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Optimal Exit Costs of Foreign Direct Investment

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ABSTRACT *This paper examines the optimal policy on exit costs of foreign direct investment for a host country considering the impact of varying income level and host country's risk aversion against volatile FDI flows. Based on a dynamic model about the impact of the exit costs on FDI inflows and capital formation, we demonstrate that a host country should determine the exit cost considering two counterbalancing factors, that is, facilitating higher FDI inflows and reducing volatility of FDI inflows. When a host country is less vulnerable to volatility with inelastic risk aversion against FDI volatility, it is optimal for the host country with a negative income shock to take a more aggressive approach to induce FDI inflows by lowering exit costs. However, if the host country is more vulnerable to volatility with elastic risk aversion, the host country is advised to take a conservative approach by increasing exit costs to reduce FDI volatility. These findings, supported by the OECD data on 42 countries' exits costs, implicate that developing countries are recommended to lower exit costs to induce higher FDI inflows when they are not highly vulnerable to volatility shocks.*

KEY WORDS: Foreign direct investment; exit costs; risk aversion

JEL CLASSIFICATION: F21, F23, E61

1. Introduction

Foreign direct investment (hereafter FDI) inflows are supposed to stimulate innovation and make adoption of new technology less costly by the entry of multinational enterprises, which contributes to economic growth (e.g. Barro & Sala-I-Martin, 1995; Markusen, 1995; Borensztein *et al.*, 1998). However, the volatility of FDI inflows has a negative impact on economic growth because of the increasing uncertainties and resulted destabilizing effects. (Lensink & Morrissey, 2006). Therefore, for stable economic growth, FDI inflows need to be promoted with lower volatility of FDI inflows.

Various policy tools are used in inducing FDI inflows and discouraging divestiture of FDI such as incentive policies for FDI inflows and exit cost policies to discourage divesture of FDI. Typical types of exit costs take the form of red tape regulation in the process of divesture including pre-payment of severance pays and lay-off payments with various restrictions against layoffs. Although incentive policies for FDI inflows

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including tax exemption and direct subsidies for FDI inflows have been widely examined, the role of FDI exit costs in inducing FDI inflows and reducing FDI volatility has rarely been attended with formal analysis.

This paper examines the optimal FDI exit cost policy of host countries with varying developmental stages reflected in varying income levels considering the impact of exit costs on FDI inflows and volatility. Based on a dynamic model on a host country seeking to maximize the capital stock through FDI inflows while trying to reduce FDI volatility, we demonstrate that when a host country is less vulnerable to volatility with inelastic risk aversion against FDI volatility, it is optimal for the host country with a negative income shock to lower exit costs to increase FDI inflows. However, if the host country is more vulnerable to volatility with elastic risk aversion, the host country is required to increase exit costs to reduce FDI volatility. These findings are supported by the OECD data on 42 countries' exits costs as shown in Section 5.

Although FDI exit costs were introduced to discourage the divestiture of FDI, the real impacts of exit costs were to deter FDI inflows that are decided by the future expected profits of FDI taking consideration of the exit costs. Most earlier studies tried to determine factors that affect FDI inflows focusing on the market size, growth rate, production costs, degree of openness, infrastructure, economic stability, and tax rates of the host country (e.g. Bevan & Estrin, 2004; Demirhan & Masca, 2008; Blonigen & Piger, 2014).

A few studies find that FDI flows are also significantly affected by the exit costs that are incurred when a multinational enterprise divests or leaves a host country. Haaland *et al.* (2003) define the exit costs as lay-off costs such as severance costs or redundancy costs, and then, they find that the volumes of production, employment, and profit decrease with the increase of lay-off costs. Görg (2005) investigates the trade-off between investment incentives and the exit costs of FDI. He finds that the US FDI outflows are affected by the exit costs in host countries. The results imply that if a country aims at attracting FDIs, simple provision of incentives for FDI inflows may not be enough and barriers to exit also need to be reduced. Dewit *et al.* (2009) examine how employment protection legislation affects location decisions of multinationals. They show that a country with a higher employment protection will be less attractive to FDI inflows, but once investment is made, the high level of employment protection will make relocation less likely, thus acting as exit costs. These studies suggest that the exit costs of FDI play a role of significant obstacles to FDI inflows.

Although the exit cost of FDI is an important economic issue heavily affecting FDI flows, few studies have been tried mainly due to the following reasons. First, it is not easy to define and quantify the exit costs of FDI because the exit costs range widely and arise in various forms at the time of the downsizing or closure of business. Specifically, the examples of exit costs include hiring and lay-off costs of labor forces according to employment protection legislation (Görg, 2005), repatriation restriction (Weigel *et al.*, 1997; Ihrig, 2000) in Brazil, Kenya, Turkey, and other African countries, and a limit on currency exchange earning in Ghana (Weigel *et al.*, 1997). A recent episode of exit costs goes as follows. An US private equity fund acquired an insolvent commercial bank at an under-valued price in South Korea during the Asian financial crisis in the late 1990s. However, when the Fund tried to sell the bank, she faced public criticism that foreign speculative funds bought domestic assets at under-valued prices, earned huge speculative capital gains in a short period, and then take out the nation's

wealth. Consequently, those funds paid unexpected additional expenses under the form of donations or taxes.[1]

The second feature is that the exit costs are very uncertain and often realized at a much higher level than originally expected at the entry decision-making stage because a host country tends to increase restrictions and barriers against FDI outflows after FDI inflows decision was made. This uncertainty of exit cost makes the entry of FDI more sensitive to the exit costs. One example is the high liquidation costs in China. According to an article titled as "China seeks foreign aid to pursue overseas investors who flee" in the *China Daily* (December 20, 2008), many foreign firms have absconded without going through the normal liquidation process because they perceived the liquidation fees as being too high and the liquidation process is too long. As an incentive policy for the foreign firms that invested in China, the corporate income taxes are exempted for initial two years and the taxes are reduced for additional three years. However, if the firms cannot operate 10 years at a minimum, then the firms have to pay back all the special financial benefits given to foreign investors as incentives, including the exempted taxes. Furthermore, unpaid employees' salaries, financial expenses, and public utility fees, etc. should be paid as part of the normal liquidation process. In general, the actual liquidation process takes from eight months to two years.

As far as we understand, this paper is the first trial for formal modeling on how to optimize exit costs of FDI for the sustainable economic growth of a developing country via FDI inflows although there has been several empirical studies on the exit costs of FDI (e.g. Görg, 2005; Dewit *et al.*, 2009). In this study, we focus on how various features of host countries affect the policy on the exit costs of FDI, such as the size of economy, the volatility of FDI inflows, the risk aversion and per capita GDP (Gross Domestic Product) of the host country. For the analysis, we set up a dynamic model and derive the optimal dynamics of the exit costs to maximize the expected utility of a risk-averse policy-maker taking consideration of FDI inflows and her risk-averse preference.

