Economic Openness and Growth in China and India: A Comparative Study

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Abstract: This paper examines the Melo-Vogt hypotheses and compares the effects of economic openness in China and India. The two defining characteristics of this paper are the addition of a cross term containing the economic globalization index to the traditional import demand function model, and testing for cointegration between variables using Hansen's (1992) method that considers structural change. The results indicate that increasing economic openness has had a greater impact on the economy in China than in India.

Keywords: Economic openness, KOF index, Melo-Vogt hypotheses, Hansen test, FMOLS, DOLS.

I. INTRODUCTION

The term "BRICs"—denoting Brazil, Russia, India, and China—was first used in a report titled "Building Better Global Economic BRICs," published by Goldman Sachs in 2001. It subsequently gained currency as a keyword in the lexicon of global economic discussions from its use in "Dreaming with BRICs: The Path to 2050," an investor-oriented report issued by the same company in October 2003[1].

Among the BRIC countries, China and India—large countries with populations continuing to grow at high rates—have drawn the attention of experts and policy makers. Together, their populations exceeded 2.5 billion in 2010, constituting almost 40 percent of the global population. According to some forecasts, between 2010 and 2020, China will maintain an economic growth rate of 8–10 percent, while India will post figures of 7–8 percent. Further, China will become the world's largest economy between 2030 and 2050 and India will rise to the number three spot, behind the US economy. Apart from similarities in size and economic growth rates, China and India also have in common the fact that economic openness has led to economic growth. Deng Xiaoping's 1992 tour of southern China was the catalyst for market-based economic development, accelerated reforms, and opening up of the economy that sparked China's rapid economic growth. Meanwhile, in India, the Persian Gulf crisis led to economic reforms and liberalization under the Rao administration (1991–96). Therefore, China and India have shared similar courses toward growth; however, there are significant differences between them in terms of degrees of economic openness and the resultant impacts. The main purpose of this paper is to shed light on these differences.

Several empirical studies have confirmed the hypothesis that increasing openness of an economy has a positive impact on economic growth. For example, Melo and Vogt (1984) estimated Venezuela's real income and relative price elasticities of demand for imports using disaggregated annual data for the period 1962–79[2]. They found that during 1974–79, the increase in the market value of Venezuela's oil reserves led to an increase in all categories of imports. Further, they argued that the greater price elasticities suggest that the Venezuelan economy has made progress in developing industries that produce substitutes for imports. Their conclusions were summarized by Boylan and Cuddy (1987) and termed the Melo-Vogt hypotheses: If the degree of import liberalization increases, the income elasticity of import demand will increase; if economic development continues, the price elasticity of demand will increase owing to import substitution.

Mah (1999) tested the Melo-Vogt hypotheses by applying these to Thailand for the period 1963–92. He used the equilibrium and disequilibrium forms of the conventional traditional import demand function and found that the results using first-differenced variables

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[1]With the inaugural participation of South Africa in a summit of the four BRIC countries held on April 13, 2011 in Beijing, the formal rendering of "BRICs" was changed to "BRICS".

[2]Other examples include Doller (1992), Sachs and Warner (1995), and Edwards (1998).

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show that Thailand's income elasticities increased after trade liberalization, thereby supporting the first hypothesis. However, the price elasticities showed no increase with economic development; thus, the second hypothesis was not supported.

