Received 20 March 2015
Revised 19 August 2015
Accepted 24 August 2015

International capital inflows and labour immigration

A heterogeneous panel application in Malaysian manufacturing industries

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Abstract

Purpose – The purpose of this paper is to examine the relationship between inward foreign direct investment (FDI) and unskilled immigrants for a panel of 23 manufacturing industries in Malaysia, spanning the period 1985-2009.

Design/methodology/approach – The paper establishes the causal FDI-immigrant links within a multivariate model framework for the period 2000-2009, and in a univariate context for 1985-1999 and 1985-2009.

Findings – Based on heterogeneous panel cointegration tests, there is a long-run equilibrium between inward FDI, unskilled migrant share, output growth, export intensity and market concentration. The long-run cointegrating coefficient based on the fully modified least squares estimator suggests the presence of unskilled migrant workers a significant location determinant for inward FDI for the first sub-period and the overall period. The results of the panel vector error correction model further attest to causal links between unskilled migrant worker presence and inward FDI in the short- and long run. Bidirectional causality between inward capital and labour flows is present in the first sub-period and unidirectional causal links from unskilled migrants to inward FDI is evident for the overall period.

Research limitations/implications – The observed FDI-immigration (unskilled) links in manufacturing support the argument that inward FDI is induced by unskilled migration. The study reveals that unskilled immigration increases FDI inflows or rather "capital chases labour" in terms of international factor mobility.

Practical implications – This has profound implications for public policy as the government seeks to reduce its dependence on migrant workers. Policy coordination is therefore needed between regulating inflows of foreign capital and foreign labour so that implemented policies do not pull in different directions and undermine Malaysia's attractiveness as a destination for FDI.

Originality/value – The large presence of unskilled migrants, an intrinsic characteristic (based on the new trade theory that includes factor endowments) of Malaysia, seems to be largely ignored when explaining FDI inflows to manufacturing, particularly so when the siting of MNCs in this sector have traditionally been in light scale manufacturing.

Keywords Labour, Local economies, Migration/immigration, Panel cointegration, Inward FDI, FMOLS, Panel causality

Paper type Research paper

International Journal of Social Economics
Vol. 43 No. 12, 2016
pp. 1420-1438

0306-8293
DOI 10.1108/IJSE-03-2015-0062

JEL Classification — F20, F21, F22, O15

1. Introduction

The inflow of migrant workers to Malaysia dates way back to the colonial days, but gained further momentum when tight labour market conditions emerged in the late 1980s[1]. The sector that first hosted migrant workers is plantations in the 1970s and early 1980s as the rural-urban migration drift had "dried up" the agricultural sector. With the formation of the New Economic Policy (NEP, 1970-1990), the government encouraged the rural-urban migration of young Malay women to work in export-oriented factories in the 1970s. They occupied mainly poorly paid jobs as production operators in the electronics industry. The rise of this new female working class became more prominent with the advent of Free Trade Zones and micro-chip assembling factories in the 1980s. Following which, the "Minah Karan"[2] issue became the focus of hostility and concern in the Malay community, to the extent of becoming a public issue. The feminization of the workforce through the industrial restructuring of the 1970s through the 1980s was in fact not the desired outcome of the state, as the industrialization strategy within the confines of the NEP was premised on creating a male Malay working class. To resolve the tension between economic restructuring and the moral social order, in-migration was permitted to sustain labour market demands and to maintain Malaysia as a favourable manufacturing site to foreign investors.

Since then, Malaysia has been largely courting vertical foreign direct investment (FDI) inflows (see also Vogiatzoglou, 2007) to the manufacturing sector[3] on the back of cheaper production factors, mainly that of unskilled migrants. It is thus not surprising to note that the manufacturing sector has emerged as the largest employer of migrant workers given that this sector, largely supported by inward FDI and heavily oriented towards exports, continues engaging in labour intensive activities[4] (notwithstanding the fact that there are some foreign firms that have moved into higher value-added activities). In this case, capital flows appear to be induced by immigration, in other words, "capital is chasing labour" (Hatton, 2006). Despite the fact that historical trends suggest the presence of subtle linkages and feedback effects between the availability of foreign capital in the form of inward FDI and an elastic supply of unskilled workers, this issue remains relatively unexplored in the Malaysian case. There are in fact compelling reasons to believe that the endowment of unskilled labour augmented by the presence of unskilled migrants and FDI inflows may reinforce each other through possible "complementary effects". The question as to whether "capital chases labour" or "labour chases capital" has not been solved, in part because it is likely that both phenomena exist simultaneously.

The paper therefore adds to the body of literature on international factor mobility by focussing on inflows (same direction) of capital (FDI) and labour inflows (unskilled immigrants) and tries to understand whether the linkages may prevail from the perspective of a high immigration economy. Understanding the FDI-immigration relationship is important for future public policy formulation. The key questions are: Are the stocks of unskilled migrants an important location advantage (pull factor) for FDI inflows to Malaysia? What are the causal effects between FDI inflows and unskilled immigration?

The remainder of the paper is structured as follows. Section 2 presents a brief historical profile of inflows of FDI and unskilled migrants to the Malaysian manufacturing sector for the period 1985-2009[5]. Section 3 describes the theory, model specification, empirical strategy and the data. Section 4 reports and discusses the results. Section 5 concludes.

2. Inflows of FDI and labour

Foreign capital and foreign labour play a critical role in the Malaysian manufacturing sector. Export-oriented manufacturing industries that have a higher degree of foreign participation, are generally more reliant on foreign labour (Athukorala and Devadason, 2012). The share of FDI in total capital investment in manufacturing had increased substantially from 17 to 72 per cent between 1985 and 2009. Similarly, the share of unskilled migrants in total unskilled employment increased from 2 to 38 per cent over the same period.

