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# Revisiting Jamaica's Trade Weights and the Impact on the Real Effective Exchange Rate

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## Abstract

This paper presents a proposal for a new set of trade weights to be used in the calculation of Jamaica's real effective exchange rate (REER). The existing trade weights are based on total bilateral trade flows for the period 2003 to 2005 while the proposed weights are based on more recent data, for the period 2008 to 2010. In addition, the new methodology incorporates import competition, bilateral export competition and third-market export competition in contrast to the existing trade weights which are defined as the share of bilateral trade. Results from the new measure indicate that there has been a change in trading relations between Jamaica and its top ten trading partners, which has contributed to an increase in Jamaica's external competitiveness. With respect to the source of Jamaica's competition, results suggest that the country receives most of its import and export competition from the United States of America. Third-market competition on the other hand, stems mostly from the Euro Area and China.

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*Keywords: Trade Weights, Double-weight Scheme, Multilateral Exchange Rate Model, Real Effective Exchange Rate*

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<sup>\*</sup> The views expressed are those of the authors and not necessarily those of the Bank of Jamaica.

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## **1.0 Introduction**

Historically, Jamaica's trade was characterized by a few exports of primary products, sold mainly in the UK and the USA, and a wide range of imports mainly from these same trading partners. In recent years, however, there has been a change in the relative importance of some of Jamaica's main trading partners, with countries in the region moving up in rank. Notwithstanding this, the value of imports in Jamaica has consistently exceeded the value of exports, at least since the 1970s. This trade deficit has put constant pressures on the exchange rate which in turn has passed through to inflation. In addition, the country has experienced higher relative inflation mainly on account of exogenous shocks. Consequently, since 2003, Jamaica has recorded a substantial loss in external price competitiveness.

The nature of a country's external price competitiveness weighs heavily on the value of its currency and the rate of change in domestic prices relative to those of its major trading partners. Against this background, the Bank of Jamaica (BOJ) has utilized one of the most popular measures of external competitiveness, the real effective exchange rate (REER) index, which has been developed with the use of bilateral trade weights with Jamaica's top ten trading partners. The weights currently being used reflect bilateral trade during the period 2003 to 2005. However, given the changes that have occurred in Jamaica's trading relations since then, a recalculation of the trade weight indices is warranted. In addition, the existing weights do not take account of competition faced by Jamaica from third countries. Unlike other central banks such as New Zealand and Australia that update trade weights on an annual basis, Jamaica's trade weights also do not currently have an affixed updating cycle and as such have not been updated since 2005. This analysis therefore seeks to employ a more comprehensive methodology to the calculation of our trading weights than what is currently employed by the BOJ and to also suggest a suitable updating cycle of these weights.

Various methods have been employed in the estimation of trade weights namely; Bilateral Trade Weighting Scheme, the Double-weighting Scheme and the Multilateral Exchange Rate Model (MERM). For the purpose of this paper, we adopted the framework put forward by the Bank for International Settlements (BIS) and incorporated the Double-weighting Scheme in the

calculation of a new set of trade weights. In particular, bilateral merchandise trade data for the period 2008 to 2010 is applied to a double-weighting scheme, to obtain weights that account for import competition, bilateral export competition and third-market export competition.

The remainder of the paper is organized as follows. Section 2 summaries the various methodologies used in the calculation of trade weights. Section 3 outlines the proposed methodology and presents a brief description of the data set and Section 4 presents the results from the new set of weights. Section 5 provides the concluding statements.

## **2.0 Literature Review**

Ott (1987) asserts that in order to construct trade weights several questions should be answered, such as: (1) which foreign currencies should be used in the calculation; (2) what measure of trade should be used to weight the individual currencies; (3) should the weights be based on bilateral or multilateral trade shares and (4) what time period should be used for the weights. It has been argued that the answer to each of these questions depends upon the purpose of the analysis. That is, the utility of the effective exchange rate (EER). As a result, this section seeks to outline some of the methodologies used by central banks in calculating trade weights, with an aim to re-assess the current methodology employed by the BOJ and define a suitable updating cycle of these weights.

Economic literature reveals that two types of weighting schemes have gained wide acceptance, the bilateral trade weighting and the double-weighting schemes. Turner and Van't dack (1993) posit that in the bilateral scheme, it is implicitly assumed that in each export market the domestic producer constitutes the sole competitor; ruling out competition from other exporters to that market. This weighting scheme thus assigns weights to trading partners strictly in proportion to their share in the domestic country's exports and imports. Based on this definition, the current approach taken by the Bank may be classified as a bilateral trade weighting scheme.

Previous studies have found that bilateral trade weights are not ideal indicators of how exchange rate changes capture changes in the country's external competitiveness (Hargreaves and White, 1999). As a result, trade weights, defined only as the share of bilateral trade, have become less popular among central banks. Nonetheless, these weights are still used in countries such as Australia and are found at the core of weighting methodologies around the world.

For Australia, Ellis (2001) posits that trade weights are defined as the share of total bilateral trade (exports plus imports) with each country. The Reserve Bank of Australia includes enough countries in its calculation of trade weights to account for at least 90.0 per cent of Australia's total international trade in manufactured goods. In Jamaica, trade data on average captures at least 80.0 per cent of the country's total international trade. Weights in Australia are based on annual data and are revised annually.

The Central Bank of Trinidad and Tobago uses two types of weights in the construction of the REER and both measures are based only on bilateral trade with the country's top 17 trading partners (Des Vignes & Smith, 2005). The first set of weights are based on total trade volumes (imports and exports) while the second measure utilizes export data. These weights produce a trade-weighted REER and an export-weighted REER. The trade-weighted REER measures the external competitiveness of Trinidad and Tobago's trade in goods, while the export-weighted REER shows the competitiveness of only Trinidad and Tobago's exports.