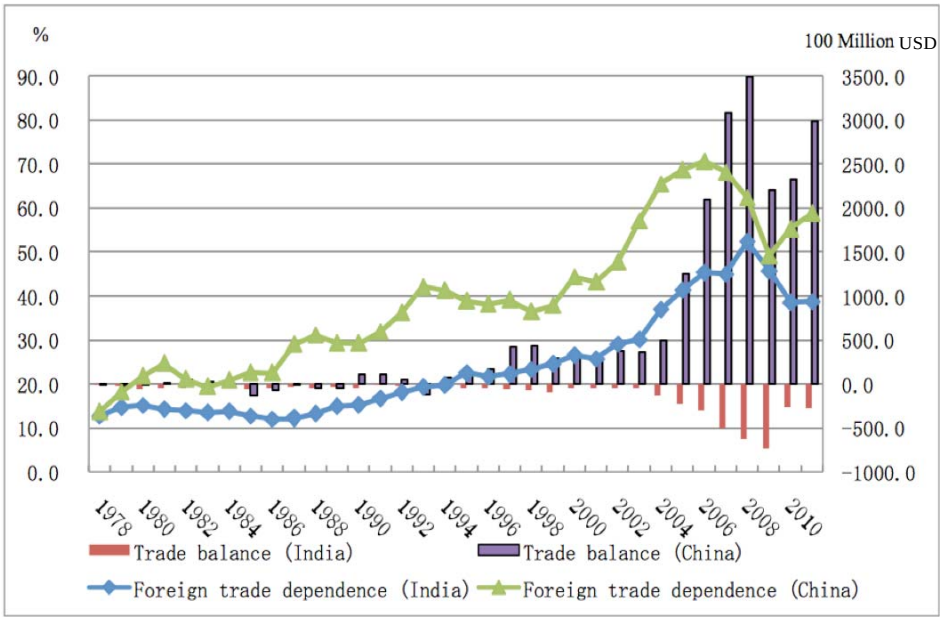
This paper tests the Melo-Vogt hypotheses and compares the effects of economic openness in China and India. The rest of this paper is organized in the following manner. Section II compares China and India in terms of foreign trade dependency, foreign direct investment (FDI), tariffs, and other basic data to review the performance of the two countries after their economies opened up. Section III provides a synoptic description of the KOF index on openness. Section IV describes the data and empirical framework. Section V discusses the results of the estimation procedures. Section VI concludes with a few brief remarks.

II. OPENNESS OF CHINA AND INDIA: A BASIC OVERVIEW

This section compares the economic openness and performance in China and India using a graphical approach. An advantage of this comparison is that it will provide insight into how opening up an economy can lead to higher growth since the two countries have many similarities although their degree of openness is quite different.

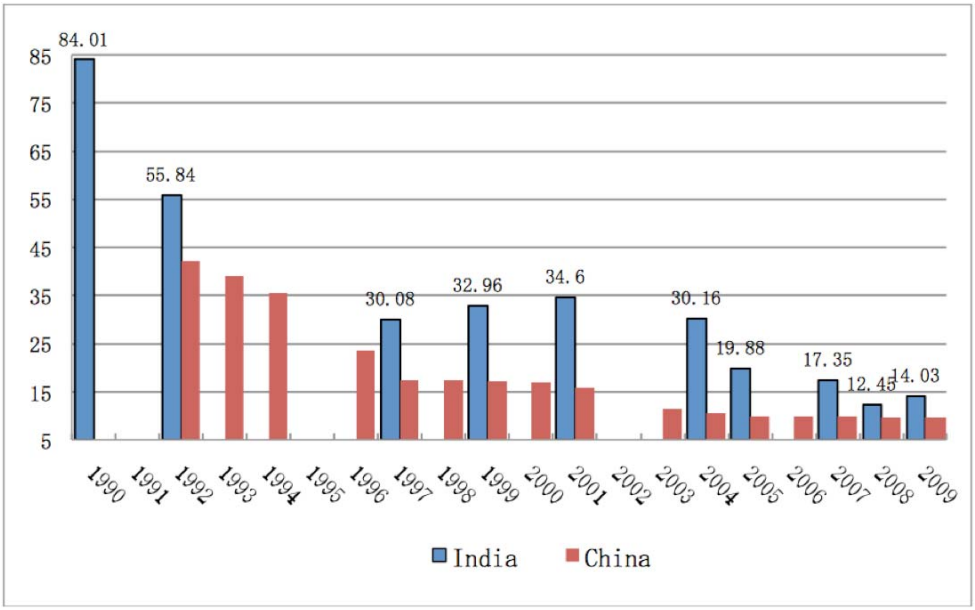
An overview of trade in the two countries reveals that in China, foreign trade reform was officially implemented in 1978 as an integral part of the overall economic reform program. Since then, China's trade has increasingly developed in an export-oriented direction. Consequently, as shown in Figure **1**, the degree of dependence on foreign trade (trade volume/GDP) has been growing rapidly. In the first year of the economic reforms, the ratio of dependence on foreign trade was only 13.7 percent, while in 2006 this figure peaked at 70.8 percent. On the other hand, India implemented a partial economic liberalization in the 1980s and joined the World Trade Organization (WTO) in 1995, six years before China. However, its trade liberalization did not really begin until around 2000. The biggest difference between China and India is in their trade imbalances. The greatest problem of India's foreign trade is the massive and constant trade deficit, which has become a significant research subject. In contrast, the rapid development of China's foreign trade and huge trade surplus has caused friction in international trade.

