

Research Note:
**Research on Measurement and Application of
International Investment Competitiveness Indices**

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Abstract

With the development of multinational business ties among nations, and establishment of closer bi-lateral cooperation among partner countries, international direct investment (or FDI) has begun to play a more significant role in the world economy. Moderate and large businesses serving as the drivers of the national economy of countries such as China, have been racing to achieve higher competitiveness by proactively establishing foreign branches via OFDI alongside aggressive promotion and marketing of products through international trade.

In the context of OFDI, this study first of all, attempts to define international investment competitiveness index (IIC) in terms of a firm's capability of making external investment decisions as well as operating and managing international projects (through foreign branches, and subsidiaries). The IIC puts special emphasis on the following factors: project investment and financing; technology, entrepreneurial management; and brand competitiveness relative to international trade competitiveness that primarily depends on the marketing mix.

Second, this study initiates designing of illustration of three kinds of indices that may be used to measure IIC levels of the countries, sectors and firms respectively. These three indices are Investment Market Share (IMS), Investment Competitiveness (IC), and Revealed Investment Competitive Advantage index (RIC). These three indices should show international investment competitiveness from three separate perspectives: the market share, the country advantage, and the industry or sector advantage.

Third, the study then applies the measurement of IIC to top ranking investing countries of the world with the available recent data. This paper reports the advantages and shortcomings of country specific FDI strategies using the results of comparative calculations and analyses. Finally, the paper explores further application of the indices in the investment management, investment project assessments, investment risk control and precautions, and investment policy making.

Key Words: International Investment competitiveness, Indices, Measurement

1. Introduction

The most recent World Investment Report shows that global flows of foreign direct investment (FDI) rose by about 40 per cent, to \$1.8 trillion in 2015. It was the highest level since when the

global economic and financial crisis began in 2008. Although the global FDI still remains about 10 per cent short of the 2007 peak, over the medium term, however, the global FDI flows are projected to keep growing during next 3 years. With the increase of capital flow, FDI has been one of the effective approaches, not only for the host country but also for the home country via increased economic development, closer political/diplomatic relationships and higher international standing and status, and the like. An increase in a country specific OFDI fosters a rapid increase in global investment competition. FDI competitiveness as such has become one of the most important aspect in national competitiveness.

Over years, the literature on international competitiveness have become rich, and a variety of perspectives and concepts been used in the economic and business literatures. Microeconomic concepts and indicators of competitiveness focus on the essential characteristics of producers in competition for market share, and profits or the ability to export. (Siggel, 2007; Balassa, 1991, Mandeng, 1991; Turner and Golub, 1997) International competitiveness under this perspective can be measured by trade competitiveness, price competitiveness and cost competitiveness. We believe that on top of these factors, investment competitiveness, especially the OFDI competitiveness, as an important and indispensable measuring aspect should be added within the context of emerging international market environment. We have done so in this paper. In this respect, this paper contributes to the literature on the subject of measurement of international investment competitiveness, especially in the Outwards Foreign Direct Investment (OFDI) competitiveness.

The paper has been organized in the following format: The first segment advocates distinctive aspects of the international investment competitiveness (IIC), the second section focuses on the study leading to the design and illustration of three kinds of indices which can be used to measure IIC level of the selective countries, sectors, and firms respectively. The three indices are: Investment Market Share (IMS), Investment Competitiveness (IC), and the Revealed Investment Competitive Advantage index (RIA). The third section devotes to application and measurement of IIC of top ranked investing countries with the recently published data. The relative advantages and shortcomings of the countries will also be illustrated following a comparative calculation and analyses. The final segment will explore the efficacy of the three indices on matters of investment management, investment project assessment, investment risk control and precaution, and investment policy making.

2. Literature Review

2.1 Competitiveness and RCA

The competitiveness concept has been quite popular among the macroeconomists. Started in 1980, World Economic Forum, and Institute of Management Development (WEF/IMD) have computed World Competitiveness Index and published reports annually since 1989. This popular index became the basis for an international ranking of countries in terms of their respective business climate. Its popularity lies in the fact that it is a composite of a large number of attributes condensed into a single index.

