FDI AND ECONOMIC GROWTH:

AN EXTERNAL DEBT THRESHOLD EFFECT

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ABSTRACT

This paper investigates the relevance of external debt as a factor inhibiting economic growth gains to be accrued from foreign direct investment (FDI). We develop a model which formalises a mechanism to allow for the influence of external debt in the transmission of FDI-generated externalities and conduct threshold regressions to show the existence of a debt contingency effect which limits the positive impact of inward FDI on growth. Using annual as well as five-year averaged data for 39 developing countries over the period 1984-2010, our findings support the hypothesis that the FDI-induced growth effect is dependent on the external debt constraint. In particular, high indebtedness can constrain economies from reaping growth benefits from FDI as they seek to reduce their debt levels. In this scenario, the evidence shows that increasing financial development can mitigate the negative influence of debt thresholds in the FDI-growth nexus.

Keywords: Foreign direct investment, External debt, Economic growth, Threshold estimation.
JEL Classification: F21; F34; C24.

1. INTRODUCTION

Foreign direct investment (FDI) is commonly regarded as a critical catalyst for economic growth and development, especially in developing countries. However, taken collectively, the evidence from the FDI-growth literature suggests that the growth-inducing properties of inward FDI are dependent upon developing countries' absorptive capacity in order to maximise the benefits stemming from the technology transfer and spillover effects associated with such investment, at either aggregate or industry-specific level (see, e.g., Lorentzen and Barnes, 2004; Durham, 2004).

In the quest for the specific factors that influence the absorptive capacity of host countries, previous studies have advanced hypotheses in relation to a variety of explicit thresholds. For example, Blomstrom *et al.* (1992) argue that the level of personal wealth acts as a threshold, in that a sufficiently high level of per capita income is necessary to ensure that FDI positively affects economic growth. Balasubramanyam *et al.* (1996) find that the degree of trade openness provides a critical threshold for FDI to induce higher economic growth. Borensztein *et al.* (1998) emphasise that only countries meeting a minimum level of human capital can benefit from FDI-led growth gains. More recently, Slesman *et al.* (2015) present strong and robust evidence that portfolio equity (including FDI) and debt inflows have a positive impact on economic growth only in countries with high-quality institutions. Countries that fall below the identified threshold level of institutional quality record either negative or statistically insignificant effects. Other studies suggest that variables such as financial market development, economic freedom as well as corruption could also constitute threshold factors affecting the FDI-growth nexus (see, among others, Hermes and Lensink, 2003; Alfaro *et al.*, 2004; Azman-Saini *et al.*, 2010a, 2010b; Okada and Samreth, 2014).

Apart from the FDI-growth literature, a separate strand of studies have characterised the link between foreign debt and economic growth in the form a 'debt Laffer curve', pointing to a nonlinear relationship between them, incorporating both a growth enhancing effect at lower levels of debt and a growth retarding effect (the overhang problem) at higher levels of debt

(Krugman, 1988; Cohen, 1993, 1995; Pattillo *et al*., 2004; Reinhart and Rogoff, 2010). Given the nonlinearity of this relationship, the literature has also empirically explored whether a debt threshold exists in the debt-growth relation using various modelling strategies (Cordella *et al*., 2010; Kumar and Woo, 2010; Eberhardt and Presbitero, 2015). However, to the best of our knowledge, no previous study has considered the importance of an external debt threshold effect in the linkage between FDI and economic growth. Yet, as Reinhart and Rogoff (2009) demonstrate in their book, *This Time is Different: Eight Centuries of Financial Folly*, a high level of indebtedness increases the sovereign risk of the country, which may limit the volume of FDI inflows as multinational enterprises (MNEs) seek safer environments elsewhere to avoid potential expropriation of their resources. Moreover, governments are inclined to generate revenue typically from financial repression in order to service their debt (Reinhart, 2012), which can affect the incentives of MNEs to interact with host country firms or intermediaries, thereby limiting the capacity of the host economy to accrue growth benefits from FDI.