Tariffs are one of the most influential factors impacting the trade balances. Until the early 1990s, India was a relatively closed economy. As reflected in Figure **2**, the average statutory tariff in India was 84.01 percent in 1990. The following year, India embarked on a series of major trade reforms, progressively cutting tariff and non-tariff barriers, thereby phasing out quantitative restrictions. Despite these changes, India's tariffs have been higher than that of China. By the end of 2009, China and India had competitively lowered



Source: Data compiled from World Development Indicators (World Bank).

Figure 1: Foreign trade dependence and trade balance.



Source: World Development Indicators (World Bank).

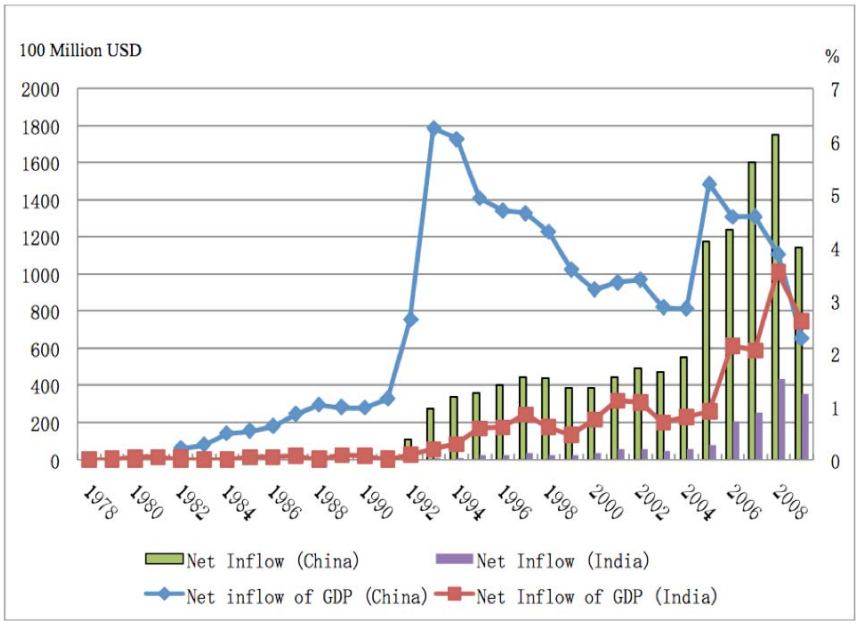
Figure 2: Average tariff level, all products (percentage).

their average tariffs to 9.68 percent and 14.03 percent. Table **A-1** provides detailed information based on the 2011 World Tariff Profiles.

The vigorous development of China's international trade is characterized by the promotion of FDI. Figure **3** shows that the gap between the two countries began to grow in the first half of the 1980s and increased substantially in the 1990s. Although in recent years, the FDI net inflow/GDP ratio in India has caught up with that of China, the actual net inflow of FDI was less than one-third that of China's in 2009. It was suggested that India would be able to move on to a higher growth path only if it could attract sufficient foreign capital (Alamgir 1999).