One of the drawbacks associated with bilateral trade weight-indices relates to its failure to account for third-market competition or third-country effects. This refers to the competition that domestic exports experience in foreign markets from other sources of similar exports. Against this background, some central banks have revised their weighting methodologies to account for third-country effects in an effort to more accurately capture changes in their country's external competitiveness. In particular, the European Central Bank (ECB) adopts a double-weighting scheme put forward by the BIS in its calculation of trade weights. Using this approach trade weights represent a combination of separate import and export weights based on the trade flow of manufacturing goods, excluding trade between Euro Area countries. The import weight refers to each trading partner's share of the total Euro-Area imports while export weights are double-

weighted to account for direct export competition and third-market competition. Exports are double-weighted in order to account for “third-market effects”, that is, to capture the competition faced by Euro Area exporters in foreign markets from both domestic producers and exporters from third countries (Buldorini, Makrydakis, & Thimann, February, 2002). The overall weight assigned to each trading partner is then defined as the weighted average of the export and import weights over a three-year period.<sup>1</sup> For several Euro Area trading partners, the full range of desirable import and export data are often unavailable or may be available with a lag and subject to quality caveats. In order to deal with this trade-off, the ECB, calculates trade weights for different groups of countries. Specifically, weights for three groups of trading partners are reported; a narrow group of 12 countries, a group of 20 countries and a more extensive group of 40 countries.

The Federal Reserve also utilizes the double weighting scheme proposed by the BIS. The export weights are decomposed to capture competition in the foreign country’s home market and competition in third-country markets. The first export weight is calculated based on the foreign country’s share of US exports and is used to measure the extent to which US goods compete directly with a foreign country’s goods in that country’s home market. The second export weight is constructed to account for the extent to which a particular foreign country’s exports go to third-country markets that are also destinations for U.S. exports. Import weights, calculated as a country’s share of US imports, capture the degree of competition the US encounters domestically from that country. Trade weights therefore rely on the share of the foreign country’s goods in all the markets that are important to US producers; and the overall weight is a simple average of the bilateral import share weights and the combined export weights ((Leahy, 1998).

Another double weighted scheme has been implemented by the Reserve Bank of New Zealand (RBNZ). Since 1997 trade weights computed by the RBNZ reflect trading partner’s share of bilateral trade as well as the relative size of the country being assessed<sup>2</sup>. For each of its top five

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<sup>1</sup> The most recent weights, calculated by the ECB are reflective of trade data for the period 2007 to 2009 (Mobu, February, 2012).

<sup>2</sup> This 1997 revision, from bilateral trade weighted-indices, was done to capture the notion that a larger economy is likely to be a bigger competitive force in the foreign markets in which New Zealand competes.

trading partners<sup>3</sup>, 50.0 per cent of the allotted weight is based on its share of bilateral trade in manufactured goods with New Zealand, while the other 50.0 per cent is dependent on the foreign country's share of a five-currency aggregate nominal GDP, normalized to total 100 per cent (Kite, 2007). In addition, the RBNZ generates a set of trade weights based on information from 14 countries in an attempt to better capture the economy's trading activities. These new weights are also based on the 50:50 trade to GDP methodology and both weighting schemes are updated on an annual basis.

The International Monetary Fund's (IMF) calculations of trade weights also take into account import and export competition as well as third-market competition. However, this approach differs from the double-weight scheme and is widely known as the Multilateral Exchange Rate Model (MERM). The MERM is a general equilibrium model in which various supply and demand equations for tradable goods are specified. Notably, the IMF incorporates the trade of services, which has not been included in the trade weights analysis of most central banks given difficulties surrounding data availability. In addition to trade in services, the trade weights indices calculated by the IMF are based on trade flows in commodities and manufactures.<sup>4</sup> However, trade in petroleum and energy products is excluded from the calculation of commodity weights.<sup>5</sup> When calculating trade weights for the IMF, Bayoumi, Lee, and Jayanthi (2006) asserted that services and manufactures are influenced by factors such as distance and relative gross domestic product (GDP); as a result, trade in services, with the exception of tourism, is assumed to be distributed in the same manner as manufactures. Given that no comprehensive data on bilateral trade in services is available, the same weights, with the exception of tourism, are used for trade in services and manufactures. The commodities, manufactures and services weights are constructed using bilateral trade data for 164 countries over the three year period, 1999 to 2001.<sup>6</sup> Historically, the IMF updates the trade weights every ten years.

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<sup>3</sup> New Zealand's top five trading partners include Australia, USA, UK, Japan and the Euro Area.

<sup>4</sup> There are three broad categories of trade flows: manufactured goods, commodities and services. The most commonly adopted trade flow in the calculation of trade weights has been manufactured goods; as such trade is typically responsive to changes in competitiveness and the data readily available for almost all countries.

<sup>5</sup> Trade in petroleum and energy products are excluded because in the short run exchange rate changes are not likely to have much effect on trade in oil or gas. Additionally, the world oil market is strongly influenced by cartels, and exchange rate variations have only indirect effect on the market (Bayoumi, Lee and Jayanthi, 2006).

<sup>6</sup> Previous trade weights were based on bilateral trade data for the period 1989 to 1991.

Since 1996, the Bank of Canada adopted the multilateral trade weights published by the IMF in the calculation of the Canadian dollar EER index (CERI). The weights are based on trade with the six economies with the largest share of Canada's international trade (Ong, 2006); namely the USA, Euro Area, Japan, China, Mexico and the UK. Trade weights incorporate trade data over the 1999 to 2001 period and encompass trade in non-energy commodities, manufactured goods, and services. The index captures 86.0 per cent of Canada's international trade volume relative to the 81.0 per cent that was previously used. The new multilateral trade weights replaced the previous bilateral trade weighting scheme and provided a more comprehensive picture of Canada's trade competitiveness as they account for both direct and third-market export competition.<sup>7</sup>

According to Kite (2007), weights calculated by the IMF do not vary much over time and capture third-market competition more precisely than the 50:50 trade-to-GDP used in New Zealand. It is important to note that though useful, the calculation of multilateral trade weights is hampered by the difficulty of obtaining comparable data. This is because the calculation relies on trade statistics published in other countries. As a result Kite (2007) concludes that the MERM methodology is highly complex and requires a large amount of data. Consequently, this methodology is not widely adopted by most central banks.

### **3.0 Methodology**

This section describes the methodology used in the calculation of trade weights to be used in the new estimation of Jamaica's REER. In what follows, the option available for constructing a new set of trade weights is outlined. In particular, this involves the choices regarding the trade basis upon which the weights may be computed, the selection of trading partners, the weighting scheme and a suitable updating cycle.

#### ***3.1 Trade Basis***

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<sup>7</sup> The previous index was calculated using data on bilateral trade in manufactured goods over the period 1989 to 1991, and valued the Canadian dollar against six major currencies (U.S. dollar, the euro, the Japanese yen, the U.K. pound, the Swiss franc, and the Swedish krona).

