Does halal food export follow the gravity trade theory? The Malaysian perspective

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Abstract

***Purpose of the research**: Despite empirical evidence in support of the gravity theory of trade, the applicability of the theory in Halal food trade appears confusing and inconclusive in the adolescent Halal literature. This study aims to further investigate this issue when analysing the Halal export opportunities for Malaysia.*

***Design/methodology**: This study examines Malaysia's top 10 exportable food commodities with the respective Key Halal markets for the period of 2000-2017 by using the panel data analysis approach including the Hausman-Taylor model.*

***Results/findings**: This study finds that the application of the gravity theory of trade within the Halal context provides mixed results. Being consistent to the theory, economic size of both exporter and the trading partners positively influences trade; however, as theoretically predicted, distance between trading partners does not always appear as barrier for Halal food trade. In addition, the study identifies the food commodities which displays market potential within the Key Halal markets. This will allow Malaysia to strategically diversify its exports in food commodities to the Halal markets. For example, given a market potential for Oil of Palm, Food Preparations, Oil of Palm Kernel and Cocoa Powder and Cake, Malaysia could consider diversifying its exports in these products to the Key Halal markets.*

***Practical implication and conclusion**: This study suggests that the application of gravity trade theory cannot be generalized for Halal food trade. It rather appears as commodity specific. Hence careful commodity selection is crucial for Halal food export diversification.*

Introduction

Malaysia is described as an export dependent nation due to its heavy reliance on exports in fuelling the economy. 71% of Malaysia's GDP was attributed to its export activity as of 2017 (World Bank, 2019). Despite the benefits of internalisation such as improved productivity and innovativeness (as in Krugman, 1985), Malaysia's overreliance on its export sector makes it vulnerable to potential adverse economic shocks affecting its trading partners. For instance, adverse consumer sentiments during the 2008 US Subprime Mortgage Crisis led to a lower demand for Malaysia's exportable goods, which in turn resulted in the economic slowdown of Malaysia's economy (Kabir, Salim & Bloch, 2018). A 0.1% GDP growth was recorded during the fourth quarter of 2008 compared to the average GDP growth of 5.9% during the first nine months of 2008 (Lim & Goh, 2010). Given the risks inherent in international trade, Malaysia could minimize the risks by

diversifying its portfolio of export destinations as opposed to sole reliance on its traditional trading partners.

Given Malaysia's exemplary Halal standards as mentioned by the Codex Alimentarius Commission (responsible for the regulation of food preparation globally) and the lucrativeness of the global Halal market, Malaysia could consider diversifying its exportable food commodities to Key Halal Markets (Detail on the Key Halal Markets is presented in Appendix A) (Kabir, Shams & Lawrey, 2018). With the growing Muslim population and their increased purchasing power, the global Halal market is currently valued at US$ 3 trillion and projected to grow to approximately US$ 8 trillion by 2030 (Husin, 2018). The Halal market is very broad and includes a wide range of goods such as food and beverages, personal care products, cosmetics, as well as services covering restaurants, hotels and banking and finance (Mazlan & Hamzah, 2015). However, the Halal food market is most promising as a recent estimate suggests that the global Halal food and beverage market size alone was US$ 1,173 billion (16.6% of the global food and beverage industry) in 2015 and is expected to be worth US$1,914 billion by 2021 (18.3% of the global food and beverage industry) (Thomson and Reuter, 2018).

Successful accession into these markets require the realignment of Malaysia's trade policies to suit the trading mechanism underlying trade with Halal markets. Being known as the workhorse of international trade, the gravity theory of trade posits that trade among country pairs are proportionately enhanced by their economic size but is inversely related to the distance separating them. The most common finding in studies adopting the gravity framework is the adverse distance effect on trade (Frankel, 1997; Disdier & Head, 2008; Berthelon & Freund, 2008). Larger the distance separating trading pairs apart, higher the transportation costs incurred thus suppressing trade relations as exportable goods become more expensive. However, past studies assessing Malaysia's trade relations with various Halal markets either documented a positive distance effect or an insignificant distance effect on trade (Abidin, Bakar & Sahlan, 2013; Masron, Nik Azman & Hassan, 2014; Mazlan & Hamzah, 2015). A common explanation for such inconsistency is the inelastic demand for Halal food commodities by consumers thus indicating their willingness in paying a premium price for Halal goods (Abidin et. al., 2013; Masron et. al., 2014; Mazlan & Hamzah, 2015). In other words, the institutional effect of Islam on its believers to consume only Halal food items make economic agents within Halal markets more behavioural thus explaining their willingness to pay a premium in ensuring the Halal status of their purchase (Ali, 2014; Wilson and Liu, 2010).