The major findings of this paper are that a host country with a relatively lower income level reduces FDI exit costs for more FDI inflows and enhanced economic growth. However, the risk factors caused by the volatility of FDI inflows and risk-averse preferences force a policy-maker to choose exit costs to minimize the negative impacts caused by the volatility of FDI inflows. We also demonstrate that if a host country is highly sensitive to volatility with elastic risk aversion to income changes, then the host country with a negative income shock increases FDI exit costs to reduce the volatility of FDI inflows. If the policy-maker's risk aversion is inelastic to the income changes, she will lower exit costs to induce higher FDI inflows when there is a negative income shock. This implies that if the host country becomes more risk averse with negative income shock, then the country prefers to reduce the volatility of FDI inflows by increasing the FDI exit costs. However, if the policy-maker of the host country with negative income shock is relatively less risk averse, she prefers to induce higher FDI inflows via lower FDI exit costs. These findings are supported by the empirical evidences based of OECD on 42 countries as shown in Section 5.

The analysis proceeds as follows. Section 2 presents the model to describe the relationship between the exit cost of FDI and the expected utility of the host country's

policy-maker, and derives the optimal dynamics of the exit cost considering policy incentives to increase FDI inflows and reduce volatility of FDI inflows. Section 3 examines the impact of the income level and the volatility of FDI inflows on the choice of FDI exit costs. Section 4 analyzes how host country's risk aversion with respect to the FDI volatility affects the optimal exit costs. Section 5 discusses the empirical supports from the OECDE data on 42 countries, and Section 6 considers the policy implications and concludes.

2. The Model

We set up a model to examine the optimal dynamics of the exit costs of FDI. A policy-maker has a von Neumann–Morgenstern utility function U defined over FDI stock, S_t, at time t and the utility is differentiable and increasing in FDI stock. Because FDI inflows have a positive effect on the growth rate of production and consumption of an open economy via increased capital formation, we assume that the policy-maker maximizes the expected utility from FDI stock, that is, $E_t[U(S_{t+1})]$ where $E[\cdot]$ is an expectation operator.[2] Taking a Taylor series expansion around S_τ yields the expected utility of the policy-maker as:

$$E_t[U(S_{t+1})] = \sum_{n=0}^{\infty} \frac{1}{n!} U^{(n)}(S_\tau) E_t[(S_{t+1} - S_\tau)^n]. \tag{1}$$

We assume that the utility function is quadratic, which gives us

$$E_t[U(S_{t+1})] = U(S_\tau) + U^{(1)}(S_\tau) E_t[(S_{t+1} - S_\tau)] + \frac{1}{2} U^{(2)}(S_\tau) E_t[(S_{t+1} - S_\tau)^2]. \tag{2}$$

If the utility function is unique up to a positive linear transformation and $U^{(1)} > 0$, then the policy-maker's expected utility function can be expressed as

$$E_t[\tilde{U}(S_{t+1})] = E_t\left[\frac{U(S_{t+1}) - U(S_\tau)}{U^{(1)}(S_\tau)}\right] = E_t[(S_{t+1} - S_\tau)] - \frac{1}{2}\gamma E_t[(S_{t+1} - S_\tau)^2], \tag{3}$$

where $\gamma = -U^{(2)}(S_\tau)/U^{(1)}(S_\tau)$ represents the constant absolute risk aversion. This utility function suggests that the policy-maker's expected utility increases with the level of FDI inflows, but decreases with its volatility.

The literature finds that the FDI flows as a percentage of GDP can be explained by economic variables such as the economic size, growth rate of economy, cost of production, degree of economic openness, infrastructure, economic stability, tax rates, and exit costs (e.g. Bevan & Estrin, 2004; Görg, 2005; Demirhan & Masca, 2008; Blonigen & Piger, 2014). Based on these findings, we assume that the expectation of FDI inflows (F^i_{t+1}) is a function of GDP and the economic variables, including the exit cost of FDI as follows:

$$E_t[F^i_{t+1}/G_t] = \mu^i + \sum_{k=1}^{K} \alpha_k \pi_{kt} - \alpha c_t, \tag{4}$$

where μ^i is a constant, α_k is the coefficient of a macroeconomic variable π_{kt}, and α is the coefficient of the exit cost, c_t, which works as barriers against FDI inflows. We also assume that the expected outflows of FDI (F^o_{t+1}) decrease linearly with the exit costs of FDI as follows:

$$E_t[F^o_{t+1}/G_t] = \mu^o - \beta c_t, \tag{5}$$

where μ^o is a constant and β is the coefficient of the exit cost ratio of FDI. Combining the two equations yields the FDI flows (F_{t+1}) as

$$\frac{F_{t+1}}{G_t} = F^i_{t+1}/G_t - F^o_{t+1}/G_t = \mu + \sum_{k=1}^{K} \alpha_k \pi_{kt} + \rho c_t + \varepsilon_{t+1}, \tag{6}$$

where $\mu \equiv \mu^i - \mu^o$, a stochastic term $\varepsilon_{t+1} \sim N(0, \sigma^2)$ represents the uncertainty of FDI flows, and $\rho \equiv \beta - \alpha$, which is assumed to be negative because the FDI inflows are more sensitive to the exit cost due to the higher expected total costs aggravated by the uncertainty of exit costs in the future. In addition, multinational firms' decision on the exit of FDI is mainly driven by the long-term profitability of the FDI influenced marginally by the exit costs of FDI. Therefore, in this study, we consider the case of negative ρ, where FDI inflows are reduced when the exit costs are increased.

Let S_τ take the value of the average FDI stock denoted as μ_S. As the current FDI stock is equal to the current FDI flows added to the former FDI stock, the dynamics of FDI stock can be expressed as $S_{t+1} = S_t + F_{t+1}$, and then, we get the policy-maker's expected utility function as follows:

$$\begin{aligned} E_t[\tilde{U}(S_{t+1})] &= E_t(S_{t+1}) - \mu_S - \frac{1}{2}\gamma Var_t(S_{t+1}) \\ &= S_t + E_t(F_{t+1}) - \mu_S - \frac{1}{2}\gamma Var_t(S_t + F_{t+1}) \\ &= S_t + E_t[G_t(A + \rho c_t)(1 + \varepsilon_{t+1})\,] - \mu_S - \frac{1}{2}\gamma Var_t[G_t(A + \rho c_t)(1 + \varepsilon_{t+1})] \\ &= S_t + G_t(A + \rho c_t) - \mu_S - \frac{1}{2}\gamma G_t^2 (A + \rho c_t)^2 \sigma^2, \end{aligned} \tag{7}$$

where and A denotes $\mu + \sum_{k=1}^{K} \alpha_k \pi_{kt}$.