The important stream of migrant inflows to Malaysia is that of the unskilled. In fact, the share of unskilled workers among foreign workers in manufacturing is uniformly high at more than 90 per cent across all industries. In the manufacturing sector, they are mainly employed as production workers/operators. More importantly, though unskilled foreigners are considered temporary with restrictions imposed on them for staying on indefinitely, the reality is that they have become a permanent feature of the labour market. Malaysia, indeed has trouble keeping them "temporary" due to structural problems in the labour market, resulting in circular migration (Chia, 2008). Therefore the large presence of unskilled workers have augmented the domestic labour force.

From Figure 1, it is obvious that capital inflows are volatile *vis-à-vis* labour inflows. The contraction of FDI following the 1997/1998 Asian financial crisis continued to 2000-2003 with the slowdown in global FDI. The 2008/2009 global financial crisis again resulted in severe contractions of FDI inflows. Overall the increased FDI inflows seem to coincide with increased immigration (which was formalized in 1992 for the manufacturing sector). This observation concurs with historical evidence that migrants and international capital flows often move in the same direction (Hatton, 2006).

FDI inflows, though important for manufacturing, are unevenly distributed across industries. From Table I, it is clear that the electronics and electrical (E&E) industry commanded a lion's share of FDI inflows. This, however, seems to have changed in 2009, with chemicals and glass products emerging as the target sectors for FDI. However, too much cannot be read based on the 2009 statistics given the slowdown in global FDI flows. Likewise, the E&E sector is also the largest employer of unskilled migrants.

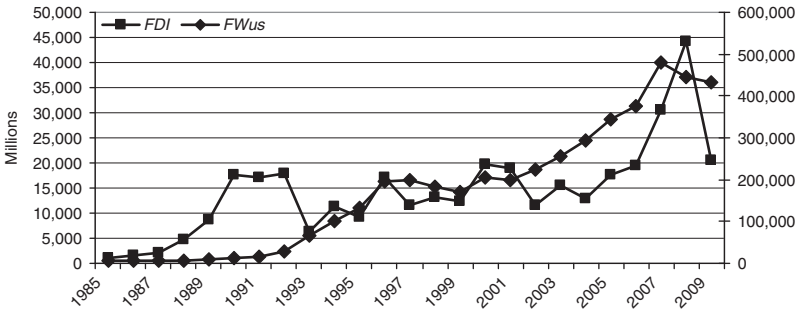

Figure 1.
Inflows of FDI and unskilled migrants to manufacturing, 1985-2009

Notes: FDI – inward foreign direct investment, RM (left scale); FWus – unskilled foreign workers (right scale)

Source: Unpublished returns of the Malaysian Investment Development Authority (MIDA) and the Department of Statistics (DOS), Malaysia

Table I. Distribution and importance of FDI and unskilled foreign workers, by industry (in per cent)

	Distribution								Importance							
	FDI				FWus				FDI:CI				FWus:US			
Industry	1985	1995	2005	2009	1985	1995	2005	2009	1985	1995	2005	2009	1985	1995	2005	2009
Food	6.12	1.31	3.08	4.21	15.07	4.44	6.34	8.09	10.12	23.90	36.93	59.63	2.05	9.75	24.21	31.22
Beverages	0.11	0.02	0.36	0.00	0.55	0.06	0.10	0.18	4.20	32.60	87.46	0.00	0.93	2.51	7.78	13.96
Tobacco	0.00	0.00	0.00	0.00	0.00	0.15	0.02	0.03	0.00	0.00	0.00	0.00	0.00	2.28	1.32	6.62
Textiles	0.92	4.83	0.34	0.00	0.31	4.49	3.19	2.24	23.66	82.15	52.59	0.00	0.08	17.01	42.86	44.62
Garments	2.34	0.36	0.48	0.06	0.09	4.19	5.67	5.04	26.18	33.22	33.03	55.52	0.02	9.66	38.78	52.70
Leather	0.04	0.05	0.02	0.00	0.02	0.22	0.15	0.14	30.00	100.00	40.00	0.00	0.20	12.36	29.75	40.21
Footwear	0.00	0.19	0.00	0.00	0.00	0.16	0.26	0.40	0.00	28.81	0.00	0.00	0.00	11.25	21.18	30.27
Wood	1.21	8.12	0.44	0.47	53.21	26.02	18.10	12.73	9.92	39.60	21.42	30.37	7.25	28.56	58.18	64.02
Furniture and fixtures	0.63	1.21	0.36	0.21	4.49	7.85	11.77	9.39	25.76	46.65	12.40	27.66	3.46	29.67	58.29	63.64
Paper, printing and publishing	10.65	1.08	0.70	0.00	0.53	1.28	2.94	3.33	5.62	28.35	12.98	1.79	0.19	5.09	19.80	30.51
Chemicals	3.07	9.87	4.90	34.48	0.24	0.66	1.42	3.44	15.08	50.17	50.52	84.01	0.15	5.29	15.51	31.02
Petroleum refineries/products	0.08	14.41	0.75	2.25	0.67	0.05	0.02	0.03	3.16	72.73	18.32	39.11	3.70	8.56	7.33	16.68
Rubber	3.11	0.84	1.21	0.47	1.00	6.21	6.32	8.06	30.96	44.75	27.83	65.20	0.26	14.02	33.99	52.72
Plastic	2.00	1.95	3.35	2.68	0.82	5.94	8.82	8.69	18.13	41.59	52.67	72.60	0.41	14.72	35.29	47.15
Glass	3.41	11.24	3.00	25.60	0.16	0.50	0.30	0.67	29.84	74.61	94.15	55.22	0.61	16.61	15.26	35.90
Non-metallic mineral	7.96	2.42	0.36	0.28	7.84	2.62	2.79	3.57	18.38	8.34	17.78	15.87	2.43	11.17	26.28	37.20
Basic metal	15.47	5.19	2.43	2.13	1.18	1.96	2.06	3.16	23.83	13.79	13.43	16.83	0.71	12.81	25.03	34.50
Fabricated metal	4.58	3.12	1.41	3.39	7.39	5.15	4.29	5.94	16.34	51.25	33.03	57.48	2.72	12.53	26.85	37.09
Machinery	4.56	2.53	5.42	3.08	1.46	2.88	2.12	2.72	31.97	74.06	67.44	51.14	0.85	8.02	21.26	29.27
Electrical and electronics	11.56	25.98	61.60	18.40	0.51	20.09	19.76	17.34	45.95	75.31	81.58	85.85	0.05	9.12	22.80	28.97
Transport equipment	19.47	5.05	2.02	0.59	4.31	2.77	2.13	2.55	27.38	32.61	30.79	45.03	1.56	10.00	20.70	20.02
Scientific and measuring equipment	0.60	0.03	7.69	1.52	0.00	1.38	0.27	1.06	26.78	50.00	95.62	60.53	0.00	9.25	5.97	17.15
Miscellaneous	2.10	0.20	0.07	0.17	0.15	0.90	1.17	1.20	26.39	25.92	3.64	42.75	0.16	7.84	22.59	25.56
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	16.86	43.82	57.70	72.06	1.64	13.14	30.77	37.91