Considering the differing trading mechanism underlying trade with Halal markets and the limited number of studies contributed towards this line of literature, this study aims at investigating whether the conventional trade theory such as gravity theory is compatible with Halal trade. We do this by analysing Malaysian exports of 10 food commodities from 2000 to 2017 to the Key Halal markets thus covering 80% of Malaysia's food export. The study has several findings. First, standard gravity model cannot equally explain the trade pattern of all 10 Halal food commodities. Instead, designing commodity specific augment gravity model would better explain Malaysia's export potential for Halal food industry, implying that Malaysia's Halal export policy might have to be commodity specific. Second, demand from the Muslim community of the trading partners show significant positive influence on trade for three out of ten commodities. Hence, Malaysia may have high demand only for selected Halal food commodities. Third, except for Oil of Palm, Food Preparation and Pastry, the coefficients for distance between the trading partners appear as positive. This result drift away from a basic assumption of gravity trade theory that trade is inversely proportional to the distance, i.e., the cost involved in trade between the trading partners. Thus, the study supports that of Abidin et. al. (2013), Masron et. al. (2014) and Mazlan & Hamzah (2015) that demand inelasticity of Halal food may have important role in Halal trade policy. However, previous studies covered either OIC members or Middle east countries, while the current study covers the Key Halal market which includes countries from Middle east, Asia, Africa and Europe. Overall, the study suggests that the conventional trade theories cannot be generalized for Halal food exports, rather be

commodity specific. Thus, Halal food export requires careful commodities selection as well as commodity specific policy focus.

The paper is organized as follows. Section 2 explains the theoretical framework for the study, followed by the details for variables and estimation techniques in Section 3. Section 4 explains the results, and the last section concludes the paper.

The Theoretical Framework for Halal Trade

Earlier studies such as Tinbergen (1962) and Poyhonen (1963) employed the gravity model of trade with a high predictive power of the gravity specification. The model has been widely applied within trade literature in examining the impacts of various trade enhancing and impeding factors. In particular, much research has been directed at examining the adverse effects of transportation costs (Engel & Rogers, 1996; Frankel, 1997; Berthelon & Freund, 2008; Disdier & Head, 2008; Hornok & Koren, 2015), administrative barriers to trade (Djankov, Freund & Pham, 2010; Hornok & Koren, 2015), cultural and linguistic dissimilarity on trade (Grossman, 1998; Felbermayr & Toubal, 2010; Ku & Zussman, 2010; Lohmann, 2011; Oh, Selmier & Lien, 2011; Carrere & Masood, 2018), and the trade promoting effects such as establishing a regional trade agreement (Ghosh & Yamarik, 2004; Carrere, 2006; Yang & Martinez-Zarzoso, 2014; Barbalet, Greenville, Crook, Gretton, & Breunig, 2015; Bhattacharyya & Mandal, 2016) and economic size of trading pairs.

Despite the wide employment and support for the gravity framework, the limited application of the gravity specification in Halal trade literature makes the applicability of the gravity framework within the Halal context questionable. Among few, Yunus & Ismail (2009) highlighted the trade enhancing effect of economic size and FDI in promoting Malaysia-OIC trade relations. On the other hand, factors such as exchange rate volatility and distance between trading pairs suppress trade between Malaysia and OIC countries. Additionally, Masron et. al. (2014) concluded that the population of the importing country and size of both the exporting and importing country enhances Malaysia's exports to MEACs (Middle Eastern Asian Countries) whereas distance between trading pairs discourages trade. Furthermore, Abidin et. al. (2013) found that the real exchange rate of both Malaysia and OIC member countries significantly and positively effects Malaysia-OIC trade whereas, the per-capita GDP of Malaysia and the consumer price index of OIC member countries negatively effects Malaysia-OIC trade. Mazlan and Hamzah (2015) as well supported the applicability of the gravity framework by showing a positive association between Malaysia's halal exports and the GDP and population size of the importing country. However, Abidin et. al. (2013) observed a positive distance effect on trade with a 10.73% increase in trade with each kilometre increase in distance between Malaysia and OIC member countries. Similarly, Masron et. al. (2014) observed a diversion from the gravity specification due to the insignificant distance effect on trade between Malaysia and MEACs.

Diversions from the gravity framework in Halal trade is driven partly by consumer behaviour. Consumer-based brand equity specifies that the product attributes of a product guides consumer preference of a brand over the other (Butt, Rose, Wilkins & Haq, 2017). However, given the onset of religious identity, Butt et. al. (2017) suggest that consumers differentiate products based on psychological and behavioural characteristics as opposed to a product's attribute. For instance, despite a Cadbury bar being identically the same globally, consumers may prefer a Cadbury bar from Malaysia for its Halal certification. Thus, the determinants of consumer-based halal brand equity (CBHBE) measures the propensity for a consumer to opt for a halal certified brand over its non-halal counterpart. Butt et. al. (2017) claim that self-expressive religious benefits (SERB) of Muslims is the strongest determinant of CBHBE. That is, consumers in consuming halal goods may feel a sense of being rewarded as they have successfully hindered themselves from consuming prohibited goods. Hence, the positive effect of Halal certification on consumer behaviour occurs due to the institutional effects of Islam on its believers (Mazlan & Hamzah, 2015; Masron et. al., 2014; Butt et. al., 2017). Thus, agents within Halal markets seem to be more behavioural as opposed to depicting

cost saving behaviour as posited by the gravity specification. The institutional effect of religion dictates the consumption patterns of consumers (Cosgel & Minklers, 2004). This therefore may explain the diversions from the gravity specification as evidenced by Abidin et. al. (2013) and Masron et. al. (2014).

Considering such behavioural difference, one would expect a different trading mechanism underlying trade with Halal markets as opposed to trade with conventional markets. We test this difference in the Gravity framework. Following the literature discussed in this section, the basic framework of this study is as follows:

$$trade_{ij} = gdp_i gdp_j \left(t_{ij}\right)^{1-\sigma} \quad \ldots\ldots\ldots (1)$$

Here, gdp_i is the GDP of country i, gdp_j is the GDP of country j, and t_{ij} is the bilateral trade cost factor. Further elaboration of the model is discussed in the next section.

