Exchange rate, political environment and FDI decision: a new insight

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Exchange rate, political environment and FDI decision: a new insight

Abstract: We examine the role of exchange rate (ER) and political environment (PE) alterations in determining Japanese Multinational Companies’ (MNCs) investment decisions. First, we present a model where MNCs make an investment decision under uncertainty. Second, we employ a panel data analysis of 56 developed and developing countries for the period of 1995-2012 (country and industry level). The main findings show that MNCs are less likely to tolerate financial and political risks in developing countries. However, they may tolerate these risks in developed countries if the level of initial stability is far enough than their essential need. The impact of ER expectation remained ambiguous. Various interpretations and mechanisms are discussed.

JEL Classification Number: F-21, International Investment; Long-Term Capital Movements
F-23, Multinational Firms; International Business

Key words: foreign direct investments, multinational companies, exchange rate, political environment
1. Introduction

According to JETRO survey on the International Operations of Japanese Firms (JETRO 2013) Japanese Multinational Companies (MNCs) are concerned with a high level of foreign exchange risk, undeveloped legal systems and problems in application of laws, problems in protection of intellectual property rights, political risks and other risk factors in the emerging economies. In particular, a concern of political and financial stability is of a primary importance for Foreign Direct Investment (FDI) decision.

The main scope of our study is to analyze the effects of exchange rate and political environment on the investment behavior of Japanese MNCs in developed and developing countries for a recent period of 1995-2012 years.

The effect of financial risk (through Exchange Rate (ER) volatility) and political risk (proxied by Political Environment (PE)) on Japanese MNCs behavior can be gleaned from the figures 1a and 1b respectively.¹

Figures 1a-1b show a non-linear response of Japanese MNCs to the changes in these risk variables. We postulate in our paper that the reason for such a non-linear effect is a different perception of financial, business and risk environment by Japanese MNCs that depends on the level of economic development of the host countries. In addition, this non-linear response depends on the industry in which the company operates.

There is a vast literature on the ER and political risk effects on FDI (e.g. Guerin and Manzocchi 2009, Lee and Min 2011). Most studies suggest that political instability may have a negative effect on the incoming FDI (Busse and Hefeker 2007, Hayakawa, Kimura, and Lee 2011, Wei 2000). Nevertheless, a few opposite evidence studies note that a role of countries’ level of economic development (Peng and Beamish 2008) together with industries as FDI destination (Clare and Gang 2010) should not be neglected.

With regard to Exchange Rate level effect on MNCs activities the theoretical prediction is that home country’s currency appreciation is expected to affect positively FDI flows due to relative wealth effect (Froot and Stein 1991) and capital market imperfection (Blonigen 1997) arguments.

ER volatility, however, is a more debatable issue in both theoretical and empirical literature. Several theoretical arguments were emphasized in the literature. First, foreign investors tend to postpone the investment due to the effect of risk aversion (Campa 1993, Dixit 1989). On the other hand, Goldberg and Kolstad (1995) proposed that if uncertainty is correlated with export demand shock in the market that MNCs intend to serve, then risk-averse firms would

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¹ PE represents political stability and is interpreted as opposite to political risk. This measure is compiled by Euromoney Country Risk rating. For more details, see variables discussion in section 3.
tend to increase FDI. Finally, Itagaki (1981) and Cushman (1985) theoretical analysis hypothesized that uncertainty may affect positively FDI if it is used as substitute to exports. Urata and Kiyota (2004) showed that ER volatility discouraged Japanese FDI to a large number of countries for a period of 1990-2000. However, Takagi and Shi (2011) found evidence that ER uncertainty had a positive impact on Japanese MNCs activities in the nine Asian countries in the period of 1987-2008. In addition, Takagi and Shi (2011) emphasized the importance of ER expectation and proposed its alternative way of measurement by the third moment of ER changes. They suggested that expectation of yen appreciation will discourage Japanese FDI since it may “reduce expected value of repatriated profits expressed in yen” (2011, 5). This result is somewhat identical to the findings of Chakrabarti and Scholnick (2002) for US FDI flows to OECD countries for a period of 1982-1995. On the other hand, Cushman (1985, 1988) hypothesized a contrary behavior for the case of domestic production with input from foreign subsidiary which could be associated with vertical form of FDI.

Our work is inspired by Clare and Gang’s (2010) theoretical analysis, and by three empirical studies of the political stability and exchange rate effects on Japanese FDI, namely Urata and Kiyota (2004), Peng and Beamish (2008), and Takagi and Shi (2011). However, our analysis differs in several important ways. First, Clare and Gang’s (2010) theoretical model represents only a partial maximization while ours is a full optimization. Second, we distinguish between host countries’ level of economic development, and we perform industry level analysis. Finally we measure ER level, ER volatility and expectation by the first, second and third moment of the ER changes as was suggested by Takagi and Shi (2011). However, we extend the analysis to a larger number of countries for a period of 1995-2012 and to the industry level dimension.

As a result, our analysis suggests a new interpretation of the MNCs outward activities’ decisions. We postulate that their response to changes in political risk and ER risk is sensitive to the MNCs perception of what is necessary level of these uncertainties for their activities. Our new interpretation suggests that if the level of stability is far enough what is necessary for MNCs than a slight increase in the risk may actually be tolerated by them, and FDI would be undertaken due to higher expected profits. Thus, we believe that our theoretical and empirical contribution, if any, has an important implication for the understanding of multinational companies’ behavior in response to changes in the levels of ER risk and political risk.