Source: Calculated from unpublished returns of the Malaysian Investment Development Authority (MIDA) and the Department of Statistics (DOS), Malaysia

Though the distribution of FDI and unskilled migrant inflows appear heavily skewed, both foreign capital and foreign labour are of considerable importance for a majority of industries when measured in shares of total capital investment and total unskilled employment, respectively. Based on the 2009 statistics, negligible shares of FDI in total capital investment is noted only for beverages, tobacco, textiles, leather, footwear and paper, printing and publishing. The presence of FDI is strongly evident in the E&E, followed by chemicals industries. Likewise, unskilled migrants make up more than one-fourth of total unskilled employment across most industries, with the exception for tobacco, beverages, petroleum refineries, scientific and measuring equipment and transport equipment.

The uneven distribution patterns of FDI and unskilled migrants across industries coupled with the varying importance of these "foreign" elements within industries justify the need for further empirical enquiry on the relationships between both mobile factors for the Malaysian case.

3. Methodology

3.1 Theoretical exposition

Determinants of FDI. Globalization has induced a shift from purely market-seeking and resource-seeking FDI to new types of efficiency-seeking FDI. Most efficiency-seeking FDI in developing countries tends to be vertically integrated (Dunning, 1998). In relation to this, the relevance and the importance of the traditional determinants of FDI become increasingly debatable, both in terms of the theory and empirics.

According to the widely known OLI (ownership, location, internalization) framework (Dunning, 1993, 1998), firm-specific factors concern competitive advantages in a transnational corporation and commercial benefits in an intra-firm relationship. Firm-specific factors are, however, ignored since host country governments cannot influence them. Subsequently, in the late 1990s, the institutional dimension emerged as a chief factor for explaining FDI inflows. Recently, an alternative framework to Dunning's eclectic paradigm, the new trade theory (NTT) combines ownership and location with technology and factor endowments (intrinsic country characteristics) (see Markusen, 2002). The spotlight of FDI determinants falls on location-specific factors, grouped into the overall policy framework for FDI, economic determinants and business facilitation measures (UNCTAD, 1998; Nunnenkamp, 2001). However, specified in empirical work, these location determinants of FDI are entrenched in the three afore-mentioned theories (see Assuncao *et al.*, 2011) of the OLI paradigm (infrastructure, human capital, economic stability, production costs), the institutional approach (corruption, political instability, institutional quality, financial and fiscal incentives) and the NTT (market size, market growth, openness of the economy, factor endowments).

Though there are push factors apart from pull factors for explaining FDI inflows, the latter seems to drive capital inflows to Malaysia (see Thiam, 2011). In this respect, there are numerous studies on determinants (pull factors) of FDI inflows to Malaysia (Wong, 2005; Ang, 2008; Choong and Lam, 2010; Tan, 2010). The following would briefly highlight the Malaysian studies that have considered labour market indicators, amongst others, as a pull factors for FDI. A recent study by Noor Al-Huda and Fleming (2012) examined FDI inflows in the Malaysian manufacturing sector across States. Amongst the various determinants, market demand, labour productivity, socio-economic development and provision of industrial estates. FDI inflows are

found to be most sensitive to labour productivity and gross domestic product. Conversely, a regional-based study on FDI inflows by Athukorala and Wagle (2011), indicate that while investment policy and innovation capability are significant in explaining FDI inflows to Southeast Asia, low relative wages are no longer an important determinant of FDI inflows.

The empirical literature on FDI inflows to Malaysia is confined largely to national-level factors and for those that have captured labour market-related locational advantages, they have mainly focussed on human capital (skill levels, educational levels, literacy rates) and production costs (labour productivity, labour costs). The large presence of unskilled migrants, an intrinsic characteristic (based on the NTT that includes factor endowments) of Malaysia, seems to be largely ignored when explaining FDI inflows to manufacturing, particularly so when the siting of multinational corporations (MNCs) in this sector have traditionally been in light scale manufacturing. Specifically, the activity of the United States (US) and Japanese MNCs, are at least, partly based on the comparative resource endowments of their home countries. Further, with the current intense global competition for FDI, unskilled labour has become a condition for attracting and retaining FDI (Chia, 2008; ASEAN Secretariat, 2013).

FDI and migration. The FDI-migrant nexus can also be directly explained by non-economic factors, such as network effects. Empirical studies linking capital and migration have found a positive and significant impact of migrant networks on bilateral trade and investment between their source and host countries. The focus of those studies have been largely on network effects (see Kugler and Rapoport, 2007; White, 2007; Murat and Pistoresi, 2009; Jansen and Piermartini, 2009; Tan, 2010; Lee, 2012), in which, migrants provide information flows and serve as a contract enforcement mechanism.

