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Influence of Exchange Rate Fluctuations and Credit Supply on Dividend Repatriation Policy of U.S. Multinational Corporations

Abstract: This study aims to examine the effect of exchange rate fluctuations and credit supply on the dividend repatriation policy of foreign subsidiaries of U.S. multinational corporations (MNCs) around the world. The difference generalised method of moments (GMM) estimator was applied to estimate the dynamic dividend repatriation model. The results suggest that the appreciation of host-country currency against the USD leads to higher dividend repatriation by the foreign subsidiaries of U.S. MNCs. Moreover, results reveal that higher availability of private credit in the host country results in lower dividend repatriation by the U.S. MNCs' foreign subsidiaries.

Keywords: Exchange rate fluctuations, Credit supply, Dividend repatriation policy, Generalised method of moments, Multinational corporations.

JEL Classification Codes: F23, F31, F34, G35

1. Introduction

Dividend repatriation policy is the distribution decision of earnings between retained earnings and dividend repatriation by a foreign subsidiary to the parent company. Dividend repatriation is one of the most vital decisions in multinational financial management (Desai, Foley, & Hines, 2007). As a result, multinational corporations (MNCs) are strug-

gling to determine the optimal dividend repatriation policy to maximize shareholders' wealth. In contrast to dividend payout policy to diffuse shareholders, dividend repatriation policy involves additional issues such as repatriation taxes, exchange rate risk, parent company loans, the supply of credit in the host country, differential rates of return between the host and home country, and the parent company's financing needs. These factors, along with the traditional factors, are leading to the inefficient utilisation of funds, resulting in high accumulation of earnings by foreign subsidiaries.

Previous research on dividend repatriation policy suggests that dividend repatriation tax is the main reason for this accumulation of foreign earnings (e.g. Altshuler, Newlon, & Slemrod, 1993; Desai et al., 2007; Grubert, 1998; Hines & Hubbard, 1990), since higher repatriation taxes can reduce funds at the parent level for investment opportunities, debt repayments, and dividend payouts to common shareholders. However, the findings of Hasegawa and Kiyota (2017) and Xing (2018) showed that, after moving to a territorial tax system from the worldwide tax system, Japanese foreign subsidiaries from low-tax countries did not significantly increase dividend repatriation to the parent companies in Japan. This suggests that repatriation tax is not the sole reason for the high accumulation of foreign earnings and lower dividend repatriation by the MNCs. Hence, this study aims to examine the effect of non-tax factors such as exchange rate fluctuations and the supply of credit in the host country on the dividend repatriation policy.

The present study aims to address two important research questions. First, is there a significant direct impact of exchange rate fluctuations on the dividend repatriation policy of U.S. MNC?¹ Since exchange rate fluctuations represent one of the most significant issues facing MNCs. It can affect future cash flows, profitability, and firm value (Eiteman, Stonehill, & Moffett, 2012). For instance, if the cost and revenues of the MNCs are in different currencies, then fluctuations in the exchange rate between the currencies will affect the cash flows of the firm. Foreign subsidiaries operating in different countries with dissimilar currencies are exposed to exchange rate risk. Dividend repatriation is one of the examples of exchange rate risk faced by MNCs.

The dividend repatriation from a foreign subsidiary to the parent company needs the conversion of the host currency into the home currency at the current exchange rate. Exchange rate fluctuations may have a favourable or unfavourable impact on the dollar value of dividends paid by a foreign subsidiary, depending on the movement of the host country currency against the USD. If the host country currency appreciates against the USD at the time of dividend repatriation, it will result in greater dollar value for the parent company and vice versa, which demonstrates the significance of

¹ There are number of studies which examines the efficiency of the foreign exchange markets (see for instance, Iyke, 2019; Golit et al., 2019).

exchange rate fluctuations on the dividend repatriation policy. Some effects of this are modelled by Brada and Tomsik (2009).

Second, does credit supply in a host country affects the dividend repatriation policy of U.S. MNCs? As the parent companies operating far from their foreign subsidiaries face the control issue of international management (Giacobbe, Matolcsy, & Wakefield, 2016), because the association between headquarter and foreign subsidiaries in MNCs is very similar to principal and agent arrangement (Ambos, Kunisch, Leicht-Deobald, & Steinberg, 2019; Gong, 2003; Kostova, Nell, & Hoenen, 2018; Roth & O'Donnell, 1996). The agency problem arises if a foreign subsidiary's management goals are not aligned with goals of the headquarters (parent company) or if there is a self-serving attitude on the part of foreign subsidiary's management (O'Donnell, 2000; Hai, Min & Barth, 2018). The parent company can demand regular dividend repatriation to mitigate agency problems, which reduces the free cash flows at foreign managers' discretion for empire building or value-destroying investments.

Alternatively, the parent company can reduce the agency cost or control issue by the inclusion of more debt in the capital structure of a foreign subsidiary. Jensen (1986) proposes that debt financing can mitigate the agency cost of free cash flows. It can motivate the managers to perform efficiently and effectively to minimise the chances of job loss due to bankruptcy. Additionally, lenders would demand more restrictions on free cash flows, limiting the usage of free cash flows for dividend payments and managerial perquisites. The inclusion of debt in capital structure reduces agency cost by increasing the performance of the management due to induced monitoring by lenders (Agrawal & Knoeber, 1996; Ang, Cole, & Lin, 2000; Fleming, Heaney, & McCosker, 2005; Florackis, 2008). The reduction in agency cost may result in lower dividend payments.