The remainder of the paper is organized as follows. Section 2 presents our theoretical model. Section 3 describes data and empirical approach. Section 4 and 5 presents the empirical results and robustness checks. Section 6 concludes.
2. Theoretical model of ER and PE effects on FDI

Consider a Japanese MNC with a foreign affiliate producing a single homogeneous product with inputs at constant prices. The product is distributed to home and foreign market, and the randomness in exchange rate is the only source of random variation in the firm’s value. Assume that the firm is a risk averter, and it seeks to maximize its expected utility of profits. Thus, the following are some essential assumptions:

(2-1) Two-country model: H (home) and F (foreign)
(2-2) H - The parent company is located in H; F - The foreign subsidiary (the foreign affiliate) is located in F.
(2-3) A single homogeneous product is produced by the affiliate, and is sold by both the parent and the affiliate.
(2-4) The exchange rate (e) is measured in units of home currency per unit of foreign currency. This is the only random variable for the baseline model. (PE is considered later).
(2-5) Timing:
   1. FDI is carried out by home parent to foreign affiliates. There is no production by the parent.
   2. Production by foreign affiliate is done by employing Labor (L) and Specific factor (Z).
   3. The output (Y) is distributed to H's and F's markets with no transport costs.
   4. H's parent makes profits (R) by the sales after paying FDI costs.
   5. F's affiliates make profits (R*) by the sales after paying factor costs.
   6. The parent counts the joint profits (Q~).
(2-6) Risk: Both the parent and the affiliates are "risk averters" in the sense of Arrow-Pratt. This assumption will be considered in more detail later.
(2-7) FDI represents the Capital (K) bought in H and sent to F. The cost of K for Parent is the implicit rental cost (r) (for example, the opportunity costs).
(2-8) Factor markets for Z and L in Foreign country are competitive. Factor Prices are constant (w* for L and r* for Z).
(2-9) A fixed proportion "a" of output is sold in H's market (0<a<1): The rest (1-a) in F's market.
(2-10) The final prices are P and P* for H and F. The prices are assumed constant throughout the analysis.
(2-11) Production function is Cobb-Douglass with Constant Returns to Scale (CRS) for closed-form solutions.
(2-12) ER and PE are mutually independent

Production: The output (Y) is produced only in F.

\[ Y = K^\alpha Z^\beta L^\gamma; \quad \alpha + \beta + \gamma = 1, \quad (1) \]

Where K represents FDI, Z is a Foreign Specific factor (cost=r*) and L= Foreign Labor(cost=w*). The MNC’s profit is restrained by these three factors. Following Clare and
Gang (2010) K and Z are not regarded as substitutes. Z is foreign country capital and “contains within it knowledge of host country institutions which multinationals lack”. (2010, 4)

The MNC’s Domestic Profits are defined as Domestic Revenue minus Costs:
\[ R = \text{PaY} - rK \]  
(measured in the Home currency) \hspace{1cm} (2)

Foreign Affiliate’s Profits are defined as Foreign Affiliate’s Revenue minus Costs:
\[ R^* = \text{P*(1-a)Y} - r^*Z - w^*L \]  
(measured in the Foreign currency) \hspace{1cm} (3)

PE is considered to represent “political risk” (PR) for the MNC. Kesternich and Schnitzer (2010) consider three PRs namely:

(1) outright expropriation representing a classical form of political risk when the foreign country government takes the MNC’s property without compensation (Buckley 2003, Hill 1998).

(2) creeping expropriation “negatively affects the expected returns on the investment project (e.g. exchange rate restrictions, failure to enforce or respect the agreed property and contract rights)” (Kesternich and Schnitzer 2010, 211).

(3) confiscatory taxation “directly affects the MNC’s profits (e.g. corruption, discriminatory taxation)” (Kesternich and Schnitzer 2010, 212).

The baseline model abstracts from any "local taxation" (Kesternich and Schnitzer 2010, 210). Outright expropriation is functionally equal to confiscatory taxation. Thus, we consider (1) and (2). However the derived theoretical model suggests that equations for the optimal K (FDI) are qualitatively the same in both cases. Thus, it is not necessary to distinguish "outright" and "creeping" expropriations. For space considerations we present only the case of outright expropriation here.²

The Joint Profits (measured in the Home currency).

We capture this form of political risk by a probability to retain profit after expropriation \((s_1)\). The part of foreign affiliate’s revenue is expropriated and, thus is random.

The expected revenue is:
\[ E[R^*] = (1 - s_1)R^* + s_1R^* = s_1R^* \]  
\hspace{1cm} (4)

Where, \( s_1 \) is probability of retained profit after outright expropriation; \((1 - s_1)\) is probability of outright expropriation (a decrease in \( s_1 \) is associated with an increase in PR).

This leads to the following form of the MNC’s joint profit defined as a sum of H and F profits from equations (2), (3) and (4):
\[ \tilde{Q} = R + \tilde{e} s_1R^* = (\text{PaY} - rK) + \tilde{e} s_1[\text{P*(1-a)Y} - r^*Z - w^*L ] \]  
\hspace{1cm} (5)

Where, \( \tilde{e} \) is the random exchange rate with the mean \( e \) and a constant variance. \( \tilde{Q} \) represents random joint profits. It is random through the random exchange rate \( \tilde{e} \).

² The details for the case of creeping expropriation are available on request for an interested reader.
Thus, the utility function of the parent firm is

\[ U = U(\tilde{Q}) = U(R + \tilde{e} s_1 R^*) \]  

(6)

where \( U' > 0 \) and \( U'' < 0 \), as implied by (2-6). Expanding the utility function around the neighborhood of zero (Maclaurin's expansion) and approximating it by the second order yields

\[
U(\tilde{Q}) = U'(\tilde{Q}) \tilde{Q} + \frac{1}{2} U''(\tilde{Q}) \tilde{Q}^2
\]

(7)

Since the marginal utility is assumed to be positive, division yields the normalized utility

\[
V(\tilde{Q}) = \frac{U(\tilde{Q})}{U'(\tilde{Q})} = \tilde{Q} + \frac{1}{2} \frac{U''(\tilde{Q})}{U'(\tilde{Q})} \tilde{Q}^2 = \tilde{Q} - \frac{R_A}{2} \tilde{Q}^2
\]

(8)

Where \( R_A \) is Arrow-Pratt's absolute risk aversion measure (\( R_A = -\frac{U''}{U'} > 0 \) and assumed constant).