However, the implied network effects between the source and host countries are clearly not applicable to the Malaysian context, specifically the manufacturing sector, for the following reasons. First, the source countries for migrants are the low-income neighbouring countries (namely Indonesia, followed by Bangladesh, Nepal, Myanmar, India, Vietnam, Cambodia, Pakistan, Philippines and Sri Lanka), which is clearly different from that for foreign capital (Japan, South Korea, US and Singapore). Therefore the bilateral (source-host) dimension is not relevant for examining FDI-immigration links from the Malaysian perspective. The study by Djafar and Hassan (2014) further support the absence of network effects for Malaysia based on the examination of trade-migrant nexus. Second, network effects plausibly explain the variability in observed migration inflows, as they may account for the size of migration inflows and the unskilled content of migrants; implying a strong hysteresis in migrant inflows. Network effects may therefore be suitable in explaining the inflows of migrant workers to Malaysia, but not for understanding capital inflows.

The standard literature has devoted little attention to immigration as a determinant of FDI. Further, the focus has largely been on relationship between FDI inflows and immigrant inflows from the same country of origin. The general consensus from the empirical literature is that larger immigration stocks induce more inflows of FDI from the same country of origin, thereby confirming the network or diaspora effects. Some of the studies find that the nature of the relationship also differs by immigration type, with possibilities of complementary skilled immigration flows and FDI inflows and substitution in the case of unskilled

immigration flows and FDI inflows. Our study, however, differs from previous work. Within the framework of FDI determinants, we study the effects of immigration on inward FDI (same direction of factor movements), without accounting for the sources of those inflows.

3.2 Economic model

The economic model of inward FDI across manufacturing industries relates to the demand-side (pull) factors that are based on the theoretical underpinnings of the NTT, as follows:

$$FDI_{it} = \alpha_i + \delta_{it} + \gamma_{1i} FWus + \gamma_{2i} GVA_{it} + \gamma_{3i} EI_{it} + \gamma_{4i} CR4 + \varepsilon_{it} \quad (1)$$

where $i = 1, \ldots, N$ for each industry in the panel and $t = 1, \ldots, T$, refers to the time period. The parameters α_i and δ_i allow for the possibility of country-specific fixed effects and deterministic trends, respectively. All variables are expressed in percentages. *FDI* is the share of real inward *FDI* in total capital investment[6] for approved manufacturing projects by industry; *FWus*, the key variable of interest, is the share of unskilled migrant workers in total unskilled employment to capture (low quality or cost effective) labour endowment[7]; *GVA* is the growth in real value-added as a proxy for market demand; *EI* is the export intensity or the share of exports in total output of industries as a measure of openness; and *CR4* is the four-plant concentration ratio to capture barriers to entry based on market power. All explanatory variables are expected to have coefficients with positive signs, with the exception for *CR4*. The following discussion provides explanations for the inclusion of the explanatory variables associated with the NTT, factor endowments, market size (growth), openness and barriers to entry.

Given that the availability of migrants is an important unskilled labour-augmenting factor endowment for attracting FDI to Malaysia, it is posited by many that Malaysia is exclusively selected by foreign investors for its abundant unskilled labour supply. Hence, FDI is considered to be directed to labour intensive activities with low-skilled requirements.

A growing industry would reflect a growing market demand and lower costs due to economies of scale, and this in turn is an impetus for MNCs to invest in that particular industry. However, for a small domestic economy like Malaysia, the outward orientation of industries is a target for FDI inflows given the complementarity between trade and FDI inflows. In short, Malaysia is an export platform for MNCs. Moreover, openness increases vertical FDI inflows especially when it involves trade in intermediate goods (see Walsh and Jiangyan, 2010). A highly open economy would therefore also make it easier for MNCs to import the necessary intermediate goods and raw materials for their production in the host economy (Vogiatzoglou, 2007).

The Malaysian manufacturing sector structure is highly oligopolistic (Jensen and Kara, 2011) with a few firms dominating the industry's market share. As such, this may impose problems in terms of market accessibility. The dualistic incentive structure (Athukorala and Wagle, 2011) for one, which allows for liberal foreign ownership in some sectors whilst curbing ownership and MNC entry in other sectors, is somewhat important in explaining FDI distribution across the manufacturing industries.

3.3 Empirical strategy

Before proceeding to cointegration techniques, the required condition is to verify that all variables are integrated to the same order. In doing so, the Levin *et al.* (2002,

hereafter LLC) and the Im *et al.* (2003, hereafter IPS) panel unit root tests are used to determine the stationarity properties of the respective variables. Both tests assume the null hypothesis of non-stationarity.

Once the order of stationarity has been defined, the panel cointegration tests developed by Pedroni (1999, 2004) are applied. This test is chosen as it allows for cross-section interdependence with different individual effects to overcome the heterogeneity problem. Two types of cointegration tests are proposed by Pedroni, panel tests based on the within dimension approach (panel cointegration statistics, of which includes four statistics, the panel v-, ρ-, PP- and ADF-statistics) and group tests based on the between dimension approach (group mean panel cointegration statistics, of which includes three statistics, the group ρ-, PP- and ADF-statistics). The null hypothesis of no cointegration, $\rho_i = 1$, is tested by conducting a unit root test on the residuals as shown below upon estimating the long-run relationship based on Equation (1):

$$\varepsilon_{it} = \rho_t \varepsilon_{it-1} + w_{it} \tag{2}$$

Next, the cointegrating coefficients are estimated using the between dimension fully modified least squares (FMOLS) technique as proposed by Pedroni (2000, 2001; see also Kao and Chiang, 2000). The FMOLS is considered appropriate as it has several merits. It exhibits small sample bias, and corrects for endogeneity in the regressors and serial correlation in the errors (Phillips, 1995; Pedroni, 2000).

