Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

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Abstract

Despite interest in the influence of religion on economic activity by early economists like Adam Smith, modern economists have done little research on the subject. In light of the apparent religious fervour in many parts of the global economy, economists’ seeming lack of interest in studying how religious cultures enhance or retard the globalization of economic activity is especially surprising. In general, trade theories have given less weight towards the reason for trade explanation on demand side. As a contrary to H-O theory Linder had proposed a theoretically sound and empirically consistent trade theory with a new claim for the reasons why countries trade on the demand side. To fill this gap, I use international survey data on religiosity for a broad panel of countries trading with US to investigate the effects of church attendance and religious beliefs on trade. The beliefs are, in turn, the principal output of the religion sector, and the believer alignment to a specific denomination measures the inputs to this sector. Hence, I used an extended gravity model of international trade to control for a variety of factors that determine trade, and I used two regression methods, OLS and WLS, to exploit the model to its fullest. I find that the sharing of same religious cultures by people in different countries has a significantly positive influence on bilateral trade, all other things being equal. These results accord with a perspective in which religious beliefs influence individual traits that enhance trade and economic performance in general. And my attempt to magnify religion as a means to trade is only a derivation of Linder’s overlapping demand theory.

Key words: International trade, gravity model, similarity score, network theory and religion
1. Foreword

The problem for this essay has been conceived on my “aha” moment in the ministerial meeting to hear an annual export performance of my country. The reporter mentioned the challenge to transport the cattle fattened in the central part of Ethiopia which is apparently dominated by Christianity to the eastern part where Islam and Islamic culture have a dominion. And the minister of trade asked wondering why, the reporter replied “because the Saudi buyers prefer to buy from the eastern part”. It was actually interesting and easy to conceive an idea but to deliver it with same passion and energy needs a soar commitment. It was overwhelmingly devastating to find a precise data neither on religious affiliation nor as to calculate the score of similarity between nations. The mishandling and non comprehensiveness of the data on religion not only have indulged my time but threatened my assertion towards delivering what have been conceived with great enthusiasm and passion. I learned that motivation is only a starter while commitment would bring up progress to the end. I appreciate and very grateful for the unreserved comments forwarded by my advisor Thomas Marmefelt and I would have presented an outstandingly better result if I could have followed his toes at my best. But the final draft is forwarded without his knowledge and I would utterly take the responsibility for all the probable blemishes and flaws in this paper. Hopefully, researchers on the topic could find it convenient to refer the results I came up with.
2. Introduction

Religion plays a significant role in the entire struggle of a human race yesterday and today. It is hardly possible to find an adult grown without a moral teachings of a certain religion what so ever the faith is based. The moral teachings resulted in the moral values of an individual and all sorts of decisions are associated with all the accrued values in his subconscious as psychologists claim that “child is the father of the man” to emphasize the impact of our childhood experiences on our adult hood activities. How we act today or our decision making habits can be traced back to our childhood practices and learning. It is this psychological impact of the religion which might make it to be superior in determining the taste and preferences of goods and services intensely available in the world market. The classical economists emphasize the dissimilarities which derive countries to trade. For a bilateral trade to function the trading partners must have “unlike variables”, unlike technology or unlike factor abundance, as in physics there is a natural rule that “unlike charges attract each other”. It is the dominant feature of the classical trade concepts that “unlike countries attract each other”. But the more revealed view of Linder’s overlapping demand theory which claimed that the more similar the countries are the more intensive trade will occur is a big step forward. I would associate this with the general philosophy of the law of attraction “like attracts like” in the motivational teachings of today, on the book of the secret. My argument is to claim that dissimilarities could not be the poles of attraction whereas individuals all over the world would be attracted to the likes of their own and it has to be clear that trade is finally by individuals. Similarity in religion especially is the dominant variable to influence the likes of the citizens of the world beyond boarders. And this paper would not attempt to nullify any theoretical concept but to strengthen the significance of similarity in religion as a proxy of culture is a means to trade and yet derived from the Linder’s overlapping demand theory.

This thesis will use a panel of US and other 168 countries of the world for 2000 and 2010 to test if similarity in religion does really matter in traders’ decision to trade.
The paper begins by discussing statement of the problem in chapter 3. The following chapters, chapter 4 and chapter 5, present the background of the study and the trade theories with the theoretical foundations of the gravity model are discussed in this chapter. Chapter 6, chapter 7 and chapter 8 have discussed the methodology, the data and the econometric modelling respectively. The data source and data accuracy are also presented under chapter 7. Earlier studies which are relevant to this study are also discussed in chapter 8 along with econometric modelling. I present the estimation results and estimation analysis on chapters 9 and 10. The estimation results have been discussed and some relevant comments have been forwarded. The analysis has also been tried to be validated by the existing theoretical findings. Chapter 11 presented the concluding remarks and in the last chapter both published and unpublished references are incorporated.

3. Formulating the problem

This essay would focus on an attempt to empirically test if religious similarity does influence the direction of trade. Hence, the research problem would be,

Does religious similarity influence the direction of trade? Is the effect of religious similarity significant on trade? (Based on a US bilateral trade with 168 countries)
3.1 Delimitation

The paper will be limited to the US bilateral trade with other 168 countries of the world. My intention was to include all countries of the world due to the fact that trade touches all individuals of the world and religion does same either of religious or non-religious. But technically there are some countries with no data at the fullest of my consumption and therefore those are excluded. I used only two reference years 2000 and 2010 considering the availability of data and the less probable progression or regression of the believers’ adherence through time except with population. Discussing each religious belief in detail is beyond the scope of this study. Religious adherence on the aspect of identifying similarity is the limit.
4. Background

There had been a wider range of concern and studies had progressively been made to explain why countries do trade, and there is still a growing concern to understand the real reasons to international trade. In the late medieval period, the mercantilists with the extreme advocates of free trade had tremendous utterances of freer trade while the bullionists did much to influence the realms for more trade but less import. Trade theories like comparative advantage and Heckscher-Ohlin theories had contributed much for us to understand how trade continue to occur between different nations and regions of the world. However, a widely accepted H-O theory could not explain an intensive intra-regional trade even though the regions share fairly similar factor availability and failed to be consistent with empirical findings. Considering this, Burnstam Linder forwarded a new trade theory with a more elaborated and yet empirically consistent trade theory on the demand side. Demand similarity with other cultural variables like religion are important to explain either inter or intra-regional trade. Religious similarities have significantly impacted the flow of trade especially after the Second World War.

Adam Smith (1776) anticipated the network effects of trade when he described how the strict social organization of religious sects provided a behavioural guarantee that could substitute for formal government institutions to enforce contracts. Fafchamps’ (2003) recent study on Africa finds that the sharing of religious cultures still enhances trust and enables trade.

Since the 1980s, especially since the early 1990s when the Cold War came to an end, economic activities in the homogeneously cultural environment have become more and more important than in the heterogeneously cultural environments. For example, trade among the ASEAN, Taiwan, Hong Kong, South Korea, and the mainland China, most of which either fall within or are closely related to the Chinese cultural circle, increased from less than 10% to over 30% of their total trade from the 1950s to the 1990s. Similar shifts towards the intraregional trade also occurred in intra-Latin American trade in the early 1990s, with trade between Brazil and Argentina tripling and Colombia-Venezuela trade quadrupling between
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1990 and 1993. In 1994, Brazil replaced the United States as Argentina’s principal trading partner.
5. Theory

In this chapter I would try to show how international trade theory is developed and evolved from the maxim of classical, neo classical and new trade theories framed under a conception that countries trade to exploit the “differences” in technology, factor abundance and economies of scale to the Linder’s overlapping demand theory which basically draws the attention through a more or less new explanation of why countries trade on the demand side. Linder’s explanation is based on the similarities in the aggregate demand of the trading partners and basically on the axiom that countries trade not to exploit their differences but rather their “Similarities”.

5.1 Mercantilism and free trade

In the 16th century the economic interdependence of different countries on account of the differentiated natural resources which includes a really eloquent idea of the economic function of international division of labour derived from the religious and ethical heritage of the middle ages according to Eli-Heckscher.

The ecological and evolutionary interaction between religion and ethics is so of colossal complexity and the interlacing is very elusive and ubiquitous to perceive simple patterns in it, what is a private good and a private bad, a public good and a public bad would somehow be pronounced by the motivation of fear for the eternal.