Description of Model and the Estimation Technique

Considering the discussion of the above section on possible diversification of Halal trade behaviour from the conventional trade model, the augmented gravity model used in this study is as follows:

$$\ln exports_{ijt} = \beta_0 + \beta_1 \ln gdp_{it} + \beta_2 \ln gdp_{jt} + \beta_3 \ln muspop_j + \beta_4 \ln dist_{ij} + \beta_5 border_{ij} + \beta_6 comlang_{ij} + \beta_7 colties_{ij} + \beta_8 rta_{ijt} + \alpha_{it} + \alpha_{jt} + \varepsilon_{ijt}$$

$\ldots\ldots\ldots$ (2)

Here, $exports_{ijt}$ is the exports from exporting country i to the respective Key Halal markets (country j); $\ln gdp_{it}$ and $\ln gdp_{jt}$ represents the production capacity of the exporting country and potential demand by Muslim consumers from the importing country respectively; $\ln muspop_{jt}$ refers to the market size (number of potential consumers) in the importing country; $\ln dist_{ij}$ represents the distance between the exporting and importing country; $border_{ij}$ is a dummy variable which takes a value of 1 if country pairs share a common border, 0 otherwise; $comlang_{ij}$ is a dummy variable which takes a value of 1 for country pairs sharing the same official language, 0 otherwise; $colties_{ij}$ is a dummy variable which takes a value of 1 for country pairs who were ever in a colonial relationship, 0 otherwise; rta_{ijt} is a dummy variable which takes a value of 1 if country pairs are signatories to the same regional trade agreement, 0 otherwise; α_{it} and α_{jt} represents the exporter-year and importer-year fixed effects respectively.

Variables identified in Equation 1 are described in the Table below.

Variables	Description
$LGPD_i$	$LGDP_i$ = (Log) Exporters GDP Based on the value-added approach, GDP represents the monetary value of all finished goods and services produced within a country. Inclusion of LGDPE therefore acts as a proxy in measuring the production capacity of the exporting country. The more goods a country can produce, the more supply it must increase its volume of exports. This rationalises the posited hypothesis of a positive association between trading volumes and exporters GDP via the gravity theory of trade.
$LGDP_j$	$LGDP_j$ = (Log) GDP of the Importing Country Based on the expenditure approach, GDP represents the sum of purchases made within an economy. Given that an increase in purchases by the importer suggests a higher demand for goods and services, inclusion of importers GDP acts as a proxy in measuring the potential demand for international goods. Hence, a significant and positive association between importers GDP and volume of exports imply a significant market for the considered food commodity.

$LMUSPOP_j$	$LMUSPOP_j$ = (Log) Muslim Population of the Importing Country The demand for international goods derives from both the population and/or GDP per capita of the importing country. Inclusion of population assesses the market size (number of potential consumers) of the importing country whereas GDP per capita proxies the purchasing power of consumers. Given a positive and significant effect of Muslim population on volume of exports, one could infer a significant demand for the considered food by a large portion of the Muslim community within the considered market.
$LDIST_{ij}$	$LDIST_{ij}$ = (Log) Distance The larger the distance separating trading pairs apart, the higher the transportation costs incurred thus suppressing trade relations. This rationalises the adverse distance effect on trade as hypothesized by the gravity theory of trade.
$BORDER_{ij}$	$BORDER_{ij}$ = A dummy variable which either takes a value of 1 for trading pairs sharing a common border or 0 for trading pairs who do not share a common border. Given the lower transportation costs incurred by neighbouring countries, the gravity theory of trade posits higher levels of trade between bordering countries.
$COMLANG_{ij}$	$COMLANG_{ij}$ = A dummy variable which either takes a value of 1 for trading pairs speaking the same official language or 0 for trading pairs who do not speak the same official language. Not only does speaking the same official language enhance trust trade relations but it as well reduces the transaction costs to trade. For instance, countries speaking dissimilar official languages induce the need in hiring a translator thus making trade more expensive. Given that trade becomes more expensive, the levels of trade among country pairs are predicted to decline. Hence, as predicted by the gravity theory of trade, higher levels of trade are expected for countries speaking the same official language.
$COLTIES_{ij}$	$COLTIES_{ij}$ = A dummy variable which either takes a value of 1 for trading pairs who were ever in a colonial relationship or 0 for trading pairs who were never in a colonial relationship. This variable has been commonly used within trade literature as a proxy for cultural similarity. Given the uniqueness of each culture, the dietary requirements posed by different cultures may require the alteration of international goods to suit the importers cultural background. With an increase in transaction costs thus making trade more expensive, trade between countries of dissimilar cultural backgrounds is expected to be lower compared to countries of similar cultural backgrounds. Hence, as posited by the gravity theory of trade, trade among country pairs with similar cultural backgrounds are predicted to trade more with each other.
RTA_{ij}	RTA_{ij} = A dummy variable which either takes a value of 1 for signatories of the same regional trade agreement or 0 for signatories of different regional trade agreements. Given the abolishment/reduction of tariffs between signatories of the same regional trade agreement, the reduction in trading costs should result in higher levels of trade. This justifies the positive effect of regional trade agreements on trade as hypothesized by the gravity theory of trade.