Moreover, debt financing decisions, in part, depend on the supply of credit in a country. Foreign subsidiaries operating in those countries that have unsegmented and developed capital markets can secure external debt easily, which encourages foreign subsidiaries to issue more debt in such countries (Aggarwal & Kyaw, 2008; Desai, Foley, & Hines, 2004). Consequently, regular interest and principal payment can motivate foreign managers to invest free cash flows in value-enhancing projects, hence reducing the role of dividends to minimise agency cost. Thus, suggesting the importance of debt finance in the formulation of dividend repatriation policy, which has not been taken into account by prior studies as a tool to mitigate internal agency problems. This provides opportunity to fill this gap in the dividend repatriation policy literature.

The present study uses secondary annual data to investigate the effect of exchange rate fluctuations and credit supply on dividend repatriation policy of U.S. MNCs. Panel difference generalised method of moments (GMM) is used to estimate the

dynamic dividend repatriation model. All diagnostic test for difference GMM were found to be satisfactory. Moreover, robustness checks were carried out to assess the sensitivity of results to alternative estimation methods such as pooled ordinary least square (POLS), fixed effect model (FEM), and random effect model (REM) and different measurement of dividend repatriation policy and exchange rate fluctuations.

The findings indicate that there is a significant negative association between exchange rate fluctuations and dividend repatriation policy. It implies that appreciation of host country currencies against USD lead to higher dividend repatriation by U.S. MNCs. The findings are in line with the hypothesis (*H1*) and confirm that exchange rate fluctuations have the first-order effect on dividend repatriation policy rather than indirect effect through repatriation taxes as proposed by Dodonova and Khoroshilov (2007). In addition, findings reveal a significant inverse relationship between credit supply in the host country and dividend repatriation policy. This implies that foreign subsidiaries of U.S. MNCs repatriated lower dividends from those countries that had high private credit to GDP ratio. Because these countries have developed and unsegmented credit markets. Consequently, foreign subsidiaries can access external debt at a lower overall cost. Lower cost of borrowing in such countries leads to higher debt financing, which reduces the importance of dividend repatriation to minimize internal agency problems. Hence, foreign subsidiaries repatriate low dividends from such countries.

This study contributes to dividend repatriation policy literature by documenting the direct effect of exchange rate fluctuations on dividend repatriation decisions, rather than an indirect effect through transitory changes in repatriation taxes, as suggested by previous research (Dodonova & Khoroshilov, 2007; Moore, 2011). The findings can help financial managers of MNCs to time the dividend repatriation during favourable exchange rate movements, or they can use dividend repatriation policy as a hedging tool to mitigate the exchange rate risk. Additionally, findings can assist financial managers in developing the optimal capital structure for foreign subsidiaries, which is deeply integrated with dividend repatriation policy, to alleviate agency problems within the firm.

Moreover, policy makers can benefit from the findings of the present study. Since this study sheds light on the role of financial development in retaining foreign direct investment (FDI) in a host country. As retained earnings are part of overall FDI and availability of private credit in the host country assists MNCs to reduce internal agency problems through debt creation. Which ultimately minimizes the role of dividends in mitigating internal agency problems and leads to lower dividend repatriation and higher retention of earnings in the host country. Higher retention of earnings increases the FDI stock in the host country.

The rest of this study is organised as follows. Section 2 develops the hypotheses. Section 3 explains the data, sample selection, empirical model, and the econometric estimator applied. Section 4 details and interprets the empirical results. Section 5 provides the conclusions, limitations of the study, and directions for further research.

2. Hypotheses Development

2.1. Exchange Rate Fluctuations

Hartman (1985) assumed constant repatriation tax rate over time and proposed that repatriation taxes would have no impact on the dividend repatriation decisions of the mature foreign subsidiaries financing investment projects from the retained earnings. He used the trapped equity model of King (1977), Auerbach (1979), and Bradford (1981), which is related to dividend payouts to diffuse shareholders. He argued that, if a foreign subsidiary has more investment opportunities and less internally generated funds, then the parent company will inject equity in such a foreign subsidiary.

However, mature foreign subsidiaries have fewer investment opportunities and more free cash flows. The equity is trapped in such foreign subsidiaries, and these foreign subsidiaries repatriate excess free cash flows to the parent company. This suggests that the permanent tax rate does not affect the repatriation decisions of mature foreign subsidiaries. However, repatriation tax rates are not constant over time and can vary from time to time depending on the parent company's foreign tax credit position, corporate tax rate changes in the host and home country, and the foreign income tax regime of the home country (Hasegawa & Kiyota, 2017). The empirical studies by Hines and Hubbard (1990), Altshuler, Newlon, and Slemrod (1993), Altshuler (1995), Grubert (1998), Desai *et al.* (2001, 2007), Moore (2011), and Egger, Merlo, Ruf and Wamser (2015) provide evidence for the relevance of changes in repatriation taxes on the dividend repatriation policy.

In a similar vein, Dodonova and Khoroshilov (2007) propose a theoretical model concerning the impact of transitory repatriation tax rate changes triggered by the exchange rate fluctuations on the dividend repatriation decisions of U.S. MNCs. They argue that the U.S. tax system encourages U.S. MNCs to time their dividend repatriation based on exchange rate fluctuations, since the U.S. tax system translates dividend payments into USD at the time of repatriation but tax credits are translated at the exchange rates when the foreign taxes were paid. This provides the opportunity to time the dividend repatriation depending on the movement of the host country currency against the USD.