The cultural and religious conceptions of the society in the pre and post medieval period have been vital to the development of economic concepts. In terms of the general conception of the society, the two extreme economic thoughts towards international trade, mercantilism and liberalism are the same. A significant number of slogans of the mercantilists to free trade have been derived from the religious conception of the society. Among the voluminous correspondence of Colbert (the king of Great Britain, 1660s) the phrases “liberty is the soul of trade” and sometimes he expressed clearly that trade had to be “utterly free”, that it was “the result of the free will of man”, that “the commerce consists universally in the liberty of all men to buy and sell”, are some. Axel Oxenstierna, the Swedish Chancellor, who became the virtual ruler of his country after the death of Gustavus
Adolphus, wrote in 1633 that “trade has been diminished, as it always loves freedom”. The Danish customs laws at the end of the 17th century were also drawn up to echo the same axiom of freer trade. Liberty as a condition of trade was therefore the maxim which belonged to the international terminology of mercantilism and this liberty was conveyed in a manner that the natural scarcity and natural abundance of commodities are the divine make-ups for countries to understand the need for one another in an exchange. As clearly be observed all the terminology used to advocate free trade is somehow utterances of religious sermons.

A study of the social starting-points of economic ideas (ecodynamics) shows that the change from mercantilism to liberalism was not primarily a change in the general conception of the society. Even though the primitive nature of the mercantilist economic theory gradually was executed by liberalism; the two extreme economic concepts were basically the same in the general conception of the society. What grows from conservative protectionism to laissez-fair was rather the primitive economic conception of the mercantilists. On many grounds, both mercantilism and laissez-fair were based on one and the same conception with regard to man as a social animal, and that both had the same view on how the treat to this animal must be.

The religion has had played a very important role in appreciating the need for imports in the medieval period while bullionism had overshadowed the mercantilist view of trade. Clement Armstrong stated on the pamphlet called “how to reform the realm, 1535/36, that “needful for the common weal of the realm which God hath ordained in other countries and not in England” to proclaim that free trade should be taken as a blessing for one another. In 1535 William Cholmeley also wrote “as God hath enriched us with wool, lead, leather and thin, so hath he enriched other countries with other commodities which we may in no wise lack”. It is pretty easy to understand how religious views were vital towards developing a freer trade even in the time of protectionism.

This was summed up in the discourse of the common weal (1549), the writer said “common reason would that one region should help another when it lacketh. And therefore God hath ordained that no country should have all commodities, but
that, that one laketh, another bringeth forth and that, that one country lacketh this year, another hath plenty thereof the same year, to the extent that one may know they have need another's help, and thereby love and society to grow amongst all the more”. Bodin in 1568 had also boldly written how religion is important for trade and countries should not declare war among themselves. He also emphasised the apportionment of the divine gifts are for countries to understand the mutual interdependence among themselves and it is a religious duty of one to allow others to participate in what the native country was blessed with. The influence of religion was not limited to the 16th century but has continued to the 17th and the following centuries in the continual reference to “the blessings of trade”.

The “blessings of trade” which is the mercantilist’s version of “gains from trade” was also uttered and conscientiously applied by the contract of the Swedish general trading company of 1625, the French bye-laws for the east India and northern companies. Eli-Heckscher has considered as misleading to consider these utterances of the time as an expression of the growing laissez-fair which rather are the conception of the society more pronounced by religion. The blessings of trade were widely explained in the late medieval period and were a dominant social conception of the time. The blessings of trade which was uttered very frequently in the late medieval period had been the laissez-fair conception of the mercantilism which Heckscher had caricatured it as religious sermon of the time while it was meticulously uttered by the elite and leaders of the realms. The evil of protectionism and the blessings of trade had been basically influenced by religion and had widely been uttered in the mercantilist time.

5.2 Absolute advantage

In the 18th century, Adam smith brought an influential and optimistic view of trade. The theory of absolute advantage states that a country produces and exports greater output of a good or service which the country is on absolute advantage. Smith had also stated that tariffs and quotas should not restrict international trade; it should be allowed to flow according to market forces. Smith’s (1776) Wealth of Nations was the dominant discovery of economic
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thoughts ever since. Smith had mentioned that tariffs and quotas are elements of trade distortions which would affect the natural pattern of trade. The factors which affect the buyers’ decision to buy or consume are many and similarity in culture is one for a natural reason of attraction to consume. But if tariffs and quotas are applied, the direction of the pattern of trade would be kinked towards a different direction unnaturally.

The modern nations today have the influence of bullionism with a pessimistic view that the world resource is limited. The policy measures of countries to finance trade is to export more and import less so as to accumulate financial wealth through hard currencies which is another version of accumulating wealth through gold and silver. Smith aware of these facts had claimed the driving forces to trade should not be dictated with government policies but with a stimulus of the consumers for a specific good. Smith’s invisible hand is the core element of a “natural trade” which implies that it is the stimulus of the consumer what matters to an exchange of a given commodity.

However, the absolute advantage theory had failed to justify how countries without an absolute advantage of all the goods involve in international trade which Ricardo later answer the quest through the theory of comparative advantage. But I could say that smith had answered already that the natural forces which built a bridge for trading items can be channelled through. The purchasing power of individuals, the geographical distance between the trading partners and other measurable items of trade in gravity model to test the empirical consistency of the trade theories for instance are the unnatural (environmental) factors to trade and the governments of individual trading partners can inject their domestic policies to improve the purchasing power of their respective citizens and their transportation and communication system. Whereas the Adam smith’s “invisible hand” refers to the natural reasons to trade which are the most important ingredients of both the domestic and international trade. But what guides the invisible hand? It is clearly the taste and preferences of individuals to exchange goods (supply and demand) which are embodied with the living standards and norms of a certain society, the beliefs, cultures and religious views which are vital
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...to a decision making of individuals on which items and with whom to exchange with.

5.3 Comparative advantage

The comparative advantage trade theory is the basic concept of international trade and has a major influence on the policy making decisions of the developed and emerging economies today. The theory which has been first introduced by David Ricardo (1817) brought good news for economically disadvantaged countries of the world. Countries with no absolute advantages in any of traded items can still open their doors by specializing on the production of items with relatively lower cost of production in their borders in autarky. The common illustration for the concept is the gain from trade by for example England and Portugal through specializing on their relative comparative advantages. The example is given on the table below,

Table 1: Comparative advantage

<table>
<thead>
<tr>
<th>Country</th>
<th>Wheat</th>
<th>Wine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost Per Unit In Man Hours</td>
<td>Cost Per Unit In Man Hours</td>
</tr>
<tr>
<td>England</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Portugal</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

As shown on the table above, Portugal is in absolute advantage of producing both of the items than England by having lower costs of production for both goods.

In Table 5.1, a unit of wine in England costs the same amount to produce as 2 units of wheat. Production of an extra unit of wine means foregoing production of 2 units of wheat (ie the opportunity cost of a unit of wine is 2 units of wheat). In Portugal, a unit of wine costs 1.5 units of wheat to produce (ie the opportunity cost of a unit of wine is 1.5 units of wheat in Portugal). Because relative or comparative costs differ, it will still be mutually advantageous for both countries to trade even though Portugal has an absolute advantage in both commodities.
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Portugal is relatively better at producing wine than wheat: so Portugal is said to have a COMPARATIVE ADVANTAGE in the production of wine. England is relatively better at producing wheat than wine: so England is said to have a comparative advantage in the production of wheat.

Table 5.2 shows how trade might be advantageous. Costs of production are as set out in Table 5.1. England is assumed to have 270 man hours available for production. Before trade takes place it produces and consumes 8 units of wheat and 5 units of wine. Portugal has fewer labour resources with 180 man hours of labour available for production. Before trade takes place it produces and consumes 9 units of wheat and 6 units of wine. Total production between the two economies is 17 units of wheat and 11 units of wine.

Table 2: Total production between the two economies

<table>
<thead>
<tr>
<th>Country</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Trade</td>
</tr>
<tr>
<td></td>
<td>Wheat</td>
</tr>
<tr>
<td>England</td>
<td>8</td>
</tr>
<tr>
<td>Portugal</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
</tr>
</tbody>
</table>

If both countries now specialise, Portugal producing only wine and England producing only wheat, total production is 18 units of wheat and 12 units of wine. Specialisation has enabled the world economy to increase production by 1 unit of wheat and 1 unit of wine.