Table 1: Description of Variables

Despite its empirical success at uncovering the trading dynamics, the applicability of the gravity theory of trade within the Halal context remains unclear. This study assesses the predictive power of the gravity theory of trade in predicting Malaysia's exports to the Key Halal markets. The results could contribute in aligning Malaysia's trade policies with the trading dynamics of the Key Halal markets. In addition, given the differing demand structures of consumers within international markets, Malaysia's accession into the Key Halal markets depends on its composition of exports. Hence, this study contributes in identifying the food commodities which displays market potential within the Key Halal markets. Considering this research objectives, the study is centred at determining the market potential for exportable food commodities by Muslim consumers. Hence, the importers GDP has been recalculated by multiplying the Muslim population with the GDP per capita of the respective importing country and expressed as $\ln gdpm_{jt}$. The Halal trade model developed in Equation 2 has been further modified by $\ln gdp_{jt}$ with $\ln gdpm_{jt}$. Such modification of the model tells us whether estimated export potential changes if we control for purchasing capacity of the importer's Muslim community instead of purchasing capacity of the importer. Thus, the modified model appears as:

$$\ln exports_{ijt} = \beta_0 + \beta_1 \ln gdp_{it} + \beta_2 \ln gdpm_{jt} + \beta_3 \ln muspop_j + \beta_4 \ln dist_{ij} + \beta_5 border_{ij} + \beta_6 comlang_{ij} + \beta_7 coltie s_{ij} + \beta_8 rta_{ijt} + \alpha_{it} + \alpha_{jt} + \varepsilon_{ijt}$$

… … … (3)

A two-way fixed effect model has been a commonly recommended gravity model estimation. Disdier and Head (2008) documented the increasing number of studies in incorporating importer and exporter fixed effects within their gravity specification. Anderson and Van Wincoop (2003) and Silva and Tenreyro (2006) support this approach due to its ability in capturing the multilateral resistance faced by trading pairs. The failure in incorporating the multilateral resistance faced by trading pairs would lead to an omitted variable bias as Gaurav and Mathur (2016) have evidenced. Sun and Reed (2010) as well stress the importance of including year effects within the gravity specification due to its ability in controlling for economic shocks affecting global trade. However, estimation of gravity model relying on the fixed effect may suffer from potential endogeneity (e.g. Chit et al. 2010). The Hausman-Taylor model (HTM) is strongly suggested by Egger (2002) to avoid such endogeneity issue in gravity model.

Considering that economic shocks such as the 2008 financial crisis and 2015 Chinese stock market crash coincide with the period of interest of this study, year fixed effects were initially employed within the gravity specification of this study. However, in counter to the endogeneity effect in the model, the models are re-estimated using the HTM technique. Results for the HTM models are discussed in the next section and results for year fixed effect models are presented in Appendix. The estimated results are adjusted for heteroskedasticity, serial correlation and outliers.

Results and Discussion

The models (Equation 2 & Equation 3) are estimated on export data for 10 selected commodities as listed below in Table 2. The estimated results are presented in Table 3 and Table 4 explained below in Section 4.1 and Section 4.2.

No	Commodity	%Malaysia's Food Exports	Cumulative % Malaysia Food Exports
1	Oil of Palm	53.706	53.70616
2	Food Preparations	5.618	59.32396
3	Oil of Palm Kernel	4.848	64.17245
4	Pastry	3.289	67.46111
5	Cocoa Butter	2.965	70.42624
6	Coffee Extracts	2.415	72.84156
7	Food Preparations of Flour, Meal or Malt Extract.	2.334	75.17597
8	Cocoa Power and Cake	1.993	77.16928
9	Non-Alcoholic Beverages	1.939	79.10872
10	Fat Preparations	1.758	80.86671

Table 2: The list of 10 commodities selected based on Malaysia's export share (2016) as published by the Food and Agriculture Organization of the United Nations.

4.1 Gravity Theory

The gravity theory of trade postulates the trade enhancing effects of regional trade agreements, contiguity, economic size and commonality of both linguistic and cultural background of trading pairs on trade. However, the theory also predicts that trade relations among country pairs deteriorate with distance. This study observes a quite consistent but mixed result for different commodities, especially in case of distance between the trading partners. The results are explained below.

Based on the value-added approach, GDP represents the monetary value of all finished goods and services produced within a country. Inclusion of exporters GDP therefore acts as a proxy in

measuring the production capacity of the exporting country. The more goods a country can produce, the more supply it must increase its volume of exports. This rationalises the posited hypothesis of a positive association between trading volumes and exporters GDP via the gravity theory of trade. Referring to Table 3 and Table 4, signs for coefficients of exporter GDP are as expected, indicating to positive effect of exporters GDP on trade. Similarly, coefficients are significant except for Oil of Palm Kernel in Table 4. Thus, the result confirms that increase in Malaysian GDP would increase Halal exports. For example, a 1% increase in Malaysian GDP is predicted to increase Halal exports of the Oil of Palm by ($e^{1.1341}$ or) 3.1% on average, ceteris paribus.

Based on the expenditure approach, GDP is merely the sum of purchases made within an economy. Given that an increase in purchases by the importer suggests a higher demand for goods and services, inclusion of importers GDP acts as a proxy in measuring the potential demand for international goods. Hence, as predicted by the gravity theory of trade, an increase in importers GDP should result in higher levels of exports. From the regression output presented in Table 3, the coefficients of importer GDP are positive for all commodities; however, are significant for all commodities except Oil of Palm. This result indicates that except for Oil of Palm, higher expenditure capacity of the Halal market will induce Malaysian Halal export. Similarly, in Table 4, coefficients of importer's Muslim GDP is positive and significant for all commodities except Oil of Palm. This result indicates that an increase in the expenditure capacity of the Muslim community in the importing country can induce Malaysian export of Halal food. For example, a 1% increase in the Muslim expenditure capacity of the importer is predicted to increase exports of Food Preparation by ($e^{2.735}$ or) 15.4% on average, ceteris paribus.