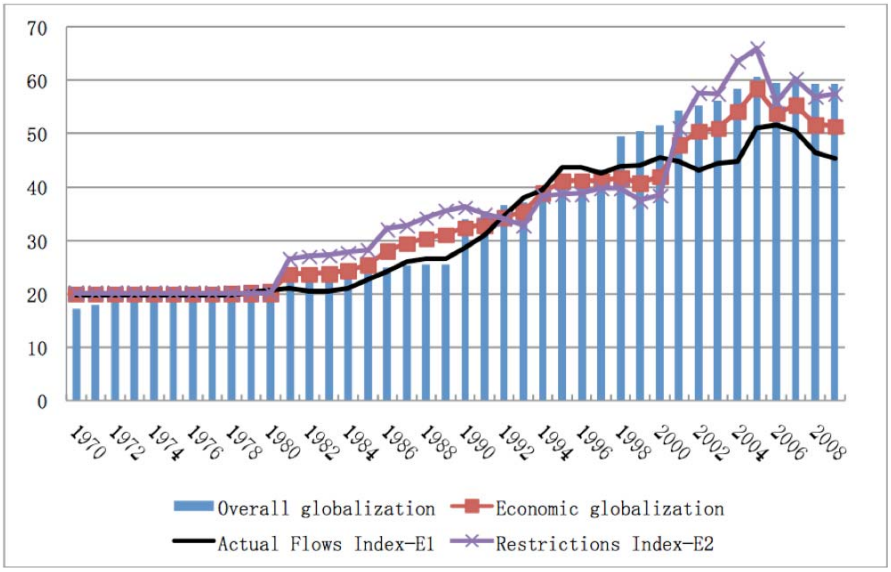
III. THE KOF INDEX

Although the term openness is widely used in international economics, there is no consensus on how to measure it. Existing empirical studies apply various



Source: Same as for Figure **2**.

Figure 3: Foreign Direct Investment in China and India.



Source: Author's calculation using data from the KOF Index of Globalization, 2012.

Figure 4: China's trends of globalization as per KOF indexes (1970–2009).

measures for this purpose. These include the Economic Freedom Index[3], Capital Access Index (CAI)[4], the World Bank's Outward Orientation Index—which classifies countries into four categories according to their perceived degree of openness (World Bank, 1987)—and other indices (see Balassa 1982; Michaely *et al*. 1991; Johnson and Sheehy 1996).

Significant efforts have been made to construct a satisfactory comparative openness index, and it is generally agreed that a majority of such measures continue to be subject to various limitations (Edwards, 1998). In this paper, openness is measured using the sub-index of the KOF index of globalization.

The KOF index quantifies the globalization degree by country for 23 items[5] in three main dimensions, economic, social, and political; it was prepared by Dreher at the KOF Swiss Economic Institute based on the three dimensions of globalization defined by Keohane and Nye (Dreher 2006:1092)[6]. Sub-indices are constructed in such a manner that the items associated with each dimension are converted on the basis of a scale from 0 to 10, according to the method used by Gwartney and Lawson (2002). Next, the economic, social, and political globalization indices are combined into a single index of overall globalization, thereby providing the respective weight for each dimension. The KOF index takes values between 0 and 100, with higher values representing greater globalization. The economic sub-index is measured using actual economic flows (E1) such as foreign trade and FDI with additional economic restrictions (E2) placed on metrics such as imports and capital balance. Figures **4** and **5** demonstrate features of China and India's globalization measured using the KOF index[7].

IV. DATA, MODEL, AND ESTIMATION PROCEDURES

Most of the data used in this paper were taken from the World Bank's World Development Indicators, 2011. For openness, data from the KOF Index of Globalization sub-index for economic globalization were used. The data period for India is 1970–2009, while for China it is 1978–2009[8].

[3]The Economic Freedom Index encompasses over 100 countries and is announced in an annual report by the *Wall Street Journal* and Heritage Foundation.