One major weakness of the comparative advantage theory is that it cannot explain as to why a rising fraction of world trade is taking place among Western developed nations. Given that such nations (e.g. Western European partners of the EU) have very similar technologies and resource structures, the justification for trade therefore has to be something other than comparative advantage. The bulk of this trade is of the 'intra-industry' variety, i.e. countries export and import...
similar products. There are factors related to demand and supply that cause intra-industry trade. On the demand side, for example, consumers in the U.S. might wish to buy luxury cars from Europe while buyers in Europe import cheaper cars from the former. On the supply-side, certain kinds of capital-intensive industrial technology is such that as output rises the average costs, and, hence, prices, fall due to economies of scale. As a result, European firms that produce larger quantities of luxury cars like Mercedes have comparatively lower costs and prices making them more attractive to buyers in, say, U.S.

Another trade pattern that comparative advantage fails to justify is the growing intra-industry trade that takes place between developed countries and less developed countries.

The number of unrealistic assumptions set to theorize the comparative advantage and its failure to explain the large sum of trade between similar countries in terms of technology made the early-20th century popular Heckscher-Ohlin model to be theoretically sound among many economists.

5.4 Heckscher-Ohlin theory

The Heckscher-Ohlin theory still emphasizes the importance of the presence of the “common ingredient” of trade theories in an attempt to justify why countries trade. The given ingredient for trade theorists particularly in traditional gains from trade theory is exploiting nations’ “Differences” for a positive sum game. The two basic concepts of trade theories, comparative advantage and factor proportions theory claim difference in cost of production and difference in factor abundance are the reasons for trade respectively.

Eli Heckscher and Bertil Ohlin formulated a theory in the 1920s and 1930s that identified different relative factor endowments as the source of comparative advantage among nations. For instance, if one country has a relative abundance of land and another country a relative abundance of capital, the first country will have a comparative advantage in producing and exporting a land-intensive product such as wheat, while the second country would have a comparative advantage in a capital-intensive product such as autos. Transformation schedules would be bowed out, because in each country some land and capital would be
relatively better suited to wheat production and some to auto production. However, in the first country the transformation schedule would be extended farther out along the wheat axis because of land abundance, and in the second country it would be extended farther out along the auto axis because of capital abundance. If demand conditions (community indifference curves) are identical or at least similar in the two nations, price lines without trade will show wheat to be relatively inexpensive in the first country because of its land abundance, and autos to be relatively inexpensive in the second country because of its capital abundance. With trade, an equilibrium terms-of-trade line between the two initial extremes will induce the first country to shift toward more wheat production as wheat rose in price, while the second country will shift toward more auto production as autos rose in price in that country. Each nation will export the product that uses intensively the factor of production that is relatively abundant in that country, and import the product that uses intensively the factor of production which is scarce in that country. In effect, each nation gains access to scarce factors of production (land, capital, or labor) through trade, importing such resources indirectly through products intensive in their use.

A further implication of the factor endowments theory is that international trade tends to equalize not only the relative prices of products between nations (for instance, wheat and autos) but also the prices of factors of production. If we consider labor and capital to be the factors of production, pre-trade wage rates will be relatively low in the labor-abundant country and high in the labor-scarce country. With trade, the labor-abundant country will increase production of the labor-intensive product, and the labor-scarce country will shift away from such production. This production shift will strengthen the demand for labor and raise wage rates in the first country, and relieve such demand and reduce wage rates in the second country, thus bringing wage rates closer together. In similar fashion, capital costs or interest rates will converge as trade increases demand for capital in the capital-abundant country and as imports of capital-intensive products alleviate the scarcity of capital in the other country. Thus, international trade tends to bring about factor-price equalization between countries.
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The conditions under which factor-price equalization occurs are quite restrictive, so we rarely find complete equalization of wage rates, interest rates, and rental rates among nations in the real world. However, the tendency toward such equalization does explain why increased trade among nations often brings with it a concern about the impact of such trade on the distribution of income within each nation. Within each nation, the returns to the scarce factor of production tend to fall, while the returns to the abundant factor tend to rise. Workers in capital-abundant countries resist the potential impact of trade on their wage rates, and owners of capital in labor-abundant countries fear that trade will bring lower interest rates in their country. The inclination to favour trade restrictions in each case is understandable, although the realization that each nation enjoys overall gains from trade according to comparative advantage might encourage us rather to consider the use of internal government spending, taxation, and transfer programs to address the distributional impacts of trade.

How well does the Heckscher-Ohlin factor endowment theory explain actual trade patterns among nations? The most celebrated effort to test this theory was that of Wassily Leontief in 1954, who applied a mathematical input-output model of the U.S. economy to 1947 trade data. He found that the capital/labor ratio for U.S. export industries actually was lower than for U.S. import-competing industries, exactly the opposite of what the factor endowment theory would predict for a capital-abundant nation such as the United States. He later achieved similar results using 1951 trade data. Economists have developed a variety of theoretical and empirical explanations for what has come to be known as the Leontief Paradox. Most of these explanations essentially involve creating a more generalized factor endowment model, recognizing the importance of finer distinctions within the general categories of land, labor, and capital as factors of production. U.S. exports, for instance, were found to be intensive in their use of skilled labor, engineering talent, and research and development input; these are resources that the United States had in abundance relative to its trading partners.

Though Leontief discovered an empirical evidence against the factor proportion (H-O) theory, he didn’t dared to conclude that the factor proportions approach was unsatisfactory (Burenstam Linder, 1961)
According to Burenstam Linder (1961), the H-O theory is a theory of trade based upon supply: according to the theory trade takes place because of “differences in the supply” of factors such as capital, labour and human capital. Burenstam Linder noticed that some trade (especially in consumer goods) has little to do with supply and is based upon demand. His theory of Overlapping Demands suggested that rich countries, with similar income levels and factor endowments, might actually trade similar products with each other based upon similar types of demands and differences in tastes and preferences. Thus, for example, Germany, Sweden and Japan all have high income levels and consumers who can afford to purchase luxury automobiles. German buyers may buy home-grown BMWs, for example, but they might decide to purchase Lexus from Japan or Volvo from Sweden based upon their tastes and preferences. This generates a pattern of trade in similar products that would confuse Leontief, but it makes sense to us as Linder mentioned. Burenstam Linder type trade is therefore based upon “similarities” in overall demand (luxury cars) combined with variations in individual tastes.

Smith’s famous invisible hand, the Leontief paradox and Burenstam Linder’s overlapping demand would suggest the real reasons why countries trade. The comparative advantage and HO theory and all other proponents of the theories failed to consider the significance of the taste and preferences of the trading countries. As in classical economics, supply-side economics claimed that production or supply is the key to economic prosperity and that consumption or demand is merely a secondary consequence. Early on this idea had been summarized in Say’s Law of economics, which states: "A product is no sooner created, than it, from that instant, affords a market for other products to the full extent of its own value." John Maynard Keynes summarized Say’s Law as "supply creates its own demand (Keynes 1936, p. 18). He turned Say’s Law on its head in the 1930s by declaring that demand creates its own supply.

I could possibly argue that the trade theories of comparative advantage and factor proportions could be considered biased to value only the supply side of trade. The factor proportions theory would recommend a country that is relatively abundant for instance in cotton raw material to specialize in the production of cotton products or textile products, but what if the cotton products remain inferior in the
world market and the international buyers remain less responsive towards the product. And on the other side, a country abundant in raw materials for superior products specializes and trades the product using the given raw material. If the theory continues to influence the trade policies of countries, the trade balance of a country producing a superior product will be dominant. In this situation a healthy trade would be unattainable which later result in a distorted trade or no trade. H-O theory failed to be consistent with the empirical evidence but no one was dared to question the theory including Leontief himself but Burenstam Linder.

5.5 Linder’s overlapping demand theory and similarity in religion

Burenstam Linder claims that a country cannot achieve a comparative advantage in the production of a good which is not demanded in the home market. He also criticised “the factor proportions account does not make it possible for us to explain inter-regional trade in manufacturers as factor proportions, Ohlin’s definition, do not differ with in a region. As intra-regional trade is more intensive than inter-regional trade, one is tempted to draw the conclusion that these other relationships whatever they may be are more important than factor proportions”. These other relationship are the taste and preferences of the world consumer composed of the per capita income, the norm and belief of the consumer which dictate him what to see, what to listen and to value the items beyond the physical composition of the product. His claim is that the most realistic reason for countries to trade is their similarity in demand, the taste and preference. Particularly, in today’s networked world economy, the strength of boundaries and territories of the countries become less important. The emergence of e-commerce made the governments of countries less sovereign which resulted in more intensive trade than before due to a more similar taste and preferences of the world consumer.