The expected utility of the policy-maker increases with the level of FDI stock and decreases with the volatility of FDI flows. The constant absolute risk aversion (γ) represents the degree of negative impact of FDI volatility to the expected utility. This utility function is consistent with Lensink and Morrissey (2006) who show that an increase in FDI leads to an increase in the growth rate of output, whereas an increase in the volatility of FDI negatively affects the growth rate.

As a maximization problem of the expected utility of the policy-maker, the dynamic objective function is given as:

$$\max_{c_t} \int_0^T e^{-rt}\left[S_t + G_t(A + \rho c_t) - \mu_S - \frac{1}{2}\gamma G_t^2 (A + \rho c_t)^2 \sigma^2\right] dt, \tag{8}$$

where T is the end of period and the FDI stock (S_t) is a state variable. We assume that both the initial value of the FDI stock and the shadow price of the FDI flows at the end of period are zero, without loss of generality. Solving this optimization problem gives us the optimal exit cost of FDI:

$$c_t^* = \frac{1}{\rho}\left[\frac{\varphi}{\gamma G_t \sigma^2} - A\right], \tag{9}$$

where $\varphi = 1 + \frac{1}{r}(1 - e^{-r(T-t)})$ which decreases as time goes and reaches one at the end of time T (see the Appendix for the proof). Using the optimized exit cost ratio in (9), we investigate how the policy-maker determines the exit cost ratio of FDI considering economic characteristics of a host country.

3. The Impact of Economic Size and FDI Volatility on the Optimal FDI Exit Costs

First, we examine how the optimal exit costs are affected by the host country's market size measured by GDP. In order to analyze this issue, Equation (10) is obtained by taking the derivative of Equation (9) with respect to GDP.

$$\frac{\partial c_t^*}{\partial G_t} = -\frac{\varphi}{\rho\gamma G_t^2 \sigma^2}, \tag{10}$$

Since FDI inflows are more sensitive to the exit cost than FDI outflows as discussed before, that is, $\rho < 0$, Equation (10) has a positive sign. Thus a host country with a smaller GDP lowers the exit cost in order to induce larger FDI inflows for economic growth.

Now, we examine the impact of volatility of FDI inflows on the optimal exit cost. The objective function of the host country's policy-maker, Equation (8), suggests that the volatility of FDI inflows reduces expected utility with a higher constant absolute risk aversion (γ). In order to find out how FDI volatility and the risk aversion affect the optimal exit cost of FDI, we take derivatives of Equation (9) with respect to these risk factors, respectively, as follows:

$$\frac{\partial c_t^*}{\partial \sigma} = -\frac{2\varphi}{\rho\gamma G_t \sigma^3} > 0, \tag{11}$$

$$\frac{\partial c_t^*}{\partial \gamma} = -\frac{\varphi}{\rho\gamma^2 G_t \sigma^2} > 0. \tag{12}$$

These results mean that the optimal exit cost increases with the higher volatility of FDI

flows represented by σ, and the higher risk aversion of the policy-maker represented by γ with ρ given as negative. The intuition behind these results is that the exit cost should be adjusted to reduce the negative impacts caused by the volatility of FDI. When the volatility of FDI flows is increased, the host country needs to increase the exit costs to reduce the negative impacts of the volatility via reduced FDI inflows resulted from higher exit costs. These results imply that high FDI volatility with high risk aversion of the policy-maker affects economic growth negatively with reduced net FDI inflows.

4. GDP per Capita and the Exit Costs of FDI

In this section, we investigate how the income level as per capita GDP influences the host government's choice of FDI exit cost considering the conflicting effects of the income level and the volatility of FDI flows. In general, a low-income group in developing countries is more risk averse (Haushofer & Fehr, 2014), and thus we assume that the risk aversion coefficient (γ) is a decreasing function of GDP per capita. As GDP is decomposed into GDP per capita (g_t) and resident population (N_t), the optimal exit cost in Equation (9) can be expressed as follows.

$$c_t^* = \frac{1}{\rho}\left[\frac{\varphi}{\gamma N_t g_t \sigma^2} - A\right]. \tag{13}$$

In order to find out the effect of GDP per capita to the exit costs, we take the first derivative of Equation (13) with respect to GDP per capita:

$$\frac{\partial c_t^*}{\partial g_t} = -\frac{\varphi}{\rho N_t \sigma^2 \gamma g_t^2}(1+\delta), \tag{14}$$

where $\delta = (\partial\gamma/\gamma)/(\partial g_t/g_t)$, that is, income (i.e. per capita GDP) elasticity of risk aversion with negative sign because we assume that low-income group is more risk averse. The sign of Equation (14) is determined by δ which is summarized in Table 1. If a host country has inelastic income elasticity of risk aversion, that is, $-1 < \delta < 0$, the optimal exit cost is lowered when the income level is decreased as shown in Table 1.

Therefore, we can expect that when the policy-maker's risk aversion is inelastic, a country with a lower income level will be more vigorous in inducing FDI inflows by lowering exit costs of FDI. On the contrary, if per capita GDP elasticity of risk aversion is elastic, that is, $\delta < -1$, the optimal exit cost is raised as GDP per capita decreases with negative ρ. The intuition behind this result is that when the policy-maker's risk aversion is inelastic, the policy-maker does not become that much risk averse when the income level is lowered. Therefore, with inelastic risk aversion, the policy-maker prefers to lower exit cost to induce higher FDI inflows notwithstanding the possible increased FDI volatility since she is not that much sensitive to the

Table 1. The impacts of per capita GDP on the choice of exit costs.

	$-1 < \delta < 0$	$\delta < -1$
$\rho < 0$	$\partial c_t^*/\partial g_t > 0$	$\partial c_t^*/\partial g_t < 0$

increased volatility. However, when policy-maker's risk aversion is elastic to income change, the optimal exit cost will be increased to reduce the FDI volatility if the income level is lowered since the policy-maker become very sensitive to the volatility when income is lowered.

More specifically, if policy-maker's risk aversion is inelastic to the change of income level, that is, $-1 < \delta < 0$, when per capital income is decreased, policy-maker's risk aversion is increased inelastically, implying that the policy-maker becomes relatively less risk averse preferring larger FDI inflows. When a policy-maker's risk aversion is inelastic to income change with $\rho < 0$, the policy-maker responds to an income decrease by lowering the exit costs inducing larger FDI inflows.