Some researchers followed the macroeconomic competitive idea, and injected some microeconomic interpretation of competitiveness. Productivity, both labor, and the total factor productivity, should serve as indicators of competitive advantage/disadvantage. (Dollar and Wolff, 1993). They conclude that a competitive nation is one that can succeed in international trade via high technology and productivity, with accompanying high income and wages. Somewhat similar concepts were proposed by Hatsopoulos, Krugman and Summers (1994) and Horstmann and Markusen. (1992)

Microeconomic concepts and indicators of competitiveness tended to be more popular and solid during the last decade of 20th century when more researchers contributed and proposed design

indicators to measure competing ability of each country. This competitive ability often was measured by the size or an increase of market share (Mandeng, 1991). Sometimes, it was measured by the export performance (Balassa, 1965, 1991). It was also measured by the price ratios (Durand, Giorno, 1987); and cost competitiveness (Turner, Gollub, 1997; Siggel, Cockburn, 1995). Business scholars used a more complex and multi-dimensional business strategy model Porter, 1980, 1986, 1990(a), 1990(b), 1994; 1998) to assess competitiveness of firms as well as the nation. We also may recognize many other similar dimensions (Buckley et al. 1992; Oral, 1993) of competitiveness.

Based on the earlier research, recently, researchers evaluated and improved the measurement of investment competitiveness, especially the Balassa's RCA index. Elsa Leromain and Gianluca Orefice (2013) worked on a dataset and empirical distribution of new RCA; Alex R. Hoen and Jan Oosterhaven (2006) used multiplicative location quotient (LQ) as a measure for the revealed location attractiveness of certain regions or countries for certain types of industry; Keld Laursen (2015) proposed an adjusted index called 'revealed symmetric comparative advantage' (RSCA).

2.2 Investment Competitiveness and OFDI Competitiveness

Compared to other microeconomic aspects of competitiveness, investment competitiveness comparatively received less scholarly attention. However, authors emphasized that: first, FDI can increase the national competitiveness. It was also recognized that FDI can change the host countries' prevailing market conditions and productive efficiency of the existing firms as well as of new firms Cho, Hwi, Mun, 2013). So, it became quite clear that FDI increases competitiveness and the latter also attracts the former. Bonelli, 1999, Razafimahefa and Hara, 2005; Razafimahefa and Hamori, 2005). Secondly, most literatures are inclined to consider investment competitiveness from the perspective of the host country and therefore analyses the factors, features, and motives in the host country when they focus on investment competitiveness. The size of the host markets, measured by GDP, is the first determinant in the most analyses. Movement in the price levels, the strength of the host country's currency measured by exchange rates, the investment policies in the country are included as determinants of investment competitiveness (Moore 1993, Chakrabarti 2001, Ivohasina and Razafimahefa 2007). By using the above determinants, some studies set composite indices or indicators, assign weight to each factors in order to measure the investment competitiveness (Aiginger, 1998; Neary, 2007; Brakman, 2009; Kiel, Smith, Ubbels, 2014). Hong Chen and Yucheng Yang (2014) optimized the measurement and calculated international investment competitiveness for China and other host countries, and make strategic suggestions under some hypothetical conditions.

Although the outward FDI is equal to inward FDI in quantity when computed globally, it is undeniable that OFDI is driven by special motivation, and (political/cultural) attractions between the host and investing countries. In addition, OFDI brings different impacts to the home countries. Just as when we clearly separate export advantages from trade competitiveness, it would be good practice to do the same for international competitiveness and OFDI competitiveness. To be more specific, significant and obvious distinctions exist between OFDI competitiveness and investment competitiveness. As a result, the respective determinants as well as their measurements tend to be different and varied.

3. OFDI Competitiveness Descriptions

3.1 Interpretation of OFDI Competitiveness

Several studies mentioned OFDI competitiveness when they studied on the firm level competitiveness. (Jinyong Lu, 2003, Bijun Wang, 2014) The studies recognize the company's international investment competitiveness (IIC) apart from the firm's capability of making external

investment decisions and operating/ managing international projects. In a conceptual study of IIC, Kun Ma (2010) notes that OFDI competitiveness puts special emphasis on project investment and finance, technological complexity, entrepreneurship management and brand competitiveness, international trade competitiveness and the marketing mix. However, since study was mainly conceptual, it lacked measurement details and empirical analysis.