More over Burenstam Linder further explained, it is possible that differences in factor proportions do not have any effect on commodity prices so that the other forces, (economies of scale, transport costs, etc) thus have a free play.
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(My emphasis is on factors determining the intensity of terms of trade which are inherently dominant but Linder expressed them as “other forces”. The main important point which is a breakthrough for the more clear explanation of the pattern of trade less significant for the classical supply side economists revealed with a strong argument, less ambiguous and empirically consistent is that “the more similar the demand structures of two countries, the more intensive, potentially, is the trade between these two countries, if two countries have exactly the same demand structures, all the exportables and importables of the one country are also the exportables and importables of the other country” (Burenstam Linder, 1961, pp. 94).

To determine the intensity of bilateral trade, Burenstam Linder argued that the level of average income is the most important single factor which has a dominating influence on the demand structure. In this case, similarity of average income levels could be used as an index of similarity of demand structures.

5.6 **Social network theory**

5.6.1 **Discussing concepts**

**A. Network**

A network is a set of relationships. More formally, a network contains a set of objects (in mathematical terms, nodes) and a mapping or description of relations between the objects or nodes. The simplest network contains two objects, 1 and 2, and one relationship that links them. Nodes 1 and 2 might be people, and the relationship that links them might be “are standing in the same room.” Kadushin 2004.

Social scientists have investigated three kinds of networks: ego-centric, socio-centric, and open-system networks. Ego-centric networks are those networks that are connected with a single node or individual. To be considered networks these connections must not only be lists of people or organizations, but information must be available about the connections between these people or organizations. Otherwise, there is no network to analyze. In popular discourse, especially when social support is discussed, any list is considered to be a network. A person with a large number of good friends whom he or she can count on is said to have a large
“network.” This network cannot be discussed in social network terms, however, unless we know whether and how these people are connected with one another. It is obviously one thing to have a supporting network in which most people know one another and a very different matter if the people are unknown to one another. Socio-centric networks (closed system networks) are, in Russell Bernard’s term (personal communication), networks in a box. Connections between children in a classroom, between executives or workers in an organization are closed system networks and the ones most often studied in terms of the fine points of network structure. Open system networks are networks in which the boundaries are not necessarily clear, they are not in a box -- for example, the elite of the United States, or connections between corporations, or the chain of influencers of a particular decision, or the adoption of new practices. In some ways these are the most interesting networks. They are also the most difficult to study (kadushin 2004).

B. Connections

Sociologists analyse social connections in two kinds of propositions (i.e Propinquity and Homophily).

**Propinquity** refers to a concept that at all levels of analysis nodes are more likely to be connected with one another, other conditions being equal, if they are geographically near to one another. Individuals are more likely to be friends if they are geographically close (Feld and Carter 1998)

**Homophily** is defined as having one or more common social attributes, like the same social class. More technically, pairs can be said to be homophilous if their characteristics match in a proportion greater than expected in the population from which they are drawn or the network of which they are a part (Verbrugge 1977).

Two kinds of causes for pair homophily. Common norms may bring nodes with common attributes together, or the reverse, common attributes and contact may lead to common norms and this holds true for both individuals and collectivities (Burt 1982). A second cause for homophily is structural location. Two nodes may have the same attributes because both operate in the same arena, and again, vice versa (Feld and Carter 1998).
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

**Homophily and Connections**

The greater the homophily the more likely two nodes will be connected. At the individual level (considering nodes as individuals), persons are more likely to have a connection, friendship or association, if they have common attributes (Lazarsfeld and Merton 1978). While common norms are promoted through common attributes, so are common attributes likely when association or friendship occurs as a result of co-location and commonly situated activities (Feld and Carter 1998).

**C. Distance between any two nodes**

The distance between two nodes in a network is determined by four parameters: (1) the size of the first order zone of nodes in the network; (2) the extent to which nodes in the network have overlapping members in their first order zones; (3) barriers between nodes; (4) agency exercised by the nodes.

Distance is essentially the issue raised by Milgram with respect to individuals in his “Small World” studies (Milgram 1967) but it can be extended to apply to all levels of network analysis.

The region of nodes directly linked to a focal node is called the first order zone. The nodes two steps removed from a focal node are called the second order zone, and so on (Mitchell 1969; Barnes 1972).

**D. The “Small world”**

According to the “Small world” proposition, if there were no overlap in people’s personal networks, then one could reach the entire population of the United States in two or three steps. (Pool and Kochen 1978).

**E. The effective distance between nodes.**

While in principle there can be an infinite number of zones, (third, fourth, fifth ...), the impact of each zone on an individual node declines exponentially. For most purposes, the number of effectively consequential zones is between two and three; that is, whatever is being studied, individuals or organizations, past the third or at most fourth zone objects or nodes have relatively small effects on the focal individual or structure (Kadushin 2004).
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Burt’s diffusion models and his related structural holes models (Burt 1987; Burt 1992) zones past the third or even second are generally not important. Further, the proposition that zones beyond the third zone are not consequential is consistent with “loose coupling” theory that suggests that tight linkages between parts of an organization are not only unlikely, but also inefficient (Perrow 1986). There are some findings in diffusion studies, however, that suggest that even distant nodes, especially if connected to a focal node through a number of redundant paths, can have an effect (White and Harary 2001). Recent work in modelling small world ideas (Watts and Strogatz 1998; Watts 1999) lends support to the proposition that in large connected1 networks that are not dense but have highly clustered2 regions or neighbourhoods such as might be typical of friendship or organizational circles or mutual collaboration networks, average shortest path lengths tend to be under 4.

F. Multiplexity

Multiplexity is related to the concept of homophily discussed above, for the bundling of particular kinds of ties is hardly at random and follows the laws of homophily of position.

Multiplexity has been used in the network literature in two related senses: one, sometimes called “role multiplexity” (Beggs, Haines, and Hurlbert 1996) refers to the possibility that two nodes occupy more than one position that ties them together, typically, the situation described above in which two nodes have an organizational relationship, say “supervisor” and “assistant” (to the supervisor), but are also friends. And according to (Boissevain 1974), the second is the concept of high multiplexity which is explained by a complex non-village societies, roles may become bundled in a somewhat different way. Merton calls attention to “role sets” – the set of relationships that ensue because one occupies a given role (what he calls status) an idea that Rose Coser further elaborates (Merton 1968; Coser 1975).

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1 In a fully connected network, it is possible to reach every node from every other node in the network through a path or connection running from one node to another.

2 In dense or clustered networks, there may be a large proportion of mutual connections, such as friendship circles or people who work in the same part of an organization, etc.
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)
G. Thresholds

Another form of the effect of networks as a totality on individual nodes is contained in the concept of "threshold" or what is sometimes called "tipping point" (Granovetter and Soong 1983; Valente 1995; Valente 1996; Gladwell 2000). This idea refers to the extent to which a given phenomenon is spread throughout a network. Once a certain level has been reached, then all the nodes join in the behaviour or phenomenon. In this model, the probability of any individual node acting is a function of the number of other nodes in the network that have acted in a given way or possess the given quality. It is a step function, rather than a linear one. Thus, the action is not necessarily dependent upon one's immediate partner(s), but on the relative number of nodes throughout the network that have adopted the given behaviour or attribute. Not only is this a key idea in "crowd behaviour" where the adoption of the behaviour is visible to all, but in other kinds of diffusion models. Following our insistence that network models apply to macro as well as micro phenomena, the adoption of behaviours by other organizations as an influence on the focal organization is a key component to the theory of the "new institutionalism." Grounded formal propositions about what proportion of others is necessary to effect adoption, what the effect is of network visibility, the extent to which the others are "weak ties," and to what extent the adoption functions follow a strict step function are unfortunately in their infancy.

5.6.2 Religious affiliation and the concept of network

In considering religious network, the connecting ties are no more between nodes. The concept of a "hub" could be introduced here which strengthen our understanding of the influence of religious affiliation with in a network of individuals having the same cult. In defining connection we have considered so far the nodes and a focal node involved in explaining the social ties among a specific peer. In a network of religious affiliation, the adherents of a given creed are obviously the nodes, the religious leaders and/or preachers can be considered focal nodes and most importantly the religious teachings, principles or dogmas

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3 acquaintances ("weak ties") are less likely to be socially involved with one another than are our close friends ("strong ties")
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

and other values are the hubs. Hence, in a religious network, the nodes, focal nodes and hubs should be considered. The combination of socio-centric and open system network could probably explain this kind of network.