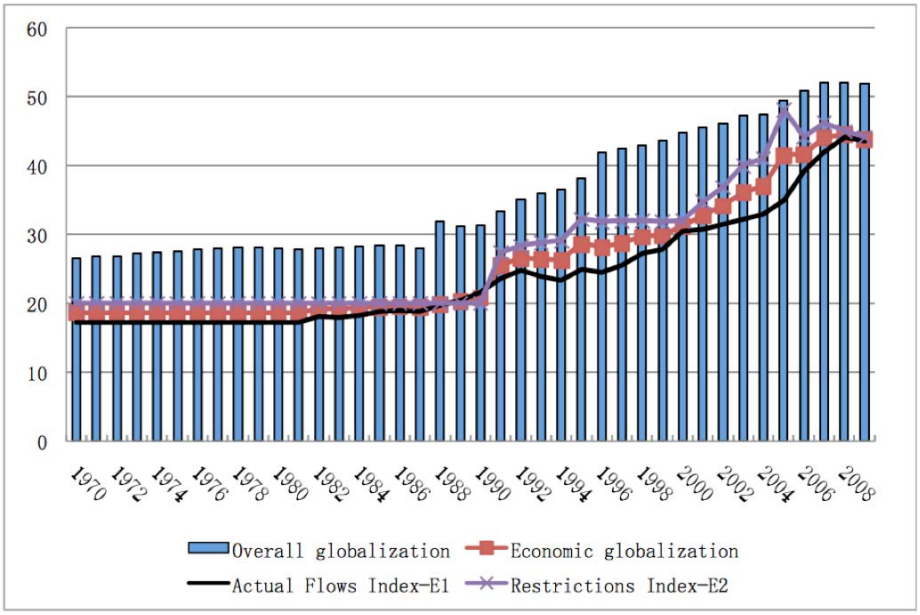
[4]The CAI index communicates the capital market openness of individual countries and is prepared annually by the Milken Institute, a US think tank that performs research on capital markets and world economic trends. The CAI is calculated on the basis of seven components, examples of which include commodity prices, interest rates, tax rates, and other macroeconomic components; components reflecting financial laws and systems; measures of soundness, efficiency, and other characteristics of financial institutions; measures of the development of equity and bond markets; components reflecting the conditions of venture capital, credit cards, and other capital markets; and components reflecting the ability of foreigners to utilize capital markets.

[5]The variables are shown in Table **A-2**.

[6]This paper uses the 2012 version of this index, as documented in Dreher *et al*. (2008), which is available at http://globalization.kof.ethz.ch/.

[7]In contrast, China and India differ in the levels of economic globalization—China began to achieve progress 10 years before India and has been ahead ever since.

[8]Since China's import data for 1970–77 was unavailable, the data set begins with 1978.



Source: Same as for Figure **4**.

Figure 5: India's trends of globalization as per KOF indexes (1970-2009).

Table 1: Variable Definitions and Source

Variable		Definition	Source
lnIM	Log (Imports)	Imports of goods and services (constant 2000 US$)	World Bank's World Development Indicators, 2011
lnY	Log (GDP)	GDP at purchaser's prices. Data are in constant 2000 US$.	World Bank's World Development Indicators, 2011
lnRP	Log (Relative Price)	The import price index deflated by a GDP deflator	World Bank's World Development Indicators, 2011
EF	Economic Globalization Index	The sub-index of KOF Index (KOF Index of Globalization, 2012)	http://globalization.kof.ethz.ch/
EFA	Actual Flows	The sub-index of the EF Index See Table **A-2** for details	http://globalization.kof.ethz.ch/
EFB	Restrictions	The sub-index of the EF Index See Table **A-2** for details	http://globalization.kof.ethz.ch/

The basic model specification is from the imperfect substitution theory framework[9]. Based on both Keynesian and neoclassical economics, the total imports demanded by a country are related to its real expenditure or income (or another scale variable capturing domestic demand conditions) and relative price (i.e., the ratio of import to domestic prices). The standard mathematical form of import demand can be shown as

$$IM_t = Y_t^{\beta_1} RP_t^{\beta_2} e^{\beta_0 + u_t}, \quad (1)$$

where u_t is the error term, IM_t is the size of import demand at time t, Y_t is real domestic output (GDP), and RP_t is the relative price (the import price index deflated by a GDP deflator) at time t. Generally, the expected signs for coefficients are $\beta_1 > 0$ and $\beta_2 < 0$,

[9]For details, see Carone (1996:3).

representing income and price elasticities, respectively, of import demand. Detailed information on the data is provided in Table **1**.

The following is the log-linear specification for equation (1):

$$\ln IM_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln RP_t + u_t. \quad (2)$$

To test the Melo-Vogt hypotheses, this paper extends the model to include the cross term containing the economic globalization index.

$$\ln IM_t = \alpha_0 + \alpha_1 \ln Y_t + \alpha_2 \ln RP_t + \alpha_3 EF_t * \ln Y_t + \nu_t, \quad (3)$$

$$\ln IM_t = \gamma_0 + \gamma_1 \ln Y_t + \gamma_2 \ln RP_t + \gamma_3 EF_t * \ln Y_t + \gamma_4 EF_t * \ln RP_t + \omega_t, \quad (4)$$

where EF_t refers to the economic globalization index that is the sub-index of the KOF Index at time *t*. The other variables are as defined previously. In Equation (3), if parameter $\alpha_3 > 0$, the first Melo-Vogt hypothesis is confirmed. In Equation (4), if $\gamma_3 > 0$ and $\gamma_4 < 0$, both hypotheses are confirmed.