Then we can derive the expected utility as follows

\[
E[V(\tilde{Q})] = Q - \frac{R_A}{2} E[\tilde{Q}^2]
\]

(9)

where the expected value of joint profit is

\[
Q = E[\tilde{Q}] = R + E[\tilde{e}] s_1 R^* = R + e s_1 R^*
\]

(10)

And the variance is

\[
\text{Var}(\tilde{Q}) \equiv \sigma_{\tilde{Q}}^2 = E[(\tilde{Q} - Q)^2] = E[\tilde{Q}^2] - Q^2 = E[(\tilde{e} s_1 R^* - (\tilde{Q} - Q))^2] = (s_1 R^*)^2 E[(\tilde{e} - e)^2] = (s_1 R^*)^2 \sigma_{\tilde{e}}^2
\]

(11)

where \( \sigma_{\tilde{e}}^2 = E[(\tilde{e} - e)^2] \) is the variance of the exchange rate, or exchange risk.

Therefore, \( E[\tilde{Q}^2] = \sigma_{\tilde{Q}}^2 + Q^2 = (s_1 R^*)^2 \sigma_{\tilde{e}}^2 + Q^2 \)

(12)

Substituting (12) into (9) yields

\[
E[V(\tilde{Q})] = Q - \frac{R_A}{2} \frac{R_A}{2} \sigma_{\tilde{Q}}^2,
\]

(13)

or

\[
E[V(\tilde{Q})] = Q - \frac{R_A}{2} \frac{R_A}{2} (s_1 R^*)^2 \sigma_{\tilde{e}}^2
\]

(13')

Now we can formally hypothesize how exchange rate risk (\( \sigma_{\tilde{e}}^2 \)) and political risk (\( s_1 \)) will affect the expected utility from joint profits.
\[
\frac{\partial E[V]}{\partial \sigma^2} = -\frac{R_A(s_i R^2)^2}{2}
\]  
(14)

is unambiguously negative for a positive \( R_A \). It could be negative only for an unlikely case where MNCs are risk lovers.

Similarly for \( PR \) (meaning a change in probability of retained profit \( s_i \)):
\[
\frac{\partial E[V]}{\partial s_i} = -R_A s_i R^2 \sigma^2
\]  
(15)

which is unambiguously negative for a positive \( R_A \). But it could be negative for an unlikely case where MNCs are risk lovers. In sum, attitudes towards risk play an important role for the sign.

Now, we turn to derive the Optimal FDI with outright expropriation. Assuming that \( \sigma^2 \) is constant the expected utility function is maximized with respect to the factors of production:
\[
\max E[V(\hat{\sigma})] = PaY - rK + e s_i s_i [P*(1-a)Y - r*Z - w*L] - \frac{R_A}{2} \{ PaY - rK + es_i s_i [P*(1-a)Y - r*Z - w*L] \}^2
\]  
(16)

where \( Y = K^\alpha Z^\beta L^\gamma ; \alpha + \beta + \gamma = 1 \)

The maximization with respect to \( K, Z, \) and \( L \) yields the following still incomplete solutions:

(I) FDI (optimum level of capital bought in H and sent to F from partial maximization of the expected utility with respect to \( K(FDI) \))
\[
K = \frac{\alpha Y}{r / D}
\]  
(16-1)

(II) Foreign Labor (optimum level of Foreign Labor from partial maximization of the expected utility with respect to \( L \))
\[
L = \frac{\gamma Y}{es_i w^* / D}
\]  
(16-2)

(III) Foreign Specific Factor (optimum level of Foreign Specific Factor from partial maximization with respect to \( Z \))
\[
Z = \frac{\beta Y}{es_i r^* / D}
\]  
(16-3)

Where \( D \) is the expected price defined as \( D \equiv Pa + e s_i P*(1-a) \).

Solving (16-1) with (1) for the optimal \( K \) (FDI), given the optimal \( Z \) and \( L \) yields
\[
K = \left( \frac{\alpha Z^\beta Y}{r / D} \right)^{1 / (1 - \alpha)}
\]  
(17)

Now we can suggest the sign conditions for the optimal \( K \) (FDI) in a reduced form function as follows:
\[ K = K(r, e; Z, L, P, P^*, \alpha; \sigma^2, s_t) \]  

(17')

where theoretical signs are noted above each variable, and where \( K \) is desired amount of FDI.

Thus, the variance of exchange rate \((\sigma^2)\) and political risk level \((s_t)\) in the host country can both affect positively and negatively FDI depending on the MNCs perception of the uncertainty. We proxy the exchange rate risk by the second moment of real exchange rate changes and political risk by Euromoney Political Environment measure in our empirical setting.

3. The variables and the empirical model

To test for possible political and exchange rate risk’s effect on foreign direct investment we used panel data of 56 countries over the period 1995-2012 (see appendix table 1a for details).\(^3\) These data are collected from two main sources: Japanese Ministry of Finance (MOF) and Bank of Japan (BOJ).\(^4\) The summary statistics of the empirical variables is reported in Appendix table 1b. Their measurement proceeded as follows.

**Political Environment**

\(PE_{it}\) represents political environment for ‘country i’ at time t. To capture the effect of Political Risk \((s_t)\) we used Euromoney Country Risk index. The political index is calculated from the ECR index, and has been scored from 0 to 25 with a higher score indicating a lower political risk. The ECR index includes not only political risk, but also government and institutional assessment as the qualitative expert opinions. In addition, the ECR index also includes information and policy environment (see Appendix Table 1c). It is likely that this multiple dimensionality of a composite index may have different effects on the MNCs’ behavior for FDI, depending on the host countries’ level of economic development. Thus ECR index is a perfect measure to test our postulate about the nonlinear sensitivity of MNCs to political risk in developed and developing countries.\(^5\)

**Exchange Rate variables**

To capture the effect of ER on direct investment we employed three variables. \( \log_{\text{Mean}}_{it} \) (ER level, \( e \)) is the natural logarithm of the average of monthly real exchange-rates around year \( t \) (that includes monthly observations for year \( t \) and \( t-1) \) for ‘country i’. It represents the

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\(^3\) We used annual real FDI flows in Japanese Yen (FDI), and transformed it logarithmically.

\(^4\) The data for the period of 1995-2004 years are collected from MOF statistics and the data for the period 2005-2011 are collected from BOJ statistics.