However, when the policy-maker's risk aversion is elastic to the income level change, that is, $\delta < -1$, if per capita income level is decreased, the policy-maker becomes significantly risk-averse preferring to reduce negative impacts from the FDI volatility by increasing exit costs that lower FDI inflows. Since $\rho < 0$, the policy-maker can reduce the welfare loss from FDI volatility by increasing exit costs when the income level is decreased as shown Table 1.

5. Empirical Evidences

We examine whether empirical evidences are in the same line as our model predicts about the impact of the income level on the optimal exit costs of FDI based on OECD data about 42 countries' FDI exit costs and income levels. For this analysis, we use 210 observations for a total of 42 countries from 2010 to 2014 on yearly basis.

Data of FDI Inflows and Outflows, GDP, and GDP per Capita

OECD provides time series data of FDI inflows and FDI outflows of 42 countries including its member countries and other G20 member countries (Argentina, Brazil, China, India, Indonesia, Russia, Saudi Arabia, and South Africa).[3] OECD also provides major macro data including GDP, and GDP per capita for the 42 countries.[4]

Table 2 shows the basic statistical properties of FDI inflows, FDI outflows, GDP, and GDP per capita in each country. The unit of GDP is billion US dollars and the units of the others are million US dollars. In the case of United States, both GDP and FDI outflows are the largest and the size of FDI outflows is about double of FDI inflows. Thus, United States also has the largest FDI net outflows. On the contrary, GDP of China is about half of United States' GDP, but China has 20% larger FDI inflows than the United States. The FDI inflows of China are the quadruple of FDI outflows, and thus, the size of FDI inflows is the largest among those countries. India also has large GDP but per capita GDP is 1378 USD, which belongs to the lowest group. India also has larger FDI inflows than FDI outflows. In case of Korea, however, FDI outflows are about three times larger than FDI inflows with a large net FDI outflows.

Measures of the FDI Exit Costs

We use two types of measures for the FDI exit costs. The first measure of FDI exit costs is the severance cost for redundancy dismissal, which is consistent with the

Table 2. Statistical properties of FDI flows, GDP, and GDP per capita.

	FDI inflows		FDI outflows		GDP		GDP per capita	
	Mean	Std.dev.	Mean	Std.dev.	Mean	Std.dev.	Mean	Std.dev.
Argentina	8589	2992	1088	291	558,532	63,143	12,601	2296
Australia	47,489	12,347	11,352	7397	1,415,581	167,744	58,324	10,831
Austria	7158	4536	14,580	5051	418,199	19,211	48,848	1920
Belgium	44,888	60,598	17,024	48,975	513,888	21,198	45,781	1496
Brazil	54,085	17,357	–1170	7913	2,395,195	146,338	11,252	1708
Canada	39,228	15,302	44,921	8663	1,772,229	91,688	49,071	5113
Chile	19,050	5118	12,918	5717	253,667	22,337	13,716	2254
China	233,272	58,666	57,169	11,600	8,368,884	1,690,065	5429	1289
CzechRepublic	4878	2329	1376	1322	211,079	9147	20,130	857
Denmark	1892	8703	7637	5087	332,283	10,571	58,860	1642
Estonia	1249	604	309	1128	23,146	2470	16,507	1815
Finland	2623	3183	6489	2424	263,410	10,826	48,165	1851
France	25,279	12,886	53,197	40,139	2,766,071	95,630	41,924	1301
Germany	37,476	23,462	82,837	26,067	3,656,030	178,776	43,890	2186
Greece	1643	930	1088	1088	263,550	28,559	25,354	3137
Hungary	5520	5046	4266	4175	133,275	5194	13,224	503
Iceland	562	470	–571	2214	14,929	1426	43,986	3007
India	30,328	5460	10,840	5850	1,860,952	129,570	1378	145
Indonesia	15,095	6142	4345	2245	872,990	67,007	3272	610
Ireland	33,186	8258	17,835	11,002	231,234	11,273	50,042	1819
Israel	8433	3205	4604	2751	268,660	28,542	31,995	3159
Italy	16,042	12,780	29,453	16,803	2,152,269	75,359	36,314	1387
Japan	2593	5520	100,707	33,685	5,375,304	599,508	42,750	3744
Korea, Rep.	10,002	1269	27,045	5439	1,247,152	118,273	23,020	2953
Luxembourg	19,577	11,694	12,141	8470	56,881	3541	106,804	5382
Mexico	23,101	7369	13,946	5251	1,190,789	91,466	9235	1004
Netherlands	17,289	17,194	36,010	24,186	855,266	27,702	51,142	1669
New Zealand	1368	2069	597	1199	168,564	18,029	36,254	5655
Norway	16,054	4113	19,999	1976	491,768	36,630	94,527	10,160
Poland	9499	10,107	3195	5342	514,265	27,918	12,923	989
Portugal	5725	4052	2049	8074	230,812	11,171	22,177	1114
Russian Federation	36,191	10,754	44,549	16,160	1,877,089	215,157	12,226	2529
Saudi Arabia	20,273	12,194	3480	826	684,172	93,447	21,439	4065
Slovak Republic	1465	1155	369	604	95,358	4387	17,246	790
Slovenia	–7	710	–10	225	48,578	1865	23,760	1020
South Africa	4803	2514	2493	2150	381,042	26,283	7172	824
Spain	28,710	12,021	22,833	18,624	1,415,851	51,732	30,782	1402
Sweden	9536	6094	27,749	4842	549,098	36,394	55,075	5922
Switzerland	19,129	16,446	53,328	22,541	657,265	52,219	79,996	7693
Turkey	11,991	3149	2511	1101	783,513	34,207	10,188	927
United Kingdom	52,227	14,623	47,997	33,808	2,646,976	193,112	39,848	2020
United States	189,258	31,619	353,680	47,265	16,166,502	974,217	49,919	2380
Average	26,589	10,596	27,530	10,944	1,528,150	130,794	33,965	2680
Std. dev.	44,201	12,810	56,035	12,931	2,773,259	297,065	23,684	2385

Notes: This table shows the basic statistical properties of FDI inflows, FDI outflows, GDP, and GDP per capita in each country. Data period is from 2010 to 2014. The units of FDI flows and GDP are Million US dollars and the unit of GDP per capita is US dollars, respectively.

exit costs used in related literature, for example, such as severance costs or redundancy costs (Haaland *et al.*, 2003) and the lay-off cost index (Görg, 2005). The data of severance costs are provided in Labor Market Regulation data in Doing Business report in World Bank.[5] Specifically, we use the severance pays for redundancy dismissal for a worker with 1 year, 5 years, and 10 years of tenure as the proxies of the FDI exit costs. The second measure for FDI exit costs is FDI regulatory restrictiveness index in OECD database. While the index is classified into four sub-indices by the types of restrictions on FDI, we use the forth index about operational restrictions that includes the restrictions on capital repatriation.[6] The index is scaled from 0 (open) to 1 (close).