They propose that, if the foreign currency is depreciating against the home currency, the repatriation tax rate will be low and U.S. MNCs will prefer to repatriate more dividends to avoid foreign tax credit losses. However, the fact that foreign tax credits carry forwards for ten years and backward for one year under the previous U.S. taxation system weakens this argument. In addition, the permanently reinvested earnings option in the U.S. tax system also reduces the significance of their proposition. Which suggests that a foreign subsidiary can invest earnings indefinitely in the host country and does not need foreign tax credits to offset tax liability.

Moore (2011) used Dodonova and Khoroshilov's (2007) model and empirically tests the transitory component of tax rate caused by exchange rate fluctuations on the dividend repatriation behaviour of U.S. MNCs' foreign subsidiaries. She finds a weak effect of transitory changes in repatriation tax rate caused by exchange rate fluctuations on the dividend payout decisions of full-sample firms. She divides the sample based on size, tax haven operations, and bond rating. The results show that changes in tax rate due to exchange rate fluctuations have a greater effect for large firms, subsidiaries in tax havens, and firms having a good bond rating because these firms are not resourced limited, can allocate funds for such tax planning, and are not supposed by their parent companies to repatriate dividends consistently.

However, exchange rate fluctuations can also increase or decrease the after-tax USD value of dividends and may have greater impact on dividend repatriation policy than the transitory changes in tax rate due to exchange rate fluctuations. The benefit from the appreciation of the host country currency against the USD will be more than the tax benefit from the exchange rate fluctuations. Let us consider as an example a Malaysian subsidiary of a U.S. MNC repatriating a dividend of 100 Ringgit to the parent company. Let us say that the exchange rate at the time of repatriation is RM4/USD and that the exchange rate was RM5/USD when income taxes were paid in Malaysia. Further, we assume that the Malaysian subsidiary paid 20% income tax in Malaysia, and the corporate tax rate in the US was 35%. Now, for tax calculation, the amount repatriated as a dividend will be translated at RM4/USD, and the foreign tax credits will be translated at RM5/USD. The formula to calculate the repatriation tax will be $TUS (D+TM) - TM$, where TUS is the statutory corporate tax in the US, D is the amount of dividend repatriated by the Malaysian subsidiary to the parent company in the US, and TM is the corporate tax rate in Malaysia. Thus, the USD translated values in above formula would be: $0.35(\$25+\$5) - \$5 = \5.50 .

However, if the exchange rate were RM6/USD at the time of repatriation, then the repatriation tax cost would be $0.35(\$17+\$5) - \$4 = \2.70 . It is clear from the above example that appreciation of foreign currency against the home currency results in higher repatriation taxes than the depreciation of the foreign currency against the home currency. Nonetheless, the increase in repatriation taxes ($\$5.50 - 2.70 = \2.80) is more than offset by the increase in the dollar amount of dividends repatriated

(\$25-17=\$8). Therefore, this study proposes that the exchange rate fluctuations have a greater direct impact on dividend repatriation than the tax-based component of exchange rate fluctuations. This leads to the first hypothesis.

H1: Appreciation of the host country currency against the U.S. dollar leads to higher dividend repatriation and vice versa.

2.2. Credit Supply

Jensen (1986) suggests that the conflict of interest between the principal and agent is more severe when a firm generates ample free cash flows. The primary challenge in such situations is how to encourage the managers to disgorge cash rather than investing it in projects below the cost of capital or wasting it on managerial benefits. He proposes the control hypothesis, which advocates that debt financing can be used as a bonding mechanism to reduce the agency cost of free cash flows and argues that more reliance on debt financing can motivate managers to work efficiently and effectively and return the promised interest and principal to the lenders.

Jensen (1986) further states that managers having more free cash flows at their discretion can pay dividends or purchase outstanding stock back to minimise the agency cost of free cash flows. However, from these current dividend payments, they cannot assure the shareholders to return future free cash flows to them. He claims that debt creation enables managers to meet their promise of regular payments of free cash flows. Debt issuance provides rights to lenders regarding taking the firm to the bankruptcy court. The threat of being unable to make debt service payments acts as a bonding mechanism and makes such firms more efficient. Thus, debt financing can substitute dividends and reduce the agency cost of the free cash flows by limiting the cash holding of the managers for private benefits and overinvestment.

Notably, prior empirical studies on dividend repatriation policy have not considered debt financing as a device to control the agency problem between foreign subsidiaries (agents) and the parent company (principal). The current study fills this gap in the dividend repatriation policy literature. Jensen (1986) asserts that the agency problem is more severe for firms having a significant amount of free cash flows and low growth opportunities. In this type of firm, the probability of wasting the free cash flows in value-destroying investment is more severe. This suits well the situation of U.S. MNCs' foreign subsidiaries as they hold a significant amount of cash, which intensifies the agency cost of free cash flows (Amberger, Markle, & Samuel, 2018; Harford, Wang, & Zhang, 2017).

Moreover, Jensen (1986) proposes that debt financing can be used as a substitute for dividends to mitigate the agency cost of free cash flows. The inclusion of debt in the capital structure of foreign subsidiaries can act as a disciplinary device by reducing

the free cash flow at managers' discretion for overinvestment (Huizinga, Laeven, & Nicodeme, 2008). This implies that debt creation will lead to lower dividend repatriation. Since the debt financing decision, in part, depends on the supply of credit in the host country, foreign subsidiaries operating in those countries that have unsegmented and developed capital markets can secure external debt easily. Which, leads to higher debt financing by foreign subsidiaries (Aggarwal & Kyaw, 2008; Desai et al., 2004). Consequently, regular interest and principal payment can motivate foreign managers to invest free cash flows in value-enhancing projects, hence reducing the role of dividends to minimise agency cost. This study uses credit supply as a proxy for debt financing and formulates the following hypothesis:

H2: Credit supply in the host country is negatively associated with dividend repatriation.