It is a general practice by a number of central banks to use bilateral trade in *manufactured goods* as the basis for determining the trade weight of the relevant bilateral exchange rates included in the calculation of the REER. As a small developing economy, Jamaica competes internationally with a small number of goods. This was reflected in the disaggregation of the various exports which revealed that manufactured goods as defined by the Standard International Trade Classification (SITC) have accounted for a mere 6.7 per cent of the overall trade since 2004 (see **Figure 1, Appendix**). Consequently, this paper utilizes *merchandise* trade flows as defined by the United Nations Statistics Division.<sup>8</sup> Merchandise goods exports are classified into food, beverage and tobacco, crude materials, mineral fuel, animal and vegetable oil, chemicals, manufactured goods, miscellaneous manufactured goods, miscellaneous commodities and machinery and equipment. Approximately 43.5 per cent of overall merchandise goods exports are classified as crude materials, which includes metalliferous ores and metal scrap as well as crude animal and vegetable materials (see **Figure 1, Appendix**). The metalliferous ores and metal scrap category has been the main driver of the crude materials over the years.

Jamaica is widely known for its tourism industry; consequently, it would have been desirable to include trade in services in our calculations to present a more wholesome view of the economy's competitiveness in international trade. However, comparable data on trade in services proved difficult to acquire and though it has been used by the IMF and the Hong Kong Monetary Authority in the calculation of their trade weights (Schmitz, De Clercq, Fidora, Pinheiro, & Lauro, 2012), considerable data gaps in the bilateral services trade flows, motivated the decision to exclude trade in services from this analysis. However, an extension of the trade basis to include trade in services could become feasible in the future as the availability and quality of data becomes more accessible.

### ***3.2 Trading Partners***

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<sup>8</sup> The data sources for bilateral trade in merchandise goods are the International Trade Centre, the Bank of Jamaica and the United Nations.

This new methodology maintains the use of the value of merchandise trade flows between Jamaica and its top ten trading partners namely: *the United States of America (USA), Trinidad and Tobago, Venezuela, the Euro Area, China, Canada, the United Kingdom (UK), Japan, Brazil and Mexico*. The decision to maintain the set of countries stemmed from their importance as trading partners. Data on trade flows between 2004 and 2011 revealed that trade with these ten countries accounted for approximately 81.0 per cent of Jamaica's total merchandise trade (see **Figure 2, Appendix**). Additionally, the full range of desirable import and export data was readily available.

### 3.3 Weighting Scheme

In relation to the calculation of the weights, we have adopted the double-weighting scheme proposed by the BIS framework presented by Turner & Van't dack (1993) in our calculation of trade weights. This approach was deemed most suitable as it is recognized that Jamaica's merchandise goods not only face competition with foreign goods in foreign markets but also from domestic producers and exporters from third-markets. In this context, this method accounts for import competition, bilateral export competition as well as third-market competition.

Import competition is captured through the calculation of import weights, which is essentially each trading partner's share of Jamaica's total imports. This is represented as:

$$w_i^m = \frac{m_j^i}{m_j} \quad (2)$$

where  $m_j^i$  represents the imports to the domestic economy  $j$ , Jamaica, from economy  $i$  during the reference period and  $m_j$  represents Jamaica's total imports. Therefore the import weights,  $w_i^m$ , capture the relative importance of each trading partner in Jamaica's total import or the competition among country  $i$  and other exporters to Jamaica, (import competition). It is important to note that the import weight implies that the higher the share of trading partner  $i$  in Jamaica's total imports, the greater the weight of its exchange rate in the basket of currencies included in Jamaica's REER calculations.

Export weights, on the other hand, are double-weighted to account for domestic or bilateral export competition and third-market competition. As a result, the export weights capture the effect of competition faced by Jamaica's exporters in foreign markets from their domestic producers as well as from exporters from third-markets. This is expressed as:

$$w_i^x = \left( \frac{x_j^i}{x_j} \right) \left( \frac{y_i}{y_i + \sum_{h=1}^9 x_h^i} \right) + \sum_{k \neq i} \left( \frac{x_j^k}{x_j} \right) \left( \frac{x_i^k}{y_k + \sum_{h=1}^9 x_h^k} \right) \quad (3)$$

where  $x_j^i$  represents Jamaica's export to country  $i$ ,  $x_j$  represents Jamaica's total exports and  $x_j^k$  captures Jamaica's exports to foreign markets,  $k$ . Domestic produce in the economies of each trading partner is represented by  $y_i$ , while  $x_h^i$  reflects what the foreign country,  $h$ , exports to country  $i$  and  $x_h^k$  represents a foreign country's export to third-markets.  $x_i^k$  represents the

exports of economy  $i$  to foreign market  $k$ , and the domestic supply in economy  $k$ , represented as  $y_k$ .

The domestic supply of merchandise goods in each trading partner's domestic market,  $y_i$ , is included in the calculation of the export weights in order to capture the effect of competition faced by Jamaica from domestic producers in each foreign economy. As a proxy for the output of country  $i$  we used the total gross value added and for uniformity, data was denominated in current US prices.<sup>9</sup> Since we are interested in output produced and sold in the domestic market, for each country, goods imports were added to the total value added from which goods exports were then subtracted.<sup>10</sup> This method was also adopted by Schmitz, De Clercq, Fidora, Pinheiro, & Lauro (2012). Bilateral or domestic export competition was captured by the first term in the export weight reflected in **Equation 3** and is illustrated in **Equation 4** below.

$$\left(\frac{x_j^i}{x_j}\right) \left(\frac{y_i}{y_i + \sum_{h=1}^9 x_h^i}\right) \quad (4)$$

where  $\left(\frac{x_j^i}{x_j}\right)$  captures the share of Jamaica's export to each country while  $\left(\frac{y_i}{y_i + \sum_{h=1}^9 x_h^i}\right)$  measures country  $i$ 's degree of openness. A large value for  $\left(\frac{x_j^i}{x_j}\right)$  indicates that Jamaica exports a large share of goods to country  $i$  relative to the other trading partners. In addition a large value for  $\left(\frac{y_i}{y_i + \sum_{h=1}^9 x_h^i}\right)$  implies that the economy's share of domestically produced and sold goods of total domestic supply, is large; indicative of an economy that is less open to foreign markets. Export weights also reflect the competition faced by Jamaica's exporters in each foreign country included in the set of trading partners. This is represented by the second term of Equation 3 and re-stated in Equation 5 below.

$$\sum_{k \neq i} \left(\frac{x_j^k}{x_j}\right) \left(\frac{x_i^k}{y_k + \sum_{h=1}^9 x_h^k}\right) \quad (5)$$

This captures the competition faced by Jamaican exporters in all  $h$  foreign markets (excluding country  $i$ 's domestic market) from country  $i$ 's exports. Consequently, the weight of  $i$ 's currency

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<sup>9</sup> The gross value added included in the analysis reflects total value added net services such as construction, wholesale and retail, storage, communication and transport.