Table 3 shows the FDI restriction index and the severance pays for redundancy dismissal as the amount of paid weeks for 42 countries as of 2014. In general, the countries with higher FDI restriction index have larger severance pays. The severance pays for long-term workers are largest in Indonesia, and the severance pays are also relatively large in Argentina, Chile, China, Israel, Korea, and Turkey. On the contrary, there are no severance pays in 12 countries, specifically, Belgium, Denmark, Finland, Iceland, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, and United States. The FDI restriction index in Table 3 shows that there are little operational restrictions on FDI in Luxembourg, Spain, Slovak Republic, and Slovenia although Spain has larger severance pays. However, Iceland has the strongest operational restrictions on FDI, and there are also heavy restrictions on FDI in Brazil, Russia, and Saudi Arabia.

Table 4 shows the Pearson correlations among FDI flows divided by GDP, standard deviation of FDI flows, and our proxies of FDI exit costs, that is, FDI restriction index and three severance pays. We take a natural log of three severance pays. In this table, FDI flows (=FDI inflows – FDI outflows) appear to have positive correlations with all FDI exit cost proxies although FDI outflows show negative correlations with those exit costs. These results support that our assumptions described in Equations (5) and (6) are rational. However, standard deviation of quarterly FDI flows shows negative correlations with all exit costs variables, which means that exit costs reduce FDI volatility. This relation supports the intuition behind the result (11) which suggests that the exit costs reduce the volatility of FDI flows.

Panel Estimation Results

We estimate the following equation which is a linear version of Equation (9) using the data of 42 countries from 2010 to 2014:

$$y_{it} = \alpha + \mu_i + \tau_t + \sum_{k=1}^{K} \beta_k X_{kit-1} + e_{it}, \tag{15}$$

where y_{it} is the dependent variable to measure the FDI exit costs, i and t denote each country and time, α is a common intercept across countries, μ_i is a country-specific intercept for the pure cross-country effect, τ_t is the time effect, X_{kit-1} is the explanatory variables such as GDP, GDP per capita, β_k is the coefficient of a explanatory variable, and e_{it} is an error term. We use the FDI restriction index as well as three severance

Table 3. FDI restriction index and the severance pays as of 2014.

	Country	Restriction Index	Severance pays for redundancy dismissal for a worker with		
			One year tenure	Five year tenure	Ten year tenure
1	Argentina	0.014	4.33	21.67	43.33
2	Australia	0.003	4.00	10.00	12.00
3	Austria	0.007	0.00	0.00	0.00
4	Belgium	0.026	0.00	0.00	0.00
5	Brazil	0.049	1.66	8.32	16.64
6	Canada	0.005	0.00	5.00	10.00
7	Chile	0.003	4.33	21.67	43.33
8	China	0.005	4.33	21.67	43.33
9	Czech Republic	0.007	8.67	13.00	13.00
10	Denmark	0.003	0.00	0.00	0.00
11	Estonia	0.004	4.33	4.33	4.33
12	Finland	0.010	0.00	0.00	0.00
13	France	0.012	0.87	4.33	8.67
14	Germany	0.006	2.17	10.83	21.67
15	Greece	0.001	8.67	13.00	26.00
16	Hungary	0.001	0.00	8.67	13.00
17	Iceland	0.100	0.00	0.00	0.00
18	India	0.013	2.14	10.71	21.43
19	Indonesia	0.016	17.33	60.67	95.33
20	Ireland	0.008	0.00	11.00	21.00
21	Israel	0.032	4.33	21.67	43.33
22	Italy	0.004	0.00	0.00	0.00
23	Japan	0.011	0.00	0.00	0.00
24	Korea, Rep.	0.005	4.33	21.67	43.33
25	Luxembourg	0.000	0.00	4.33	8.67
26	Mexico	0.026	14.57	21.43	30.00
27	Netherlands	0.002	0.00	0.00	0.00
28	New Zealand	0.005	0.00	0.00	0.00
29	Norway	0.005	0.00	0.00	0.00
30	Poland	0.010	4.33	8.67	13.00
31	Portugal	0.004	2.86	14.29	28.57
32	Russia	0.057	8.67	8.67	8.67
33	Saudi Arabia	0.070	2.17	10.83	32.50
34	Slovak Republic	0.000	0.00	8.67	13.00
35	Slovenia	0.000	0.87	4.33	10.83
36	South Africa	0.018	1.00	5.00	10.00
37	Spain	0.000	2.86	14.29	28.57
38	Sweden	0.003	0.00	0.00	0.00
39	Switzerland	0.011	0.00	0.00	0.00
40	Turkey	0.005	4.33	21.67	43.33
41	United Kingdom	0.025	0.00	3.13	6.27
42	United States	0.011	0.00	0.00	0.00
	Average	0.0014	2.694	9.369	16.980

Notes: This table shows the FDI restriction index and the severance pays for redundancy dismissal as the amount of paid weeks for 42 countries as of 2014. FDI regulatory restrictiveness index is publicly provided in OECD database. While the index is classified into four sub-indices by the types of restrictions on FDI, we use the forth index about operational restrictions that includes the restrictions on capital repatriation. The index is scaled from 0 (open) to 1 (close). The severance pays for redundancy dismissal for a worker with 1 year, 5 years, and 10 years of tenure are provided in Labor Market Regulation data in Doing Business report in World Bank.

Table 4. Correlation matrix of FDI flows and FDI exit cost proxies.

	FDI flow per GDP	FDI inflow per GDP	FDI outflow per GDP	Std. Dev. of FDI flows	FDI Restriction Index	Svr. Pay –1 year	Svr. Pay –5 year	Svr. Pay –10 year
FDI flow per GDP	1	0.604	–0.037	–0.131	0.323	0.050	0.129	0.146
FDI inflow per GDP	0.604	1	0.774	0	–0.029	–0.110	0.001	0.034
FDI outflow per GDP	–0.037	0.774	1	0.118	–0.293	–0.177	–0.102	–0.074
Std. Dev. of FDI flows	–0.131	0.011	0.118	1	–0.055	–0.318	–0.268	–0.223
FDI Restriction Index	0.323	–0.029	–0.293	–0.055	1	–0.001	–0.039	–0.023
Svr. Pay –1 year	0.050	–0.110	–0.177	–0.318	–0.001	1	0.799	0.701
Svr. Pay – 5 year	0.129	0.001	–0.102	–0.268	–0.039	0.799	1	0.985
Svr. Pay – 10 year	0.146	0.034	–0.074	–0.223	–0.023	0.701	0.985	1

Notes: Table 3 shows the Pearson correlations between FDI flows divided by GDP, the standard deviation of quarterly FDI flows, and proxies of FDI exit costs, that is, FDI restriction index and three severance pays. In this table, "Svr. pay – 1 year", "Svr. pay – 5 year" and "Svr. pay – 1 year" represent severance pays for redundancy dismissal for a worker with one year tenure, 5 year tenure, and 10 year tenure, respectively. We take a natural log of three severance pays.

pays as the dependent variables. We take a natural log for the explanatory variables and the severance pays.