The present study aims to investigate the relevance of debt overhang as a constraint affecting the contribution of FDI to economic growth. Specifically, we wish to determine whether the level of external debt characterising many developing countries may itself constitute a threshold barrier in realising the growth benefits typically associated with inward FDI. Given the liability of countries to meet their foreign debt obligations, we argue that their ability to reap growth benefits from inward FDI might be contingent on their external indebtedness, in addition to other economic factors influencing absorptive capacity (such as financial development). Our analysis attempts to reconcile the conflicting roles of debt and FDI in the process of economic development while accounting for the possibility that certain threshold conditions have to be met before growth benefits can be accrued from FDI. In particular, we posit that inward FDI promotes economic growth below a certain threshold of external debt but otherwise the growth benefits diminish beyond that level. In this process, we also highlight a role for financial development in terms of enhancing the capability of FDI to promote growth, thereby mitigating the negative influence of the debt constraint. In

specifying this inherently nonlinear relationship, a theoretical model is developed to allow for a role for external debt to influence the FDI-growth relationship through a mechanism which supports the view that governments use financial repression as a means for liquidating debt, as suggested by Reinhart *et al.* (2011) (see also Reinhart, 2012; and Reinhart and Sbrancia, 2015). The implications of our theoretical model are tested empirically to establish evidence of the existence of an external debt threshold which indexes the FDI-growth relationship and we also show that this can be alleviated by accounting for the influence of host country's absorptive capacity, in the form of increasing financial development. Our empirical analysis is based on country level panel data for 39 developing countries over the period 1984-2010, applying Hansen threshold estimation methods (Hansen, 2000; Caner and Hansen, 2004).

The main contribution of our paper is to highlight the importance of accounting for the external debt burden of economies in assessing the impact of FDI on economic growth. Many developing countries have continually experienced a serious issue of debt overhang since the 1980s, as a result of relying on borrowing from abroad to finance their domestic investments (World Bank, 2016). Attempts to restructure their debt obligations with foreign creditors have led to slower economic growth and development of these economies due to painful macroeconomic adjustments (see, e.g. Krugman *et al*., 2012, Chapter 22). Reinhart and Rogoff (2010) present long term evidence that high debt is associated with slower growth for advanced and emerging economies. Our study emphasises, from a slightly different perspective, the relevance of a debt contingency effect which can limit the potential for host economies to extract growth-enhancing benefits from inward FDI; however, we demonstrate that this negative influence of debt in the transmission of FDI effects can be mitigated through greater financial development. Hence, our study complements previous studies in the FDI-growth literature by emphasising the role of unfavourable local economic conditions (debt overhang) and the importance of financial system absorptive capacity in counteracting them.

The rest of the paper is organised as follows. Section 2 reviews the literature. Section 3 develops a model of FDI-debt-growth. Section 4 outlines the methodological approach for

empirical testing. Section 5 presents the data and discusses the empirical results. Section 6 concludes.

2. A SYNTHESIS OF RELATED LITERATURE

2.1. Thresholds in the FDI-Growth nexus

Theoretical studies tend to emphasise the importance of achieving a minimum threshold level of development for economic growth gains to be accrued (Azariadis and Drazen, 1990) while empirical studies test the existence of threshold effects in regressions using various proxies for absorptive capacity. One such proxy is the level of financial development which is considered to be important in the process of technological diffusion associated with FDI. Hermes and Lensink (2003) develop a model which predicts that the impact of FDI on economic growth is contingent on the development of host country financial markets. Their empirical evidence using cross-section and panel data for 67 developing countries suggests that FDI has a positive growth impact if the financial system is sufficiently developed. Alfaro *et al.* (2004) also emphasise the importance of local financial development by examining the effect of FDI on economic growth using cross-country data covering up to 71 countries over the period 1975-1995. They find that while the relationship between FDI and growth is ambiguous, the FDI-growth effect turns out to be positive and significant after including the interaction effect of FDI with financial development, and conclude that the development of local financial markets is crucial in ensuring that FDI inflows have a positive impact on growth.

There are also studies suggesting that other factors such as human capital, economic freedom, institutional quality as well as corruption could be relevant thresholds in the relationship between FDI and growth. Borensztein *et al.* (1998) examine the importance of human capital in the relationship between FDI and per capita GDP growth using data for 69 developing counties over the period of 1970-1989. They find that FDI contributes to growth

only when the host country meets a minimum threshold level of human capital. Following Borensztein *et al.* (1998), other studies have also investigated the importance of the threshold effect of human capital. Using data for States in the USA, Ford *et al.* (2008) find that FDI affects output growth if the states meet a minimum level of human capital. Using time-series data from 10 ASEAN countries over the period 1990-2008, Tu *et al.* (2012) also find a positive impact of FDI on economic growth when human capital is above a threshold level; otherwise FDI is more likely to erode growth as it tends to utilise local cheap labour and crowd out domestic investment.