<sup>10</sup> The value of imports was added to gross value added because of the assumption that imports are used as a proxy for inputs in production.

in Jamaica's REER is greater if  $i$  is an important exporter to a foreign market which is a key destination for Jamaica's exports.

The overall weight incorporates information on both exports and imports between Jamaica and each of its trading partners. Specifically, the overall weight for each trading partner is defined as the weighted average of the export and import weights (see **Equation 6**).

$$w_i = \left( \frac{m_j}{x_j + m_j} \right) w_i^m + \left( \frac{x_j}{x_j + m_j} \right) w_i^x \quad (6)$$

For the purpose of this study the value of exported and imported merchandise goods, measured in thousands of US dollars, were used as a proxy for bilateral trade. This trade data were collected on an annual basis for the period 2008 to 2010. It was also assumed that international trade is only conducted between Jamaica and its top ten trading partners (see Schmitz, De Clercq, Fidora, Pinheiro, & Lauro, 2012). As a result, the calculations exclude exports and imports from the rest of the world. Finally, the assumption was made that there was only one type of good traded, which is differentiated by the country of origin and exhibits a constant elasticity of substitution.<sup>11</sup> These assumptions were imposed due to data constraints.

## 4.0 Results

This section presents a comparison of the previous and current trade weights with an emphasis on the significant changes observed. The impact of such changes on the Bank's REER estimates and by extension Jamaica's external competitiveness are also discussed.

### 4.1 Trading Weights

Trade weights were computed for each trading partner using annual data from 2008 to 2010 (see **Table 2, Appendix**). These annual weights which represent a combination of the export weights with the simple import shares were not significantly different. However, in choosing a cycle, consideration was given to the fact that annual updating entails frequent data revisions, which

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<sup>11</sup> Similar assumptions were adopted by Schmitz, De Clercq, Fidora, Pinheiro, & Lauro (2012) based on the theoretical foundation outlined by Armington (1969). These assumptions limit the scope of analysis as the product mixes of competing countries differ, especially when comparing advanced and emerging economies as is the case in this study.

could complicate the analysis of external competitiveness. Given the possible complications that an annual updating cycle would attract, as well as the relative similarities between the annual estimates for each trading partner, it was decided to implement an updating cycle of a three year period. Subsequently, an average weight for the period 2008 to 2010 was computed.

**Table 1** below outlines the previous weights using bilateral trade data over the period 2003 to 2005 compared to the trade weights computed using data for the period 2008 to 2010 and the new methodology (see also **Figure 3, Appendix**). Between 2008 and 2010, the two countries with the largest trade weight, namely, the United States of America (USA) and Trinidad and Tobago, together accounted for approximately 60.0 per cent of the total weight compared to the previous weight of 58.0 per cent. This suggests an increase in trade flows from those countries with Jamaica during the period. With the exception of Brazil, Mexico, Trinidad and Tobago and the USA, the ranks assigned to trading partners using the current weight have changed.

**Table 1: A Comparison of Previous and Current Trade Weights**

<b>Trading Partners</b>	<b>Current Weights (2008-2010)</b>	<b>Previous Weights (2003-2005)</b>
	<b>Weight (Rank)</b>	
<b>USA</b>	<b>0.467 (1)</b>	<b>0.457 (1)</b>
<b>Trinidad and Tobago</b>	<b>0.134 (2)</b>	<b>0.119 (2)</b>
<b>Venezuela</b>	<b>0.101 (3)</b>	<b>0.026 (8)</b>
Euro-Area	0.078 (4)	0.095 (3)
China	0.046 (5)	0.053 (6)
Canada	0.040 (6)	0.079 (4)
United Kingdom	0.034 (7)	0.061 (5)
Japan	0.033 (8)	0.047 (7)
Brazil	0.030 (9)	0.030 (9)
Mexico	0.022 (10)	0.026 (10)

The most significant change was identified with the rank and trade weight allotted to Venezuela. Previously, Venezuela was ranked as the eighth largest trading partner; with a trade weight of approximately 0.03 indicating that only 3.0 per cent of Jamaica's trading activities was conducted with that country. Notwithstanding, the signing of the PetroCaribe agreement between the Jamaican and Venezuelan governments in mid-2005 has facilitated the purchase of crude oil based on preferential payment conditions by Jamaica from Venezuela.<sup>12</sup> This has therefore resulted in an increase in trade between the two countries, particularly due to the fact that Jamaica's fuel imports comprise on average 33.3 per cent of its total import bill. Against this background, Venezuela's trade weight has increased from 0.03 to 0.10 making it Jamaica's third largest trading partner. With that country now allotted a trade weight of 0.1 implies that approximately 10.0 per cent of Jamaica's trading activities are conducted with that country. Another country that has showed improvement in rank is China, which is now viewed as Jamaica's fifth largest trading partner up from sixth place. These upward movements have simultaneously resulted in a lower rank to the Euro Area and the UK to fourth and seventh, respectively, from third and fifth using the previous weights.