Based on the above concept, a node to node tie passes through a hub and a focal node could play a role in activating the hubs in order for the ties among the nodes strengthened. For instance, a specific information (may be economic, political or religious) is released, node 1 would receive and transfer it to node 2 but before the information is deciphered it actually passes through the hub, transformed. So that, the rout of the ties would be “node1-hub-node2”. A scheduled airline operation might help me explain the concept more elaborately. My mind had just jumped in to the introductory course for an airline industry that I took when I was in training. No “scheduled carrier” or operator connect the cities without passing through its hub (the local airport) which the in-bound routes are converged to the hub and the out-bound routes are diverged from the hub.

I can possibly mention the recently released (July 2012) a 14 minute infamous anti-Islam movie on YouTube. The movie is just a movie before it reaches the hub (the religious dogmas) but it resulted in a brutal global turmoil especially in the Arab world after being transformed. Here the concept of “Threshold” or “Tipping point” could be involved. Once a given event or phenomenon reaches at a specific level of threshold, all the nodes would connect and respond in the same fashion.

Swine flu and the religious teachings of some creeds could be another example. Eating pork is forbidden in some religions and even some preachers from the western Christianity (or protestant) had been proponents of forbidding eating pork which could also be explained by the concept of “Tipping point”. But in our day today activities, interpersonal communications (ego-centric networks), our decisions for exchanges, the religious hubs implicitly play a great role but could be with a lower threshold.

(Weber 1930) in his famous work “The protestant ethic and the spirit of capitalism” wrote “The emancipation from economic traditionalism appears, no doubt, to be a factor which would greatly strengthen the tendency to doubt the sanctity of the religious tradition, as of all traditional authorities. But it is
necessary to note, what has often been forgotten, that the Reformation meant not the elimination of the Church’s control over everyday life, but rather the substitution of a new form of control for the previous one”.

The rise of liberalism, capitalism and Protestantism are all sisters of similar age which had been grown in the 14th century when America was newly discovered. They share the same meaning but associated for politics, economics and religion respectively. Free market economy is an elimination of the role of government (at its extreme level) in an exchange of goods where the buyers and sellers should decide how to trade. In Protestantism, it was a revolution against catholic teachings which declared the elimination of priests or church as mediation where the new claim promotes a man is free to communicate with God with no need for intervention. It is an open-network concept that the concept of free trade overlaps with protestant ethic and the ideology of liberalism. Economic decisions are motivated by religious values which show religion influences our traits and preferences consciously or unconsciously, implicitly and explicitly.

5.6.3 The network effects of religion on international trade

As a social institution, religion will encourage social behaviour favourable to specialization and exchange. An important social institution like religion has a broad range of economic consequences (Hendric 2007).

One specific way in which religion can influence trade is through its network effects. That is the sharing of religious beliefs by adherents on same religion living in different countries can create networks of trust and familiarity that facilitate complex international economic transactions (Eakin 2003).

Rauch and Trinidade(2002), had explained how networks of immigrants and ethnic diaspora stimulate trade between countries. Networks enable trade when other institutions necessary for carrying out international transactions are missing.

Griefs(1989,1993,1994) analysis of the maghribi traders in the Mediterranean after the fall of Rome details how small communities of Jewish merchants that
were spread across distant cities facilitated transactions requiring a high degree of mutual trust.

Typically trade begins close to home and then as experience and confidence grows, expands “like rings in the water as expressed by an official from Stockholm chamber of commerce” (Nothdurft 1992). The confidence can easily be developed from trust and trust is the core ingredient of faith in something. If a potentially trading partners share the same faith, in no doubt they have the same religion that will give them more confidence to trust each other. This network effect of religion would therefore minimize the search cost and trade will be speeded up.

Anderson (2004) mentioned how actual trade flows in gravity model are far smaller than the frictionless prediction of the model. The deviation of actual bilateral trade from the frictionless prediction allows inference about bilateral trade costs. Distance appears to be more costly than can be accounted for by transport costs. Other costs are associated with non-contiguity, language barriers, exchange rate barriers, insecurity and other plausible bilateral characteristics (Anderson, 2004).

Emily Eakin, 2003, has briefly discussed the network effects of religion. The structure of scale-free networks has important practical implications. If you remove a few nodes at random the network can still function normally. But if you remove one of the hubs, the results can be catastrophic. Inspired by this insight, cancer researchers are now homing in on the cell’s hub proteins in order to learn how to defend them from devastating attacks. Epidemiologists studying that it makes more sense to identify and treat hubs in the transmission network than to give drugs to everyone. “The Bush administration’s policy to give drugs to mothers with children is completely irrelevant to stopping Aids in Africa”. “It is much better to go and target the hubs”, Emily Eakin, 2003. Even the US military has begun recruiting network theorists to conduct counter terrorism research, with the goal of learning how to protect information and economic networks at home and destabilize terrorist networks abroad.

In a network of trading activities the GNP, distance and boarder adjacency are important variables to measure the intensity of trade in gravity model. Some
researchers like Anderson 2004, incorporated language as a dummy variable. The fact that many economists consider only those variables above to measure the intensity of bilateral trade may be, it is too complicated to empirically test the language, religion and other less convenient to measure but important variables for a network of trade. All the above quantifiable variables are nodes of a network but the language, religion and other cultural variables are the hubs of the network. Without these hubs one can get trouble to find a normally functioning trade networks. As trust remains significantly important to trade regardless of the technological advancement, religion would remain significant to strengthen trust.

In addition, the cultural and religious beliefs would mould the consumer behaviour (the taste and preferences towards a specific brand). The natural propensity to consume a certain item is basically dictated by a natural consciousness articulated by moral, religious and traditional acts of the average consumer in his early child hood learning. I consider the national income and distance variables of the gravity model as a mere nodes which only play a roll along with the hub (the taste and preference dominated by cultural and religious views). The hubs are therefore more important than the nodes for a natural trade to occur.

5.6.4 Summary of trade theories

In summarising the discussions of theories, religion had played a significant role in bolstering the idea of free trade. Beginning from mercantilism, religion had contributed a lot in influencing the elite and the leaders of the realm to proclaim free trade in the time where the idea of protectionism was dominant.

Linder’s overlapping demand had stressed the importance of similarity for trade. However, Linder’s focus was the similarity in demand, he implicitly mentioned that religion as a cultural variable is more important than Eli-Heckscher’s difference in factor endowments as briefly discussed above. Most importantly, religion would affect trade and other economic phenomenon through its network effect. Below are figures which show the evolution of trade theories and some relevant theories.
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

Figure 1: Evolution of trade theories
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

Figure 2: Summary of relevant theories

<table>
<thead>
<tr>
<th>Theory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merchantilism</td>
<td>• Merchantilist &quot;Blessings of trade&quot; motivated by religious teachings.</td>
</tr>
<tr>
<td>Adam Smith's &quot;invisible hand&quot;</td>
<td>• Adam Smith's &quot;The invisible hand&quot; favours the idea that free trade would be decided by individuals in an exchange of goods with out intervention. Individuals are the results of social values, moral teachings and other associated psychological impacts where religious teachings would contribute more in shaping ones learned traits.</td>
</tr>
<tr>
<td>Linder's overlapping demand theory</td>
<td>• Linder’s overlapping demand theory have implicitly favoured the idea that, it is &quot;similarity&quot; or samness which would result in an intensive trade, either of intra or inter-regional trade unlike other influential trade theories. But Linder had also explicitly mentioned, &quot;As intra-regional trade is more intensive than inter-regional trade, one is tempted to draw the conclusion that these other relationships whatever they may be are more important than factor proportions&quot;. Among the relationships he mentioned are similarity in culture, and religion takes a lion share of a specific culture.</td>
</tr>
<tr>
<td>The network effect of religion</td>
<td>• Religion influences trade through a concious and unconscious dominance on our traits. But religion as an institution would also influence our decision behaviour through the network effect, religious teachings and/or values are the hubs where the individual adherents (nodes) communicate interpersonally, exchange information and interpreted based on the the religious dogmas which binded them as followers. Hence a given phenomenon is transfered from node to node and transformed knowingly or unknowingly through the hub and resulted as a common value which could influence the buying and selling habit of the individuals.</td>
</tr>
</tbody>
</table>
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

5.7 The gravity model

Gravity model is an econometric tool most commonly applied to quantitatively study trade between pairs of countries. The gravity model of trade in international trade, similar to other gravity models in social science, predicts bilateral trade flows based on the economic sizes of (often using GDP measurements) and distance between two units. The model was first used by Tinbergen in 1962. The basic theoretical model for trade between two countries (i and j) takes the form of:

\[ F_{ij} = G \frac{M_i M_j}{D_{ij}} \]

Where \( F \) denotes the trade flow, \( M \) is the economic mass of each country, \( D \) is the distance and \( G \) is a constant.