The final step is to examine the causal interactions among the variables by estimating a panel vector error correction model. The Engle and Granger (1987) two-step procedure is undertaken by first estimating the long-run model specified in Equation (1) to obtain the estimated residuals. Next, defining the lagged residuals from Equation (2) as the error correction term, the following dynamic error correction model is estimated:

$$\Delta FDI_{it} = \xi_{1j} + \sum_{k-1}^{q} \psi_{11ik} \Delta FDI_{it-k} + \sum_{k-1}^{q} \psi_{12ik} \Delta FWus_{it-k} + \sum_{k-1}^{q} \psi_{13ik} \Delta GVA_{it-k} + \sum_{k-1}^{q} \psi_{14ik} \Delta EI_{it-k} + \sum_{k-1}^{q} \psi_{15ik} \Delta CR4_{it-k} + \lambda_{1i} \varepsilon_{it-1} + u_{1it} \tag{3}$$

$$\Delta FWus_{it} = \xi_{2j} + \sum_{k-1}^{q} \psi_{21ik} \Delta FDI_{it-k} + \sum_{k-1}^{q} \psi_{22ik} \Delta FWus_{it-k} + \sum_{k-1}^{q} \psi_{23ik} GVA_{it-k} + \sum_{k-1}^{q} \psi_{24ik} \Delta EI_{it-k} + \sum_{k-1}^{q} \psi_{25ik} \Delta CR4_{it-k} + \lambda_{2i} \varepsilon_{it-1} + u_{2it} \tag{4}$$

$$\Delta VA_{it} = \xi_{3j} + \sum_{k-1}^{q} \psi_{31ik} \Delta FDI_{it-k} + \sum_{k-1}^{q} \psi_{32ik} \Delta FWus_{it-k} + \sum_{k-1}^{q} \psi_{33ik} \Delta GVA_{it-k} + \sum_{k-1}^{q} \psi_{34ik} \Delta EI_{it-k} + \sum_{k-1}^{q} \psi_{35ik} \Delta CR4_{it-k} + \lambda_{3i} \varepsilon_{it-1} + u_{3it} \tag{5}$$

$$\Delta EI_{it} = \xi_{4j} + \sum_{k-1}^{q} \psi_{41ik} \Delta FDI_{it-k} + \sum_{k-1}^{q} \psi_{42ik} \Delta FWus_{it-k} + \sum_{k-1}^{q} \psi_{43ik} \Delta GVA_{it-k} + \sum_{k-1}^{q} \psi_{44ik} \Delta EI_{it-k} + \sum_{k-1}^{q} \psi_{45ik} \Delta CR4_{it-k} + \lambda_{4i} \varepsilon_{it-1} + u_{4it} \quad (6)$$

$$\Delta CR4_{it} = \xi_{5j} + \sum_{k-1}^{q} \psi_{51ik} \Delta FDI_{it-k} + \sum_{k-1}^{q} \psi_{52ik} \Delta FWus_{it-k} + \sum_{k-1}^{q} \psi_{53ik} \Delta GVA_{it-k} + \sum_{k-1}^{q} \psi_{54ik} \Delta EI_{it-k} + \sum_{k-1}^{q} \psi_{55ik} \Delta CR4_{it-k} + \lambda_{5i} \varepsilon_{it-1} + u_{5it} \quad (7)$$

where Δ is the first-difference operator; k is the lag length set at one based on likelihood ratio tests; and u is the serially uncorrelated error term. The above specifications for Granger causality allows for the investigation of both short- and long-run causality.

3.4 Data

Data on FDI inflows at the five-digit Malaysia Standard Industrial Classification (MSIC) were obtained from the Malaysian Investment Development Authority. Industry-level data on migrant employment, value-added and exports are from the unpublished returns of the Industrial Surveys, canvassed by the Department of Statistics. The four-plant concentration ratio is, however, calculated based on the gross output statistics at the plant level.

There are some limitations in the data that are worth noting. First, data on exports are not available from the Industrial Surveys prior to 2000. Therefore the multivariate analysis (or the full model) is confined to the period 2000-2009. To test for robustness of the results, a univariate approach (or the truncated model) of examining the bilateral relationship between inward FDI and unskilled migrants (the variable of interest) is also conducted for the periods 1985-2009 (the overall period), 1985-1999 (first sub-period) and 2000-2009 (second sub-period). Second, for 2000-2009, there is a change in the industrial classification from MSIC (DOS, 2000) for the period 2000-2008 to MSIC (DOS, 2008) for the year 2009. As such, the matching of both classifications requires the data to be aggregated to the three-digit MSIC level for the ensuing empirical enquiry.

The empirical estimations constitute balanced panels of 230 (23 industries × 10 years) observations for the analysis at the multivariate level for the period 2000-2009. For the univariate analysis, the total number of observations is 345 (23 industries × 15 years) for the period 1985-1999 and 575 (23 industries × 25 years) observations for the period 1985-2009.

Tables AI and AII present the descriptive statistics and the pairwise correlations for the variables used in the empirical analysis.

4. Results and discussion

4.1 Panel unit root tests

Table II reports the results of the panel unit root tests. The results based on the LLC and the IPS show no uniform conclusion that the null of unit root can be rejected for the levels of the variables. However, both the LLC and IPS test statistics for the

	Level		First difference	
	LLC	IPS	LLC	IPS
2000-2009				
FDI	−16.877***	−2.737**	−19.988***	−2.937***
FWus	−12.037***	−2.142	−19.182***	−2.674**
GVA	−12.850***	−2.208	−14.697***	−4.054 (2)***
EI	−12.386***	−1.957	−19.391***	−3.373 (2)***
CR4	−11.598***	−1.798	−15.586***	−4.398 (2)***
1985-2009				
FDI	−17.276***	−3.370***	−26.752***	−5.096***
FWus	−11.076	−2.277	−19.046**	−3.674***
1985-1999				
FDI	−14.752***	−2.544**	−20.833***	−3.582***
FWus	−11.462***	−2.214	−13.053***	−2.305***

Notes: The *t*-value and *t*-bar are reported for LLC and IPS, respectively. Unit root tests include a constant and trend. One lag is assumed in most cases, except when specified. Numbers in the parentheses are the augmented lags included in the unit root test. **,***Rejection of the null hypothesis of unit root at the 5 and 1 per cent significance level, respectively

Table II. Panel unit root test results

first-differences strongly reject the null hypothesis, which indicate that each variable is integrated of the order one. Thereby, what follows is testing for the Pedroni heterogeneous panel cointegration test in the next step of empirical analysis.