It is important to identify the underlying causes for the changes in trade weights. Consequently, we decomposed the overall weight into three components; import weights, domestic exports and third-market exports (see **Figure 1**). From this analysis, we were able to identify Jamaica's most competitive trading partner and subsequently provide reasons for the weights observed. With respect to import competition **Figure 1** shows that among the set of trading partners, the USA supplies approximately 45.0 per cent of the total imports and is therefore the most competitive among the group of trading partners. The USA was followed by Trinidad and Tobago and Venezuela. These three source markets were also allotted the highest trade weights suggesting that the competitiveness of each country as a source market contributes a substantial amount to

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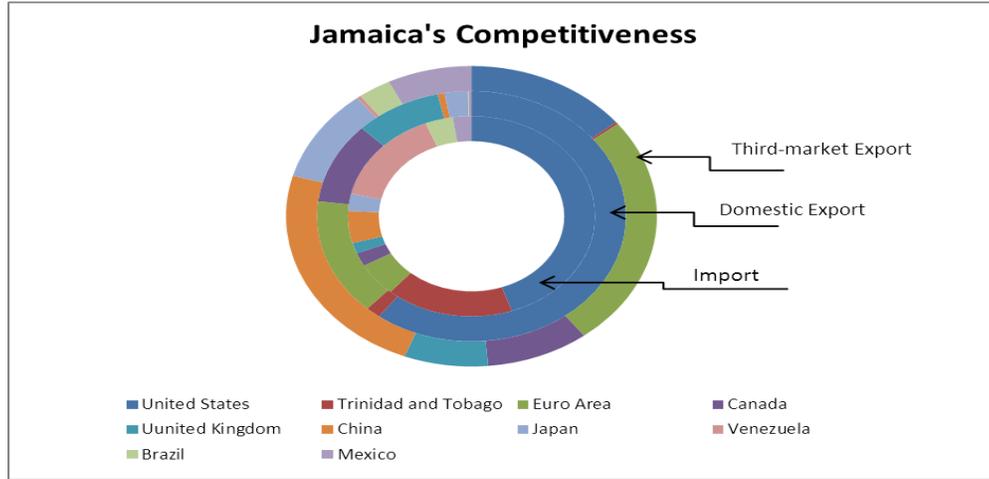
<sup>12</sup> The PetroCaribe agreement was drafted in 2005 and is a concessionary loan that allows for the importation of 23 500 barrels of oil per day from Venezuela. Under the amended agreement, Venezuela offers long-term financing for a determined percentage of the cost of the barrels of fuel imported. This percentage is dependent on the current price of oil. For example, when the price of oil exceeds US\$150.0 per barrel, PetroCaribe members pay 30.0 per cent of the cost of fuel imported upfront, given their respective quotas. The remaining 70.0 per cent of the fuel is financed on a loan basis where members receive a 25-year repayment period at an interest rate of 1.0 per cent, including the two-year grace period, as long as the price remains above US\$40.0. However, when the price goes below US\$40.0 the repayment period falls to 17 years, with the interest rate climbing to 2.0 per cent, including the two-year moratorium.

the overall weight. This is not surprising as the value of imports outweighs the value of exports in Jamaica, specifically the value of imports contributed to approximately 80.0 per cent of the value of total trade for the review period.

An analysis of the double export weights reveals that Jamaica receives most of its competition from exporters in the USA, both in the USA market as well as in all of the other markets. Decomposing the export weight into domestic exports and third-market exports reveals that relative to the other trading partners, Jamaica receives most of its competition in the USA. This result was in line with expectations given that approximately 56.0 per cent of Jamaica's exports are sent to that country. On the other hand, Jamaica exports the least amount of merchandise goods to Venezuela and Trinidad and Tobago relative to the other major trading partners which supports the little domestic export competition encountered in these economies.

The outermost circle in **Figure 1** illustrates third-market export competition and reveals that the Euro Area is the largest exporter to third-markets which are key destinations for Jamaica's exports. This indicates that of the ten trading partners, Jamaica receives most of its competition from the Euro Area when it exports goods to other trading partners. China is the second largest exporter to third-markets which are key destinations for Jamaica's exports and consequently provides the second largest level of third-market export competition. Unlike the competition provided by the Euro Area and China, Jamaica's merchandise goods do not encounter significant export competition from Trinidad and Tobago or Venezuela as they provide Jamaica with the least amount of competition in third-markets. Even though the majority of third market competition emanates from the Euro Area and China, it should also be highlighted that Jamaica's exports receive third market competition from countries within the region that were not considered in this study. This is against the background of similar agricultural products such as sugar, coffee, citrus and yam being exported to the USA from countries such as Costa Rica, Dominican Republic and Belize.

**Figure 1**



These results indicate that as a measure of external competitiveness, the new set of trade weights better capture the level of competition Jamaica's exports encounter in the international market as it identifies the location and source of competition, making policy geared towards improving external competitiveness easier to create and implement. **Table 2, Appendix** displays in detail the trading partners that are most competitive, and outlines their most dominating form of competition; import competition, domestic competition or third-market competition.

#### **4.2 Impact of New Trade Weights on Jamaica's REER**

The REER for Jamaica measures the competitiveness of Jamaican goods in terms of prices and costs relative to its top ten trading partners. This indicator is expressed in a common currency and is constructed by deflating the nominal effective exchange rate (NEER) index using appropriate price or cost indices<sup>13</sup>. The general expression for the REER is therefore:

$$REER = \prod_{i=1}^N \left( \frac{d_{ja} e_{i,ja}}{d_i} \right)^{w_i} \quad (7)$$

where  $d_i$  and  $d_{ja}$  are the deflators for trading partner  $i$  and Jamaica, respectively.  $N$  represents the number of competitor countries in the reference set against which the external value of the Jamaican Dollar is measured. For the purpose of the study  $N$  is equal to ten.  $e_{i,ja}$  is the index for