More recent studies have focussed on the importance of other factors affecting the FDI-growth nexus. In examining the role of economic freedom as a threshold, Azman-Saini *et al.* (2010b) use system GMM estimation with interaction effects in cross-country growth regressions for 85 countries over the period 1976-2004. Their findings reveal that a country can gain significantly from FDI when it has a sufficiently high degree of economic freedom. Okada and Samreth (2014) consider the influence of corruption in the estimation of the FDI-growth regression using an interaction model and find that the threshold is around the 10^{th} percentile of the least corrupt countries in their large sample of 130 countries over the time period 1995-2008. Interestingly, they find that the impact of FDI on economic growth is negative if the corruption level is below the threshold but positive if the corruption level is above the threshold. In other words, a high level of corruption is associated with a positive impact of FDI on growth. They rationalise this counter-intuitive result by arguing that profit-seeking MNEs engage in foreign investments in countries with weak regulations or poor law enforcement.

A common limitation of the modelling specification adopted in the above studies pertains to the inclusion of multiplicative interaction terms in linear regressions, which implicitly imposes the *a priori* assumption that FDI monotonically rises (or declines) with absorptive capacity (Girma, 2005). Hansen (1996, 2000) and Caner and Hansen (2004) propose alternative estimation procedures which avoid the use of interaction terms. Applying Hansen-type methodology, Kim *et al.* (2013) use data for 85 countries over the period 1975-2010 to

show that per capita income, human capital, financial development and corruption serve as effective thresholds in the positive impact of trade and FDI on domestic investment. Interestingly, they find that trade has an adverse effect on domestic investment in countries which lack sufficient absorptive capacity but FDI positively affects investment in countries with poor financial development, low human capital, or a high level of corruption. Azman-Saini *et al.* (2010a) also apply Hansen's method with cross-country data from 91 countries over the period 1975-2005 to confirm that the positive effect of FDI on economic growth "kicks in" only if financial development is above a certain threshold. Huang *et al.* (2012) use Hansen's threshold estimations on provincial data for China over the period 1985-2008 and find that the level of regional innovation can be a threshold in the transmission effect from FDI to growth.

2.2. The relevance of debt level as a threshold

Turning to debt issues, conventional wisdom suggests that foreign borrowing is an important source of finance for investment particularly in developing economies. As observed by Todaro and Smith (2011), a large accumulation of foreign debt is particularly common in the early stages of economic development, when there are low levels of domestic savings, high current account deficits, and/or lack of capital imports. However, following the Third World Debt crisis of the early 1980s, many developing countries suffered from a serious problem of debt overhang. Krugman (1988) argues that debt overhang occurs when the expected repayment on external debt falls short of the contractual value of debt. If a country's debt level is expected to exceed the country's capability of future repayment, then expected debt service is likely to be an increasing function of the country's output level. Some of the returns from investing in the domestic economy are effectively taxed away by foreign creditors, thus discouraging further investment. Furthermore, a high burden of debt increases expectations that debt will tend to be financed by distortionary measures (e.g. financial repression or other punitive taxes or expenditure cuts), leading to lower or riskier investment, greater uncertainty about future returns, and potentially lower growth prospects (Calvo, 1998;

Clements *et al*., 2003).

Numerous empirical studies have sought to provide evidence of the debt overhang hypothesis by testing the effect of debt on investment (Cohen, 1993; Elbadawi *et al*., 1997; Aguiar *et al*., 2009) and growth (Hwang *et al*., 2010; Reinhart and Rogoff, 2010; Eberhardt and Presbitero, 2015) with the aim of determining debt thresholds to convey nonlinear effects in the implied relationship. Reinhart and Rogoff (2010), for example, investigate the systematic relationship between debt, growth and inflation using a unique dataset covering 44 countries with 200 years of historical data incorporating more than 3700 country-year observations. Their primary findings indicate that public debt undermines economic growth beyond a threshold of 90% of GDP for advanced countries while the corresponding threshold of external debt to GDP for emerging economies is 60%.[1]

While the aforementioned studies have emphasised the effects of debt on investment or economic growth, and there have been also a few studies comparing elements of debt and FDI as ingredients of growth (Chung 2010; Nicholson and Lane, 2013), the issue about the relevance of debt acting as a threshold in the FDI-growth link has not been previously examined. In analysing the salient features of financial crises, Reinhart and Rogoff (2009: 58) shed light on the possible debt-FDI-growth link by pointing out the importance of sovereign risk in the location decisions of MNEs. MNEs inevitably consider the reputation of target FDI markets given the possibility that a debt-defaulting country might expropriate their plant and equipment.[2] Bayar and Kilic's (2014) empirical study for Turkey confirms that sovereign credit ratings (where external debt level is a crucial element for the ratings) influence FDI inflows. Earlier, Nunnenkamp (1991) suggested that sovereign risk and debt overhang were relevant factors in explaining the decline of FDI to developing countries during the 1980s.