The concept had been originated from Newton’s “Law of Universal Gravitation” by Tinbergen (1962) later extended to an application on a bilateral trade and published by his student Linnemann (1966). The application of the gravity concept can be traced back to Ravenstien (1885) and Ziepf (1946) who are among others to use the concept in modelling migration flows. The most recent application of the model to international trade was Frankel et al (1997), Rauch (1999) and Rongxing Guo (2004). Rongxing Guo (2004) had included language and religion in the gravity model in his study “how culture influences international trade”. As of gravity model the size of trade is positively related with the size of the products of the gross domestic products and the boarder adjacency of the trading partners and inversely related with distance. But actual trade flows are far smaller than the frictionless prediction of gravity model. The deviation of actual bilateral trade from the frictionless prediction allows inference about bilateral trade costs. Distance appears to be more costly than can be accounted for by transport costs. Other costs are associated with non-contiguity, language barriers, exchange rate barriers, insecurity and other plausible bilateral characteristics (James E. Anderson, 2004).
6. Methodology

My equation is developed from the method of ordinary least squares which is attributed to Carl Friedrich Gauss, a German mathematician. Under certain assumptions, the method of least squares has some very attractive statistical properties that have made it one of the most powerful and popular methods of regression analysis. However in situations like this, when it may not be reasonable to assume that every observation should be treated equally, weighted least squares can often be used to maximize the efficiency of parameter estimation. This is done by attempting to give each data point its proper amount of influence over the parameter estimates.

A procedure that treats all of the data equally would therefore give less precisely measured points more influence than they should have and would give highly precise points too little influence. I would compare the results of OLS and WLS for more precision towards the influence of each explanatory variable on the dependent variable.

The US bilateral trade with other 168 countries is considered to be measured. US is the largest economy with a reasonable population size and more predictable cultural, political and economic structure. The 2000 and 2010 import and export trade of the country is used to justify the bilateral trade of the country with the rest of countries under assessment.

The distance considered in the study is the geographical distance (in miles) between the capitals of the nearest state in US to the capital of the respective trading partner.

Religious similarity is based on the similarity score calculation given in eq.8.4. Earlier studies have used the same formula to calculate the religious similarity score but the religions they considered are based on the major US religions. But in this study the major religions are based on the general classification of the Wikipedia the free encyclopaedia.

The religious similarity score is a value between 0 and 1 in which a value closer to zero indicates there is a little or no religious similarity between US and the
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

respective country and to the contrary the value approaching 1 implies higher similarity between the two countries.
7. Data

7.1. Data Source

The numbers of sample countries in the survey are 169 including the US. The list of those countries is shown in the appendix. The major data sources used in the study are, IMF (2000&2011), US Census bureau (2000&2011) for TRADE 2) the WORLD BANK and UN (2000&2011) for GNI 3) The authors calculation based on the WORLD ATLAS book of 2011 for DISTANCE. 4) Calculations based on equation 8.3 and THE WIKIPEDIA ENCYCLOPEDIA 2010.

The US bilateral trade is the sum of imports and exports with the respective trading country. To calculate the religious similarity score the last two items (Non-religions and Others) are not included. The reason why the last items are excluded from the data analysis is that non-religions and others which are yet determined as religious affiliations by the BOOK OF BRITANICA could not be sources of faith or trust among the people who belongs to same category. Therefore it would be misleading to incorporate them in calculations of similarity scores.

7.2. Data accuracy

As explained by Gujarati (2004), most non experimental data types like in the social sciences are not free from observational errors, either of omission or commission. Especially in questionnaire-type surveys, the problem of non response can be serious; “a researcher is lucky to get a 40 percent response to a questionnaire” Gujarati, 2004. Analysis based on such partial response may not truly reflect the behaviour of the 60 percent who did not respond, thereby leading to what is known as (sample) selectivity bias. The nonregistered religious adherents of some countries given in the Wikipedia encyclopaedia are given in ranges of percentages which I calculated the mean of the percentage ranges to get a specific approximate percentage of religious adherents.

It is also important to remind that the data for religion is based on questionnaires which imply that all the respondents included in a certain religious affiliation are not all registered members.
8. Earlier Studies and econometric modelling

There has been a tremendous attempt to study why countries would trade or what are the reasons which facilitate or impede free trade. However, religion was a marginalized field of study. Rongxing Gue(2004), has studied religion as a means to trade and he also used the extended gravity model.

The previous studies, such as those of Frankel et al. (1995, 1997), used dummies for ‘membership’ in the geographical areas of East Asia, Western Hemisphere. Including these dummy variables could, as argued by Rauch (1999), shrink the estimated coefficients on ‘distance’. I excluded these dummies to minimize the complexity of interpreting the significance of the intended variable in this paper.

Unlike Rongxing Gue(2004), I have excluded border adjacency for the reason that my reference country US share a common border with only two countries among a total of 168 countries included in my survey. The language variable is also excluded to less complicate my analysis and avoid the possible causality problems.

Kenneth Boulding, in his book Ecodynamics, have argued that the linguistic intelligence of a human being would cause the demand for gathering, celebration, rituals and even worships which tend to be evolved as religions. His argument regarding the causal relationship between language and religion has strengthened my intention to exclude the language variable in my model. By the “Principle of parsimony” I kept my model as the following.

The basic form of the gravity model to be used in my empirical analysis is

\[
\ln(EXPORT_{ij}) = \beta_0 + \beta_1 \ln(GNI_i)\ln(GNI_j) + \beta_2 \ln(DISTANCE_{ij}) + \beta_3 RELIGION_{ij} + U_{ij}
\]

\[
\ln(IMPORT_{ij}) = \beta_0 + \beta_1 \ln(GNI_i)\ln(GNI_j) + \beta_2 \ln(DISTANCE_{ij}) + \beta_3 RELIGION_{ij} + U_{ij}
\]

The null hypothesis of this study is, similarity in religion does not have any significant effect on the size of trade. i.e, the similarity score coefficient is not significantly different from zero.
Does similarity in religion influence the direction of trade?

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\[ H_0; \beta_3 = 0, \alpha_3 = 0 \]

\[ H_1; \beta_3 \neq 0, \alpha_3 \neq 0 \text{ and } \beta_3 > 0, \alpha_3 > 0 \]

While the null hypothesis is, the religion coefficient is not significantly different from zero, the alternative hypothesis would be the religion coefficient is not only significantly different from zero but also greater than zero. The similarity in religion coefficient is expected to positively and significantly affect trade.

In eq(8.1), “i” represents only US and “j” represents all other 168 countries in the survey. On the left side of the model “ln” denotes the natural logarithm whereas \( \text{EXPORT}_{ij} \) represents the nominal export trade of US for country j (in unit US dollars). \( \text{GNI}_i \times \text{GNI}_j \) is the product of nominal GNIs of the US and jth countries. \( \text{DISTANCE}_{ij} \) represents the distance between the geographical centres of gravity of the US and jth countries (in miles). As witnessed by the past studies, the estimated coefficients on the above variables should have the following characteristics: \( \beta_1 > 0 \) and \( \beta_2 < 0 \).

The most important issue in this study is how religion, as a proxy to culture, would aid or resist international trade. RELIGION\(_{ij}\) is used to show the extent to which US is religiously linked with the jth trading partner. Religious similarity can be measured differently. The simplest method is to use a dummy index: that is, ‘1’ for countries to be religiously linked with each other and ‘0’ for otherwise. It has been applied by a number of studies (see, for example, Havrylyshyn and Pritchett, 1991; Foroutan and Pritchett, 1993; Frankel and Wei, 1995; Frankel et al., 1997, Rongxing Guo, 2004). However, this method is too simplified as explained by Rongxing Guo, 2004 to precisely express the extent to which how the country pairs are religiously connected, particularly given that the countries concerned have a diversified religion.

**8.1 Similarity measure**

In this paper, I will use a comprehensive method for the measurement of religious similarity.