3. Methodology

3.1. Data

This study used secondary data for estimation purposes. Data were collected from various sources, including the Bureau of Economic Analysis (BEA), the World Bank Group's World Development Indicators (WDI), and the International Monetary Fund's (IMF) International Financial Statistics (IFS). The present study's estimation period was 2006–2016. The motivation for selecting this period is that it excludes the year 2005, during which, under the American Job Creation Act (AJCA) tax holiday, a significant amount of dividends was repatriated.

The data regarding foreign subsidiaries of U.S. MNCs came from two surveys carried out by the BEA that contain detailed information regarding the operating and financial activities of U.S. MNCs' foreign subsidiaries. U.S. MNCs must file comprehensive information regarding the operating and financial activities of their foreign subsidiaries to the BEA, for which the International Investment and Trade in Services Survey Act governs the data collection. This Act ensures the confidentiality of the firm-specific data; therefore, the BEA provides publicly only country-level data, with firm-level data being restricted for investigative, tax, and regulatory purposes. The BEA's special onsite program makes firm-level data available only for approved academic research that ensure the conditions for maintaining legal confidentiality (Campbell, Dhaliwal, Krull, & Schwab, 2018).

The first survey used is the Annual Survey of U.S. Foreign Direct Investment Aboard, which contains data regarding dividend and interest payments, as well as balance sheet and income statements of U.S. MNCs' foreign subsidiaries. The BEA believes data from these surveys to be complete and accurate due to confidentially being as-

sured and the existence of penalties for non-compliance. From the BEA's Annual Survey of U.S. Foreign Direct Investment Aboard, the current study utilised data concerning foreign subsidiaries' total assets, foreign income taxes, sales and net income. The second survey utilised is the Quarterly Balance of Payments Survey of U.S. Direct Investment Abroad, which relates more to financial flows between foreign subsidiaries and the parent company. It contains data about dividend payments from a foreign subsidiary to the parent company. Hence, the current study used dividend repatriation data from the Quarterly Balance of Payments Survey of U.S. Direct Investment Abroad.

The exchange rate data was obtained from the IFS, which provides detailed data regarding the exchange rates over time of different currencies. GDP growth rate and private credit data were gathered from the World Bank Group's WDI, which provides compressive data about these indicators in various countries.

3.2. Sample Selection

The initial sample comprised the entire population of foreign subsidiaries of U.S. MNCs covered by the BEA. Given that the present study is based on country-level data to determine various explanatory variables' effect on dividend repatriation policy, however, it excludes the foreign subsidiaries of U.S. MNCs from countries for which the BEA does not provide separate country-level data (the BEA provides separate data for those countries in which U.S. MNCs have a substantial investment). This leaves the present study with a total of 25,760 foreign subsidiaries of U.S. MNCs from 57 countries. The present study further excludes foreign subsidiaries of U.S. MNCs from countries that had pegged exchange rate regimes during the study period, which further reduces the sample size to 24,180 foreign subsidiaries of U.S. MNCs from 51 countries. Further, foreign subsidiaries of U.S. MNCs in the banking, insurance, and finance sectors were excluded from the sample because these sectors have different rules and regulations regarding income distribution and taxes (Beyer, Downes, & Rapley, 2017). This reduces the final sample size to 22,040 non-financial foreign subsidiaries of U.S. MNCs from 51 countries.

The reason for using foreign subsidiaries of U.S. MNCs' data aggregated at country-level for estimation are: first, the decision to repatriate dividends depends on broader country-level factors such as exchange rate fluctuations, credit supply in the host country, productive uses of earnings in the host country and investment opportunities in the host country compared to home country rather than just firm-level factors (Brajcich, Friesner, & McPherson, 2013). Hence it is important to conduct a dividend repatriation study where the unit of analysis is the country rather than the firm (Brajcich et al., 2013). Second, the present study examines the effect of country-level variables such as exchange rate fluctuations and credit supply on dividend repatriation policy, hence using country-level data is a more appropriate choice to assess the effect

of these factors on dividend repatriation policy (Lehmann & Mody, 2004). Otherwise using firm-level data will lead to panel and time series data combination, which reduces the variation in country-level variables and might lead to insignificant effects. Third, foreign subsidiaries of U.S. MNCs are non-listed firm; therefore, financial data is not available for these foreign subsidiaries in DataStream and Bloomberg. Fourth, MNCs also do not provide detailed data regarding their foreign subsidiaries in their financial reports.

3.3. Variables

3.3.1. Dependent Variable

The dependent variable of the present study is dividend repatriation policy, with dividend repatriation to asset ratio being utilised as a measure for dividend repatriation policy. This is one of the most used measure for firms' dividend repatriation policy and was calculated as dividend repatriation divided by total assets. Prior studies on dividend repatriation policy have used this ratio to measure foreign subsidiaries' dividend repatriation (Altshuler et al., 1993; Blouin, Krull, & Robinson, 2012; Moore, 2011).