[1] They also find a positive association between high public debt levels and inflation for emerging economies. However, their findings about the debt threshold effect on growth for advanced economies have been challenged by Herndon *et al.* (2014) who claim that their threshold ratios are much lower - after rectifying inaccuracies in their data selection, methodology and coding errors – resulting in debt/GDP ratio of around 30%, beyond which growth is expected to decline.

[2] In history, this kind of expropriation is not rare. For example, the Chilean government confiscated the US copper mining companies in 1977; and the OPECs nationalised foreign oil companies in the 1970s (Reinhart and Rogoff , 2009: 58).

The presence of increased sovereign risk might suggest a possible reason why external debt could affect foreign investment (including FDI) flows, although this may not be a convincing case for considering the relevance of debt as a threshold barrier in the FDI-growth nexus. In an attempt to provide a channel through which a country's debt burden could influence the FDI-growth link, we introduce a financial repression mechanism in our theoretical model (discussed in the next section) which is just one possible way in which debt could influence the FDI-growth nexus. An alternative mechanism could be that debt servicing costs eat up a major proportion of a country's foreign exchange earnings and, while capital inflows contribute to the build-up of foreign exchange reserves, depletion of such resources can undermine macroeconomic stability and growth (Corden, 1989). In this scenario, Ahlquist and Prakash (2010) demonstrate the importance of a debt threshold effect in the relationship between FDI and the costs of contract enforcement (typically between private actors such as MNEs and local entrepreneurs), arguing that highly indebted countries are vulnerable to FDI inflows. Using cross-country data for 98 developing countries over the period 1992-2002, they find that FDI inflows contribute to reducing the costs of contract enforcement as long as the level of external debt is below the threshold. Since contract enforcement is a relevant institutional characteristic (backed by rule of law) which facilitates private transactions that may ultimately drive economic growth, their analysis suggests an intuitive way of treating the external indebtedness of the host economy as a relevant constraint in analysing the growth benefits associated with inward FDI.

To summarise, while the above synthesis of related literature yields insights about the importance of various factors in affecting the FDI-growth nexus, to the best of our knowledge attempts to explicitly characterise the debt-FDI-GDP growth nexus at either theoretical or empirical level have not been previously reported in the literature. This paper aims to make a unique contribution in these directions.

3. A THEORETICAL MODEL

In this section, we develop a theoretical model to illustrate why external debt can influence the link between FDI and economic growth. The model has two features. First, in line with the view espoused Reinhart *et al.* (2011) among others, it highlights the relation between external debt and financial repression; second, it illustrates how financial repression affects the FDI-growth relationship and, as a consequence, how external debt can affect the relationship through this mechanism.

To establish the link between financial repression and external debt, we use the model originally developed by Giovannini and de Melo (1991) who show how financial repression, like tax, exerts a negative impact on per capita growth. Their analysis of consumer optimisation is based on the overlapping generations (OLG) model used by Blanchard (1985). They show that governments can raise their revenue by levying an implicit tax θ (financial repression) on foreign asset (F) returns, thereby proportionally reducing the interest paid on domestic debt (D). Financial repression thus exerts a wedge (distortion) which drives the domestic interest rate (r) below the world interest rate (r^*), giving the relationship[3]:

$$(1 + \mathrm{r}^*)(1 - \theta) = 1 + r \qquad (1)$$

Assume that government revenue from the financial repression tax is set equal to the government expenditure (G) on domestic and foreign debts, so that $G = \theta(F + D)$. Moreover, rather than rely on levying a tax on private agents' income from investing in foreign assets, governments exercise the means of financial repression to affect foreign investment by driving a wedge between domestic and foreign interest rates. Hence, assuming that government expenditure is financed by domestic borrowing (D) and external debt (E), the government's budget constraint can be represented as $E + D = \theta D$. Normalising government expenditure to be unity, the relationship between financial repression and

[3] Appendix I outlines the structure of the model with derivation of this and subsequent relationships below.

external debt can be expressed more simply as:

$$\theta = \frac{1}{1-E} \tag{2}$$

The implication of this model is that with high levels of external indebtedness, governments tend to rely more on the means of financial repression to reduce the burden of their external debt, particularly when they cannot easily raise revenue from other formal levies to repay the debt.