Moreover, to investigate further the impact of different economic policies, a new model is created based on the composition of the economic globalization index.

$$\ln IM_t = \phi_0 + \phi_1 \ln Y_t + \phi_2 \ln RP_t + \phi_3 EFA_t * \ln Y_t + \phi_4 EFB_t * \ln Y_t + \varsigma_t, \quad (5)$$

where EFA_t is an indicator of actual economic flows and EFB_t is an indicator of economic restrictions placed on metrics.

An important difference between this study and extant literature is introducing the cross term. To consider the economic impacts of a changing policy of openness, Melo and Vogt (1984) and Mah (1999) divided the sample period into two, taking a particular year as the dividing line; introduced a dummy variable; and assessed the impact using the dummy variable coefficient. However, the methods employed in these two studies have significant problems. The former did not consider stationarity (nonstationarity) of the variables and therefore, could not eliminate spurious regression. The latter performed unit root tests on the variables but did not consider cointegration.

This paper first tested for unit roots in the variables following the usual convention. The ADF test indicates that the relevant model variables are nonstationary and integrated of the order of one, irrespective of whether the data are from China or India. To identify long-run relationships among the variables, tests that consider structural changes were performed, based on Hansen (1992). For estimation, Phillips and Hansen's (1990) fully modified Ordinary Least Squares (FMOLS) approach—also used by Hansen (1992)—and Stock and Watson's (1993) dynamic Ordinary Least Squares (DOLS) approach are used.

V. EMPIRICAL RESULTS

As stated in the introduction, the main objective of this study is to compare the effects of economic openness between China and India.

Tables **2**, **3**, and **4** present the results for China based on Equations (2), (3), and (4), respectively. The results for India are compared with those for China in Tables **5**, **6**, and **7**. Based on the Hansen test, the null hypothesis is adopted for all the results, except the FMOLS estimation results in Table **5**, and the long-run relationship between the variables is found to be supported. In other words, even if structural change is considered, the null hypothesis that a co-integrating relation exists is adopted.

From Equation (2), expressing a traditional import demand function, it is evident that India's import demand income elasticities are larger than those of

Table 2: Estimated Result for Equation (2) (China)

Technique	Variable	Estimate	SE	*p*-value	adjR^2	Hansen
DOLS	lnY	1.468	0.044	0.000	0.990	0.059 (P > 0.2)
	lnRP	–0.899	0.108	0.000		
	Constant	–14.820	1.199	0.000		
FMOLS	lnY	1.404	0.042	0.000	0.983	0.157 (P > 0.2)
	lnRP	–0.852	0.134	0.000		
	Constant	–12.778	1.156	0.000		

Notes: DOLS—lead and lag are set at 1.
Hansen (1992); Lc (m2 = 2, k = 0) *p*-values, where m2 = m-p2 is the number of stochastic trends in the asymptotic distribution.

Table 3: Estimated Result for Equation (3) (China)

Technique	Variable	Estimate	SE	*p*-value	adjR^2	Hansen
DOLS	lnY	0.662	0.129	0.000	0.996	0.118 (P>0.2)
	lnRP	–0.738	0.060	0.000		
	E × lnY	0.188	0.030	0.000		
	Constant	5.267	3.219	0.121		
FMOLS	lnY	0.891	0.118	0.000	0.987	0.188 (P>0.2)
	lnRP	–0.777	0.081	0.000		
	E × lnY	0.127	0.029	0.000		
	Constant	–0.108	2.915	0.971		

Notes: DOLS—lead and lag are set to be one.
Hansen (1992); Lc (m2 = 3, k = 0) *p*-values, where m2 = m-p2 is the number of stochastic trends in the asymptotic distribution.