\(^5\) Our formulation in the theoretical section does not distinguish explicitly the MNCs behaviour in developed and developing countries. However, it is well known that the level of PR is correlated with the economic development. Thus, MNCs’s attitude towards risk is adjusted for developed and developing countries. Our interpretation in section 4 aims at addressing this issue.
relative price difference between the host country and Japanese aggregated goods. Real Exchange Rate (RER) index is calculated so that an increase (positive sign) is associated with Yen appreciation (host country currency depreciation), and a decrease is associated with Yen depreciation (host country currency appreciation). We expect a positive sign of the Log_Mean since Yen appreciation may favor Japanese outward FDI.

\[ \text{Volatility}_{it} (\text{ER risk}, \sigma^2) \] is the natural logarithm of the standard deviation of real monthly exchange rates around year \( t \) for country \( i \). Standard deviation is calculated using 24 monthly observations for year \( t \) and \( t-1 \). The higher value is associated with higher ER volatility. Given our theoretical model and previous literature results the expected sign is ambiguous subject to the host country’s level of economic development and industry’s specifics.

We thought of an additional important variable that was first introduced by Takagi and Shi (2011). Skewness, \( \text{Skewness}_{it} \), is a third moment of monthly exchange rates around year \( t \) for country \( i \). Skewness is calculated using 24 monthly observations for year \( t \) and \( t-1 \). The third moment is expected to capture ER expectation effect in case we accept that “relatively large ER shocks predominantly in one direction could create expectations of reversal”. (Takagi and Shi 2010, p. 5) Thus, we expect that a positive sign is associated with a large number of Yen appreciation shocks which in turn may lead to the expectation of Yen depreciation and thus an increase in the future value of repatriated profits. Hence, FDI is expected to be associated positively with Skewness.

Other control variables

The explanatory variables are selected to reflect the theoretical model specification. However, with so many variables some consolidation seems necessary. First, \( \text{LOG}_GDP_{it} \) represents the market size for country \( i \) at time \( t \) that has been considered as one of the first principal determinants of FDI. Indeed, it could serve as a proxy for sales that are reflected in the variable \( D \). We expect a positive sign of GDP on FDI.\[ ^7 \]

We abstract from Specific Factor (Z) as it can be captured by Gross Fixed Capital Formation which is a component of GDP, and thus its effect is well reflected in \( \text{LOG}_GDP_{it} \) measure as well.

Second, human capital of the host economy \( (L) \) is another important factor for FDI flows. Availability of low cost labor is expected to stimulate FDI of vertical type where the cheap wage is considered to be of high importance (e.g., Sahoo (2006)). Labor cost can be proxied

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\[ ^6 \] The real exchange-rate is calculated as \( e^{\text{host}}_{it} = \frac{P_{\text{host}it}}{P_{JPt}} \), and is normalised assuming a value of 100 in 2005. The nominal exchange-rate, \( e^{\text{host}}_{it} \), is defined as the amount of host country currency required to purchase one unit of Japanese Yen. The relative price of country \( i \) to Japan \( P_{\text{host}it}/P_{JPt} \), is calculated using the CPI index. Monthly CPI index data are obtained from IMF-IFS database. We use the CPI index rather than GDP deflator or producer price index, since it allows for using a larger number of observations. Exchange-rates of the Yen against the host currencies are obtained from Yen/Dollar rates.

\[ ^7 \] The GDP data are taken from the World Bank World Development Indicators (WDI) database and are reported in constant 2005 US$. 

by wage cost (Nunes, Oscategui, and Peschiera 2006). Thus, \( W_{\text{Real}} \), which is the employees compensation received in US$ per hour for country i at time t, represents the labor cost.\(^8\) The data were deflated using the CPI index.\(^9\) The sign of this variable is expected to be negative as higher labor cost is expected to discourage FDI flows.

Third, the implicit rental cost for parent company (r) could be captured by interest rate in Japan. Thus, \( IJP_{it} \) (real interest rate in Japan) is expected to have a negative sign as a higher cost of funds reduces an incentive for outward FDI.\(^10\)

We thought of additional important variable to impact the behavior of Japanese MNCs: \( \text{OPENNESS}_{it} \) to trade of the host country. In general the impact of openness is linked to the type of FDI (Sahoo 2006). The openness is expected to have negative sign for horizontal FDI (implying that trade barriers are high) and positive sign for vertical-type FDI (implying that trade barriers are low).\(^11\)

**Data and Methodology**

To test a possible political and financial risk’s effect on direct investment we used Generalized Method of Moments (GMM) analysis. The basic model for GMM is specified in a reduced form as:

\[
y_{it} = \delta y_{it-1} + X'_{it} \beta + \varepsilon_{it}.
\]

where \( y_{it} \) is the logarithm of annual outward FDI from Japan into a host ‘country i’ at time t and \( X'_{it} \) denote an (1xk) vector of exogenous variables which vary in the cross-section and in the time dimension. \( \delta \) is a scalar. \( y_{it-1} \) is a lagged dependent variable. \( \varepsilon_{it} \) is a stochastic error term, which is assumed to be uncorrelated over all \( i \) and \( t \).

Theoretical model presented in Section 2 suggests a possible ambiguous effect of political risk on MNCs activities. We proxy political risk (\( s_j \)) by ECR PE index. Thus the expected joint profit is defined to depend on "PE". The optimal FDI (=K) is shown to depend not only on "PE" (probability of retained profit/revenue), but also on "PE\(^2\".

First, we estimate the following model for a pooled sample of all 56 countries.

\[
(\text{LOG}_\text{FDI})_{it} = \delta (\text{LOG}_\text{FDI})_{it-1} + \beta_1 \text{LOG}_\text{GDP}_{it} + \beta_2 IJP_{it} + \beta_3 \text{LOG}_\text{W}_{it} + \beta_4 \text{OPENNESS}_{it} + \beta_5 PE_{it} + \beta_6 PE^2_{it} + \beta_7 \text{Log}_\text{Mean}_{it} + \beta_8 \text{Volatility}_{it} + \beta_9 \text{Skewness}_{it} + \varepsilon_{it}.
\]

Second, in order to distinguish the level of host countries economic development and identify direct effect of political and financial risks on Japanese outward FDI activities we estimate the following model separately for developed and developing countries:

\(^8\)The data source is also the WCY and represents an average salary ($/h) in the host country. However, the data are compiled from US Department of Labor, Bureau of Labor Statistics and National Sources.