3.3.2. Variables of Interest

3.3.2.1. Exchange Rate Fluctuations

Exchange rate fluctuation is one of the problems faced both by domestic firms and MNCs. The impact is more severe, however, for MNCs because of their presence in different countries and the increased flow of funds between foreign subsidiaries and the parent company. It can both negatively and positively affect the dividend repatriation, depending on the movement of the host country currency against the home currency. The present study utilised the average annual exchange rate between the host country currency and the USD as a measure for exchange rate fluctuations and utilised host country currency per USD to measure exchange rate fluctuations. This measure for exchange rate fluctuations has been adopted previously in the studies of Moore (2011), Clare and Gang (2010) and Parlapiano, Alexeev, and Dungey (2017).

3.3.2.2. Credit Supply

Debt creation can be a motivator for managers to work efficiently and effectively in order to return to lenders the promised interest and principal (Jensen, 1986). Debt financing induces lenders to monitor the management's activities. Monitoring by lenders and the inclusion of a restrictive debt covenant ensures the proper utilisation of funds, thus reducing the agency cost of free cash flows. The debt covenant may

restrict the usage of funds for dividend payments or managerial perks, which suggests a negative link between dividend payout and debt creation. As a proxy for debt financing, the present study used credit supply as measured by the private credit to GDP ratio, because debt financing is high in countries with developed debt markets. The private credit to GDP ratio has also been used by Desai *et al.* (2004) and Desai, Foley, and Hines (2008) in their examination of the capital structure of U.S. MNCs' foreign subsidiaries.

3.3.3. Control Variables

The current study utilised a set of control variables that have the potential to influence the dividend repatriation decision. The first of these is repatriation tax, i.e. the tax that MNCs must pay on dividend income received from foreign subsidiaries. If the home country uses a worldwide tax system with foreign tax credits for foreign income, then the repatriation tax is the difference between the corporate taxes due upon repatriation in the home country and the foreign corporate taxes paid. The U.S. had a worldwide tax system during the present study; therefore, we measured the repatriation tax as the difference between the U.S. corporate taxes due upon repatriation and corporate taxes paid in the host country. This measure for repatriation tax has been used previously by Foley, Hartzell, Titman, and Twite (2007).

Second, return on asset was used to control for the foreign subsidiaries' profitability, given that profitable firms are more likely to repatriate high dividends to the parent company (Altshuler, 1995; Brajcich *et al.*, 2013; Desai *et al.*, 2007; Hines & Hubbard, 1990; Moore, 2011). Third, the natural logarithm of total assets was included in the model to control for firm size. This is because large firms tend to pay high dividends (Duygun, Guney, & Moin, 2018; Fama & French, 2001; Tahir & Mushtaq, 2016; Yusof & Ismail, 2016), since large firms can obtain external finance at an overall lower rate than their small counterparts.

The final control variable used is the GDP growth rate, which controls for investment opportunities in the host country. GDP growth rate is a suitable proxy for measuring investment opportunities in the host country and is measured by the real GDP growth rate of the host country in percentage. A higher GDP growth rate in the host country suggests more investment opportunities for foreign subsidiaries and a greater need for internally generated funds.² This greater need for internally generated funds may result in lower dividend payouts, as suggested by the pecking order theory and the transaction cost hypothesis. This proxy for investment opportunities

² There is a related literature which provides significant evidence on relevance on growth with respect to number of factors, such as FinTech, information and communication technologies. (see for instance, Narayan, 2019; Juhro and Aulia, 2019; Rath and Hermawan, 2019).

at the country-level has been previously adopted, in their study on dividend repatriation policy, by Hasegawa and Kiyota (2017).

3.4. Empirical Model

This sub-section describes the dynamic dividend repatriation model, which includes lagged dividend as an independent variable, given that dividends are persistent over time and managers do not wish to cut dividends (Lintner, 1956; Skinner, 2008). Desai *et al.* (2001, 2007) also used a dynamic approach to estimate the dividend repatriation model. The dynamic dividend repatriation model is as follows:

$$DRP_{i,t} = \beta_{0,i} + \beta_1 DRP_{i,t-1} + \beta_2 EX_{i,t} + \beta_3 CS_{i,t} + \beta_k X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (1)$$

where $DRP_{i,t}$ denotes the dividend repatriation to asset ratio of U.S. MNCs' foreign subsidiaries in country i at time t , and $DRP_{i,t-1}$ represents the lagged dividend repatriation to asset ratio of U.S. MNCs' foreign subsidiaries in country i at time $t-1$, $EX_{i,t}$ represents the bilateral exchange rate between USD and currency of the host country i at time t , and $CS_{i,t}$ represents the private credit to GDP ratio of country i at time t . In addition, $X_{i,t}$ contains a set of control variables, including profitability (PROF), repatriation tax cost (TAX), firm size (SIZE), and GDP growth rate (GDP). β_{0i} represents the intercept of the equation, $\beta_1 + \dots + \beta_k$, denoting coefficients of a set of independent and control variables. μ_i represents time-invariant unobserved heterogeneity and, finally, $\varepsilon_{i,t}$ is the error term.

3.5. Econometric Estimator

Desai *et al.* (2001, 2007) used the ordinary least squares (OLS) method, with and without fixed effect, to estimate the dividend repatriation model. However, Bond (2002) asserts that OLS with and without fixed effect is biased and inefficient for dynamic panel models, because lagged dividend repatriation (as the explanatory variable in the model) will be correlated with the error term. In such situations, the pooled ordinary least squares (POLS) method offers inconsistent and biased results (Bond, 2002), because POLS ignores the heterogeneity among the cross-sectional units and pools all cross-sectional units over time.