Table 4: Estimated Result for Equation (4) (China)

Technique	Variable	Estimate	SE	*p*-value	adjR^2	Hansen
DOLS	lnY	0.727	0.172	0.001	0.996	0.117 (P>0.2)
	lnRP	–1.578	0.576	0.018		
	E × lnY	0.191	0.034	0.000		
	E × lnRP	3.013	1.784	0.117		
	Constant	3.430	4.370	0.448		
FMOLS	lnY	0.867	0.146	0.000	0.987	0.234 (P>0.2)
	lnRP	–0.631	0.466	0.187		
	E × lnY	0.130	0.031	0.000		
	E × lnRP	–0.395	1.517	0.797		
	Constant	–0.530	3.670	0.886		

Notes: DOLS—lead and lag are set at 1.
Hansen (1992); Lc (m2 = 4, k = 0) *p*-values, where m2 = m-p2 is the number of stochastic trends in the asymptotic distribution.

Table 5: Estimated Result for Equation (2) (India)

Technique	Variable	Estimate	SE	*p*-value	adjR^2	Hansen
DOLS	lnY	1.814	0.090	0.000	0.988	0.020 (P>0.2)
	lnRP	–0.101	0.333	0.765		
	Constant	–23.847	2.271	0.000		
FMOLS	lnY	1.807	0.047	0.000	0.990	0.429 (P=0.069)
	lnRP	–0.257	0.181	0.164		
	Constant	–23.614	1.252	0.000		

Notes: Same as for Table **2**.

China; however, absolute price elasticities are small and statistically insignificant. Tables **3** and **6** clearly show that the cross term coefficients of Equation (3) are positive and statistically significant. Therefore, the first Melo-Vogt hypothesis is supported for both China and India. However, as India's coefficients of 0.082 and 0.075 are smaller than those for China at 0.188 and 0.127, it is evident that openness progressed more rapidly in China than in India and had greater impacts[10]. Equation (4) presents the cross term

[10]In the 2012 KOF Index of Globalization, China's economic globalization index is reported as 51.25, which is significantly higher than that of India at 43.73.

Table 6: Estimated Result for Equation (3) (India)

Technique	Variable	Estimate	SE	*p*-value	adjR^2	Hansen
DOLS	lnY	1.600	0.168	0.000	0.992	0.030 (P>0.2)
	lnRP	–0.108	0.242	0.660		
	E × lnY	0.082	0.036	0.030		
	Constant	–18.679	4.185	0.000		
FMOLS	lnY	1.536	0.115	0.000	0.991	0.228 (P>0.2)
	lnRP	–0.255	0.131	0.060		
	E × lnY	0.075	0.028	0.012		
	Constant	–16.997	2.852	0.000		

Notes: Same as for Table **3**.

Table 7: Estimated Result for Equation (4) (India)

Technique	Variable	Estimate	SE	*p*-value	adjR^2	Hansen
DOLS	lnY	1.549	0.212	0.000	0.991	0.029 (P>0.2)
	lnRP	0.701	1.555	0.657		
	E × lnY	0.095	0.047	0.054		
	E × lnRP	–4.140	7.777	0.600		
	Constant	–17.442	5.251	0.003		
FMOLS	lnY	1.479	0.115	0.000	0.992	0.313 (P>0.2)
	lnRP	0.888	0.788	0.268		
	E × lnY	0.098	0.031	0.003		
	E × lnRP	–5.750	3.907	0.150		
	Constant	–15.649	2.823	0.000		

Notes: Same as for Table **4**.

coefficients for openness and relative prices, both of which are statistically insignificant for both China and India. Therefore, the second Melo-Vogt hypothesis does not hold for either country, which is consistent with Mah (1999) who examined the applicability of the hypotheses to Thailand.

Furthermore, in an effort to provide detailed information, an analysis based on Equation (5) is conducted using the FMOLS. From the results in Table **8**, it is evident that whether it is actual economic flows or deregulation, the economic effects have been better in China than in India. In particular, in the actual economic flows, the corresponding cross-term coefficients of China are much larger than those of India and are statistically significant. This result is not surprising, as depicted in Figures **1** and **2**. On the FDI front alone, China is far ahead of India. This implies that India should further strengthen trade expansion and FDI to keep pace with China.