\(^9\)CPI price index source is International Monetary Fund (IMF) statistical database. In case of Taiwan we used Taiwan National Statistics (http://eng.stat.gov.tw/mp.asp?mp=5).

\(^10\) Real interest rates are derived from the long-term government bond rate, deflated by GDP price deflator. Both statistics are obtained from IMF International Financial Statistics.

\(^11\) Openness measures come from Penn-World Tables, and are defined as the ratio of the sum of imports and exports to GDP.
(LOG_FDI)_{it} = \delta (LOG_FDI)_{i,t-1} + \beta_1 LOG_GDP_{it} + \beta_2 IJP_{it} + \beta_3 LOG_W_{it} + \beta_4 OPENNESS_{it} + \beta_5 PE_{it} + \beta_6 Log\_Mean_{it} + \beta_7 Volatility_{it} + \beta_8 Skewness_{it} + \epsilon_{it}.

We perform a panel data analysis in order to capture static and dynamic nature of the FDI flows, accounting for at the same time possible heteroscedasticity, autocorrelation and endogeneity. By including lagged FDI flows as an additional regressor we change a static model to a dynamic panel model. Thus our panel data set consists of a cross-section dimension (56 countries, 32 developed countries and 24 developing countries: i = 1,……,N), and a time dimension (18 periods: 1995-2012: t=1,….T). The total number of observations in this context is 952 for all countries, 544 for developed countries and 408 for developing ones, and it can be considered adequate to produce robust estimations for the scope of the analysis.

Generally the problems of autocorrelation, endogeneity and heteroscedasticity are inherent in economic data sets. First, some explanatory variables can be endogenous, and therefore OLS estimators become biased and inconsistent. Second, unobserved panel-level effects (fixed effects) may be correlated with the explanatory variables. Finally, the inclusion of lagged dependent variable can lead to autocorrelation. In order to deal with these issues, a commonly used method for dynamic panels is the GMM estimator proposed by Arellano and Bond (1991). As their estimator is set up, the fixed effects are eliminated using first differences, and an instrumental variable estimation of the differenced equation is performed. However, a first difference has a weakness in unbalanced models, since it magnifies gaps in it. Our sample contains some missing data particularly for developing countries. Thus, we follow the second common transformation proposed by Arellano and Bover (1995) namely “forward orthogonal deviations”. In contrast to the “first difference” it subtracts the average of all future available observations of a variable. Next, we use GMM style instruments as proposed by Holtz-Eakin, Newey, and Rosen (1988) in order to account for possible endogeneity of the explanatory variables. We perform the Hansen J-test of overidentifying restrictions for the selected instruments. All the regressions were shown to be robust according to this criterion. Finally, we do not include any additional (external) instruments.

4. Estimation results and discussions

Table 1 gives the results of the GMM estimation of equation (19).

Several interesting features are disclosed, and in what follows, we give some interpretations and evaluations for them.\(^\text{12}\)

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\(^{12}\) For space considerations we do not discuss other control variables results in details. Nevertheless, note that not all of them showed predicted signs that could be explained by the difficulty in empirical modeling of all FDI affecting determinants.
Does Political Environment have a non-linear effect on Japanese Outward FDI flows?

The coefficient $\beta_6$ is negative and statistically significant for all industries and for manufacturing industries. The industry level results suggest an additional evidence (e.g. Food Industry, Chemical Products, Transport Equipment, Finance and Insurance, Wholesale and Retail, and Mining). Thus, as we hypothesized Japanese MNCs exhibit a non-linear response to the changes in PE. We infer that for developing countries the effect is positive while for developed it is negative due to differences in the attitude to PE. The next discussion is devoted to offer our interpretation of this result.\footnote{It is interesting to note that we are not the only one FDI research that encounters different and contradicting signs for developed and developing countries samples for PE. A similar sign pattern was reported in a recent empirical research by Peng and Beamish (2008) who discussed difficulties in interpreting the effect of another composite index, a National Corporate Responsibility Index (NCRI) on the Japanese outward FDI.}

We first propose our hypothesis as follows: Since the composite index PE is constructed with six different qualitative components (see Appendix Table 1c), they may have different effects on MNCs behaviour for developed and developing countries. We term these qualitative components as “institutional quality (IQ)”, reflecting multiple qualitative characteristics of host countries. Then, if MNCs are more concerned with IQ, there might be a case that an increase in IQ is associated with an increase in FDI positively. Specifically, if the level of "government stability" (item 3 in Appendix Table 1c) reflects such factors as juridical, bureaucratic and social development in the host country, a higher value of the PE variable means a relatively higher level of IQ, resulting in a lower level of law’s and social environment pressure. In other words, Japanese MNCs might expect lower pressure from the government and public sector, which could serve as an incentive for their FDI. From this point of view, starting from a point where PE has been sufficiently high (i.e., IQ has been high enough) as in developed countries, it is likely that Japanese MNCs could tolerate a slightly lower IQ (i.e. a slightly lower PE) to undertake additional FDI if profitable. Several reasons could be put forth. The first reason for it may be that, starting from a level of IQ far above what is necessary for FDI, a decrease in PE (a decrease in IQ) means a slightly higher level of law’s and social environment pressure, which could be perceived as a good sign by Japanese MNCs, as it might imply “more discipline”. The second reason for it may be that, if a decrease in PE (a decrease in IQ) is associated with slightly deteriorated information access within the market (item 4 in Appendix Table 1c), then some wider and more “profitable business opportunities” could be opened for Japanese MNCs due to the asymmetric information argument. Interestingly, the first reason put forth as above is similar in spirit to Peng and Beamish (2008, p.691) who emphasize MNC’s corporate responsibility. They concluded that "(a) loosening of (political) environment will attract more FDI" (emphasis

\footnote{It is also interesting to note that effects of some composite indices are ambiguous has been found in another area, the choice of the (optimal) exchange rate regime. Alesina and Wagner (2006) used the Business Environment Risk Intelligence (BERI) index and the Composite Indicator Dataset of the World Bank in order to examine the ambiguous effects of institutional quality on the choice of the exchange rate regime.}
added) for developed countries, because "the levels of (political environment) may be far above what is necessary" for MNCs’ operations.