	Commodity									
	1	2	3	4	5	6	7	8	9	10
LGDPE	1.341***	1.733***	0.704*	1.806***	1.355***	2.399***	2.378***	0.842***	1.170***	0.784***
	(0.252)	(0.072)	(0.421)	(0.105)	(0.388)	(0.176)	(0.272)	(0.181)	(0.162)	(0.198)
LGDPI	0.284	2.719***	1.103**	1.741***	1.220***	2.334***	1.796***	1.924***	2.397***	1.507***
	(0.305)	(0.087)	(0.509)	(0.112)	(0.397)	(0.203)	(0.233)	(0.187)	(0.146)	(0.271)
LMUSPOPI	1.129***	-0.496***	-0.473	-0.002	0.689**	-0.276	0.783***	0.159	-0.406***	0.376
	(0.229)	(0.087)	(0.384)	(0.110)	(0.333)	(0.180)	(0.222)	(0.178)	(0.135)	(0.244)
LDIST	-2.284	-0.145	2.152	-0.347	1.286	2.270***	2.227**	0.290	0.310	2.148**
	(1.713)	(0.323)	(3.381)	(0.388)	(1.333)	(0.690)	(1.000)	(0.552)	(0.470)	(0.849)
BORDER	-7.805**	0.744	3.126	1.535	1.723	2.941	3.961	1.188	1.864*	2.762
	(3.759)	(1.447)	(7.489)	(0.994)	(5.251)	(2.285)	(5.795)	(2.108)	(1.128)	(2.504)
COMLANG	-	3.790***	-	2.907***	1.601	6.026***	1.869	0.908	2.274***	-6.552*
		(0.670)		(0.632)	(3.986)	(1.208)	(3.148)	(3.351)	(0.804)	(3.671)
COLTIES	-	0.453	-	0.668	-3.213	-	-2.436	-0.086	-0.732	1.202
		(0.845)		(1.028)	(4.118)		(3.570)	(1.593)	(1.216)	(2.430)
RTA	0.011	-0.180**	-0.638	0.188*	-0.017	0.080	1.005***	0.296*	0.488***	0.219
	(0.508)	(0.078)	(0.455)	(0.104)	(0.324)	(0.174)	(0.197)	(0.160)	(0.152)	(0.264)
Constant	-24.788	-94.143***	-44.917	-78.443***	-79.531***	-128.563***	-129.911***	-65.401***	-76.970***	-72.116***
	(16.664)	(3.265)	(31.255)	(4.002)	(15.284)	(7.487)	(10.702)	(6.656)	(5.594)	(8.793)
Observations	543	5,015	366	3,376	626	1,972	1,745	1,434	2,741	877
R-squared	0.867	0.711	0.914	0.659	0.795	0.605	0.619	0.747	0.597	0.755

Clustered standard errors in parentheses due to serial correlation and heteroskedasticity; Exclusion of outliers in estimating the prescribed model. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Regression Output from Halal Trade Model (Equation 2)

The larger the distance separating trading pairs apart, the higher the transportation costs incurred thus suppressing trade relations. This rationalises the adverse distance effect on trade as hypothesized by the gravity theory of trade. Interestingly, the adverse effect of distance in trade has only been observed for Oil of Palm, Food Preparation and Pastry, all three being statistically insignificant. The distance coefficients for other seven commodities appear as positive, which is a diversion from basic trade theory. However, among these seven commodities, only the coefficients for Coffee Extract, Food Preparations of Flour, Meal or Malt Extract, and Fat Preparation appears as significant. This result indicates that distance between exporter and importer is generally not a considerable barrier for Halal food trade. Findings of some previous studies examining Malaysia's trade relations with various Halal markets also documented such diversion from the predictions of the gravity model of trade. For instance, Abidin et. al. (2013) documented a positive distance effect for trade between Malaysia and member countries of the Organisation of Islamic Cooperation (OIC). In contrast, Masron et. al. (2014) in a similar study found an insignificant distance effect in trade. Mazlan and Hamzah (2015) lend support to the findings of Masron et. al. (2014) and Abidin et al (2013). In addition to this, they as well challenge the gravity model of trade in fully explaining Malaysian export of Halal products to Muslim markets. According to them, Halal food displays a strong inelastic demand indicating the consumers' willingness in paying a premium price for Halal goods. This then provides support to Cosgel and Minklers (2004) who presupposes the institutional effects of religion in dictating the consumption patterns of consumers. That is, as opposed to the cost-saving behaviour of economic agents as predicted by the gravity theory of trade, trade in Halal food commodities being more behavioural.