Suppose that the population ratios of the N religious groups are expressed by \((x_1, x_2, \ldots, x_N)\) and \((y_1, y_2, \ldots, y_N)\) for countries X and Y, respectively. For all i,
xi and yi (where, xi ≥0 and yi ≥0) belong to the same religious group. Mathematically, the religious similarity between the two countries, similarity (X, Y), is measured according to the following formula

\[
\text{Similarity}(X,Y) = \sum_{i=1}^{N} \min(xi, yi) \tag{8.3}
\]

In Eq. (8.3), ‘min’ denotes the minimization of the variables in parentheses. In fact, several other methods can also be used to comprehensively measure cultural similarity. One reason for me to use Eq. (8.3) is that it can prevent the score of similarity from further reduction when the values of xi and yi are very small. Obviously, the value of similarity ranges between 0 and 1. In the extreme hypothetical cases, when similarity = 1, the two countries have the same religious structure (that is, for all i, xi = yi); when similarity = 0, the two countries (regions) do not have any cultural (religious) links with each other (that is, for all i, xi (or yi) = 0 and xi = yi). In the other cases, the greater the value of similarity is, the more similar the countries are. The religious similarity score between US and other 168 countries are shown in the chart below.
Does similarity in religion influence the direction of trade?
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Figure 3: Graphical representation of US religious similarity score with other 168 countries (values between 0 and 1) for year 2000 and 2010.
To quantitatively investigate the effect of religious influence on foreign trade, I will use the above models and the U.S panel data. US's import and export is used not just by intuition but because of the following facts.

To generalize the outcome of the study, a reasonable number of countries should be considered. Based on this fact I have considered 169 countries of the world including US. It would have been better if each pair of the trading countries in the sample had been used in the regression analysis. But to consider this I have to create $14,196^4$ combinations which is too difficult to handle it and almost impossible to regress such a huge data. In addition, a widely accepted Wisely Leontief test (Leontief paradox) had also considered US export and Import to test the empirical validity of H-O theory which shows that a test of theories on US economy is significant enough for one to infer on conclusions. I, therefore, believe that it is rational to consider US's international trade with the other 168 countries under assessment. The major religious groups of the U.S. are listed in Table 8.1a.

\[ \binom{169}{2} = \frac{169!}{167!2!} = \frac{169 \times 168}{2} = 14,196 \text{ bilateral combinations} \]
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

Table 3: Changes in population of major religious groups, 2000-2010, US

<table>
<thead>
<tr>
<th>Item</th>
<th>2000(%)</th>
<th>2010(%)</th>
<th>Percentage changes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(2000-2010)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>83.60%</td>
<td>78.00%</td>
<td>-5.60%</td>
</tr>
<tr>
<td>Muslim</td>
<td>1.58%</td>
<td>1.00%</td>
<td>-0.58%</td>
</tr>
<tr>
<td>Buddhist</td>
<td>0.48%</td>
<td>2.00%</td>
<td>1.52%</td>
</tr>
<tr>
<td>Hindu</td>
<td>0.34%</td>
<td>0.40%</td>
<td>0.06%</td>
</tr>
<tr>
<td>Non-religions</td>
<td>10.19%</td>
<td>15.10%</td>
<td>4.91%</td>
</tr>
<tr>
<td>Others</td>
<td>2.60%</td>
<td>2.50%</td>
<td>-0.10%</td>
</tr>
</tbody>
</table>

The descriptive statistics of the US panel data on selected variables are reported in Table 8.1b. Specifically, the average size of bilateral trade had increased by 63.7% in U.S. with the countries under assessment, from US$9,650 (in millions) in 2000 up to US$158,000 (in millions) in 2010.

With regards to the cultural variable, the US mean values of the religious similarity scores with its trade partners had increased from 0.45988 in 2000 to 0.5232854 in 2010, with the rates of 13.78%, respectively.
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

Table 4: The descriptive statistics of the US panel data for year 2000 and 2010.

<table>
<thead>
<tr>
<th>Variable</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>gni_all</td>
<td>1.01e+11</td>
<td>2.97e+11</td>
</tr>
<tr>
<td>Trade</td>
<td>9.65e+09</td>
<td>3.82e+10</td>
</tr>
<tr>
<td>import_us</td>
<td>5.96e+09</td>
<td>2.34e+10</td>
</tr>
<tr>
<td>export_us</td>
<td>3.68e+09</td>
<td>1.56e+10</td>
</tr>
<tr>
<td>relisimus~s</td>
<td>.4598809</td>
<td>.2999942</td>
</tr>
</tbody>
</table>

Variables,

gni_all= The sum of the gross national income of countries under assessment

Trade= US trade with other countries

Import_us= US total import from countries under assessment

export_us= US total export to countries under assessment

relisimus~s= religious similarity between US and other countries
9. Estimation Results

9.1. OLS results of eq. 8.1 and 8.2

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>( \ln(\text{export}) )</th>
<th>( \ln(\text{import}) )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explanatory Variables</strong></td>
<td>Coefficient</td>
<td>Std. error</td>
</tr>
<tr>
<td>Const</td>
<td>-18.9663</td>
<td>1.97143***</td>
</tr>
<tr>
<td>( \ln(\text{gniugniothers}) )</td>
<td>0.896969</td>
<td>0.028722***</td>
</tr>
<tr>
<td>( \ln(\text{distanceus_others}) )</td>
<td>-1.14648</td>
<td>0.136472***</td>
</tr>
<tr>
<td>( \text{relisimus_other} )</td>
<td>0.307014</td>
<td>0.248657</td>
</tr>
<tr>
<td><strong>No. of observations</strong></td>
<td>335</td>
<td>335</td>
</tr>
<tr>
<td><strong>( R^2 )</strong></td>
<td>0.757883</td>
<td>0.761258</td>
</tr>
<tr>
<td><strong>Adjusted ( R^2 )</strong></td>
<td>0.7556880</td>
<td>0.759094</td>
</tr>
</tbody>
</table>

Using OLS estimation, the estimated coefficients of both GNIiGNIj and DISTANCEij are statistically significant. The signs for the coefficients are also positive for the former variable and negative for the later which is consistent with the theoretical foundation.

The coefficients for religious similarity (the variable RELIGIONij) are not significantly different from zero, which implies that the variable does not have any significant effect on the explained variable. The sign of the coefficient for religious similarity which is positive is theoretically consistent. But at this point it will be difficult to accept the null hypothesis.
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)
9.2. **Heteroscedasticity Test**

To test how good the OLS regression estimators are, we need to test the presence of the heteroscedasticity in the given models above. In the absence of heteroscedasticity, the OLS regression estimators are BLUE CLRM. However, in the presence of heteroscedasticity the confidence intervals based on OLS will be unnecessarily larger. As a result, the t and F tests are likely to give us inaccurate results. OLS regression is still unbiased and consistent but it will no longer be minimum variance. That is OLS will no more be BLUE.

9.2.1 Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

\[
\begin{array}{|c|}
\hline
\text{Ho: Constant variance} \\
\hline
\text{Variables: fitted values of Intrade} \\
\hline
\text{chi2}(1) = 6.22 \\
\hline
\text{Prob>chi2} = 0.0126 \\
\hline
\end{array}
\]

The Breusch-Pagan test is designed to detect any linear form of heteroscedasticity and tests the null hypothesis that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more Variables. The results of the test which is a high chi-square value have revealed that the model is suffering from heteroscedasticity and the problem is serious. In this situation heteroscedasticity can be very problematic with methods besides OLS; it can produce biased and misleading parameter estimates.

Based on the above criterion the OLS estimation should be rejected and an alternative regression method which can give a better estimate of estimators in the presence of heteroscedasticity should be used. Therefore optimizing the weighted fitting criterion to find the parameter estimates allows the weights to determine the contribution of each observation to the final parameter estimates.
Does similarity in religion influence the direction of trade?

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The WLS regression would therefore minimize the problem leading to a better parameter estimates.

9.2.2 OLS and WLS regression

To make a clear note on the estimated values of the estimation results, I first need to point out what differences the two estimation methods OLS and WLS have?

One of the critical assumptions of ordinary least squares regression is homoscedasticity: that the variance of residual error should be constant for all values of the independent(s). If the independent(s) has/have different error variance at different ranges of their values, then the estimates of the regression coefficients will have unduly large standard errors for some ranges of the dependent and too small for other ranges. The power of significance tests will be reduced, which is to say regression estimates will be inefficient. Weighted least squares (WLS) regression compensates for violation of the homoscedasticity assumption by weighting cases differentially: cases whose value on the dependent variable corresponds to large variances on the independent variable(s) count less and those with small variances count more in estimating the regression coefficients. That is, cases with greater weights contribute more to the fit of the regression line. The result is that the estimated coefficients are usually very close to what they would be in OLS regression, but under WLS regression their standard errors are smaller.