Needless to say, when PE is sufficiently low, implying a low level of IQ, as in a case of developing countries, a still lower level of PE (i.e. still lower IQ) is always associated with a lower FDI. This implies that Japanese MNCs may react differently to Political Environment in developing host countries, compared with developed ones. Specifically, observing a composite Political Environment variable, Japanese MNCs may be more sensitive to risk factors such as corruption and government non-payment/non-repatriation, (items 1 and 2 in Appendix Table 1c) when deciding FDI to developing countries.

We can formalize our hypotheses of the effects of IQ on FDI with the following three steps.¹⁵

First, there is some level of IQ for which Japanese FDI is insensitive. Second, FDI may not be undertaken to countries with a very poor record of IQ. Thus, for a marginally lower IQ, FDI is reduced. Third, for very stable (developed) countries, FDI is undertaken. Moreover, a marginally lower level of IQ (i.e., lower PE) is interpreted as a good sign for a more disciplined economy, and thus more FDI.

**Does Japanese Yen appreciation stimulate outward FDI?**

Log_Mean is positive and significant for all industries, manufacturing and nonmanufacturing industries which complies with the theoretical prediction. However, for some industries (food industry and mining) the sign is negative and significant suggesting that Yen appreciation discouraged FDI for these industries. This result contradicts the prior hypothesis. We would like to offer the following explanation. It is plausible that Japanese manufacturers have invested as horizontal FDI for local production and sales. Thus, with Yen appreciation, the sunk cost of (initial) investment increased, and Japanese manufacturers possibly could not tolerate it anymore, because the future internalization advantage¹⁶ will not be as large as expected. Hence, they cut their FDI. Note that Japanese MNCs activities in the food industry and mining are of horizontal type nature in many cases.

**How does ER volatility affect Japanese outward FDI?**

ER volatility exhibits a negative effect on FDI activities for nonmanufacturing industries, finance and insurance, and wholesale and retail industries. These findings suggest that Japanese MNCs are concerned with ER risk in these industries. Interestingly ER volatility is positively signed for all industry and for manufacturing sector (significant only for all industry). At the industry level it is consistently positive and significant for chemical products, electric machinery, and mining industries. Our theoretical model suggests that it may happen only for an unlikely case where MNCs are risk lovers. We

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¹⁵For a similar formulation for exchange rate regimes with IQ, see Alesina and Wagner (2006).

¹⁶Dunning (1992) suggested in his OLI (Ownership, Location, Internalization) framework that internalization advantage plays an important role in FDI decision by MNCs. However, in view of Itaki (1991), changes in exchange-rates may be related to sunk costs, and thus affect MNC’s “perceived cost of integration”.
are inclined to believe that most Japanese MNCs are risk averse. However, a mirror interpretation to the political risk could be suggested. For instance, the level of ER stability may be far enough what is necessary for Japanese MNCs. Thus, they could tolerate a slight increase in the financial risk via ER volatility, and it can actually become an incentive to invest due to higher expected profits. In addition, there are other channels that motivate such a behavior as well. For instance, a positive effect of ER uncertainty is consistent with Itagaki (1981) and Cushman (1985) arguing that higher uncertainty would promote FDI as substitute to exports. This result may suggest an indirect evidence of platform-type FDI by most of Japanese MNCs since it is associated with redistribution of production channel thus replacing direct export activity.

How does ER expectation affect Japanese outward FDI?
The coefficient for skewness is found to be positive and significant for manufacturing and non-manufacturing industries. This result suggests that the yen’s bias toward relatively large appreciation shocks is associated with expectation of reversal, and hence of yen’s depreciation that leads to a higher value of future repatriated profits. Thus Japanese MNCs increase their investment. This pattern is observed for food industry, finance and insurance, and mining industries as well. However, in case of chemical products, electric machinery, transport equipment, wholesale and retail the sign is negative and significant, suggesting that yen’s bias towards depreciation shocks is more preferable for Japanese MNCs. A plausible explanation is that in this case Japanese MNCs are inclined to a long-term investment strategy, and thus the profits would be reinvested locally as well as FDI activities would continue in the long run. In such a case an expectation of future increased wealth effect may stimulate outward FDI.

5. Robustness check. Developed and Developing countries, Industry-level analysis.
As a robustness check we extend our analysis by estimating equation (20) for 32 developed countries and 24 developing countries over a period of 1995-2012. Tables 2 and 3 present the results.17 Herewith we provide an additional discussion on the channels that serve as an incentive for Japanese MNCs activities in developed and developing countries within different industries.

Does Political Environment have a non-linear effect on Japanese Outward FDI flows?
PE is negatively signed for all industry and manufacturing industries in developed countries (significant only for manufacturing industries) suggesting additional evidence to our interpretation that the level of political stability in developed countries may be far above what is necessary for Japanese MNCs. It is negatively signed for food industry, transport equipment, wholesale and retail and mining industries as well (significant only for mining).

17 We present only four variables of interest in our analysis: Log_Mean, Volatility, Skewness and Political Environment for space considerations.
On the other hand the result is positive for nonmanufacturing, chemical products, electric machinery, and finance and insurance industries (significant only for finance and insurance). This could be explained by the fact that Japanese MNCs tend to prefer political stability in these industries at the expense of lower profit opportunities.

PE turned out to be positive significant in the case of all industries, chemical products, electric machinery, finance and insurance, and wholesale and retail industries for developing countries. It confirms again that Japanese MNCs prefer lower institutional risk and hence more stable political environment for a lower level of economic development.