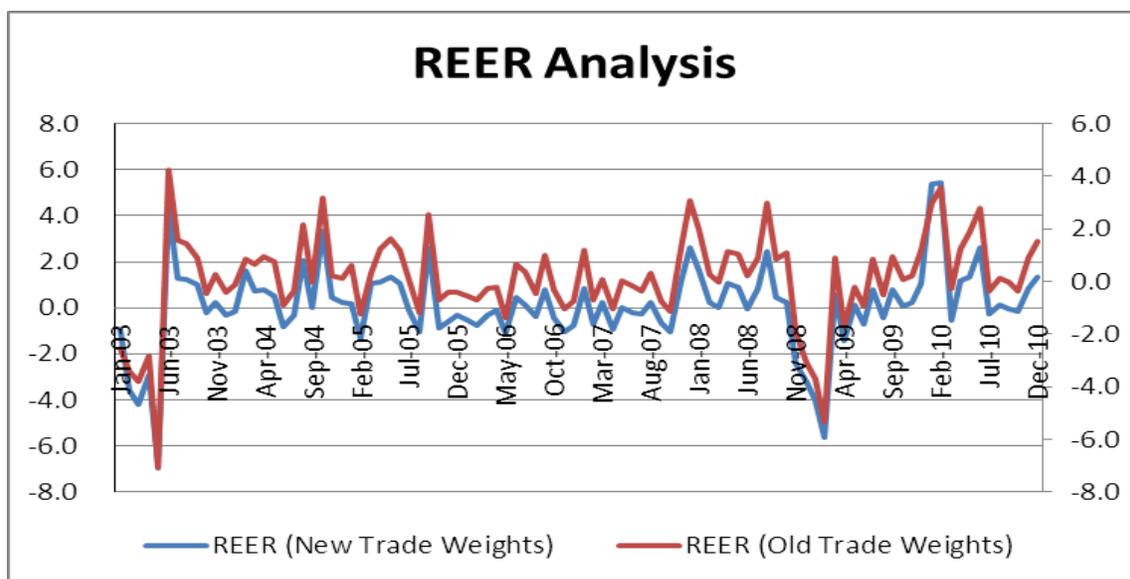
<sup>13</sup> In Jamaica, the NEER is constructed by applying the overall trade weights to the bilateral exchange rates of the Jamaican dollar against the currencies of the each trading partner.

the exchange rate of the currency of partner country  $i$  vis-à-vis the Jamaican Dollar and  $w_i$  is the overall trade weight assigned to the currency of trading partner  $i$ .<sup>14</sup>

The Bank of Jamaica (BOJ) uses the consumer price index (CPI) as the deflator in its calculation of the REER.<sup>15</sup> These estimates are available on a monthly basis with January 2006 as the base period.

In light of the changes identified in the trade weights, further analysis was conducted to identify how the percentage change in the REER, which is used to analyze external competitiveness, would change if the new trade weights were used in its calculation. **Figure 2** outlines the results from this investigation and reveals that for the period 2003 to 2010, the REER estimates calculated using the new set of weights are on average consistently lower than the previous REER estimates. This result suggests that when import competition, domestic exports competition and third-market exports competition are taken into consideration, Jamaica's external competitiveness improves relative to the measure based on the sole use of bilateral trade data as utilized in the previous trade weights.

**Figure 2**



<sup>14</sup> Section 3 outlines extensively the methodology for calculating of the overall trade weight.

<sup>15</sup> Several deflators such as consumer prices, producer (or wholesale) prices, and unit labour costs in manufacturing may be used in the calculation of the REER. For a detailed discussion on the pros and cons relating to the choice of deflators see Turner & Van't dack (1993).

Note: An increase in the estimates indicates deterioration in Jamaica's external competitiveness while a fall indicates improvement in external competitiveness.

By decomposing the REER into relative prices and relative exchange rates, both components were assessed in an attempt to identify the underlying reasons for the variations observed. **Figure 5a, Appendix** displays the findings of this analysis and demonstrates that the NEER estimate using the new set of trade weights is consistently lower than its previous estimates. On the other hand, **Figure 5b** reveals that the index for relative prices using the new set of trade weights has deviated only slightly from its previous estimate. **Figure 5a** demonstrates that most of the variation in the REER estimates, over the sample period, has been attributed to movements in the NEER. This suggests that with the new trade weights, the Jamaican Dollar has undergone a larger rate of depreciation than previously calculated relative to the currencies of its top ten trading partners. Notably, given the lower rank of the UK and the Euro Area under the new trading weights, this suggests an additional gain in Jamaica's external competitiveness as the weight of the depreciation previously experienced in those currencies would now be smaller. Additionally, China's increase in rank (from sixth to fifth) also contributed to gains via the NEER given that the Chinese Yuan has appreciated over the period, thus making their goods less competitive, especially in Jamaica's key export markets.

The deviations in relative prices though small, also partly explain the divergence in the REER estimates given that Jamaica has had a lower level of inflation relative to some of its *main* trading partners. Specifically, Venezuela's annual inflation rate over the period 2003 to 2010 averaged 23.1 per cent while Jamaica's annual inflation averaged 12.6 per cent. To investigate this assumption we assessed the time plot of Jamaica's inflation rate relative to the inflation rate in Venezuela and found a close co-movement between the overall index for relative prices (Jamaica's inflation relative to the inflation rate in the economies of its top ten trading partners) and the index capturing the relative prices in Jamaica and Venezuela (see **Figure 5b**). In light of this, it may be argued that high prices in Venezuela have contributed to the fall in relative prices and hence more gains in Jamaica's external competitiveness. **Figure 6** in the Appendix reveals that over the medium term, REER forecasts using the new sets of weights indicate that the economy is expected to be more competitive than initially projected.

## 5.0 Conclusion

This paper proposes a change to the BOJ's methodology for calculating trade weights. The analysis seeks to improve the quality of trade weights in order to provide a more comprehensive measure of Jamaica's external competitiveness, as measured by the REER. The sample consisted of annual bilateral trade data for Jamaica and its top ten trading partners from 2008 to 2010. The double-weight scheme utilized in this study was adopted from the framework put forward by Buldorini, Makrydakís, & Thimann (February, 2002) in their calculations of trade weights in the Euro Area; and sought to incorporate import, domestic export and third-market export competition.

The results indicate that of the ten trading partners, the USA remains Jamaica's largest trading partner while Mexico remains Jamaica's smallest trading partner. Notwithstanding, significant changes were observed between the current and previous trade weights allotted to the other trading partners. Specifically, a substantial increase in Venezuela's trade weight fostered an improvement in its rank; from the eighth largest trading partner to Jamaica's third largest trading partner. This result was driven by Venezuela's importance as a source market given the significant increase in the value of imports from that country since the signing of the PetroCaribe agreement in 2005.

The investigations also revealed that of the top ten trading partners, Jamaica received most of its domestic export competition in the USA while third-market competition largely emanated from the Euro Area and China. Therefore the relative exchange rate between the Jamaican Dollar and currencies of these three economies are vital; as the relative depreciation of the Jamaican Dollar against the Yuan, Euro and US dollar will likely have more impact on Jamaica's external competitiveness.

