ultimately better products. As the domestic wine quality increases the demand for lower quality wine will decrease. If having conducted this study on a country known to produce a large proportion of high-quality wine the pattern might very well be the opposite.

The market share variable expresses how large of a fraction Chinese goods are of a country's total imports. We believed that if Chinese goods constitute a large fraction of the total imports

in a country it would translate into valuable market knowledge and a greater number of potential business partners, facilitating the export of Chinese wine. This also appears to be the case as the variable is positive and significant on a 5 percent level.

As we predicted based on the gravity model framework, the variable distance carries a negative sign, indicating as theory suggest that trade will decrease as physical distance increases. Chang et al (2004) states that distance between countries decreases cooperation but also conflict (even though less than cooperation), but there is also an additional effect of greater distances in the shape of increased transportation costs.

The temperature variable carries a positive sign stating that wine export will increase as the annual average temperature increases. Countries with warmer climates will tend to have a stronger preference for Chinese wine.

We started our study by recording data on official religions for all countries. As a great majority of the included countries either stated Christianity or Islam the multicolliniarity was too high to assign each religion it own dummy variable. This forced us to only include one religion dummy in our regression. As Islam generally strictly prohibits alcoholic consumption we chose this variable as our dummy. As expected the Islam variable displays a negative sign indicating that Islamic countries will import less Chinese wine than countries stating an official religion different from that of Islam. One must still keep in mind the potential uncertainty connected to this variable mentioned in section three, such as varying degrees of secularization and the lacking knowledge of the population percentage belonging to the officially stated religion.

Wine export and wine consumption display a positive relationship, indicating that Chinese wine export increases as the annual wine consumption per capita increases in a country. We believed that the wine consumption variable would have two offsetting effects. Increased

wine consumption leads to a higher Chinese wine consumption on a pro rata basis, if everything else stays the same. But countries with higher wine consumption should have a more developed knowledge about wine and may desire higher quality than the Chinese wine can offer. The result shows that the first effect outweighs the second since the variable has a positive sign which means that increased consumption leads to an increased import of Chinese wine.

Our last significant variable was that of the top tenth percentile. We found a strong positive relationship between this variable and Chinese wine export concluding that the more wealth held by the top ten percentile of the population the larger the tendency of importing Chinese wine. In other words, if there is a large inequality between the very wealthiest individuals and the rest of the population the interest for Chinese wine import seems to grow, this does present us with the opportunity to analyze the industry with the help of Linder's hypothesis, as will be done later on in this section.

All of the included trade agreement variables turned out to be insignificant or to carry the wrong sign. We believe that this is due to the nature of the good examined. Wine is a relatively new industry in China and will therefore not be very important when petitions for increased trade are discussed among nations. The industry will, due to its short history have a weaker lobbying group fighting for better terms of trade.

We will now relate some of the examined variables to the Linder framework, beginning by looking at total GDP. After having obtained our results we believe that the domestic demand structure for the particular good makes it difficult to find a Linder relationship. As mentioned in section three, market studies suggest that Chinese wine consumption is almost exclusively an urban phenomenon on a larger scale. One of many market analyses states that income growth will be the basis for future consumption growth as low income levels are currently

keeping consumption down[19]. China displays great income inequalities between urban and rural areas. China is positioned as number 36 out of 134 on the Gini-coefficient list of world inequality displaying a value of 47,[20] where 0 expresses perfect equality and 100 represents perfect inequality distribution of income. If the simplified Linder version of total GDP comparison is abandoned and we also incorporate income differences and different consumer groups in trading countries we have a better chance of confirming a Linder relationship. Obviously wine is a novelty good in China where the wealthier part of the population demands the product. We can also deduct that the group demanding wine domestically will have a demand structure more similar to consumers in wealthier countries due to Chinas high income inequality – a rich person in Shanghai will to a large extent have life standards and expectations more similar to a person living in Belgium than a person living in the poor Chinese countryside. Our conclusion is that the traditional Linder argumentation is too simplified to explain the pattern of trade concerning novel goods in a country with great income differences. Only a small part of the population will constitute the domestic demand structure and when trying to understand the trade pattern we should compare this group's income per capita to that of other nations instead of looking at the country as a whole. We tried to do so by incorporating different income distribution variables in the regression, further discussed below.