The null hypothesis that there are no fixed effects is rejected due to high F values, and thus, we employ two ways fixed effects panel estimation. Table 5 shows the estimation results by four dependent variables. The regression model is supported by R-squared values that are close to 1. The estimation results show that FDI restriction index is significantly increased with the GDP and per capita GDP of host countries. This result implies that when GDP level or per capita GDP level of host country are decreased, FDI restriction index is decreased with lower exit costs. In other words, a host country with lower GDP level or lower per capita GDP prefers to set the lower transaction costs as predicted on our model. In the same context, when income level of the host country is increased, the severance payment for all three different types of work experiences was increased significantly. This means that when the host countries' income levels are lower, they prefer to lower the FDI exit costs, that is, lower severance costs, that will induce higher FDI flows (=FDI inflows −FDI outflows) as predicted in the model. [7]

These results are consistent with the case of inelastic risk aversion to income change in Table 1. Therefore, the policy-maker responds to an income decrease by lowering the exit costs to induce larger FDI flows because the elasticity of risk aversion to income is inelastic as demonstrated by Guiso and Paiella (2008). This finding gives an important implication to the countries with low per capita GDP such as China

Table 5. Panel estimation results.

Explanatory variables	Dependent variables							
	FDI restriction index		Severance pay for 1year's work		Severance pay for 5 year's work		Severance pay for 10 year's work	
Intercept	–0.09	–0.03	–28.04	–9.71	–20.16	–6.98	–13.94	–4.74
	(–2.67)***	(–2.14)**	(–4.29)***	(–3.91)***	(–2.85)***	(–2.61)***	(–1.87)*	(–1.68)*
gdp(–1)	3.4		930.15		671.18		462.36	
	(2.91)***		(4.31)***		(2.88)***		(1.88)*	
gdp_pcap(–1)		3.45		918.38		666.95		447.72
		(2.78)***		(3.99)***		(2.7)***		(1.71)*
R^2	0.996	0.996	0.947	0.946	0.965	0.964	0.972	0.972
F-test for no fixed effects								
F-value	982.67	977.98	49.98	41.81	77.13	53.64	102.84	73.59

Notes: The numbers in parentheses are *t*-values. *** Significant at the 0.01 level (2-tailed). ** Significant at the 0.05 level (2-tailed). * Significant at the 0.10 level (2-tailed). This table shows the panel estimation results on the impacts of income changes on the FDI exit costs based on 42 countries' data from 2010 to 2014. The dependent variables are the FDI restriction index and three severance pays for redundancy dismissal for a worker with 1 year, 5 years, and 10 years of work experiences respectively. The explanatory variables are GDP (gdp(–1)), GDP per capita (gdp_pcap(–1)), at the unit of US dollars, and (–1) denotes a previous year. We take a natural log of all variables except the FDI restriction index, and then, we divide the explanatory variables by 1000. We use two ways fixed effects panel estimation. For convenience, we omit the estimated cross-section effects for each country and time effects.

and India. Specifically, the policy-makers of the lower income countries should maintain lower level of exit costs of FDI for economic growth.

Panel Estimation Results by Countries' Income Levels

It has been shown from the previous panel estimation that the FDI exit costs have a positive relationship with country income level due to inelastic risk aversion to income, and thus, a developing country with lower income level should decrease the FDI exit costs for economic development. In this subsection, we investigate whether the relationship between the FDI exit costs and GDP (or per capita GDP) varies across countries' income levels by running regression based on two sub-samples of income levels, that is, high income and low-income groups.

Table 6 shows the panel analysis results on the impacts of income changes on the FDI exit costs by classifying 42 countries into low and high income groups. Thus, each group contains 21 countries and we check both GDP and per capita GDP as county's income. The positive relationship between the FDI exit costs and country income change is significant only in the low-income groups, that is, Panels A and C in Table 6. These results implicate that decreasing FDI exit costs is more imperative in lower income countries because those countries need FDI inflows for economic growth. Therefore, it would be more appropriate for developing countries to decrease FDI exit costs.

The Relationship Between FDI Flows and the Exit Costs

In the model section, we assumed that FDI net-inflows (=FDI inflows – FDI outflows) have a negative relationship with FDI exit costs. In order to check this relationship, we estimate the following equation:

$$F_{it} = \alpha + \mu_i + \tau_t + \omega C_{it-1} + \varepsilon_{it}, \tag{16}$$

where F_{it} is FDI net-inflows divided by GDP in a previous year, i and t denote each country and time, α is a common intercept across countries, μ_i is a country-specific intercept for the pure cross-country effect, τ_t is the time effect, C_{it-1} is an exit cost on FDI at $t-1$, ω is the coefficient of a explanatory variable, and ε_{it} is an error term.

Table 7 shows the estimation results on Equation (16). The impact of exit costs on net FDI inflows turns out to significantly negative in high per capita GDP countries while insignificant in case of low per capital GDP. As the share of high income countries in FDI flows is dominant while the FDI flows data of low-income countries show outlying patterns often, the estimation results in Table 7 are considered to support that the exit costs of FDI are working as obstacles to FDI net-inflows (Table 8).

In addition, FDI flows can be affected by cyclical movement of the economy. To consider the impact of economic movement while minimizing the possible noises from the unstable cyclicality of economic movement, we checked the Pearson correlation coefficient between FDI net-inflows and GDP growth rate. The results in Table 6 support that FDI net-inflows are positively correlated with the GDP growth rate as a proxy variable of economic movement, and the remaining impacts economic

Table 6. Panel estimation by countries' income levels.

