

# Modes of Foreign Entry and Regional Economic Growth: Evidence from US States

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*The United States continues to be a significant recipient of foreign direct investment (FDI) recently. The studies on the impact of FDI in the U.S. have focused on wage and educational effects. Little empirical investigation has distinguished the differential growth effects of two modes of FDI: greenfield investment and mergers & acquisitions (M&As). Using data from 48 states between 2003 and 2009, this study finds that M&As has an insignificant effect on state economic growth; while greenfield investment contributes positively to state economic development only when a minimum level of human capital is present.*

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## 1. Introduction

The United States continues to be a significant recipient of foreign direct investment (FDI) in the world recently. The World Investment Report (2010) states that the United States maintained its position as the largest host country in 2009, with 316 billion dollars of inflows in 2008 and 130 billion dollars of inflows in 2009.<sup>2</sup> FDI is considered playing an important role in the U.S. economy. Since 1980, the total amount of FDI in the U.S. economy has increased eight-fold and nearly doubled as a share of U.S. gross domestic product (GDP) from 3.4% to 6.4% (Jackson, 2011).

Foreign direct investment (FDI) is typically considered as a vehicle to transfer physical capital and intangible assets, such as new ideas, advanced techniques, technology and skills across borders and provide substantial spillover effects (Wang and Wong, 2009; Kottaridi and Stengos, 2010). Therefore, the rise in multinational firms corresponds with an increasing competition between state and local communities to have foreign plants locate within their borders (Ford et al, 2008). To attract potential foreign investment, state and local governments offer not only information about the advantages of locating in local communities, but also lucrative incentive packages, including large tax reductions and major infrastructure projects (Feliciano and Lipsey, 2006). A number of studies have examined the

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<sup>2</sup> China ranked the second based on the 108 billion dollars of FDI inflows in 2008 and 96 billion dollars of FDI inflows in 2009.

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welfare effects of FDI in the US local communities. Figlio and Blonigen (2000) find that greenfield manufacturing FDI pays higher wages yet decreases per capita government expenditures on public education using county-level data in South Carolina from 1980 to 1995. Zhuang (2011) and Zhuang (2008) find that an increasing share of foreign employment in a state is associated with more educational expenditure expenditures on K-12 and higher education but also less inequality in public school spending. Ford et al (2008) show that a minimum level of human capital is required for states to experience a positive economic growth rate accompanied with FDI inflows. Wang (2011) provides evidence that manufacturing FDI is related to lower tertiary schooling, while FDI in information industries tends to increase tertiary schooling.

This paper intends to extend the studies of the FDI-growth relation in the U.S. by examining how different modes of FDI affect economic growth in U.S. states. The entry of multinational corporations (MNCs) can take two modes: greenfield investment – the investment in new assets within a nation or mergers and acquisitions (M&A) – the acquisition of existing assets within the host nation. The existing studies fail to reach consensus about economic consequences of greenfield investment and M&As. The World Investment Report (2000) documents that ‘... FDI entry through the takeover of domestic firms is less beneficial, if not positively harmful, for economic development than entry by setting up new facilities. At the heart of these concerns is that foreign acquisitions do not add to productive capacity but simply transfer ownership and control from domestic to foreign hands. This transfer is often accompanied by layoffs of employees or the closing of some production or functional activities (e.g. R&D capacities).’ Friedman et al (1992) considered new foreign manufacturing plants in the United States the most important and coveted type of FDI because it creates jobs. Wang and Wong (2009) find that greenfield investment promotes economic growth while M&As are negatively associated with the host country’s economic growth using data on 84 countries from 1987 to 2001. Therefore, greenfield investment is favored by the host country government and investment incentives have gone exclusively to greenfield investment projects (Albornoz et al, 2006). However, Blonigen and Slaughter (2001) find that greenfield investment or M&As do not contribute to the skill upgrading using sector level data for all U.S. manufacturing from 1977 to 1994. Blonigen and Slaughter (2001) also show that greater Japanese greenfield investment in the U.S. is associated with less industry-wide skill upgrading. Bresman et al (1999) present evidence on knowledge transfer in international acquisitions, and Conyon et al (2002) find that M&As in the United Kingdom improve labor productivity.