We found a strong positive relationship between the tenth percentile variable and Chinese wine export. As was previously mentioned, wine consumption is still not too common in China, but it is becoming more common that people living in the urban sectors drink wine instead of other alcoholic beverages. We can therefore draw the conclusion that the wealthiest part of the Chinese population has a higher demand and preference for wine. China's wealthiest tenth percentile of the population holds an extremely large proportion of the

[19] China Wines Information website.
[20] Webpage: CIA World fact book -*Gini index.*

country's total wealth and most wine in China is consumed by this wealthier, urban population[21]. It appears as if a similar demand structure arise in other countries where as in China, the top ten percentile is extremely well-endowed relative the rest of the population. This supports our conclusion that the traditional Linder-framework is too simplified for a novel good such as Chinese wine. Instead a demand structure with a very wealthy urban population as compared to the rest of the country appears to shape the demand for Chinese wine, both domestically and abroad, supporting Linder's original argumentation about the importance of similar demand structures in trading countries.

We wanted to include the Gini variable as to help us apply the Linder framework on the Chinese wine industry. Unfortunately this proved to be impossible as the variable was not significant even on a ten percent level. We also aimed to analyze Linder's framework by including the PCI variable divided into countries with lower and higher values than that of China. Just as the Gini variable, the PCI variable was also statistically insignificant, rendering it impossible for us to use it as an explanatory indicator.

The final aim of this thesis was to look closer at the relatively new FEVD model and to decide whether it is more appropriate to use as compared to the more well-established FE and RE models for a study such as this one. We did so by running the same equation with all three estimation procedures. The results obtained from FEVD appeared much more compelling as it produced a much higher R-squared value than either the FE or RE model did. The FEVD also presented more variables as statistically significant than the FE and RE models were able to do. It certainly appears to support Plümper and Troegers findings that FEVD can produce a lot more reliable and useful results for this kind of cross-sectional time-series data than more well-known estimation processes.

[21] China Wines Information website.

Before FEVD emerged as an option we would have to rely on either FE or RE estimations for this kind of a study. Our first step in evaluating the FEVD results compared to older estimation models was therefore to test weather FE or RE would have been more appropriate if lacking other alternatives. To do so we made use of the Hausman-test which simply put evaluates one estimators significance (FE) compared to another (RE).

Our result from the Hausman-test showed that the RE estimation is not recommended to use on our panel data. But by using the FE model, we will not take the time-invariant, almost time-invariant variables into account; therefore we can conclude that the FEVD procedure is preferable since it can deal with the issue of FE estimation not being most efficient. If we would use the FE model significant and theoretically confirmed variables such as Distance would have to be excluded.

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7. Conclusion

In the beginning of this paper we stated three purposes of the study, namely;

- Constructing a linear regression model expressing the relationship between the dependent variable *Chinese wine export* and appropriate explanatory variables.
- Examining the Linder hypothesis relevance for a novelty product in the exporting country.
- Contrast the FEVD model with the results obtained from a FE model and a RE model .

In order to carry out our first aim an appropriate equation was constructed and a linear regression was run in STATA making use of variables collected from various sources. This procedure produced outputs allowing us to evaluate the soundness of the model. Our overall conclusion is that the model put forward gives a good explanatory description of Chinese wine export patterns. The R-value and R^2-value are both sufficiently high, all explanatory variables included in the final model are statistically significant and make logical sense with

no alarming signs of multicolliniarity existing. We were also able to give an account of each included explanatory variable's nature and why they turned out to be relevant when explaining wine export from China. When formulating our model we combined theories from the gravity model as well as the Linder hypothesis framework resulting in a model containing what we believe to be the most important explanatory variables for the Chinese wine export patterns.

Our second aim, to evaluate the Linder hypothesis relevance for a novelty good on the domestic market was carried out by further analyzing the dependent variable's relationship with GDP differences and national income distributions. The GDP difference between China and other nations turned out to be statistically significant, displaying a positive relationship indicating that export increases as the GDP difference grows and that exports ought to be higher to wealthier countries. We further concluded that due to China's great income inequalities between urban and rural sectors and that the domestic demand structure basically consists of the wealthier population it is impossible to evaluate the Linder hypothesis without looking at income inequality differences between trading partners. To do so we looked at different income distribution variables but unfortunately only one of these, the tenth percentile turned out to be statistically significant. The relationship was positive and lets us know that countries with high income inequality, similar to that of China, will have a greater tendency to import wine. We may conclude that the traditional Linder framework is too simplified when looking at a country with large income inequality combined with a good mainly consumed by the wealthier part of the population but that a demand structure similar to that of China, with a few very rich individuals relative to the remainder of the population encourages wine export to these regions.