4.2 Panel cointegration

Table III reports both the within and between dimension Pedroni panel cointegration test statistics. Most of the test statistics, for both the cases of intercept and intercept and trend, reject the null hypothesis of no cointegration at the 1 per cent significance level for the periods 2000-2009, 1985-2009[9] and 1985-1999. For all periods, since the null hypothesis is rejected for panel ADF and group ADF statistics, which have the best small sample properties of the seven test statistics (see Pedroni, 1999), this provides the strongest single evidence of cointegration[10]. As such, it can be concluded that a long-run equilibrium relationship exists between inward FDI share, unskilled migrant share, output growth, export intensity and market concentration for the period 2000-2009. Likewise, a long-run relationship prevails between inward FDI share and unskilled migrant share for the period 1985-2009 and 1985-1999.

In light of the panel cointegration tests, the FMOLS estimator for heterogeneous cointegrated panels is employed to determine the long-run equilibrium relationship for all three periods. Table IV displays the FMOLS results. The first panel of Table IV reports the results of the multivariate framework[11] for the period 2000-2009. The coefficient estimate for the unskilled foreign worker share in the multivariate context is compared with the univariate approach results (second panel of Table IV) for the overall period (1985-2009) and the two sub-periods, 1985-1999 and 2000-2009.

The coefficients are statistically significant at the 1 per cent level for growth in value-added, export intensity and market concentration for the full model. Industries with high output growth do not draw in FDI. This is not surprising as the aim of MNCs engaged in the vertical-type FDI is not to capture increased market shares (see also Nunnenkamp, 2001). As expected, export-oriented industries attract FDI (see also Ang, 2008; Choong and Lam, 2010; Sjoholm, 2013) whilst the lock-in created

Within dimension test statistics		Between dimension test statistics	
2000-2009			
Intercept			
Panel υ-statistic	−3.691	Group ρ-statistic	−1.265
Panel ρ-statistic	3.935***	Group PP-statistic	−20.155***
Panel PP-statistic	−16.678***	Group ADF statistic	−9.254***
Panel ADF statistic	−7.935***		
Intercept and trend			
Panel υ-statistic	−4.824	Group ρ-statistic	2.207
Panel ρ-statistic	0.083	Group PP-statistic	−21.561***
Panel PP-statistic	−17.329***	Group ADF statistic	−8.442***
Panel ADF statistic	−6.707***		
1985-2009			
Intercept			
Panel υ-statistic	6.145***	Group ρ-statistic	−16.771***
Panel ρ-statistic	−19.679***	Group PP-statistic	−39.871***
Panel PP-statistic	−33.945***	Group ADF statistic	−16.763***
Panel ADF statistic	−16.426***		
Intercept and trend			
Panel υ-statistic	0.388	Group ρ-statistic	−10.882***
Panel ρ-statistic	−13.547***	Group PP-statistic	−42.457***
Panel PP-statistic	−40.555***	Group ADF statistic	−15.201***
Panel ADF statistic	−16.609***		
1985-1999			
Intercept			
Panel υ-statistic	1.238	Group ρ-statistic	−6.993***
Panel ρ-statistic	−9.521***	Group PP-statistic	−22.595***
Panel PP-statistic	−17.416***	Group ADF statistic	−8.187***
Panel ADF statistic	−8.112***		
Intercept and trend			
Panel υ-statistic	−3.413	Group ρ-statistic	−2.603***
Panel ρ-statistic	−4.753***	Group PP-statistic	−25.438***
Panel PP-statistic	−18.876***	Group ADF statistic	−6.757***
Panel ADF statistic	−7.569***		

Note: ***Rejection of the null hypothesis of no cointegration at the 1 per cent significance level

Table III.
Pedroni panel cointegration test results

Multivariate framework				
2000-2009				
$FDI = -0.083$ (−0.203)	+0.108*FWus* (0.388)	−0.059*GVA* (−7.395)***	+0.283*EI* (9.559)***	−0.114*CR4* (−3.271)***
Univariate approach				
2000-2009				
$FDI = -0.081$ (−0.099)	+0.108*FWus* (1.231)			
1985-2009				
$FDI = +0.020$ (0.030)	+0.369*FWus* (4.397)***			
1985-1999				
$FDI = -0.087$ (−0.105)	+0.731*FWus* (4.427)***			

Notes: *t*-Statistics are reported in parenthesis. ***Significant at the 1 per cent level

Table IV.
Panel cointegration estimation (FMOLS long-run estimates)

by established market shares (see Athukorala and Wagle, 2011; Jensen and Kara, 2011; on the presence of government linked companies, the dualistic investment regime and the oligarchic nature of many industries that constrain MNCs entry in specific sectors) poses barriers to FDI.

Interestingly, unskilled foreign workers are found not to be significantly (albeit positive) important for FDI in the recent period, 2000-2009. However, for the overall period, 1985-2009 and for the first sub-period 1985-1999, the presence of unskilled foreign workers is significant for the inflows of FDI to manufacturing. In fact, the coefficient estimates of unskilled foreign worker share for the first sub-period is larger than that for the overall period. There is one noteworthy observation regarding the influence of foreign workers on inward FDI based on the FMOLS results. The positive determining role of unskilled foreign workers on inward FDI appears to be emerging secondary with the passage of time.