To our knowledge, there has been no study distinguishing different growth effects of greenfield investment and M&As in U.S. states. Using a sample of 48 states from 2003 and 2009 in the U.S., this paper separately examines the effects of greenfield investment and M&As on state growth rates. The findings suggest that greenfield investment contributes positively to state economic growth only when a minimum level of human capital is available in the host state. M&As have an insignificant effect on state economic growth. The result of this paper highlights the importance of human capital in the growth process and has important policy implications for the U.S. local governments that more government resources should be allocated toward education to better exploit the external spillovers of greenfield investment for states with human capital below the threshold level. The finding also explains a certain hostility shown by governments toward foreign firms bidding for domestic rivals.

The rest of this paper is set out as follows. Section II describes the empirical specification. Section III presents the data. Section IV discusses the empirical results. Section

V concludes.

## 2. Empirical Specification

Following the empirical specifications in Ford et al (2008) that examine the effect of total FDI on state economic growth rates and Wang and Wong (2009) that distinguish the growth effects of greenfield investment and M&As, the following model is estimated to explore the potentially heterogeneous growth effects of different FDI modes.

$$\begin{aligned} Growth_{it} = & \beta_0 + \beta_1 GFDI_{it} + \beta_2 MA_{it} + \beta_3 (GFDI_{it} \times H_{it}) + \beta_4 (MA_{it} \times H_{it}) \\ & + \beta_5 H_{it} + \beta_6 E_{it} + \beta_7 S_{it} + \gamma_t + \delta_i + \varepsilon_{it} \end{aligned} \quad (1)$$

where Growth is the annual percentage change of gross state product (GSP) per worker in state  $i$  at time  $t$ . The independent variables include the percentage of greenfield investment in GSP ( $GFDI$ ), the percentage of M&As in GSP ( $MA$ ), the interactive variables between each mode of FDI and human capital ( $H$ ), human capital, average total employment ( $E$ ) and a shock variable ( $S$ ). The model also accounts for unobservable state fixed effects ( $\delta$ ) and year fixed effects ( $\gamma$ ).  $\varepsilon$  represents for random errors.

A flow measure of FDI using capital investment announced by greenfield affiliates is used in this study due to data limitation, even though the stock measure of FDI using nonbank employment in US affiliates of foreign firms is favorable, suggested by Graham and Krugman (1991) and Ford et al (2008). No existing M&As data is available for this study. Theoretically, MNCs undertake FDI in the form of either greenfield investment or M&As (Wang and Wong, 2009). United Nations (UN) defines that FDI can take either greenfield investment in a new facility, or acquiring or merging with an existing local firm and measures the level of greenfield investment as the difference between total FDI and M&As in a country (UNCTAD 2000, p.114-119). This analysis follows the UN method to obtain the proxy for M&As. In particular, M&As are the difference between total FDI inflows and greenfield capital investment and the difference is expressed as a share of M&As in total GSP, in a consistent form with  $GFDI$ .

Human capital is measured as the percentage of population aged 25 and over with at least 4-year college education. The cross country studies of FDI-growth relation, including Borensztein et al (1998), Urata and Kawai (2000) and Wang and Wong (2009) use the secondary enrollment as the measure of human capital. Those studies analyze the effect of FDI on growth for developing countries that may have lower educational requirement for job markets than developed countries. Furthermore, it is reasonable to assume that a college graduate is more likely to take advantage of advanced technology. Therefore, it is appropriate to use tertiary educational attainment to measure human capital in this study.

The coefficients of greenfield investment and M&As capture the direct impact of different modes of FDI on economic growth; while the coefficients of the interaction of different modes of FDI with human capital measure the indirect effect of greenfield investment and M&As on economic growth through the channel of human capital.

The causality between different modes of FDI and economic growth may be reversed, as FDI tends to be attracted to fast growing regions with impressive economic performance.

To account for the potential endogeneity, greenfield investment, M&As and the interactive variables of different modes of FDI and human capital are assumed to be endogenous.

The total employment in a state ( $E$ ) attempts to control for the scale effect, as larger economies may grow faster than smaller ones due to the fact that larger economies have more resources to devote to the production.

Following Barro and Sala-i-Martin (1992) and Ford et al (2008), a shock variable ( $S$ ) is added to the empirical specification to control for shocks that may affect states heterogeneously in order to bring stability to estimated coefficients across various time periods. The shock variable is constructed as follows:  $S_{it} = \sum_{j=1}^9 \omega_{ij,t} \frac{\Delta y_{jt}}{y_{j,t-1}}$ .  $\omega_{ij,t}$  is the weight of sector  $j$  in state  $i$ 's total output at time  $t$ . The second term measures the national annual growth rate of output per worker in sector  $j$  at time  $t$ . Nine sectors are used in the computation, including agriculture, mining, construction, manufacturing, trade, finance and real estate, transportation and utilities, services and government.