	Dependent variables							
Explanatory variables	FDI restriction index		Severance pay for 1 year's work		Severance pay for 5 year's work		Severance pay for 10 year's work	
A. Low per capita GDP countries								
Intercept	–0.06	0.02	–29.86	–10.86	–17.14	–4.92	–8.22	–0.74
	(–0.9)	(0.89)	(–3.21)***	(–2.98)***	(–1.75)*	(–1.29)	(–0.8)	(–0.18)
gdp(–1)	4.75		1121.60		714.16		426.38	
	(1.49)		(3.14)***		(2.57)**		(1.3)	
gdp_pcap(–1)		4.82		1147.91		717.97		410.43
		(1.43)		(3.08)***		(2.56)**		(1.26)
R^2	99%	99%	93%	93%	85%	85%	88%	88%
F-test for no fixed effects								
F-value	296.96	337.41	33.68	33.71	12.34	14.29	14.51	18.32
B. Large per capita GDP countries								
Intercept	–0.14	–0.04	–33.39	–12.62	–55.50	–20.96	–59.89	–22.62
	(–1.43)	(–1.22)	(–4.06)***	(–4.05)***	(–4.06)***	(–4.04)***	(–4.06)***	(–4.04)***
gdp(–1)	4.84		1098.93		1826.65		1971.18	
	(1.54)		(1.46)		(1.47)		(1.47)	
gdp_pcap(–1)		5.12		1165.60		1937.33		2090.63
		(1.52)		(1.45)		(1.45)		(1.45)
R^2	99%	99%	93%	93%	96%	96%	97%	97%
F-test for no fixed effects								
F-value	398.80	391.07	35.03	33.40	62.77	61.65	91.48	90.15
C. Small GDP countries								
Intercept	0.001	0.004	–37.53	–15.16	–18.65	–6.99	–4.54	–0.79
	(0.03)	(0.4)	(–2.73)***	(–2.53)***	(–1.3)	(–1.12)	(–0.3)	(–0.12)
gdp(–1)	0.08		1385.22		686.42		163.87	
	(0.18)		(3.55)***		(3.61)***		(0.7)	
gdp_pcap(–1)		–0.14		1374.24		628.47		61.07
		(–0.27)		(3.37)***		(3.08)***		(0.25)

(*Continued*)

Table 6. Continued.

	Dependent variables							
Explanatory variables	FDI restriction index		Severance pay for 1 year's work		Severance pay for 5 year's work		Severance pay for 10 year's work	
R^2	100%	100%	94%	94%	95%	95%	96%	96%
F-test for no fixed effects								
F-value	4491.03	5353.20	40.42	31.76	53.29	32.29	69.83	44.82
D. Large GDP countries								
Intercept	–0.118	–0.036	–9.82	–3.50	–15.78	–5.61	–17.07	–6.07
	(–1.46)	(–1.18)	(–1.56)	(–1.49)	(–1.51)	(–1.43)	(–1.51)	(–1.44)
gdp(–1)	4.26		322.96		519.31		561.78	
	(1.9)*		(1.26)		(1.22)		(1.22)	
gdp_pcap(–1)		4.36		322.97		518.00		560.48
		(1.85)*		(1.25)		(1.21)		(1.21)
R^2	99%	99%	98%	98%	97%	97%	98%	98%
F-test for no fixed effects								
F-value	340.03	334.31	115.24	77.08	79.67	48.18	98.03	63.47

Notes: This table shows the panel analysis results on the impacts of income changes on the FDI exit costs by classifying 42 countries into low and high income groups. Thus, each group contains 21 countries and we use both GDP and per capita GDP as county's income. All variables' definitions and estimation methods are the same in Table 5.

Table 7. Relationship between FDI flows and FDI exit costs.

Explanatory variables	Countries with smaller per capita GDP				Countries with larger per capita GDP			
	Dependent variable : FDI_inflow/ GDP(–1)				Dependent variable : FDI_inflow/ GDP(–1)			
Intercept	–0.14	0.0227	–0.0209	–0.2019	–0.02	–0.0214	–0.0214	–0.0214
	(–2.4)	(2.51)	(–0.8)	(–4.8)***	(–0.84)	(–0.93)	(–0.93)	(–0.93)
FDI restriction index(–1)	4.94				0.66			
	(1.38)				(1.14)			
Severance pay for 1 year's work(–1)		0.0001				–0.0035		
		(0.09)				(–2.4)**		
Severance pay for 5 year's work(–1)			0.0021				–0.0014	
			(0.7)				(–2.39)**	
R^2	68%	61%	64%	78%	84%	66%	66%	66%
F-test for no fixed effects								
F-value	3.69	2.75	3.12	6.15	9.12	3.31	3.31	3.32

Notes: The numbers in parentheses are *t*-values. *** Significant at the 0.01 level (2-tailed). ** Significant at the 0.05 level (2-tailed). * Significant at the 0.10 level (2-tailed). This table shows the relationship between FDI flow (=FDI inflow – FDI outflow) divided by GDP and proxies of FDI exit costs, that is, FDI restriction index and three severance pays. The units of FDI flow and GDP are Million US dollars. (–1) denotes a previous year. The countries are classified into low and high income groups by per capita GDP.

movement depend on the preferences of agents such as the level of risk averseness, and the elasticity of risk averseness as discussed in earlier section.

6. Concluding Remarks

The exit cost is an important factor in both the entry and exit decisions of FDI. In order to analyze the effects of exit costs on FDI inflows that are essential for capital formation of host countries, we set up a theoretical model to determine the optimal exit costs of FDI from the expected utility maximization problem of the host country's policy-maker considering the level of FDI inflows and the volatility of FDI.

We find that when the host country's income level is decreased, the policy-maker reduces the FDI exit costs inducing higher FDI inflows, implying that a host country with lower income level prefers to induce higher FDI inflows by lowering FDI exit costs. In addition, if a host country is highly sensitive to the risk caused by higher volatility of FDI inflows with elastic risk aversion with respect to the income changes, a negative income shock of the host country will make the policy-maker to increase the exit costs that will lower FDI volatility via lower FDI inflows.

Table 8. Pearson correlation coefficient between FDI flows and GDP growth rate.

	FDI inflows (A)	FDI outflows (B)	FDI net-inflows (=A–B)
GDP	0.259	0.021	0.229
growth rate	(0.004*)	(0.822*)	(0.011*)

**p*-Value of the null hypothesis (no correlation between growth rate and FDI net-inflows).

However, if the host country's risk aversion is inelastic to income change with lower sensitivity the risks, a country with lower income will prefer to lower exit costs for higher FDI inflows. These findings are also supported with empirical evidences from 42 countries' data on exit costs and income changes as shown in Section 5.

These findings are in the same line with developing economies' competition for FDI inflows via various policy incentives and deregulation for FDI including lowering exit costs for FDI. In addition to the finding that the lower exit costs of FDI can work as an incentive for FDI inflows, we found that host country's risk aversion against volatile FDI flows plays an important role in the policies for the exit costs of FDI. If a host country is more vulnerable to foreign shocks and damaged more by the volatility of FDI, then a conservative approach with higher exit costs for FDI is the optimal policy. When the host country with lower income level is less vulnerable and sensitive to volatility of FDI flows, more aggressive approach with lower exit costs is the optimal policy resulting in higher FDI inflows. These results implicate that for relatively rapid capital formation via FDI inflows, a more aggressive risk-taking approach with lower exit costs might be more effective for a developing economy.