A comparison of the REER estimates using the current and previous set of trade weights revealed that with the new set of trade weights Jamaica has been more competitive than previously estimated. The results show that, since FY2002/03, the country has lost approximately 1 percentage point less competitiveness than the 15.8 per cent (point to point) lost under the old methodology. This improvement mainly emanated from movements in the NEER index, and to a lesser extent, lower relative prices. Lower NEER values indicate that with the

new trade weights, the Jamaican Dollar has undergone a larger rate of depreciation relative to the currencies of its top ten trading partners. In particular, a lower rank of the UK and the Euro Area under the new trading weights, suggests an additional gain in Jamaica's external competitiveness as the weight of the depreciation previously experienced in those currencies would now be smaller. This decline in relative prices was driven by both Venezuela's increased importance as a trading partner and its significantly high levels of inflation over the sampled period. For the medium term, the projections suggest an improvement of approximately 13.0 percent in the REER compared to an improvement of approximately 7.0 per cent using the old methodology. This suggests that a lower rate of depreciation may be accommodated to achieve the same objective as currently programmed. These findings point to increased monitoring and analysis of the economic developments in Venezuela which may have significant implications for Jamaica's external competitiveness going forward.<sup>16</sup>

Overall, this paper has provided important insights into the methodological details underlying the computation of trade weights in Jamaica, which could prove helpful in enhancing the estimation of the REER as a measure of external competitiveness. The most popular measure of the REER involves the NEER deflated by relative prices. However, the Bank has calculated other REER measures including the REER deflated by unit labour costs of the total economy, the manufacturing sector, and services sector as well as the tradables to non-tradables measure and the profitability of the manufacturing sector. It would therefore be useful to determine the impact of the new trading weights on these external competitiveness measures. Furthermore, Jamaica is widely known as a key tourist destination and as a result, trade weights incorporating trade in services, could provide some deeper insight on the state of Jamaica's competitive position in the global economy.

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<sup>16</sup> An important observation is the sharp fall in the trade weight for Trinidad and Tobago for 2010. Recent BOP data for 2011 and 2012 suggest a further fall in the value of trade with this country.

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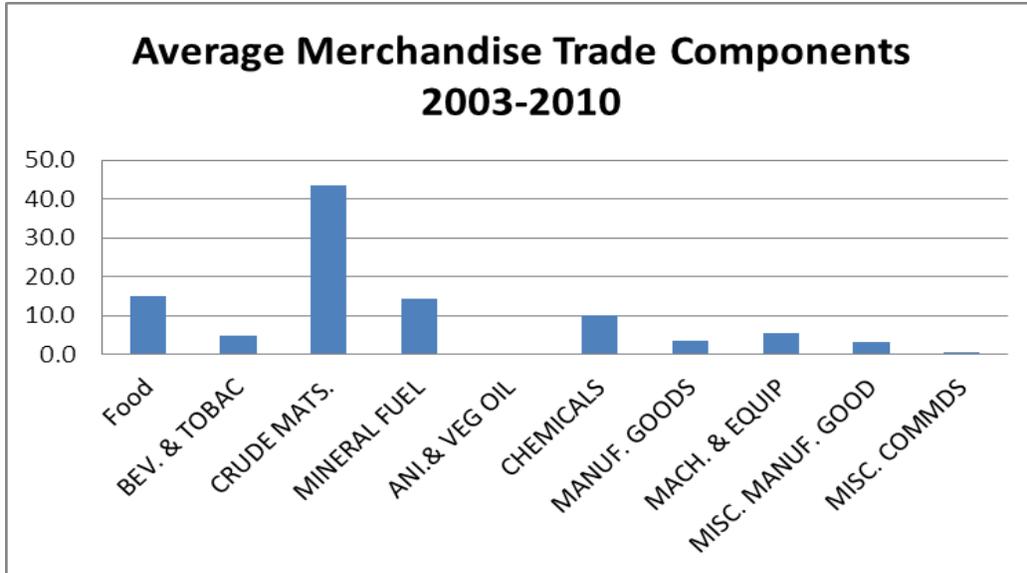
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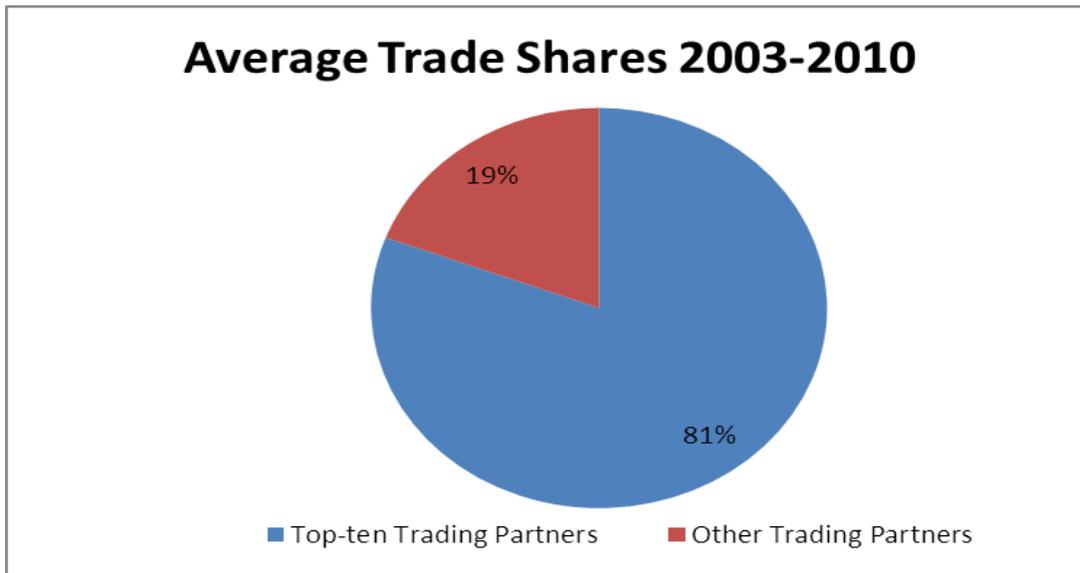
## Appendix

Figure 1



Note: BEV & TOBAC represents beverage and tobacco; MATS, material; ANI, animal; MANUF, manufactured, MACH, machine; EQUIP, equipment and MISC, miscellaneous

Figure 2



**Table 1: Annual Trade Weights**

<b>Trading Partners</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
United States	0.459	0.470	0.472
Trinidad and Tobago	0.141	0.157	0.105
Venezuela	0.080	0.102	0.120
Euro-Area	0.093	0.063	0.077
China	0.040	0.045	0.054
Canada	0.041	0.036	0.045
United Kingdom	0.038	0.033	0.029
Japan	0.037	0.031	0.030
Brazil	0.041	0.024	0.025
Mexico	0.017	0.025	0.025