Turning to the relationship between FDI and economic growth, we use a classical Cobb-Douglas production function with constant returns to scale. Following Kinoshita and Lu (2006) and Hsu and Wu (2006), we assume that technological progress in the domestic economy is driven by the international diffusion of foreign technology, measured as a function of FDI, which yields the following relationship characterising technological change:

$$A_{t+1} = A_t + (A_t^* - A_t)\varphi(k_t)\psi(M_t) \tag{3}$$

where $A_t^* - A_t$ represents the technology gap between foreign and domestic economy; $k_t = K_t/L_t$, the ratio of capital to labour; $\varphi(k_t)$ is a function which embodies the influence of foreign capital, including FDI (with Inada conditions $\varphi'(\cdot) > 0$, $\varphi''(\cdot) < 0$ implying that the existence of foreign capital is necessary for spillover through technology leakage, while the extent of leakage is diminishing); and $\psi(M_t)$ is the function of domestic financial development (*M*). In representing equation (3), we relax the original assumption in the models of Kinoshita and Lu (2006) and Hsu and Wu (2006) which suggests that the entire capital is foreign, and instead regard capital K_t as the weighted average of both domestic and foreign capital (with proportions α and $1-\alpha$ respectively). In relaxing this assumption, we allow for the possibility that multinationals do not always bring their entire capital from abroad, and their ability to also raise capital from local financial markets can be

regarded as part of domestic capital.[4] Foreign capital in this form augments domestic sources of investment, besides having potentially positive spillover effects on domestic factor productivity and knowledge capital.

Intertemporal optimisation under a competitive environment[5] leads to equilibrium output per capita which can be expressed as a function of the production parameter (β), the domestic interest rate (r) and financial repression (θ):

$$y_t = \frac{Y_t}{L_t} = A_t^{\frac{2-\beta}{1-\beta}} \left[\frac{\beta(1-\theta)}{(1-\alpha\theta)(1+r)}\right]^{\frac{1}{1-\beta}} \tag{4}$$

The growth rate of output per capita g^t is then represented (after substituting for θ as in (2)) approximately as:

$$g^t \cong \left(\frac{2-\beta}{1-\beta}\right) \ln\left\{1 + \frac{1}{A_{t-1}}(A^*_{t-1} - A_{t-1})\varphi \left[\frac{A_{t-1}\beta\left(1-\frac{1}{1-E}\right)}{\left(1-\frac{\alpha}{1-E}\right)(1+r)}\right]^{\frac{1}{1-\beta}} \psi(M_{t-1})\right\} \tag{5}$$

From equation (5) it can be seen that growth rate is a function of the level of external debt (E) the economy owes to the rest of the world, which is influenced by financial repression (θ). In this model, as depicted by equation (3), aggregate economic growth is assumed to be positively influenced by technological diffusion and spillovers associated with FDI inflows. However, the distortionary impact of financial repression, in terms of its ability to reduce (or liquidate) the real burden of debt, can effectively constrain the positive impact of FDI on growth by influencing the behaviour of MNEs and, consequently, their ability to contribute to host country development.

There are several possible channels though which a high burden of debt could limit the

[4] See Agbloyor *et al.* (2013) for discussion of how MNEs conduct their business using host country banking systems. The relationship between FDI and host countries' financial market is well documented by several studies (see, e.g. Alfaro *et al*. 2010).

[5] The assumption of perfect competition in optimisation is for illustrative purposes; in reality, of course, this may not be appropriate and the analysis that follows departs from this requirement without changing our arguments or conclusions.

FDI induced spillover effects on growth. For example, MNEs might be forced to curtail their operations in the host economy if prospects of negative real returns from investment are anticipated due to higher inflation.[6] More specifically, as shown in the above model, foreign affiliates which make use of local financial markets to raise capital find that their returns are effectively taxed through financial repression, and consequently they are more likely to scale back their operations and limit their interactions with local entrepreneurs. Thus, gains from FDI through such linkages are likely to be affected. Furthermore, irrespective of the financing conditions, the prospects of higher costs or lower competitiveness in the host economy may restrict foreign firms' reliance on domestic suppliers for (intermediate) inputs, thus limiting spillovers via backward linkages (Amendolagine *et al*., 2013; Damijan *et al*., 2003). Similarly, gains though forward linkages could be reduced if foreign firms find it less profitable to maintain their operations supplying intermediate goods and services to domestic firms. In general, the distortionary impact of financial repression that reduces the scope of engagement of foreign firms with local firms is likely to limit the potential gains from FDI inflows that come through spillovers or technological diffusion. Our analysis therefore suggests that external debt has an adverse impact on the FDI-growth relationship.