3.2 OFDI Indicators and Their Implications

This study initiates the design and illustrations of three kinds of indices, which can be used to measure IIC level of individual countries, sectors and firms respectively. The three indices are Investment Market Share (IMS), Investment Competitiveness (IC), Revealed Investment Competitive Advantage index (RIA). Three indices should reflect international investment competitiveness from three differentiated aspects: market share, country advantage and industry or sector advantage.

Measurements:

3.2.1 Investment Market Share (IMS)

$$\text{IMS} = \text{Investment Volume of a Country} / \text{Investment of the world}$$

3.2.2 Investment Competitiveness (IC)

$$\text{IC} = (\text{FDI outflow} - \text{inflow}) / (\text{outflow} + \text{inflow})$$

IC > 0, FDI net outflow; IC < 0, FDI net inflow

3.2.3 Revealed Investment Competitive Advantage index (RIA)

$$\text{RIA}_{ia} = (X_{ia} / X_{it}) / (X_{wa} / X_{wt})$$

In this formula, X_{ia} is the investment volume of country i in industry a ; X_{wa} is the world investment volume in industry a ; X_{it} and X_{wt} are the total international investment volumes of country i and the world market respectively in time period of t .

This indicator shows the comparative advantage of country i over other countries in the investment of industry during some period. Generally, if $\text{RIA}_{ia} > 1$, country i has comparative advantage over other countries in industry a , its advantage enlarges with the bigger RIA; if $\text{RIA}_{ia} < 1$, it means that country i is comparatively disadvantaged in industry a . This indicator thus eliminates the effect of gross fluctuations of variables in a country, as well in the world market.

4. Measurement of IIC with 3 indicators

4.1 Measurement of IIC with IMS and IC

Table 1: IMS and IC Value

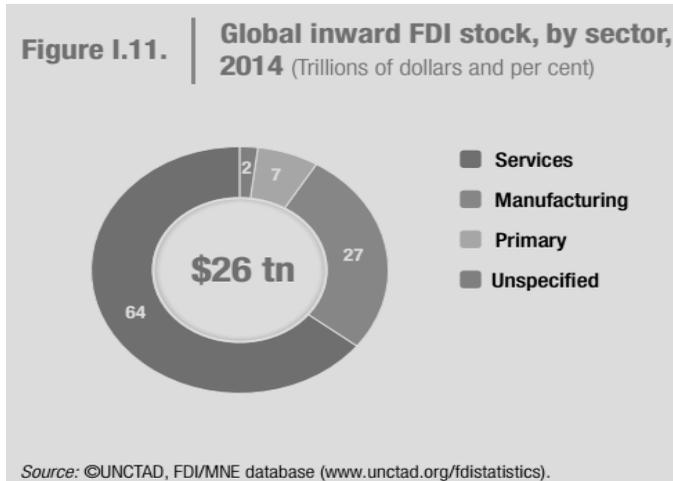
2015 Flows	Inflow (M\$)	outflow(M\$)	IMS	IC
World	1,762,155	1,474,242		
USA	379,894	299,969	0.203	-0.118
Japan	2,250	128,654	0.087	0.966
China	135,610	127,560	0.087	-0.031
Netherland	72,649	113,429	0.077	0.219
Ireland	100,542	101,616	0.069	0.005
Germany	31,719	94,313	0.064	0.497
Switzerland	68,838	70,277	0.048	0.010
Canada	48,643	67,182	0.046	0.160
HK, China	174,892	55,143	0.037	-0.521
Luxembourg	24,596	39,371	0.027	0.231

Date resource: 2015 World Investment Reports

- The study selects the top 10 countries in the World for OFDI
- The FDI flows data are used
- From IC, we can judge: USA, China and HK (Hong Kong, China) are net inflow. HK has the advantage in FDI inflow. On the contrary, Japan and Germany are net outflow countries; their advantages of outflow are obvious, and their investment and economy relies more on outward FDI.