While the fixed-effect model (FEM) adequately deals with unobserved heterogeneity, it cannot, however, resolve the endogeneity problem. Subsequently, lagged dividend repatriation will be correlated with the error term, creating an endogeneity problem (Nickell, 1981). Even after within transformation, lagged dividend repatriation will still be correlated with the error term. Hence, the fixed effect model may provide biased estimates.

Random effect model (REM) also does not work well with dynamic panel models due to the presence of lagged dependent variable as an explanatory variable (Saini & Singhania, 2018). By the construction, the lagged dependent variable will be correlated with the error term due to the presence of unobserved heterogeneity in the error term. This correlation between the lagged dependent variable and the error term leads to the endogeneity problem. Hence, random effect Feasible Generalised Least Square (FGLS) estimator provides biased estimates for dynamic panel models.

Anderson and Hsiao's (1981) instrumental variable estimator performs better for dynamic panel models than POLS, FEM and REM. It vanishes out the unobserved heterogeneity by first differencing and uses the dependent variable's lagged level as a valid instrument to overcome the endogeneity problem. Arellano and Bond (1991), however, introduced a dynamic panel data approach, arguing that Anderson and Hsiao's (1981) instrumental variable approach did not fully utilise all moment conditions. They, therefore, used extra moment conditions to create more efficient estimator for the dynamic panel data model, introducing the difference generalised method of moments (GMM) estimator, which minimises the inconsistency between the sample moments and their values in probability. Difference GMM accounts for unobserved heterogeneity by first differencing, dealing with the endogeneity problem through instrumental variables. Unlike the instrumental variable approach, it includes more lagged level values and provides efficient estimates. Recent studies using panel data have relied primarily on GMM approach (Wahab, Saiti, Rosly & Masih, 2017; Xu, 2016 etc.) The present study, therefore, utilises dynamic panel difference GMM to estimate dynamic dividend repatriation model. Consistent with the above discussion, to eliminate time-invariant unobserved heterogeneity μ_i Eq. (1) can be transformed into first differenced form as follows:

$$\Delta DRP_{i,t} = \beta_1 \Delta DRP_{i,t-1} + \beta_2 \Delta EX_{i,t} + \beta_3 \Delta CS_{i,t} + \beta_k \Delta X_{i,t} + \Delta \varepsilon_{i,t} \quad (2)$$

4. Results and Discussion

4.1. Descriptive Statistics

Table I provides the descriptive statistics for all variables. It shows that, on average, foreign subsidiaries of U.S. MNCs repatriated 1.684 percent of dividends, scaled by total assets. The average exchange rate during the study period is 303.7, with a standard deviation of 1,468, which indicates high volatility. Also, the average private credit to GDP ratio, measuring debt financing, has a mean value of 86.63 percent, which indicates the depth of credit markets in different countries.

Table 1. Descriptive Statistics

Variables	N	Mean	SD	Min	Max
DRP	663	1.684	2.243	0	33.70
EX	663	303.738	1,468	0.500	13,389
CS	663	86.636	49,482	8.120	233.253
TAX	663	3,499	8,629	0	58,355
PROF	663	7.153	4.447	-31.446	28,962
SIZE	663	10.937	1.544	7,144	14,773
GDP	663	3.269	3.781	-17	33,747
Number of countries	51	51	51	51	51

This table provides the descriptive statistics for all variables. It shows the number of observations (N), mean, standard deviation (SD), minimum (Min) and maximum (Max) values for all variable of the present study.

In addition to the above, Table 1 also shows the descriptive statistics for the control variables. First, the average repatriation taxes paid by U.S. MNCs during the current study period is 3,464 million USD, whereas the standard deviation for repatriation taxes is 8,629 million USD, indicating high variation in tax rates in different countries, since a lower tax rate in the foreign country will lead to high repatriation taxes and vice versa. Second, profitability, measured by return on asset, has a mean value of 7.153 percent and a standard deviation of 4.447 percent. Third, the average size of foreign subsidiaries of U.S. MNCs, measured by the natural logarithm of total assets, is 10.93. Fourth, the average GDP growth rate in foreign countries is 3.269 percent. A higher GDP growth rate shows higher investment opportunities in that country.

4.2. Regression Results

Table 2 reports the results of dynamic linear regression model (Eq. 2) using panel difference GMM. The coefficient of lagged dividend repatriation is statistically significant, which implies that dividend repatriation is a dynamic process in which the current dividend decision depends on past dividend repatriation decisions. The lagged dividend repatriation has a coefficient of 0.1954, denoting that a 1 percent increase from the previous year's dividend repatriation will lead to a 0.1954 percent increase in current year's dividend repatriation to the parent company. This confirms the hypothesis that dividend repatriations are persistent over time and managers are reluctant to change dividends (Desai et al., 2007; Moore, 2011). Hence, panel GMM is an appropriate choice in this case.

Table 2. Results of dynamic panel difference GMM

Variables	GMM
DRP _{t-1}	0.1954** (0.0854)
EX	-0.0007*** (0.0003)
CS	-0.0829** (0.0371)
TAX	-0.0005** (0.0002)
PROF	0.2447*** (0.0806)
SIZE	0.2900 (0.8900)
GDP	-0.0648 (0.0646)
Arellano-bond test for AR(1)	-2.7000 (0.0070)***
Arellano-bond test for AR(2)	0.8800 (0.3790)
Hansen test of over identifying restrictions	36.2520 (0.4100)
Observations	561
Number of countries	51

This table shows the results of dynamic dividend repatriation model (Eq. 2) using panel difference GMM estimator. The dependent variable is dividend repatriation to asset ratio (DRP). Robust standard errors are in parentheses except for Arellano-Bond tests for serial correlations and Hansen test of over-identifying restrictions, which are the p-values. *** p<0.01, ** p<0.05, * p<0.1