	Commodity									
	1	2	3	4	5	6	7	8	9	10
LGDPE	1.303***	1.753***	0.685	1.824***	1.453***	2.452***	2.403***	0.865***	1.196***	0.896***
	(0.245)	(0.073)	(0.418)	(0.106)	(0.392)	(0.178)	(0.273)	(0.181)	(0.163)	(0.203)
LGDPM	0.252	2.735***	1.137**	1.702***	1.112***	2.294***	1.725***	1.948***	2.398***	1.457***
	(0.301)	(0.089)	(0.512)	(0.114)	(0.402)	(0.208)	(0.238)	(0.191)	(0.150)	(0.279)
LMUSPOPI	1.137***	-0.537***	-0.549	0.018	0.705**	-0.312*	0.836***	0.103	-0.438***	0.353
	(0.234)	(0.090)	(0.394)	(0.113)	(0.344)	(0.187)	(0.229)	(0.183)	(0.140)	(0.255)
RTA	0.031	-0.182**	-0.628	0.193*	-0.010	0.092	1.010***	0.292*	0.438***	0.234
	(0.498)	(0.078)	(0.460)	(0.104)	(0.340)	(0.177)	(0.197)	(0.160)	(0.153)	(0.254)
LDIST	-2.440	-0.059	2.094	-0.352	1.393	2.372***	2.344**	0.332	0.318	2.222**
	(1.691)	(0.342)	(3.409)	(0.400)	(1.374)	(0.711)	(1.033)	(0.563)	(0.487)	(0.921)
BORDER	-8.102**	0.898	3.158	1.491	2.116	3.046	4.157	1.195	1.794	3.057
	(3.732)	(1.528)	(7.578)	(1.023)	(5.412)	(2.347)	(5.984)	(2.150)	(1.167)	(2.689)
COMLANG		3.953***		2.976***	1.620	6.254***	1.774	0.923	2.429***	-6.787*
		(0.705)		(0.650)	(4.111)	(1.240)	(3.251)	(3.420)	(0.831)	(3.932)
COLTIES		0.504		0.634	-3.317		-2.316	-0.124	-0.803	1.235
		(0.898)		(1.057)	(4.246)		(3.697)	(1.626)	(1.256)	(2.605)
Constant	-21.644	-94.897***	-43.407	-78.051***	-80.487***	-129.058***	-130.456***	-65.866***	-77.031***	-74.181***
	(16.391)	(3.410)	(31.451)	(4.090)	(15.620)	(7.664)	(10.960)	(6.725)	(5.712)	(9.363)
Observations	542	5,021	367	3,377	625	1,974	1,746	1,435	2,742	880
Number of ids	35	332	33	241	67	179	154	117	200	67

Clustered standard errors in parentheses due to serial correlation and heteroskedasticity; Exclusion of outliers in estimating the prescribed model. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Regression Output from modified Halal Trade Model (Equation 3)

Considering the uniqueness posed by different cultures, the dietary requirements of different cultures may necessitate the alteration of international goods to suit the cultural background of the targeted export destination. With an increase in transaction costs thus making trade more expensive,

trade between countries of dissimilar cultural backgrounds is expected to be lower compared to countries of similar cultural backgrounds. Hence, as posited by the gravity theory of trade, trade among country pairs with similar cultural backgrounds are predicted to trade more with each other. Referring to Table 3 and Table 4, all coefficients of colonial ties are statistically insignificant. Hence, cultural proximity does not seem to be a significant factor in Halal trade.

Given the lower transportation costs incurred by neighbouring countries, the gravity theory of trade posits higher levels of trade between bordering countries. In reference to Table 3 and Table 4, coefficient for common border dummies are observed insignificant except for Oil of Palm and non-alcoholic beverage. Interestingly, a significant negative border effect in trade of Oil of Palm is observed at the 5% level of significance, indicating that trade occurs more between non-bordering countries as opposed to neighbouring countries. It is expected because the two top Oil of Palm producers are Malaysia and Indonesia, which are the neighbouring countries.

Commonality of official languages is predicted to enhance trade relations due to increase in trust and the reduction in communication costs incurred. Except for trade in Fat Preparations, having similar linguistic background seems to induce trade relations with the Key Halal Markets. The coefficients are, however, statistically significant only for Food Preparation, Pastry, Coffee Extracts and non-alcoholic Beverage. What is even surprising is the negative effect of common language in trade of Fat Preparations. Specifically, at the 1% level of significance, countries with dissimilar official languages are expected to trade 6 percent more than countries of similar linguistic backgrounds.

Given the abolishment/reduction of tariffs between signatories of the same regional trade agreement, the reduction in trading costs should result in higher levels of trade. This justifies the positive effect of regional trade agreements on trade as hypothesized by the gravity theory of trade. As predicted by the conventional trade literature, the positive effect of regional trade agreements on Halal trade is evident for most commodities except for Food Preparations and Cocoa Butter. However, most of the trade in the considered commodities indicate an insignificant effect of regional trade agreements in promoting Halal food trade.

Halal refers to the permissibility of something under Islamic law whereas Haram refers to those things forbidden under Islamic Sharia law. One of the requirements for the followers of Islam is to limit food consumption to Halal products only. While some of the dietary restrictions of Muslims are clear cut, the Halal status of some food categories are unclear. In this scenario, consumers would normally be guided by the fatwa regarding the permissibility of such food items. Different Muslim countries have different practice on the Halal standard of a product due to varying interpretation of the Sharia law in different School of Thoughts. This significantly affect halal standard and ultimately affect demand for halal certified products across countries. With the onset of differing fatwas and consumer preferences, consumers may posit differing demand structures for different goods thus affecting the market potential of goods within different markets. This may explain the diversion of Halal trade flows analysis from the conventional gravity trade theory. Consumers are often willing to bear additional trading costs as assurance in the Halal status of the respective international goods imported.