To address the issues of multiple endogeneity and fixed effects, the empirical specification will be estimated by the system Generalized Method of Moments (GMM) developed by Blundell and Bond (1998). The system GMM estimator first differences the equation to remove the time-invariant fixed effects and estimate a system of equations in first-differences and levels using lagged levels of endogenous variables as instruments for the first-differenced equation and lagged first differences of the endogenous variables as instruments for the equation in levels.

### 3. Data

Data on greenfield investment in U.S. states are obtained from the fDi Intelligence database compiled by the Financial Times Ltd. The greenfield investment is the capital investment in millions of dollars, the value announced by the foreign affiliate at the start of operation. The data contain measurement errors, as the announced value may be different from the actual investment and take several years to be completed. The data on greenfield investment are available from 2003 to 2009.

Data on total FDI inflows, GSP, GSP in various sectors, state total employment and state employment in various sectors come from the website of the Bureau of Economic Analysis (BEA). Total FDI inflows are the difference of the book value of gross property, plant and equipment of foreign affiliates in year  $t$  and  $t-1$  and this variable is in millions of dollars. As greenfield investment and total FDI are measured in millions of current dollars, GSP in current value is used to construct the percentage of greenfield investment and M&As in a state's total product. For the state economic growth rate and the shock variable, GSP in chained millions of 2005 dollars is used in the computation. State total employment is measured in thousands.

Data on human capital are taken from the website of the U.S. Census Bureau and are measured in the percent of population aged 25 and over with at least 4-year college education.

As the data on total FDI and human capital are available from 2003 to 2007, the missing values are filled in via linear interpolation to extend the time series resulting in a

panel of data across 48 U.S. states from 2003 to 2009. The descriptive statistics are provided in table 1.

Table 1 Descriptive statistics

Variables	Mean	Standard Deviation	Minimum	Maximum
Growth: growth rate (%)	0.827	1.944	-7.559	12.297
GFDI: the percentage of greenfield investment in a state's GSP (%)	0.361	0.556	0.000	4.823
MA: the percentage of M&As in a state's GSP (%)	-0.086	1.107	-5.945	3.846
TFDI: the percentage of total FDI in a state's GSP (%)	0.270	0.998	-5.594	4.060
H: the percentage of a state's population aged 25 and over with at least college education (%)	27.447	6.334	13.000	55.700
E: total employment in a state (thousands)	3387.511	3643.923	333.771	21000.000
Shock	15.382	9.464	0.000	38.776

#### 4. Discussion

First, a variant specification of equation (1) is estimated with the total FDI replacing greenfield investment and M&As and the results are reported in table 2 column (1) for comparison. Then equation (1) is estimated to distinguish potentially different growth effects of greenfield investment and M&As and the estimates are presented in table 2 column (2).

Table 2: Impact of total FDI, greenfield investment and M&amp;As on economic growth

	(1)	(2)
Total FDI	-0.156 (0.0951)	
Total FDI $\times$ H	0.00590 (0.00380)	
GFDI		-4.178* (2.152)
GFDI $\times$ H		0.162* (0.0833)
M&As		0.0921 (0.192)
M&As $\times$ H		-0.00243 (0.00680)
H	-0.0690 (0.0572)	-0.0550 (0.0695)
employment	-2.28e-04 (1.97e-04)	-4.35e-05 (8.69e-05)
Shock	-0.100 (0.0928)	-0.134* (0.0774)
State fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Constant	6.134 (3.771)	5.639* (2.960)
Observations	336	336

Note: Robust standard errors are in parentheses. The symbols, \*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% level.

In column (1), gross FDI inflows do not have a significant impact on the host regions' economic growth. The coefficient of the interaction of gross FDI and human capital is statistically insignificant as well. The results in this analysis are different from those in Ford et al (2008) where gross FDI presents significantly negative coefficients and the interactive variable of FDI and human capital exhibits positive and significant coefficients. The different results in the two papers may lie in the difference in the measures of FDI. Ford et al (2008) utilize data on employment in foreign affiliates between 1978 and 1997, whereas this study uses data on gross property, plant and equipment of foreign affiliates between 2003 and 2009. Different measures of FDI in different time periods make the estimated results between the two analyses less comparable.