Apart from its main function in correcting for heteroscedasticity, WLS regression is sometimes also used to adjust fit to give less weight to distant points and outliers, or to give less weight to observations thought to be less reliable least square (LS) estimation

Results for both equations 8.1 and 8.2 will therefore be presented in this chapter. The WLS results are presented and separate comments are forwarded. I used eq.8.1 and 8.2 to the following dependent variables. i.e \( \ln(\text{EXPORT}_{ij}) \) and \( \ln(\text{IMPORT}_{ij}) \) respectively.
9.3. WLS results of eq. 8.1 and 8.2

Table 6: WLS results of eq. 8.1 and 8.2

<table>
<thead>
<tr>
<th></th>
<th>Dependent Variables</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ln(export)</td>
<td>ln(import)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explanatory Variables</td>
<td>Coefficient</td>
<td>Std. Error</td>
<td>Coefficient</td>
<td>Std. Error</td>
</tr>
<tr>
<td>Const</td>
<td>-18.3049</td>
<td>0.65968***</td>
<td>-34.135</td>
<td>1.28135***</td>
</tr>
<tr>
<td>ln(gniusgniothers)</td>
<td>0.902319</td>
<td>0.00901673***</td>
<td>1.092550</td>
<td>0.0163916***</td>
</tr>
<tr>
<td>ln(distanceus_others)</td>
<td>-1.25679</td>
<td>0.04775***</td>
<td>-0.6240020</td>
<td>0.0907106***</td>
</tr>
<tr>
<td>relisimus_other</td>
<td>0.330183</td>
<td>0.071433***</td>
<td>0.242821</td>
<td>0.143786*</td>
</tr>
</tbody>
</table>

No. of observations 335 335 335

\[ R^2 \] 0.952613 0.976226 0.938300

Adjusted \[ R^2 \] 0.952183 0.976011 0.937741

WLS regression results shown above indicate the coefficients for GNIiGNIj and DISTANCEij are statistically highly significant for both equations 8.1 and 8.2. And the coefficients for religious similarity of equations 8.1 and 8.2 turn in to highly and moderately significant respectively. \( R^2 \) and adjusted \( R^2 \) have a very high value here implying the dependent variables are highly explained by the explanatory variables.
9.4. **Hypothesis Testing**

Based on estimation results using the OLS regression, I would be forced to accept the null hypothesis. In fact, OLS regression does not totally nullify the alternative hypothesis for the reason that the sign for the intended variable is positive in all cases. To avoid the accusation of circular reasoning, I can still consider the significance measure of religious similarity while the most important result is the sign of the estimator for the intended variable. OLS is not a BLUE estimator in the presence of heteroscedasticity. WLS will therefore be an alternative BLUE estimator with heteroscedasticity which we can reject the null hypothesis for the facts explained in 9.3 based on the second alternative regression.

10. **Analysis**

With OLS and WLS estimation, a high level of R² implies the dependent variable is highly explained by the explanatory variables. As far as the goodness of fit is concerned, both of the estimators are reliable to measure for the fact that the values of R² for both OLS and WLS are good enough for the intended explanatory variables to explain the dependent variable.

The focus of this thesis is on the premises that “Similarity not Difference” which is a core of attraction to trade and similarity in religion would influence nations for claiming sameness for socio-economic and political identity. As briefly explained by Burnstam Linder, an item which is less attractive in a home market would not be demanded in the foreign market. The more similar the countries are, the more intensive trade will occur. And religious similarity is derived from the overall similarity criterion to trade. The most important result I found in the study is a consistent positive sign for the coefficient of religious similarity variable (RELIGIONij) with a little concern on the significance. WLS results have revealed that religious similarity has a consistent positive effect on trade.

In OLS estimation the intended result for the coefficient of religious similarity variable (relisimus_others) happened to be a non-negative insignificant value. Though the variable is insignificant to determine the direction of trade, it still does have the intended positive effect to be claimed as a means of trade. Individuals
with same religion do have a more easily established trust than those with different religious views.

But the WLS estimation results which are better estimates due to the facts mentioned in (9.2.2) indicates the religious similarity between nations would positively and significantly influence the direction of trade. The significance of religious similarity variable could be explained by the following facts and theoretical grounds. The cultural variables like religion are coming to be more and more important when trade is freer. For instance, the number of WTO members has increased significantly and will of course continue to expand through time for the fact that the current observing members will be full members whom they are required to obey the basic principles and binding rules of WTO. This will encourage the removal of tariffs and quotas by the member countries which are rather elements of trade distortions and would influence the direction of trade unnaturally. So that, the freer is trade the more Adam Smith’s “invisible hand” plays a significant role where these cultural variables could also have more space to play free.

The other reason could be due to the network effects (small world effect) of religion. As proposed by pool and kochen 1978, one could reach the entire population only by two or three steps if there is no an overlap in peoples personal network and the critiques of Watts-Strogatz model, ER\(^5\) graphs do not have two important properties observed in many real-world networks: i.e

A-They do not generate local clustering and triadic closures\(^6\).

B-They do not account for the formation of hubs

These critiques imply that the introduction of the hubs would fulfil the full functioning of the network.

---

\(^5\) In graph theory, the Erdős–Rényi model(ER), named for Paul Erdős and Alfred Rényi, is either of two models for generating random graphs, including one that sets an edge between each pair of nodes with equal probability, independently of other edges.

\(^6\) Triadic closure is a concept in social network theory, first suggested by George Simmel, 1900s. It is the property among three nodes A, B and C, such that if a strong tie exists between A-B and A-C, there is a weak or strong tie between B-C.
In a real world scenario, religious teachings (hubs) would strengthen the network which otherwise would have been a free tie among individuals and would play a role up to the point where the individuals’ decision is dominated by the peer attitude in a network. So that, a product commercialized should first influence the values of a specific creed to influence the adherents. Some giant companies today are insisting influential religious leaders for commercializing their product believing that they could profit from the credibility and influence their followers (nodes) through the hubs (religious teachings). These facts could have made the religious similarity variable significant to influence the direction of trade.

11. Concluding remarks

The focus of this thesis is to indicate the importance of religious similarity for international trade. Despite a growing concern about the role of culture in international economic analyses, very few studies have dealt quantitatively with the effects of various cultural factors and it was very difficult if not impossible to find a study which did an attempt to relate religious similarity with trade theories. The paper has discussed related trade concepts beginning with the mercantilists’ view of trade, absolute advantage, comparative advantage, H-O theory; Linder’s overlapping demand theory and social network theory. Though, only few scholars had explicitly declared the importance of religion for trade, I have managed to come up with a summary of theoretical grounds for religion to influence the direction of trade. As shown in the theoretical discussion part, the mercantilist “blessing of trade” which I claimed it as the mercantilist version of “gains from trade”, Adam Smith’s “invisible hand”, Linder’s overlapping demand theory and the network theory have been summarised as a theoretical findings for religion to influence the direction of trade. In fact, there is no an explicit and comprehensive argument which could declare that religious similarity could be a reason for trade. But the summary of trade theories and concepts I tried to forward have contributed at least implicitly to bolster the concept.

The paper has also attempted to find empirical evidences. Using an extended gravity model on trade and the panel data of the U.S. and other 168 countries, it
has presented an interpretation about the significance of religious influences on international trade. The OLS estimation method has been rejected due to a serious heteroscedasticity problem where I have used WLS estimation which can give us a better estimate of the estimators in the presence of heteroscedasticity. My estimated results therefore indicate that the religious influences on foreign trade are positive and significant too.

As a conclusion, if the estimation results are based on the true premises of statistical methods and are relatively free from any faulty assumptions, I can claim that it is a new insight to influence companies’ focus for their commercials, researchers on the topic and any other stakeholders concerned for the reasons of the direction of trade.

But more careful analysis should be done before reaching any convincing conclusions. The findings of this paper could give only a glimpse of ideas for an attempt to define the reason for trade explanations and may strengthen the Linder's overlapping demand theory. Economists or researchers could possibly develop a problem that, do similar or different countries trade more? Linder’s overlapping demand claimed similarity in demand do cultivate more trade, the findings for this paper implies similarities in religion as a proxy to culture would influence for a positive trade, and future researchers would take the benefit of these inferences to do more studies on “similarities” and “differences” for bilateral trade.
Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)

12. References


Does similarity in religion influence the direction of trade?

(Empirical evidence from US bilateral trade with other 168 countries)