Overall, it can be inferred that the applicability of the gravity theory of trade within the Halal context provides mixed results. Despite this, the specified model on average, could explain approximately 60% to 90% for the 10 commodities considered within this study. However, the variability in the documented R-square values and the coefficients of different variables across commodities indicates that the standard gravity model may not be applicable to explain the trade of all Halal commodities. Commodity specific augmented gravity models could better explain the Halal trade.

4.2 Market Potential

The demand for international goods derives from both the population and/or GDP per capita of the importing country. Inclusion of population assesses the market size (number of potential

consumers) of the importing country whereas GDP per capita proxies the purchasing power of consumers. Given a positive and significant effect of Muslim population on volume of exports, one could infer a significant demand for the considered food by a large portion of the Muslim community within that market. In reference to Table 3 and Table 4, the positive and significant effect of the Muslim population of the importing country is observed in trade of Oil of Palm, Cocoa Butter and Food Preparations of Flour, Meal or Malt Extract. The result implies that a market potential exists for Malaysia for these three products within the Key Halal markets. On the other hand, significant but negative coefficient is observed for Food Preparations and non-Alcoholic Beverage, implying that the size of Muslim community may not play important role in capturing market share within the Key Halal markets. For other commodities, the coefficients of Muslim population are insignificant, implying that the size of Muslim community may not be a significant factor in capturing Halal market share for the remaining five commodities. Thus, controlling for the size of Muslim community in the model shows that except for Oil of Palm, Cocoa Butter and Food Preparations of Flour, Meal or Malt Extract, the other commodities display relatively less market potential for exports within the Key Halal Markets.

Conclusion

Malaysia's overdependence on its exports makes it vulnerable to the economic stability of its traditional trading partners. Given Malaysia's robust Halal standards, this study investigates the diversification possibilities of exports towards the respective Key Halal markets. In ensuring successful accession into these markets, this study first examine the applicability of the gravity theory of trade in explaining trade in Malaysia's top 10 food exportable with the Key Halal markets. Secondly, the study identifies the food commodities which display market potential within the Key Halal markets. These two objectives are fulfilled by adopting an augmented gravity model of trade specification commonly applied within trade literature and by employing a Hausman Taylor model.

In running the augmented gravity model of trade for all 10 commodities, it can be inferred that the applicability of the gravity theory of trade within the Halal context provides mixed results. Unlike the rational behaviour of economic agents as predicted by the gravity theory of trade, trade could with Halal markets seem to be behavioural. The somewhat behavioural trading dynamics of trade with the Key Halal markets may be explained by the presupposition made by Cosgel and Minklers (2004) who rationalises the institutional effects of religion in dictating the consumption patterns of consumers. Given that the dietary requirements of Islam only permit the consumption of Halal goods, consumers may be willing to incur additional costs to trade in ensuring the Halal status of international goods. Despite this, the specified model on average, could explain approximately 60% to 90% of export variabilities for the 10 selected commodities. The variability in observed R-square values and the coefficients of different variables across commodities indicates that the ability of standard gravity model in explaining trade with Key Halal markets varies across different food commodities. The overall result suggests that Malaysia could consider diversifying its exports to the Key Halal markets, especially the Oil of Palm, Cocoa Butter and Food Preparations of Flour, Meal or Malt Extract. For the other commodities, substantial promotional activities may be required to attract the Halal market with Malaysian product.

Limitations and Direction for future research

This study only focusses on one exporting country to assess the compatibility of gravity model in Halal food export. Including more exporters will provide a more generalized view on the topic.

Appendix A

Key Halal markets include Algeria, Bahrain, Egypt, Indonesia, Iran, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Syria, Tunisia, Turkey, United Arab Emirates, and Yemen (Salama, 2011). Imports from Malaysia and the World by key Halal markets as seen in Table 1 below have been collected from WITS.

	Key Halal Market		
	Import Value (USD$'000)		% Share of Food Imports from Malaysia
Year	Malaysia	World	
2000	1018910.95	34261761.33	2.97
2001	901178.68	32828698.95	2.75
2002	1070626.71	35613826.41	3.01
2003	1324287.62	39339307.22	3.37
2004	1516793.91	46068230.61	3.29
2005	1713217.80	46820619.99	3.66
2006	1608912.91	50599067.24	3.18
2007	2026292.25	67091947.05	3.02
2008	3584638.61	94034935.51	3.81
2009	2780498.89	75602038.48	3.68
2010	4270053.96	103694316.48	4.12
2011	5540529.81	126967720.04	4.36
2012	3738386.97	118663103.63	3.15
2013	3333607.21	125752254.66	2.65
2014	2627463.35	142262880.80	1.85
2015	2154849.25	120979933.96	1.78
2016	2394835.28	115093959.52	2.08
2017	2227427.97	72976427.03	3.05
Average	2435139.56	80480612.72	*3.10*