The negative influence of debt overhang on the FDI-growth nexus, however, can be appreciably lower in countries with higher levels of financial development. Incorporated in the above model is the influence of financial development, the importance of which can be considered in terms of both its role in enabling FDI to promote growth as well as in mitigating the adverse effect of external debt on FDI. Roubini and Sala-i-Martin (1992) present evidence to suggest that countries with high levels of financial repression tend to be less financially developed. As a corollary, this implies that increasing financial development would undermine the ability of authorities to use financial repression as a means to reduce the level of external debt.[7] Furthermore, Haslag and Koo (1999) provide evidence to support the

[6] In addition, as argued earlier, debt overhang increases the sovereign risk of host countries, which is likely to lower their international credit ratings and deter foreign investors and firms from investing in local markets. Credit rating agencies (e.g. Moody, S&P, and Fitch) consider the position of a country's public finances as an important factor for assessment of its sovereign credit rating.

[7] Roubini and Sala-i-Martin (1992) present an endogenous growth model with money demand to show that financial

view that financial development serves to weaken the link between financial repression and growth.

Taking these considerations into account suggests a complex nonlinear relationship characterising the link between FDI and economic growth, although it seems plausible to infer from the above theoretical analysis that: (i) debt overhang acts as a contingency factor inhibiting the positive influence of FDI on growth, and (ii) greater financial development serves to mitigate this negative effect while improving the host country's absorptive capacity to yield growth benefits from FDI.

4. METHODOLOGY

To test the implications of the theoretical model we apply a threshold estimation technique to determine the existence of a debt threshold effect in the FDI-growth nexus, while controlling for a range of factors including financial development. As noted above, several studies (e.g. Alfaro *et al*., 2004; Borensztein *et al*., 1998; Okada and Samreth, 2014) have used interaction terms in regression models to determine the existence of threshold effects and thus the role for spillover effects in the FDI-growth link. However, as emphasised by Girma (2005), Azman-Saini *et al.* (2010a) and Slesman *et al.* (2015), this modelling strategy has the drawback of imposing *a priori* restriction that spillovers are monotonically increasing (or decreasing) with absorptive capacity. A more flexible estimation method is proposed by Hansen (1996, 2000), which entails determining threshold effects through a sample decomposition based on dividing the data sample according to the categories (debt regimes) chosen. This method therefore allows for parameter heterogeneity through sample-splitting by regime rather than by including interaction terms in the estimation. Another advantage of Hanson's method that a more accurate threshold effect can be obtained from the estimation,

development reduces the inflation tax base and therefore the ability of the authorities to collect seigniorage from higher money growth.

while the traditional approach using interaction terms can only provide an approximation of the threshold value. We therefore use the Hanson's method for our empirical analysis.

To illustrate Hansen's procedure, assume that the FDI-debt-growth relationship is specified as:

$$Y_{it} = \tau_1' x_{it} + \varepsilon_{it}, \qquad DEBT_{it} \leq \gamma$$
$$Y_{it} = \tau_2' x_{it} + \varepsilon_{it}, \qquad DEBT_{it} > \gamma \tag{6}$$

where Y_{it} represents GDP growth per capita; x_{it} stands for all the independent variables including FDI; and $DEBT_{it}$ is treated as a threshold variable that conditions the impact of FDI on economic growth. In estimating the model represented by (6), the sample is effectively split into two regimes, depending on whether the value of *DEBT* is below the threshold level γ or not (thus distinguishing between high debt and low debt regimes). To represent the model in a form of a single equation with the 'sample-split', let $\delta_n = \tau_2 - \tau_1$ which denotes the threshold effect, indicating that there is a 'small threshold', when δ_n tends to be zero. We introduce a dummy variable $d_{it}(\gamma) = \{DEBT_{it} \leq \gamma\}$, where $\{\cdot\}$ is the indicator function. Then, set $x_{it}(\gamma) = x_{it} d_{it}(\gamma)$ and $Y_{it} = \tau' x_{it} + \delta_n' x_{it}(\gamma) + \varepsilon_{it}$, where $\tau = \tau_2$. The unified equation now allows for the subset parameters to differ between two regimes.