4.3 Panel causality analysis

The results of the short- and long-run Granger causality[12] tests for both the full model and the truncated model are reported in Table V. Equation (3) shows that only export intensity has a positive and statistically significant influence on inward FDI in the short run. In terms of equation (6), inward FDI and output growth each have a positive and statistically significant impact on export intensity in the short run. Though the unskilled foreign worker share has no significant short-run impact on inward FDI for the period 2000-2009, the opposite result holds true for the overall period (1985-2009) and the first sub-period (1985-1999). In fact, the inward FDI is also found to exert a positive and statistically significant short-run impact on unskilled foreign worker share for the 1985-1999 period.

			Short-run causality Multivariate framework		
	ΔFDI	$\Delta FWus$	ΔGVA	ΔEI	$\Delta CR4$
2000-2009					
ΔFDI		0.396 (0.673)	0.603 (0.549)	5.602 (0.005)***	1.120 (0.329)
$\Delta FWus$	0.529 (0.590)		1.886 (0.155)	0.333 (0.717)	1.141 (0.322)
ΔGVA	0.708 (0.494)	0.330 (0.719)		5.894 (0.003)***	1.503 (0.226)
ΔEI	6.141 (−0.003)***	0.189 (0.828)	0.771 (0.464)		0.344 (0.709)
$\Delta CR4$	0.373 (0.689)	0.647 (0.525)	0.159 (0.853)	0.497 (0.609)	
			Univariate approach		
	ΔFDI	$\Delta FWus$			
2000-2009					
ΔFDI		0.396 (0.673)			
$\Delta FWus$	0.529 (0.590)				
1985-2009					
ΔFDI		5.751 (0.003)***			
$\Delta FWus$	0.764 (0.467)				
1985-1999					
ΔFDI		4.586 (0.011)***			
$\Delta FWus$	5.448 (0.005)***				
			Long-run causality Multivariate framework		
	ECT				
2000-2009	−0.430***				
			Univariate approach		
2000-2009	−0.434***				
1985-2009	−0.419***				

Notes: The optimal lag length was selected using the Schwartz information criteria. *F*-statistics reported with respect to short run changes in the independent variables. Figures in brackets are the probability values. ***Statistical significant at 1 per cent

Table V.
Panel granger causality results

Thus, the short-run causality results for the 1985-1999 period indicate there is bidirectional causality between export intensity and inward FDI, whereby an increase in export intensity has a positive impact on FDI inflows with a corresponding positive feedback from FDI inflows to export intensity. The short-run bidirectional causality present in the first sub-period (1985-1999) confirms the feedback hypothesis whereby unskilled foreign worker presence and inward FDI are interdependent. A possible explanation for this is that the initial inflow of unskilled foreign workers increases Malaysia's attractiveness for foreign capital by decreasing average wages of the unskilled[13] in the domestic economy. Then, by generous investment incentives and liberal entry policies, the subsequent induced factor flow is labour from the poor neighbouring countries to occupy jobs (that are still considerably lucrative relative to their home country) created in the unskilled segments in the Malaysian manufacturing labour market. Alternatively, the same complementary effects do not hold for output growth and export intensity, given the unidirectional causality between the former and the latter. In addition, unidirectional causality also prevails between unskilled foreign presence and inward FDI for the overall period.

4.4 Discussion of main findings

On balance, the evidence supports the view that unskilled immigrants are an important location determinant for inward FDI and that the inflow of unskilled immigrants Granger-causes the inflow of FDI. However, the importance of unskilled migrants for inward FDI and the patterns of interdependence between unskilled migrants and inward FDI have changed over time. Thus, the presence of unskilled migrants may no longer be sufficient to induce FDI to Malaysia. Notwithstanding that, the results suggest that Malaysia was previously selected by a foreign investor for its abundant unskilled labour supply. Thus, it is not surprising that FDI in the past was directed mainly in labour intensive activities with low-skilled requirements.

Two counterfactual questions to this result are: Would the Malaysian manufacturing sector have received less capital had it received fewer unskilled immigrants? Would upskilling of the Malaysian manufacturing sector been realized had there been more selective inflows of FDI? The answers to both questions are most likely a "yes" based on the empirical results.

Establishing the significance of immigration on inward FDI is clearly important because it relates directly to public policy. In fact, some quarters persistently argue on the presence of a "vicious" (instead of a "virtuous") cycle between the inflows of foreign capital and foreign labour blaming it largely on the lack of selective immigration policy and aggressive wooing of FDI, which has admittedly resulted in a continuous inflow of unskilled migrants that has not only allowed the country to be projected as a cheap manufacturing site for foreign investors for several decades, but in turn hindered the development of human capital accumulation. This provides a possible explanation for the new direction in Malaysian policies pertaining to FDI, involving significant revisions of the joint venture laws, opening up of more sectors for Greenfield investment and fully foreign-owned subsidiaries. Concurrently, the government is undertaking active measures to promote the inflows of talents and curb the country's dependence on unskilled migrants in a bid to move into higher value-added (or quality-based) FDI activities.

The bottom-line is that in the absence of a restrained approach to crafting the national immigration policy on unskilled migrant inflow, the country runs the risk of losing out on quality-based FDI inflows to the manufacturing sector. Compounding this

effect is that Malaysia has a large net outflow of skilled professionals (less than 2 per cent of in-migration consists of high-skilled labour), and further skill imbalances are envisioned with the goal of free flow of skilled persons covered in the ASEAN Economic Community. Alternatively, curbing instead of regulating unskilled migrant inflows may see significant flight of investments to other unskilled labour abundant countries (or immigration friendly jurisdictions) as some manual processes are not meant to be hi-tech and would require unskilled workers[14]. There are already signs of an apparent waning of Malaysia's attractiveness to MNCs (Athukorala and Wagle, 2011; Jensen and Kara, 2011). Therefore, there should be some policy coordination between regulating inflows of foreign capital and foreign labour so that implemented policies do not pull in different directions and undermine Malaysia's overall attractiveness as a destination for FDI.