In column (2), the sign on the greenfield investment coefficient is negative and significant at the 10 percent level while the coefficient of the interaction term  $GFDI \times H$  is positive and significant at the 10 percent level. Whereas, the coefficients on M&As and the interaction term  $MA \times H$  are statistically insignificant. The results indicate that greenfield investment and M&As in the U.S. do not have homogenous effects on state economic development. Furthermore, the contradicting effects of greenfield investment and its interaction term with human capital demonstrate that a minimum level of human capital is necessary for greenfield investment to contribute to state economic growth. Taking the derivative of equation (1) with respect to  $GFDI$ , setting it equal to zero and solving for the level of human capital ( $H$ ) required to turn the total effect of greenfield FDI on growth positive, yields the college threshold of 25.790 percent.<sup>3</sup> Using college educational attainment in 2003 as an example, table 3 displays the states below the threshold. Twenty-seven states were below the threshold level of 25.790 in 2003, including Alabama, Kentucky and North Carolina, South Carolina, and Tennessee who aggressively recruit foreign firms to invest in their jurisdictions.

The coefficients of human capital and state total employment are statistically insignificant in both regressions. The shock variable is insignificant in the regression for total FDI and it is negative and significant at the 10 percent level in the regression distinguishing different modes of FDI.

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<sup>3</sup> Specifically, the derivative of estimated equation (1) is as follows:  $\frac{\partial Growth}{\partial GFDI} = -4.178 + 0.162 \times H$ .  
 $H = \frac{4.178}{0.162} = 25.790$ .

Table 3 State Human Capital in 2003

State	College	State	College	State	College	State	College
West Virginia	15.3	New Mexico	23.7	Florida	25.8	Vermont	31.3
Arkansas	17.4	North Carolina	23.8	Arizona	26	Minnesota	32.7
Mississippi	19.3	South Dakota	23.9	Oregon	26.4	New Jersey	33.4
Wyoming	20.7	Alaska	24	Missouri	26.6	Connecticut	33.5
Nevada	21.2	Wisconsin	24.1	Nebraska	26.8	New Hampshire	34
Kentucky	21.3	Oklahoma	24.3	Hawaii	27	Virginia	34.2
Indiana	22.2	Iowa	24.6	Rhode Island	27.6	Colorado	36
Louisiana	22.3	Texas	24.7	Delaware	28.1	Maryland	37.2
South Carolina	22.3	Pennsylvania	24.8	Illinois	28.1	Massachusetts	37.6
Idaho	22.5	Montana	24.9	Utah	28.4	District of Columbia	46.4
Alabama	22.7	Georgia	25	Washington	28.8		
Michigan	23.3	Ohio	25	New York	29.6		
Tennessee	23.5	North Dakota	25.2	California	29.8		
Maine	23.7			Kansas	31		

## 5. Conclusion

FDI is highly sought after by many U.S. state and local governments that are struggling to create additional jobs in their localities (Jackson, 2011). Over 75 percent of expenditures by state development agencies are aimed at attracting foreign investment (Figlio and Blonigen, 2000). Furthermore, the majority of investment subsidies go to greenfield investment projects. The entry of multinational corporations can take two modes: greenfield investment that establishes a new facility and cross-border M&As that involve purchasing an existing facility. These two forms of FDI are different in nature and could have asymmetric growth impacts in host regions (Wang and Wong, 2009). Although a number of studies have examined the welfare effects of FDI in the U.S and focused on the effects on education, there has been no study that distinguishes the impact of different modes of FDI on local communities. The paucity in the literature highlights the need for further empirical investigation in the FDI-growth relation in the U.S.

This paper focuses on the relation between the composition of FDI and economic growth. Using data for 48 states from 2003 to 2009, this paper finds that a minimum level of human capital is necessary for greenfield investment to promote economic growth in U.S states, while M&As have insignificant growth effects. Furthermore, gross FDI inflows present insignificant effects on state economic growth over the sample period. The result of gross FDI conforms to the ambiguous effects of FDI on economic growth in the prior cross country studies.

The findings in this paper suggest that greenfield investment and M&As have heterogeneous effects on economic growth. The distinction of different modes of FDI in the empirical investigation may provide better understanding of the impact of FDI on local communities in the U.S. Furthermore, the results also offer a policy implication to policymakers in terms of acquiring the benefits of greenfield investment. A well-educated

workforce is important for a state to receive the potential growth effect associated with the inflows of greenfield investment. For states with human capital below the threshold level, the state government should encourage and reallocate more resources for human capital accumulation to increase the absorptive capacity of advanced technologies embodied in foreign investment.

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