**Does Japanese Yen appreciation stimulate outward FDI?**

Japanese Yen appreciation is positively associated with FDI flows in all industry, manufacturing, nonmanufacturing, food industry, chemical products, electric machinery, transport equipment, wholesale and retail, and mining industries in developed countries. These results confirm our theoretical interpretation (i.e. the wealth effect hypotheses). The only negative and significant sign for finance and insurance industries implies a stronger sunk cost effect on the Japanese MNCs activities in this case.

The sign is positive and significant as well for all industries, manufacturing sector, food industry and electric machinery industries in developing countries. Interestingly, contrary evidence is found for non-manufacturing sector, as well as for chemical products, transport equipment, and finance and insurance industries. This negative association of Yen appreciation with outward FDI can be explained by sunk cost hypotheses. Alternatively, if we believe that Yen appreciation (depreciation) is associated with lower (higher) value of repatriated profits in Yen, then it can become an additional motivation for Japanese MNCs to decrease (increase) their investments.

**How does ER volatility affect Japanese outward FDI?**

An increase in ER volatility is associated with higher Japanese outward FDI for all industry, manufacturing, food industry, finance and insurance, wholesale and retail, and mining industries in developed countries. Thus, as our interpretation suggests a slight increase in financial risk could be tolerated by Japanese MNCs due to an incentive of higher expected profits. A negative and significant sign is observed for electric machinery and transport equipment where high ER volatility may actually be associated with much higher risk for financial operations.

The sign is consistently positive and significant for all industries, food industry, chemical products, electric machinery, transport equipment, and finance and insurance industries in developing countries. These results confirm our previous findings and interpretation that are emphasized above.
**How does ER expectation affect Japanese outward FDI?**

Skewness is positive and significant for all industries, manufacturing and non-manufacturing sector, as well as for food industry, electric machinery, transport equipment, wholesale and retail, and mining industries in developed countries suggesting that an expectation of yen depreciation (appreciation) would stimulate higher (lower) level of FDI flows. However, a negative and significant sign is observed for finance and insurance industry implying that Japanese MNCs’ prefer long-term FDI strategies in this case. Skewness is positive and significant for nonmanufacturing sector, electric machinery, and mining industries in developing countries. On the other hand, it is negative and significant for all industries, food industry, chemical products, transport equipment, finance and insurance, and wholesale and retail industries. Thus the evidence for ER expectation effect on Japanese FDI measured by the third moment of ER changes is mixed for different level of economic development and for different industries.

**6. Concluding remarks**

In this paper, first, we presented a theoretical model inspired by Clare and Gang (2010) with a complete optimization with respect to the all choice variables and solved it for FDI by taking into account of possible influences from other endogenous variables. The theoretical results suggested a possible non-linear response of Japanese MNCs to political environment (political risk) and financial risk (ER volatility).

Second, we empirically examined the outward Japanese FDI activities with a panel data of a total of 56 developed and developing countries for the period 1995-2012. Based on our theoretical model, a number of determinants (GDP, Human capital indicators, Trade cost etc.) are complemented with political and financial risk determinants for Japanese FDI, namely Political Environment, ER level, ER volatility and ER expectation. Political Environment (PE) was differently signed for developed and developing countries as well as for different industries. On this result, we put forth our hypothesis of the existence of non-linearity between Political environment and FDI due to the different perception of this factor’s necessary level in developed and developing countries. The finding can be gleaned from our theoretical analysis as well. A pooled estimation with an included PE squared term provided evidence to our discussion.

Generally, Yen appreciation proved to have a positive effect on Japanese outward FDI which is consistent with the theoretical prediction. However, when estimated in two dimensions (by level of economic development and by industries) it showed some contradictory patterns for what we put forth our discussion of sunk cost effects.

On the whole ER volatility was signed positively and significantly, suggesting that Japanese MNCs tend to enjoy higher financial risk for what we suggested a mirror to PE analysis interpretation that ER stability may be far enough what is necessary for Japanese MNCs.
Possible FDI substitute to exports effect could be an additional channel to explain this result. Nevertheless negative ER volatility effect was also found in several cases when the level of economic development and industries were taken into consideration. Thus, non-linear relationship between Japanese outward FDI and ER volatility is peculiar to our analysis. Finally, skewness as a measure of ER expectation showed ambiguous results. A general tendency implied that Japanese MNCs positively respond to an increase of Yen depreciation’s expectation due to a possible higher value of future repatriated profits. Nevertheless, an opposite result was also obtained for several cases implying a possible long-term strategic investment behavior of Japanese MNCs. A more detailed study is needed to identify the economic roots for such a behavior of MNCs, and it remains on our future agenda.

We conclude that Japanese FDI can be reasonably explained by the proposed independent variables. We successfully found that political and financial risks are, as expected, significantly associated with Japanese FDI flows. These findings have important implications for future policy consideration by host countries and academic research on multinational companies’ behavior.

REFERENCES


Figure 1a. Relationship between ER volatility and FDI.

Note: ER volatility (logarithmically transformed second moment of the real ER changes) and FDI (logarithmically transformed real FDI flows in millions of Japanese Yen), 56 countries, 1995-2011. Values are averaged by country from 1995 to 2011. The regression represented by the fitted line yields a coefficient of 3.074 for a squared term and -15.28 for a direct effect, N = 56, R^2 = 0.047. Countries abbreviations are presented in Appendix table 1a.

Figure 1b. Relationship between PE and FDI.