The findings reveal that there is a significant negative association between exchange rate fluctuations and dividend repatriation policy, implying that the appreciation of host country currencies against the USD lead to higher dividend repatriation by U.S. MNCs. These findings are in line with *H1* and confirm that exchange rate fluctuations have a first-order effect on dividend repatriation policy, rather than an indirect effect through repatriation taxes, as proposed by Dodonova and Khoroshilov (2007). It also suggests that U.S. MNCs were using dividend repatriation policy to hedge exchange rate risk, since the depreciation of host country currency against the USD reduces the dividend amount in terms of USD. Consequently, it will reduce the value of future cash flows and, according to financial theory, value of a firm depends on the

value of future cash flows. Findings show that U.S. MNCs were active in exchange rate management through dividend repatriation policy.

In addition, results indicate a significant inverse relationship between credit supply in the host country and dividend repatriation policy (supporting *H2*). This implies that foreign subsidiaries of U.S. MNCs repatriated low dividends from those countries that had a high private credit to GDP ratio, because these countries have developed and unsegmented credit markets. Consequently, foreign subsidiaries can access external debt at a lower overall cost. Hence, debt financing can be used as a monitoring or controlling device in such countries. This reduces the importance of dividends in minimising agency problems. Hence, foreign subsidiaries repatriate low dividends from such countries. These findings provide support for Jensen's (1986) control hypothesis, which predicts that debt financing can be used as a substitute for dividend payments to reduce the agency cost of free cash flows.

In terms of control variables, findings suggest a significant negative effect of repatriation taxes on the dividend repatriation policy of U.S. MNCs' foreign subsidiaries. This implies that foreign subsidiaries facing higher repatriation taxes repatriated lower dividends than those facing lower repatriation taxes. This is in line with prior research suggesting that higher repatriation taxes on dividends decreases dividend repatriation from foreign subsidiaries (Desai et al., 2007; Grubert, 1998; Hines & Hubbard, 1990). Additionally, results reveal a significant positive association between profitability and dividend repatriation policy. Profitable foreign subsidiaries repatriated more dividends than their less profitable counterparts. Moreover, results indicate an insignificant effect of firm size and GDP growth rate on dividend repatriation policy.

Overall, the estimated dynamic panel regression model is well specified. The required three diagnostic tests for difference GMM were found to be satisfactory. As anticipated, the null hypothesis that there is no first-order serial correlation (AR1) was rejected, whereas the null hypothesis that there is no second-order serial correlation was not rejected. The Hansen test statistics for instrument over-identification was not rejected at conventional significance levels. This implies that the instruments are valid and well-specified.

4.3. Robustness Checks

Robustness checks were carried out to assess the sensitivity of the results to alternative estimation methods such as POLS, FEM, and REM, and alternative measurements. First robustness check involves estimating dynamic dividend repatriation model (Eq. 1) using POLS, FEM, and REM. Bond (2002) asserts that POLS is biased upward for dynamic regression models since the lagged dependent variable positively correlates with the error term due to the presence of unobserved heterogeneity.

Additionally, he claims that the FEM is biased downward for dynamic regression models since the transformed lagged dependent variable negatively correlates with the transformed error term.

Moreover, REM or FGLS is also biased upward for dynamic regression models, because the error term contains the unobserved heterogeneity, which positively correlates with the lagged dependent variable. Bond (2002) recommends a consistent estimator to provide estimates for the lagged dependent variable that will lie between POLS and FEM estimates. The results presented in Table 3 confirm that POLS and FGLS are biased upward, whereas FEM is biased downward for the lagged dependent variable compared to panel difference GMM. This suggests that panel difference GMM is an appropriate choice for estimating the dynamic dividend repatriation model.

Table 3. Robustness check: Alternative estimation methods

Variables	POLS	FEM	FGLS	GMM
DRP _{t-1}	0.2821*** (0.0367)	0.0925** (0.0407)	0.3010*** (0.0388)	0.1954** (0.0854)
EX	0.0000 (0.0000)	-0.0006* (0.0003)	0.0000 (0.0001)	-0.0007*** (0.0003)
CS	0.0003 (0.00174)	-0.0176*** (0.0064)	0.0009 (0.0018)	-0.0829** (0.0371)
TAX	-0.0004** (0.0001)	-0.0001*** (0.0000)	-0.0002* (0.0000)	-0.0005** (0.0002)
PROF	0.1814*** (0.0208)	0.1783*** (0.0241)	0.1935*** (0.0238)	0.2447*** (0.0806)
SIZE	0.0000 (0.0000)	0.0000 (0.0000)	0.5332 (0.5452)	0.2900 (0.8900)
GDP	0.0136 (0.0235)	0.0170 (0.0273)	0.0157 (0.0234)	-0.0648 (0.0646)
Constant	-0.1300 (0.2242)	2.3160*** (0.6772)	0.2743 (0.7753)	
Arellano-bond test for AR(1)				-2.7000 (0.0070)***
Arellano-bond test for AR(2)				0.8800 (0.3790)
Hansen test of over identifying restrictions				36.2520 (0.4100)
Observations	612	612	612	561
R-squared	0.2751	0.1783	0.2777	

This table shows the results of dynamic dividend repatriation model (Eq. 1) using alternative estimation methods such as POLS, FEM and FGLS. The dependent variable is dividend repatriation to asset ratio. Robust standard errors are in parentheses except for Arellano-Bond tests for serial correlations and Hansen test of over-identifying restrictions, which are the p-values. *** p<0.01, ** p<0.05, * p<0.1