The first step in the estimation is to calculate the sum of squared residuals (RSS). The RSS is denoted by $S_n(\gamma) = \sum_{t=1}^{T} \sum_{i=1}^{N} \varepsilon_{it}^2 = S_n\big(\hat{\tau}(\gamma), \hat{\delta}(\gamma), \gamma\big)$. $S_n(\gamma)$ is linear in τ and δ, when γ is conditional on a specific threshold value (γ_0) which yields the conditional OLS estimators $\hat{\tau}(\gamma)$ and $\hat{\delta}(\gamma)$. In order to obtain the threshold point $\hat{\gamma}$, the estimation requires minimisation of $S_n(\gamma)$: $\hat{\gamma} = arg_{\gamma_0} \min S_n(\gamma)$. The way to find the minimised RSS is through a grid search on 667 quintiles from 0.15% to 99.85% with every quintile changed by 0.15%.

The second step is to test the hypothesis of no threshold. In this case, the null hypothesis

is $H_0{:}\gamma_1 = \gamma_2$, against the alternative which effectively suggests that the specification is nonlinear. Hansen (1996) demonstrates that calculating a bootstrapped *p*-value is asymptotically valid. The null of 'no nonlinearity' (i.e. no threshold) is rejected when the p-value is below the desired critical value (e.g. 0.05 or 0.1). The p-value of bootstrap is determined by setting the number of replications (e.g. 1000).

The next step, after determining the existence of a threshold, is to form the confidence interval for the threshold parameter. The null hypothesis in this case is $H_0{:}\gamma = \gamma_0$, and the LR statistic is computed as $LR_n(\gamma) = n\frac{S_n(\gamma) - S_n(\hat{\gamma})}{S_n(\hat{\gamma})}$. The null is rejected when the value of the LR statistic exceeds the critical value of the underlying distribution. However, the LR test does not have a standard chi-squared distribution asymptotically. The approach to testing is to check against the correct critical value from the table of asymptotic critical values provided in Hansen (2000: 582).

The final step in the Hansen's estimation procedure is to compute the parameter estimates and their standard errors. We use the heteroscedasticity corrected White-robust standard errors to test the significance of the estimates.

5. DATA AND EMPIRICAL ANALYSIS

5.1. Data

We use an unbalanced panel of data for the estimation of the Hanson threshold model. The data are compiled for 39 developing countries over the time period 1984-2010. The list of countries included in the sample is given in Appendix II.[8] We limit our sample to less developed economies (classified as low and lower middle income categories according to the World Bank classification of countries) since traditionally, these countries have relied on

[8] Our sample strategy was to begin with a larger set of less developed economies but owing to many missing values over the time period considered we ended up with the final sample of 39 countries.

external debt and FDI as a means to promote economic growth. Furthermore, restricting our choice to these income group of countries reduces the degree of heterogeneity that is commonly associated with using cross-country data while ensuring that there is sufficient variation in debt levels across the countries. Additionally, rather than employ cross-sectional data averaged over the entire time period (as used in some of the recent studies applying threshold methods – see, for example, Kim *et al*., 2013; Azman-Saini *et al*., 2010a), we rely on the use of panel data with annual frequency as well as compute five-year averages because debt levels tend to vary significantly over time even within the same country while other variables can be changing more slowly or smoothly (e.g. institutional quality). The use of panel data (with a sufficiently large cross-section and time dimensions) also provides us with a larger sample size which is likely to give more precise and realistic threshold values compared to using cross-sectional data.

Economic growth, the dependent variable, is represented by the growth of real GDP per capita (measured in US dollars at constant prices in 2005). FDI, the main independent variable, is measured by the ratio of net FDI inflows to GDP. External debt (as a proportion of GDP) is used as a threshold variable. The data for these variables, as well as for inflation and trade openness, are sourced from UNCTAD.[9]

Following previous studies, we include a set of control variables in the threshold regressions to represent the influence of financial repression, financial development, financial crisis, human capital, trade openness, institutions and conflict.[10]

Financial repression – which provides a channel though which external debt affects the relationship between FDI and economic growth (as depicted by our theoretical model) - is proxied by inflation. Although there are more direct measures of financial repression (such as reserve ratios and interest rate controls) lack of available data for low income countries

[9] As reported by UNCTAD, net FDI inflows can be negative when gross inflows are offset by reverse investment or disinvestment. The FDI data are reported on net bases (capital transactions' credits less debits between direct investors and their foreign affiliates)