4.2 Measurement of IIC with RIA

4.2.1 Category of industrial sectors



The **primary sector of the economy** is the sector of an economy making direct use of natural resources. This includes agriculture, forestry, fishing and mining. **Manufacturing** is the production of merchandise for use or sale using labor and machines, tools, chemical and biological processing, or formulation. The **service industries** (More formally termed: 'tertiary sector of industry' by economists) involve the provision of services to businesses as well as final consumers. (www.wikipedia.org)

4.2.2 Measurement with RIA

Table 2: OFDI stock in 2014 (By Industrial Sector)

		2014 Total (\$)	Primary	Manufacturing	Services
World Stock		26 Trillion	7%	27%	64%
U.S.	Volume	4,829,425	225,064	635,826	3,647,810
	Percent		4.7%	13.2%	75.5%
Japan	Volume	129,154	8,202	64,441	34,219
	Percent		6.4%	49.9%	26.5%
China	Volume	882,642	133,417	52,352	516,119
	Percent		15.1%	5.9%	58.5%

Data resource: www.dea.gov; www.Jetro.org; 2014 Chinese OFDI Statistic Reports

Table 3: OFDI RIA value (By Industrial Sector)

	Primary	Manufacturing	Services
U.S.	0.67	0.49	1.18
Japan	0.91	1.85	0.41
China	2.16	0.22	0.91

Shortcoming of analysis: The category of industrial sector that is not consistent across countries are excluded from comparative analysis. The table below illustrates comparative industrial sectoral analysis among the U.S., Japan, and China.

- Data of 2014 FDI stock of each country are used
- U.S., Japan and China got the advantage in different industrial sectors.
- Chinese Primary sector has advantage over other sectors, and over the U.S. and Japan, but her advantage of its manufacturing sector is comparatively much lower than both Japan, and the U.S. Its service sector is in the middle of the three countries.
- The above table illustrates specialization in investment as an inevitable trend.

5. Further Application of RIA

We had applied RIA indicator in the checking the sector feature of the Chinese troubled transaction in OFDI. A quantitative description and a statistical case study model have been developed (Ma, Amin, Wang, and Liang, 2016). An empirical test on the OFDI troubled projects of China reviews the efficacy of the model in explaining success and failure of OFDI and there by suggesting policy imperatives to Chinese Government. The preliminary result of an ANOVA test for the hypothesized relationship between OFDI competitiveness and the yearly troubled transaction proportion show the following: OFDI competitiveness level does effect on Chinese yearly troubled transaction proportion. We also found IC plays a leading role in the successful investment. The industrial proportion of troubled Chinese OFDI seems to be negatively associated with industrial IIC. One special finding of the preliminary study is that the industries with a weak advantage over other countries (i.e. RIA level is 1.01-2.00) tend to experience a higher ratio of troubled investment than the industries without a favorable IIC score. Similar studies involving for the U.S. and Japanese OFDI projects may be undertaken to formalize the findings as policy imperatives for the respective countries.