VI. CONCLUSIONS

The question as to the type economic openness that increases economic development is often hotly debated. This paper tested the applicability of the Melo-Vogt hypotheses to China and India—the two countries most discussed in the twenty-first century. The following are the two defining characteristics of this paper:

(1) addition of a cross term, including openness, to the traditional import demand function model

(2) testing for cointegration between variables, considering structural change

The analysis presents three major findings:

First, the first Melo-Vogt hypotheses on positive correlation between the absolute value of income elasticity of import demand and openness is supported for both China and India.

Table 8: Estimated Result for Equation (5) using FMOLS

Technique	Variable	Estimate	SE	p-value	adjR^2	Hansen
India	lnY	1.563	0.110	0.000	0.991	0.384 (P>0.2)
	lnRP	–0.246	0.124	-0.056		
	EFA × lnY	0.007	0.075	0.927		
	EFB × lnY	0.116	0.059	0.056		
	Constant	–17.634	2.732	0.000		
China	lnY	0.928	0.127	0.000	0.988	0.247 (P>0.2)
	lnRP	–0.776	0.086	0.000		
	EFA × lnY	0.096	0.050	0.069		
	EFB × lnY	0.135	0.030	0.000		
	Constant	–0.997	3.147	0.754		

Notes: Hansen (1992); Lc (m2 = 4, k = 0) p-values, where m2 = m-p2 is the number of stochastic trends in the asymptotic distribution.

Second, the Melo-Vogt hypothesis on positive correlation between the absolute value of price elasticity of import demand and openness is not supported, which is consistent with Mah (1999).

Third, the cross-term coefficients for openness and income are larger for China than for India, thereby indicating increasing openness and greater economic impact in China than in India. This should provide countries valuable insights on the World Bank's policy prescriptions and contribute to understanding the relationship between openness and growth.

ACKNOWLEDGEMENTS

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APPENDIX

Table A-1: Comparison of Tariff and Tariff Concessions Between India and China (2009)

		Binding coverage	Simple average		Duty-free		Duties > 15 %	
			Bound	MFN applied	Bound	MFN applied	Bound	MFN applied
		in %			Share of HS 6 digit subheadings in percentage			
All products	China	100	10.0	9.6	6.4	7.5	16.4	14.6
	India	73.8	48.7	13.0	2.7	2.8	70.5	16.6
Non-agricultural products	China	100	9.2	8.7	6.5	7.8	13.4	11.6
	India	69.8	34.6	10.1	3.1	2.4	66.2	6.7
Agricultural products	China	–	15.7	15.0	6.0	5.9	35.5	35.0
	India	–	113.1	31.8	0	5.6	98.6	82.4

Source: World Tariff Profile.

Table A-2: Components of Index of Globalization

A.	**Economic Globalization**	**[36%]**		
	(i) Actual Flows		(50%)	
	Trade (percentage of GDP)			(21%)
	Foreign direct investment (percentage of GDP)			(28%)
	Portfolio investment (percentage of GDP)			(24%)
	Income payments to foreign nationals (percentage of GDP)			(27%)

(Table A-2). Continued.

	(ii) Restrictions		(50%)	
	Hidden import barriers			(24%)
	Mean tariff rate			(27%)
	Taxes on international trade (percentage of current revenue)			(26%)
	Capital account restrictions			(23%)
B.	**Social Globalization**	**[37%]**		
	(i) Data on personal contact		(34%)	
	Telephone traffic			(25%)
	Transfers (percent of GDP)			(4%)
	International tourism			(26%)
	Foreign population (percentage of total population)			(21%)
	International letters(per capita)			(25%)
	(ii) Data on information flows		(35%)	
	Internet users (as a share of population)*			(33%)
	Television (per 1000 people)			(36%)
	Trade in Newspapers (percentage of GDP)			(32%)
	(iii) Data on cultural proximity		(31%)	
	Number of McDonald's restaurants (per capita)			(44%)
	Number of IKEA (per capita)			(45%)
	Trade in books(percentage of GDP)			(11%)
C.	**Political Globalization**	**[26%]**		
	Embassies in country		(25%)	
	Membership in international organizations		(28%)	
	Participation in U.N. Security Council Missions		(22%)	
	International treaties		(25%)	

Note: The numbers in parentheses indicate the weight used to derive the indexes. Weights may not add up to 100 because of rounding. All indexes range between 0 (not globalized) and 100 (globalized).
Source: http://globalization.kof.ethz.ch/.

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