To achieve our final aim of contrasting and evaluating the relatively new FEVD procedure to traditional FE and RE estimations we once again made use of STATA by examining R-

values, the significance of the estimated coefficients, the Hausman-test and B/W ratios. In summary we found that RE would not have been appropriate for this study as the Hausman-test would reject the hypothesis of the RE estimator being the same as the FE estimator. This would previously have caused a problem as the FE estimations exhibit the possibility of not being the most efficient method. By making use of FEVD we can evade this problem.

FEVD is still a relatively new procedure when constructing econometrical models similar to the one presented in this paper. There are many possibilities of examining many interesting relationships previously hindered by the lack of possible procedures to deal with time-invariant and almost time-invariant variables and it is our hope that the procedure is further incorporated in econometrical studies.

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Appendix

Table 3. *Test of multicolliniarity.*

	GDP	RCA	M.S.	Dist.	Temp.	WTO	Islam	Gini	Cons.	PCI_{high}	PCI_{low}	ASEAN	Ten
GDP	1												
RCA	0.13	1											
M.S.	-0.09	-0.11	1										
Dist.	-0.12	0.05	-0.10	1									
Temp.	-0.07	-0.37	0.27	0.26	1								
WTO	-0.27	-0.08	0.33	0.07	0.15	1							
Islam	-0.09	-0.08	0.13	-0.28	0.08	-0.02	1						
Gini	-0.07	-0.24	0.01	0.47	0.54	0.03	-0.06	1					
Cons	0.28	0.67	-0.15	-0.01	-0.62	-0.14	-0.21	-0.47	1				
PCI_H	0.82	0.25	-0.15	-0.11	-0.25	-0.34	-0.01	-0.24	0.45	1			
PCI_L	-0.24	-0.27	-0.03	0.13	0.22	0.17	-0.08	0.18	-0.26	-0.48	1		
ASEAN	0.06	-0.18	0.18	-0.34	0.17	0.13	-0.05	-0.02	-0.12	-0.09	0.05	1	
Ten	-0.10	-0.27	0.11	0.60	0.66	0.12	-0.08	0.79	-0.50	-0.32	0.25	-0.02	1

Table 4. *FE regression.*

Variable	Coefficient	Std. Err.	T	P>t
GDP	0.106	0.197	0.54	0.592
RCA	-0.084	0.103	-0.81	0.420
Market share	0.0189	0.194	0.10	0.923
Distance	Dropped			
Temperature	Dropped			
Islam	Dropped			
Consumption	0.107	0.532	0.20	0.841
Ten	3.564	1.952	1.83	0.071*
Constant	-11.594	7.008	-1.65	0.102
R-squared (within)	0.043			
R-squared (between)	0.000			
R-squared (overall)	0.002			

Table 5. *RE regression.*

Variable	Coefficient	Std. Err.	T	P>t
GDP	0.649	0.138	4.70	0.000***
RCA	-0.108	0.088	-1.23	0.220
Market share	0.313	0.162	1.94	0.052*
Distance	2.991	0.965	-3.10	0.002***
Temperature	-0.019	1.167	-0.02	0.987
Islam	-1.161	1.155	-1.01	0.315
Consumption	0.314	0.335	0.94	0.348
Ten	2.771	1.621	1.71	0.087*
Constant	18.509	7.990	2.32	0.021**
R-squared (within)	0.014			
R-squared (between)	0.421			
R-squared (overall)	0.405			

Table 5. *Hausman test.*

Variable	**(b) fixed**	**(B) random**	**b-B diff**	**Sqrt(diag(v_b-v_B))S.E.**
Ten	3.565	2.771	0.794	1.087
RCA	-0.083	-0.108	0.024	0.054
Marketshare	0.019	0.313	-0.294	0.107
Liters	0.107	0.314	-0.208	0.414
GDP	0.106	0.649	-0.542	0.141

b= consistent under Ho and Ha; obtained from xtreg
B= inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic

Chi2(5)
= (b-B)'[(v_b-v_B)^(-1)](b-B)
=17.08
Prob>chi2= 0.0043