Note: PE ([0,25] scale) and FDI (logarithmically transformed real FDI flows in millions of Japanese Yen), 56 countries, 1995-2011. Values are averaged by country from 1995 to 2011. A higher PE value is associated with lower political risk. The regression represented by the fitted line yields a coefficient of -0.002 for a squared term and 0.222 for a direct effect, N = 56, R^2 = 0.063. Countries abbreviations are presented in Appendix table 1a.
Table 1 Institutional and financial risk effects on Japanese outward FDI, 56 countries

<table>
<thead>
<tr>
<th></th>
<th>All Industry</th>
<th>Manufacturing</th>
<th>Nonmanufacturing</th>
<th>Food industry</th>
<th>Chemical Products</th>
<th>Electric Machinery</th>
<th>Transport Equipment</th>
<th>Finance and Insurance</th>
<th>Wholesale and Retail</th>
<th>Mining</th>
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<td>1.78</td>
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<td>(-2.65)***</td>
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<td>(-1.96)*</td>
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<td>(-4.46)***</td>
<td>(1.35)</td>
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Note: t-statistics in parentheses. *, **, and *** mean significant at the 10, 5, and 1% level, respectively.

a The null hypothesis is that the overidentification restriction is valid.
Table 2 Institutional and financial risk effects on Japanese outward FDI, Developed countries, 32 countries

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Note: t-statistics in parentheses. *, **, and *** mean significant at the 10, 5, and 1% level, respectively.

_a The null hypothesis is that the overidentification restriction is valid.
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<tr>
<td></td>
<td>(3.81)***</td>
<td>(0.27)</td>
<td>(1.18)</td>
<td>(-0.28)</td>
<td>(3.69)***</td>
<td>(5.08)***</td>
</tr>
<tr>
<td>SE of regression</td>
<td>2.02</td>
<td>2.1</td>
<td>3.21</td>
<td>2.44</td>
<td>1.83</td>
<td>2.13</td>
</tr>
<tr>
<td>Hansen J-test (p-value)</td>
<td>0.52</td>
<td>0.74</td>
<td>0.52</td>
<td>0.14</td>
<td>0.23</td>
<td>0.56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transport equipment</th>
<th>Finance and Insurance</th>
<th>Wholesale and Retail</th>
<th>Mining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatility</td>
<td>0.68</td>
<td>0.89</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>(3.58)***</td>
<td>(4.05)***</td>
<td>(0.94)</td>
</tr>
<tr>
<td>Log_Mean</td>
<td>-3.83</td>
<td>-5.66</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>(-2.99)***</td>
<td>(-5.24)***</td>
<td>(0.22)</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.39</td>
<td>-0.29</td>
<td>-0.51</td>
</tr>
<tr>
<td></td>
<td>(-4.23)***</td>
<td>(-1.85)*</td>
<td>(-2.38)**</td>
</tr>
<tr>
<td>Political Environment</td>
<td>-0.05</td>
<td>0.2</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>(-0.65)</td>
<td>(2.69)***</td>
<td>(2.42)**</td>
</tr>
<tr>
<td>SE of regression</td>
<td>2.14</td>
<td>2.3</td>
<td>2.16</td>
</tr>
<tr>
<td>Hansen J-test (p-value)</td>
<td>0.53</td>
<td>0.25</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Note: t-statistics in parentheses. *, **, and *** mean significant at the 10, 5, and 1% level, respectively. 
  a The null hypothesis is that the overidentification restriction is valid.
Appendix

Appendix table 1a List of countries used in the study

<table>
<thead>
<tr>
<th>Developed countries (32 countries)</th>
<th>Developing countries (24 countries)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Chile (CHL), Czech Republic (CZE), Denmark (DNK), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Hungary (HUN), Iceland (ISL), Ireland (IRL), Israel (ISR), Italy (ITA), Korea (KOR), Luxembourg (LUX), Mexico (MEX), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Poland (POL), Portugal (prt), Slovakia (SVK), Slovenia (SVN), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey (TUR), UK (GBR), United States (USA)</td>
<td>Argentina (ARG), Brazil (BRA), Bulgaria (BGR), China (CHN), Colombia (COL), Hong Kong (HKG), India (IND), Indonesia (IDN), Jordan (JOR), Kazakhstan (KAZ), Malaysia (MYS), Peru (PER), Philippines (PHL), Qatar (QAT), Romania (ROM), Russia (RUS), Singapore (SGP), South Africa (ZAF), Taiwan (TWN), Thailand (THA), UAE (ARE), Ukraine (UKR), Venezuela (VEN), Vietnam (VNM)</td>
</tr>
</tbody>
</table>

Appendix table 1b Summary statistics

<table>
<thead>
<tr>
<th>Developed</th>
<th>Developed</th>
<th>Pooled sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
<td>Mean</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>Political Environment</td>
<td>21.39</td>
<td>3.59</td>
</tr>
<tr>
<td>Log_Mean</td>
<td>4.80</td>
<td>0.22</td>
</tr>
<tr>
<td>Volatility</td>
<td>2.13</td>
<td>0.52</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.22</td>
<td>0.68</td>
</tr>
<tr>
<td>Log_FDI</td>
<td>3.90</td>
<td>3.73</td>
</tr>
<tr>
<td>Log_GDP</td>
<td>26.61</td>
<td>1.41</td>
</tr>
<tr>
<td>Interest Rate JP</td>
<td>1.48</td>
<td>0.34</td>
</tr>
<tr>
<td>Wages</td>
<td>18.57</td>
<td>36.11</td>
</tr>
<tr>
<td>Openness</td>
<td>84.87</td>
<td>49.66</td>
</tr>
</tbody>
</table>

Appendix table 1c Variables and indicators incorporated into the Euromoney CountryRisk (ECR) index

<table>
<thead>
<tr>
<th>Political risk</th>
<th>Component</th>
<th>Score (qualitative expert opinions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Corruption</td>
<td>10=no corruption, 0=serious corruption</td>
</tr>
<tr>
<td>2</td>
<td>Government non-payments/non-repatriation</td>
<td>10=no government interference, 0=high government interference</td>
</tr>
<tr>
<td>3</td>
<td>Government stability</td>
<td>10=stable, 0=highly unstable</td>
</tr>
<tr>
<td>4</td>
<td>Information access/transparency</td>
<td>10=unrestricted, 0=totally restricted</td>
</tr>
<tr>
<td>5</td>
<td>Institutional risk</td>
<td>10=efficient and independent institutions, 0=no state institution</td>
</tr>
<tr>
<td>6</td>
<td>Regulatory and policy environment</td>
<td>10=highly consistent, 0=no regulatory environment exists</td>
</tr>
</tbody>
</table>