References

- Aiginger, K 1998, "A framework for evaluating the dynamic Competitiveness of Countries", *Structural Change and Economic Dynamics*, 9, pp. 159-188.
- Balassa, B 1991, *Comparative advantage, trade policy and economic development*, New York University Press, New York.
- Balassa, B 1965, "Trade liberalization and 'revealed' comparative advantage," *The Manchester School of Economics and Social Studies*, 33, 2, pp. 99-123.
- Bonelli, R 1999, "A note on foreign direct investment and industrial competitiveness in Brazil," *Oxford Development Studies*, 27, 3, pp. 305-327.
- Buckley, P et al. 1988, "Measures of international competitiveness: A critical survey," *Journal of Marketing Management*, 4, 2, pp. 175-200.
- Chakrabarti, A 2001, "The determinants of foreign direct investments: Sensitivity analyses of cross country regressions," from Cockburn, J, Siggel, Colibaly, M, & Vezina, S 1999, "Measuring competitiveness and its sources: The case of Mali's manufacturing sector," *Canadian Journal of Development Studies*, 20, 3, pp. 491-519.
- Cho, Tong-söng & Hwi-ch'ang Mun 2013, *From Adam Smith to Michael Porter: Evolution of competitiveness theory (extended edition)*. World Scientific, eBook Collection, Singapore.
- Dollar, D, & Wolff, N 1993, *Competitiveness, convergence and international specialization*, MIT Press, Boston.
- Durand, M. & Giorno, C 1987, "Indicators of international competitiveness: Conceptual aspects and evaluation," *OECD Economic Studies*, 9, pp. 147-182.
- Golub, S 2000, "South Africa's international cost competitiveness," *TIPS Working Paper No.14*.
- Hara, M & Razafimahefa, I 2005, "The determinants of foreign direct investments into Japan," *Kobe University Economic Review*, 5, pp. 21-34.
- Hoen, A & Oosterhaven J 2006, "On the measurement of comparative advantage," *Annals of Regional Science*, 40, 3, pp. 677-691.
- Horstmann, I & Markusen, H 1992, "Endogenous market structures in international trade," *Journal of International Economics*, 32, 1-2, pp. 109-29.
- Hatsopoulos, G, Krugman, P & Summers, L 1998, "U.S. competitiveness beyond the trade deficit," *Science*, 241, pp. 299-307.
- Kiel, J, Smith, R & Ubbels, B 2014, "The impact of transport investments on competitiveness," *Transportation Research Procedia*, 1, pp. 77-88.
- Krugman, P 1994, "Competitiveness: A dangerous obsession," *Foreign Affairs*, 73, 2, pp. 28-44.
- Laursen, K 2015, "Revealed comparative advantage and the alternatives as measures of international specialization," *Eurasian Business Review*, 5, pp. 99-115.

- Leromain, E & Orefice, G 2014, "New Revealed Comparative Advantage Index: Dataset and empirical distribution," *International Economics*, 139, pp. 48-70.
- Ma, K, 2010, *Research on Chinese potential of foreign direct investment*, Economics Science Press, Beijing, China.
- Ma, K, Amin, M, Wang, Y & Liang, G 2016, "Risk analysis of the Chinese outward foreign direct investment from the perspective of international investment competitiveness," *International Journal of Business and Applied Sciences*, 5, 1, pp. 7-21.
- Mandeng, O 1991, "International competitiveness and specialization," *CEPAL Review*, 45, pp. 39-52.
- Markusen, J 2002, *Multinational firms and the theory of international trade*, MIT Press, Cambridge.
- Neary, P, 2007, "Cross-border mergers as instruments of comparative advantage," *Review of Economic Studies*, 74, pp. 1229-1257.
- Oral, M 1993, "A methodology for competitiveness analysis and strategy: Formulation in the glass industry," *European Journal of Operations Research*, 68, pp. 9-22.
- Porter, M 1980, *Competitive strategy: Techniques for analyzing industries and companies*, Free Press: New York.
- Porter, M 1986, "Competition in global industries: A conceptual framework," in Porter, M (ed.), *Competition in global industries*, Harvard Business School Press, Boston.
- Porter, M 1990a, "The competitive advantage of nations," *Harvard Business Review*, 68, 2, pp. 73-93.
- Porter, M 1990b, *The competitive advantage of nations*, Free Press: New York.
- Porter, M 1998a, "Clusters and the new economics of competition," *Harvard Business Review*, 76, 6, pp. 77-90.
- Porter, M 2003b, "Building the microeconomic foundations of prosperity: Findings from the Business Competitiveness Index," in *World Economic Forum, The Global Competitiveness Report*, Oxford University Press, Oxford.
- Razafimahefa, I & Shigeyuki, H 2007, *International competitive in Africa: Policy implications in the Sub-Saharan region*, Springer, New York.
- Siggel, E 2007, *Many dimensions of competitiveness, international competitiveness and comparative advantage: A survey and a proposal for measurement*, CESInfoVenice Summer Institute, pp. 1-33.
- Turner, M & Golub, M 1997, *Towards a system of multilateral unit labor cost-based competitiveness indicators for advanced, developing, and transition countries* (No. 97-151). International Monetary Fund.