Although this paper can claim as the first trial to formally examine the optimal exit cost of FDI, further extension of studies is required including empirical identification of risk aversion of the host country's policy-makers and explicit discussions on the path FDI inflows and social welfare in the future studies.

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Notes

1. According to an article titled as "Newbridge Capital: Not Being Probed By South Korea Tax Agency" in the *Dow Jones Newswires* (April 20, 2005), Newbridge Capital acquired 50% of Korea First Bank for around 415 million dollars in December 1999 when most of Korean banks were facing economic distress just after the 1997–1998 Asian financial crisis, and reaped 983 billion dollars in capital gains by selling its stake to Standard Chartered Bank in April, 2005. Newbridge said its 16.7 million dollars contribution to South Korea was provided to help develop the financial industry and to help small and medium-size businesses grow mainly considering Koreans' antipathy against speculative funds. In the case of Korea Exchange Bank (KEB), it is the biggest ever financial deal taken over by a foreign fund, Lone Star, for 1.15 billion US dollars in October 2003. The acquisition was arranged by the South Korean government as part of its efforts to consolidate the banking sector in the aftermath of the Asian financial crisis. According to the *AFX News* (April 17, 2006), Lone Star offered to donate 100 billion *won* (equivalent to 104 million US dollars) to local charities in an effort to improve its battered image as a speculative vulture fund in South Korea for finalizing this deal. The fund also offered to deposit with KEB about 725 billion *won* (equivalent to 604 million US dollars) for a tax payments after an investigation, which might be levied on the sale of its stake in KEB.
2. See Barro and Sala-I-Martin (1995), Markusen (1995), Borensztein, de Gregorio, and Lee (1998) for the discussions about the role of FDI inflows on the economic growth.

3. The data are quarterly basis since 2009 and available at http://www.oecd-ilibrary.org/finance-and-investment/data/oecd-international-direct-investment-statistics/foreign-direct-investment-main-aggregates_data-00338-en.
4. The data are yearly basis since 2006 and available at http://www.oecd-ilibrary.org/economics/data/oecd-national-accounts-statistics/national-accounts-at-a-glance_data-00369-en.
5. Several redundancy cost measures such as notice periods and severance pays for redundancy dismissal are provided in Labor Market Regulation data in Doing Business report which reviews business regulations in 189 economies. The data are available at http://www.doingbusiness.org/data/exploretopics/labor-market-regulation#firingCost, and provided yearly basis since 2010.
6. The data are available at http://stats.oecd.org/Index.aspx?datasetcode=FDIINDEX#.
7. A recent change of FDI policy in India would be an example to support this result. According to an article titled as "Easy exit norms for foreign investors in construction sector" reported in THE HINDU, December 2014, India government has eased the exit norms for repatriation of investment in order to increase FDI inflows in construction sectors.

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Appendix

This Appendix shows the solutions for the dynamic optimization on the exit cost. In order to solve the optimal control problem, we set up a Hamilton-Jacobi-Bellman equation, as follows:

$$\mathcal{H} = e^{-rt}\left\{S_t + G_t(A + \rho c_t) - \mu_S - \frac{1}{2}\gamma G_t^2 (A + \rho c_t)^2 \sigma^2\right\} + \lambda G_t (A + \rho c_t), \tag{A.1}$$

where $A = \mu + \sum_{k=1}^{K} \alpha_k \pi_{kt}$.

The objective function is subject to the following.

$$\frac{\partial E(S_{t+1})}{\partial t} = E(F_{t+1}) = G_t(A + \rho c_t), \tag{A.2}$$

$$S(0) = 0, \tag{A.3}$$

$$\lambda(T) = 0. \tag{A.4}$$

The first order condition, with respect to the FDI exit costs, is:

$$\frac{\partial \mathcal{H}}{\partial c} = e^{-rt}\{G_t\rho - \gamma G_t^2\sigma^2(A + \rho c_t)\rho\} + \lambda G_t\rho = 0.$$

$$\therefore c_t^* = \frac{1}{\rho}\left[\frac{1 + e^{rt}\lambda}{\gamma G_t\sigma^2} - A\right]. \tag{A.5}$$

The second-order condition, that is, $\partial^2\mathcal{H}/\partial c^2$, is zero. If we integrate another necessary condition, that is, $\partial\lambda/\partial t = -\partial\mathcal{H}/\partial S$, on time t using $\lambda(T) = 0$, then we can get the equation as follows.

$$\therefore \lambda = \frac{1}{r}(e^{-rt} - e^{-rT}). \tag{A.6}$$

The optimal exit costs of FDI can be obtained by incorporating (A.6) into (A.5):

$$\therefore c_t^* = \frac{1}{\rho}\left[\frac{1}{\gamma G_t\sigma^2}\left(1 + \frac{1}{r}(1 - e^{-r(T-t)})\right) - A\right]. \tag{A.7}$$

In order to find the optimal dynamics of FDI stock, we incorporate the equation above into the differential equation on the stock of FDI in the first constraint:

$$\frac{\partial E(S_{t+1})}{\partial t} = \frac{1 + \frac{1}{r}(1 - e^{-r(T-t)})}{\gamma\sigma^2}. \tag{A.8}$$

Integrating Equation (A.8) on time t yields

$$E(S_{t+1}) = \frac{1}{\gamma\sigma^2}\left(t + \frac{t}{r} - \frac{1}{r^2}e^{-r(T-t)}\right) + K, \tag{A.9}$$

where K is a constant. We can determine the value of K by using $S(0) = 0$:

$$E(S_1) = -\frac{e^{-rT}}{r^2\gamma\sigma^2} + K = 0.$$

$$\therefore K = \frac{e^{-rT}}{r^2\gamma\sigma^2}.$$

Incorporating K into Equation (A.9) gives us the optimal dynamics of expected FDI stock:

$$\begin{aligned} E(S_{t+1}) &= \frac{1}{\gamma\sigma^2}\left(t + \frac{t}{r} - \frac{1}{r^2}e^{-r(T-t)}\right) + \frac{e^{-rT}}{r^2\gamma\sigma^2} \\ &= \frac{1}{\gamma\sigma^2}\left(t + \frac{t}{r} + \frac{1}{r^2}e^{-rT}(1 - e^{rt})\right). \end{aligned} \tag{A.10}$$