**Table 2: Types of Competition Identified**

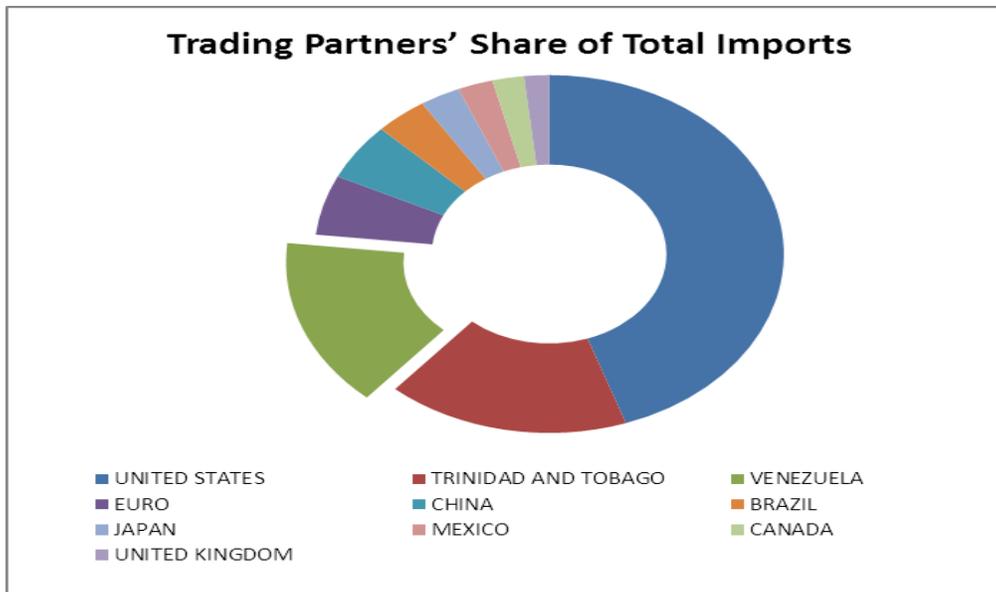
<b>Overall Rank</b>	<b>Trading Partner</b>	<b>Type of Competition</b>	<b>Possible Reasons for Rank</b>
1	United States	Import Dom. Export	Jamaica's largest source market. Jamaica receives the largest level of competition in its domestic market
2	Trinidad and Tobago	Import	The second largest source market
3	Venezuela	Import	Jamaica's third most important source market
4	Euro Area	Dom. Export 3 <sup>rd</sup> -market	Provides the most competition in Jamaica key export markets Jamaica receives the second largest level of competition in its domestic market
5	China	3 <sup>rd</sup> -market	Provides the second largest level of competition in Jamaica's key export markets

Note: Dom. Export represents Domestic Export and 3<sup>rd</sup>-market represents third-market .

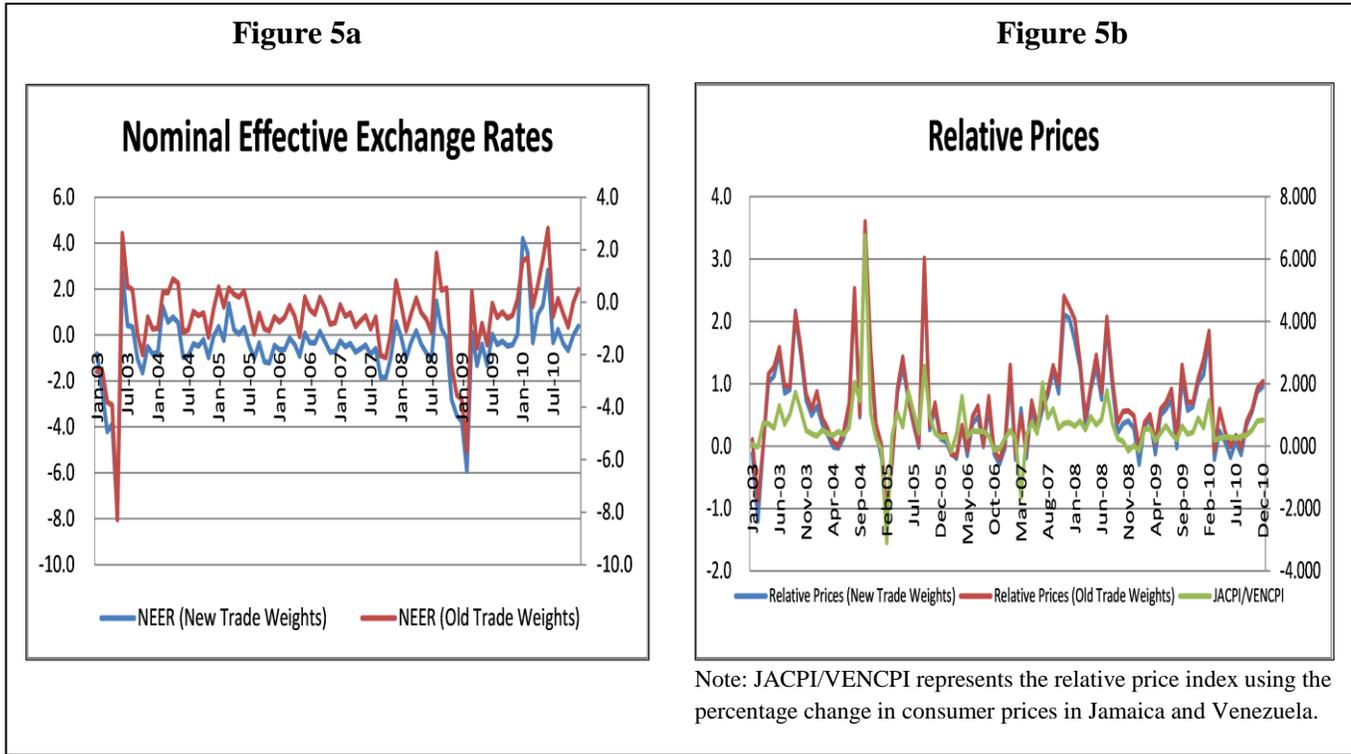
Figure 3



Figure 4



**Figure 5**



**Figure 6**