The second robustness check involves estimating dynamic dividend repatriation model (Eq. 2) using dividend repatriation to sales ratio as an alternative measurement of dividend repatriation policy. These results are reported in Table 4. The Prior study by Hasegawa and Kiyota (2017) also used dividend repatriation to sales ratio to measure dividend repatriation policy. The empirical results in Table 4 are very similar to those obtained using dividend repatriation to asset ratio as a measurement of dividend repatriation policy in Table 2. More specifically, the lagged dividend repatriation remains positive and significant, with a coefficient of 0.2164. Exchange rate fluctuations demonstrate a significant negative association with dividend repatriation, which suggests that appreciation of host country currencies against the USD leads to higher dividend repatriation and vice versa. In addition, credit supply in the host country remains significant and negative with a coefficient of -0.1693. It implies that higher availability of private credit in the host country results in lower dividend repatriation by U.S. MNCs. In terms of control variables repatriation taxes and profitability are significant determinants of dividend repatriation policy, whereas firm size and GDP growth rate insignificantly influence dividend repatriation policy.

Table 4. Robustness check: Dividend repatriation to sales ratio as dependent variable

Variables	GMM
DRP _{t-1}	0.2164*** (0.0450)
EX	-0.0016*** (0.0005)
CS	-0.1693* (0.0887)
TAX	-0.0005** (0.0002)
PROF	0.6162* (0.3310)
SIZE	-1.6595 (2.3781)
GDP	-0.4572 (0.2980)
Arellano-bond test for AR(1)	-1.3600 (0.1750)
Arellano-bond test for AR(2)	0.8027 (0.4220)
Hansen test of over identifying restrictions	35.6237 (0.4865)
Observations	561
Number of country	51

This table reports the results of dynamic dividend repatriation model (Eq. 2) using dividend repatriation to sales ratio as the dependent variable. Robust standard errors are in parentheses except for Arellano-Bond tests for serial correlations and Hansen test of over-identifying restrictions, which are the p-values. *** p<0.01, ** p<0.05, * p<0.1

The last robustness check encompasses estimating dynamic dividend repatriation model (Eq. 2) using percentage change in the bilateral exchange rate between host country currency and USD as a measure for exchange rate fluctuations. This measure is in line with prior studies of Al-Shboul and Anwar (2014), Francis, Hasan, Hunter, and Zhu (2017), and Ngo(2017). The results reported in Table 5 are consistent with results in Table 2 using a bilateral exchange rate as a measure for exchange rate fluctuations. Notably, results show significant negative relationship between exchange rate fluctuations and dividend repatriation. This suggests that appreciation of host country currency against USD results in higher dividend repatriation to the parent company. Additionally, credit supply in the host country demonstrates significant negative influence on dividend repatriation, implying that foreign subsidiaries of U.S. MNCs operating in countries with developed debt markets repatriated lower dividends to the parent company. These findings are consistent with the hypotheses of the present study. Hence, this study concludes that findings are robust to alternative estimation methods and measurements.

Table 5. Robustness check: Alternative measurement for exchange rate fluctuations

Variables	GMM
DRP _{t-1}	0.1631** (0.0677)
EX	-0.0203** (0.0102)
CS	-0.0922*** (0.0339)
TAX	-0.0004** (0.0002)
PROF	0.2020*** (0.0749)
SIZE	5.0877** (2.3206)
GDP	-0.0615 (0.0650)
Arellano-bond test for AR(1)	-2.6750 (0.0070) ***
Arellano-bond test for AR(2)	0.1470 (0.8860)
Hansen test of over identifying restrictions	36.2530 (0.3640)
Observations	561
Number of country	51

This table presents the results of a dynamic dividend repatriation model (Eq. 2) using the percentage change in the bilateral exchange rate as a measure for exchange rate fluctuations. The dependent variable is dividend repatriation to asset ratio. Robust standard errors are in parentheses except for Arellano-Bond tests for serial correlations and Hansen test of over-identifying restrictions, which are the p-values. *** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

This study investigates the effect of exchange rate fluctuations and credit supply on the dividend repatriation policy of foreign subsidiaries of U.S. MNCs around the world. It used secondary data for estimation purposes. Dynamic panel difference GMM results suggest that appreciation of the host country currency against the USD leads to higher dividend repatriation by U.S. MNCs since the appreciation of the host country currency against the USD results in a higher value of dividends to the parent company and vice versa. This indicates that foreign subsidiaries of U.S. MNCs were actively managing their exchange rate risk through dividend repatriation policy. Also, results reveal that foreign subsidiaries of U.S. MNCs repatriated lower dividends from those countries that have unsegmented or developed credit markets. A smooth supply of debt in such countries reduces the role of dividend repatriation policy in mitigating internal agency problems, hence leading to lower dividend repatriation from such foreign subsidiaries. Moreover, in terms of control variables, repatriation taxes and profitability have a significant negative and positive impact on dividend repatriation policy, respectively, whereas firm size and GDP growth rate have a statistically insignificant effect on dividend repatriation policy.

This study has a number of few limitations, which suggest avenues for further research. First, it used country-level data because firm-level data is confidential, and it was not possible to access to those data. Future research may repeat our study by using firm-level data. Second, our study was based only on U.S. MNCs; future research may extend the scope of the current study and include MNCs from different countries to enable the dividend repatriation behaviour of MNCs from different countries to be compared and contrasted.

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