Table A-1: Imports from Malaysia and the world by the key Halal markets

Appendix B

	Commodity									
	1	2	3	4	5	6	7	8	9	10
LGDPE	3.870***	0.742***	-4.374*	0.351***	3.272***	1.292**	-2.927***	-2.028***	0.652	-0.101
	(1.133)	(0.101)	(2.417)	(0.100)	(1.000)	(0.511)	(0.551)	(0.497)	(0.412)	(0.511)
LGDPI	-0.220	0.407***	1.643***	0.162	1.226**	1.096**	0.169	-0.499**	0.356	-0.135
	(0.434)	(0.141)	(0.230)	(0.183)	(0.476)	(0.458)	(0.439)	(0.220)	(0.432)	(0.216)
LMUSPOPI	0.765**	0.866***	1.479***	-0.213	-0.291	-0.310	-0.369	0.797***	0.154	0.186
	(0.333)	(0.183)	(0.539)	(0.131)	(0.243)	(0.377)	(0.226)	(0.095)	(0.251)	(0.113)
LDIST	-17.847**	-1.195***	-9.795	-0.749***	-1.010	-0.919***	-0.539	-1.476***	-1.034***	0.963*
	(7.338)	(0.145)	(9.380)	(0.182)	(0.785)	(0.298)	(0.482)	(0.250)	(0.264)	(0.516)
BORDER	-32.354***	0.653	-24.326	1.350***	-0.184	0.116	0.887	1.660**	1.309**	1.960***
	(11.133)	(0.486)	(17.931)	(0.436)	(1.932)	(0.433)	(0.811)	(0.832)	(0.623)	(0.643)
COMLANG	-	0.509*	-	0.118	-1.171	-0.305	0.737	0.387	-0.715	-3.015***
		(0.284)		(0.337)	(0.886)	(0.625)	(0.766)	(0.764)	(0.535)	(0.702)
COLTIES	-	0.882***	-	0.975***	-0.137	-	0.333	1.093*	1.293**	0.561
		(0.253)		(0.331)	(1.279)		(0.739)	(0.610)	(0.586)	(1.115)
RTA	-1.304*	0.187	-2.878***	0.292	0.300	0.248	1.118**	-0.011	0.550	0.115
	(0.738)	(0.181)	(0.885)	(0.230)	(0.884)	(0.395)	(0.519)	(0.362)	(0.352)	(0.597)
Constant	61.057*	-22.220***	151.518	5.775	-90.592***	-37.487**	94.318***	76.682***	-8.422	6.307
	(30.208)	(3.179)	(135.024)	(4.322)	(32.040)	(15.094)	(21.509)	(16.181)	(13.527)	(13.576)
Observations	543	5,015	366	3,376	626	1,972	1,745	1,434	2,741	877
R-squared	0.867	0.711	0.914	0.659	0.795	0.605	0.619	0.747	0.597	0.755

Clustered standard errors in parentheses due to serial correlation and heteroskedasticity; Exclusion of outliers in estimating the prescribed model. *** p<0.01, ** p<0.05, * p<0.1

Table B-1: Regression Output from Halal Trade Model (Equation 2 – Time-fixed effect)

	Commodity									
	1	2	3	4	5	6	7	8	9	10
LGDPE	11.444*	0.792***	3.550**	0.355***	-0.331	0.796	-2.914***	-1.761***	0.658	0.209
	(5.945)	(0.087)	(1.579)	(0.100)	(1.284)	(0.581)	(0.553)	(0.519)	(0.412)	(0.532)
LGDPM	-2.798*	0.427***	1.694***	0.162	1.319**	0.896*	-0.069	0.283	0.335	-0.115
	(1.606)	(0.140)	(0.237)	(0.184)	(0.505)	(0.474)	(0.448)	(0.248)	(0.439)	(0.240)
LMUSPOPI	4.708**	0.794***	1.362**	-0.216	-0.356	-0.282	-0.009	0.457**	0.155	0.179
	(1.761)	(0.167)	(0.535)	(0.135)	(0.240)	(0.388)	(0.321)	(0.212)	(0.259)	(0.128)
LDIST	-17.665**	-1.187***	-9.795	-0.755***	-0.966	-0.941***	-0.524	-1.470***	-1.037***	0.856
	(7.096)	(0.146)	(9.392)	(0.183)	(0.761)	(0.296)	(0.482)	(0.252)	(0.265)	(0.516)
BORDER	-42.974**	0.849*	-23.974	1.342***	-0.174	0.104	0.909	1.564*	1.310**	1.881***
	(16.686)	(0.466)	(17.929)	(0.436)	(1.935)	(0.429)	(0.813)	(0.855)	(0.624)	(0.660)
COMLANG		0.512*		0.138	-1.151	-0.381	0.828	0.375	-0.731	-2.957***
		(0.286)		(0.338)	(0.875)	(0.627)	(0.798)	(0.766)	(0.536)	(0.694)
COLTIES		0.916***		0.977***	-0.151		0.257	1.118*	1.292**	0.414
		(0.262)		(0.329)	(1.275)		(0.779)	(0.615)	(0.585)	(1.093)
RTA	-1.286*	0.185	-2.878***	0.288	0.336	0.267	1.131**	-0.018	0.558	0.184
	(0.717)	(0.181)	(0.886)	(0.232)	(0.892)	(0.399)	(0.518)	(0.362)	(0.354)	(0.598)
Observations	542	5,021	367	3,377	625	1,974	1,746	1,435	2,742	880
R-squared	0.870	0.710	0.914	0.657	0.796	0.601	0.618	0.747	0.595	0.752

Clustered standard errors in parentheses due to serial correlation and heteroskedasticity; Exclusion of outliers in estimating the prescribed model. *** p<0.01, ** p<0.05, * p<0.1

Table B-2: Regression Output from modified Halal Trade Model (Equation 3 – Time-fixed effect)

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