5. Conclusion

The empirical analysis provides results that buttress and extend prior research. Contrary to previous research on Malaysia that either did not consider FDI-immigration (unskilled) links or was restricted to examining determinants of FDI at a national level, the observed links supports the argument that inward FDI is induced by inflows of unskilled migration. Overall, the causal effect of the study implies that unskilled immigration increases FDI inflows to the Malaysian manufacturing industries or rather "capital chases labour[15]" in terms of international factor mobility. Indeed, Malaysia has benefited from capital inflows by opening up its labour market.

An important policy lesson has emerged from the analysis. Restricting the inflows of unskilled migrants, though necessary to shift away from quantity-based to quality-based FDI in efforts to propel the sector into higher value-added activities, needs to be gradual to ensure that capital inflows do not suddenly decelerate. The upshot would be for the government to face the even more difficult problems, such as the low-skills base of the economy (coupled with the brain drain), the clandestine unskilled labour migration and the application of minimum wages across industries. These impending issues must be tackled lest Malaysia may lose favour from the foreign investors' perspective.

Overall, the study provides some insights into the role of labour markets on FDI inflows, from the perspective of an unskilled-dependent country, whereby export-oriented FDI has been largely labour intensive. In this context, factor endowments, may have a greater relevance for export-oriented FDI. The importance of factor endowment as a locational factor also applies to the Southeast Asian region, which has attracted a large amount of export-oriented FDI (Sjoholm, 2013).

Notes

1. Tight labour market conditions emerged with the aggressive promotion of the second-round export-industrialization drive in the post-1985 economic crisis that saw to the formulation of the First Industrial Master Plan (1985-1995).
2. "Minah Karan" is a popular and official metaphor for the new Malay female working class during the decade of the 1970s and early 1980s, following criticisms from the traditional Islamists and the male community who could not accept this group of secularly oriented independent female industrial workers in a modern, industrial town setting, miles from the village.
3. The manufacturing sector accounts for the largest share of FDI inflows at 50 per cent (The Star, 22 February, 2012).

4. Evidence from Noor *et al.* (2002) suggest there is continued involvement in assembly-line production and medium-level value-added manufacturing activities in the electronics and electrical sector (see also Athukorala and Wagle, 2011) which is the driving force in the manufacturing sector.
5. The year 1985 is chosen as a start-year for the study following the liberalization of the foreign investment regime in Malaysia to address the economic crisis of the mid-1980s, which also coincided with the relocation of production bases by major investors from the USA, Japan, South Korea and Taiwan in response to rising domestic wages in their home countries (Athukorala and Wagle, 2011). The mid-1980s therefore reflect the start of an FDI-boom.
6. As there are zero values of FDI flows in the data set, it was decided to use FDI shares.
7. It is assumed that factor endowments determine factor costs, meaning which unskilled labour is cheap in the high immigration Malaysian economy. Though vertical FDI is directly linked to factor costs and only indirectly linked to factor endowments (Braconier *et al.*, 2005), the study considers the latter, as the main objective is to ascertain if capital chases labour internationally. Further, the major investors are from skilled intensive countries and therefore they are more likely to conduct vertical FDI in unskilled labour intensive countries.
8. The results of the IPS are considered conclusive given that it allows for heterogeneous autoregressive coefficients, and hence more powerful than the LLC.
9. The time series are sufficiently long to conduct a cointegration analysis. Several cointegration analyses are even based on shorter periods, for example de Crombrugghe *et al.* (1997) and Irvin and Izurieta (2000).
10. The cointegration result is further confirmed by Kao (1999) panel cointegration test. The estimated ADF statistics, at −2.706, −10.967 and 4.445 for the periods 2000-2009, 1985-2009 and 1985-1999, respectively, strongly reject the null hypothesis of no cointegration.
11. There is no evidence of serial correlation, heteroscedasticity and the equation also passes the RESET test.
12. From Equations (3) to (7), short-run causality is determined by the statistical significance of the partial *F*-statistic associated with the corresponding right hand side variables, whilst long-run causality is revealed by the statistical significance of the respective error correction terms using the *t*-test.
13. There is prior evidence that the supply of cheap unskilled foreign workers erodes the bargaining power of their domestic counterparts, with a wage gap identified between unskilled immigrants and their local counterparts (Mehmet, 1986; Pillai, 1995; Ruppert, 1999).
14. Many Japanese investors raised their grouses on the difficulties of employing production operators when the government disallowed the intake of foreign workers in 2010 (The Edge, 17 March 2010). Malaysia is not just experiencing skills shortages but also a general labour shortage.
15. If capital flows are induced by immigration, then "capital chases labour" (Clarke and Smith, 1996).

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Appendix

Variable	Obs	Mean	SD	Min.	Max.
2000-2009					
FDI	230	41.627	28.776	0	100.000
FWus	230	25.184	14.943	0	67.541
GVA	230	6.241	36.215	−89.440	366.330
EI	230	34.138	19.676	1.284	95.612
CR4	230	42.066	25.354	6.591	97.811
1985-2009					
FDI	575	44.022	28.158	0	100.000
FWus	575	14.220	14.538	0	67.541
1985-1999					
FDI	345	45.619	27.664	0	100.000
FWus	345	6.911	8.370	0	44.178

Table AI.
Summary statistics

	FDI	FWus	GVA	EI	CR4
2000-2009					
FDI	1				
FWus	−0.124	1			
GVA	−0.063	−0.079	1		
EI	0.244	0.133	−0.181	1	
CR4	−0.014	−0.540	0.047	−0.064	1
1985-2009					
FDI	1				
FWus	−0.131	1			
1985-1999					
FDI	1				
FWus	−0.108	1			

Table AII.
Pairwise correlations

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