[10] Other control variables could not be entertained owing to data deficiencies, such as government expenditure for which there were too many missing values for LDCs. While we use an unbalanced panel, it was sensible not to include variables with substantial missing values so as to avoid loss of degrees of freedom.

means that we have to rely on the inflation rate (measured by the annual change in consumer price index, CPI) as a more indirect measure of financial repression. As argued by Haslag and Koo (1999) and Roubini and Sala-i-Martin (1992), inflation is a reasonable proxy for financial repression as it serves to reduce the real burden of debt the government owes to the private sector. However, as a robustness check, we consider interest rate spread between the savings and lending rates as an alternative proxy financial repression.

Financial development, a determinant of growth in its own right (Herwartz and Walle, 2014), represents the absorptive capacity of a country to assimilate the growth benefits from inward FDI (Hermes and Lensink, 2003; Alfaro *et al.*, 2004, 2010). We represent the effect of financial development using M_2 which represents a measure of money in circulation outside banks including time (savings and foreign currency) deposits. Alternatively, as part of robustness, we consider the ratio of private credit to GDP, which refers to the availability of domestic credit provided by financial institutions to the private sector.

We also account for the effect of financial crises using a dummy variable which takes value 1 for the year a country experienced a financial crisis and 0 otherwise, as reported by Laeven and Valencia (2012). Financial crises, which affected a handful of developing countries over the sample period (the major episodes being the 1997-98 East Asian crisis and the 2007-08 crisis), constitute a major disruption for the affected economies which, owing to capital flight, have repercussions for their external debt obligations. For example, Korea experienced a reduction of one third of its short-term debts which stopped rolling over in 1998 after the 1997 crisis (Radelet and Sachs, 1998).

Additional control variables include initial GDP, human capital measured by the average year of schooling (Barro and Lee, 2013), and trade openness (represented by the ratio of the sum of imports and exports to GDP). Furthermore, given that some developing countries experienced a high propensity for civil conflict (considered to be harmful to economic growth), following Borensztein *et al.* (1998) we control for the effect of conflict using the Armed Conflict Dataset of the Uppsala Conflict Data Programme (UCDP), with scores ranging from 0-3, representing different intensities of conflict from low to high.

Finally, following Slesman *et al* (2015), we include a set of three institutional quality controls to represent the effects of democracy, rule of law, and control of corruption, using data from the International Country Risk Guide (ICRG). Not only do institutions influence growth (Acemoglu *et al.*, 2005), they may also have an influence through financial development (Fergusson, 2006).

Table 1 reports some descriptive statistics of the data for the full sample. External debt (as a percentage of GDP) averages around 57% with a large variance and a spread of values ranging from 10% (for Uganda in 2006) to a mighty 319% (for Nicaragua in 1994). FDI inflows (% of GDP) average around 2.3% but also vary considerably across the sample (from -15% for Sierra Leone in 1986 to 42% for Liberia in 2010). The mean of real GDP growth (per capita) over the sample is 1.76% with a range across the panel exceeding 46% (from -25% for Sierra Leone in 1996 to +21% for Congo in 1999). Economic growth also displays considerable variation across the countries. Countries' mean growth rates range from –3.34% (DR Congo) to 7.54% (Myanmar). Significantly, we find that 23% of the countries average negative growth over the sample period. Other variables (including inflation and the measures of financial development), as reported in Table 1, reveal substantive differences across countries and over time.

[Table 1 here]

5.2. Empirical Results

5.2.1. Threshold effect of external debt

The first inference drawn from the theoretical analysis is that there is a debt contingency effect which limits the positive influence of FDI on growth. Table 2 reports the basic set of results determining the threshold effect of external debt. In total, two set of results are presented, the first using non-averaged annual data and the second with five-year non-

overlapping averages. The regressions include relevant proxies representing the influences of FDI, financial repression, financial development and other control variables (initial GDP, human capital, conflict, trade openness, institutional quality and crisis) which are common in all the estimations[11].

[Table 2 here]

In both sets of regressions, the p-value of bootstrap, determined with 1000 replications and trimming percentage of 0.15%, confirms that the null of no threshold is rejected. Accordingly, our findings suggest that a debt threshold exists and the sample is split into low-debt and high-debt regimes for further estimation, determined by the value of the threshold. In both cases, the sample-split reveals a higher number of observations in the first sub-sample (low debt regime) than in the second sub-sample (high debt regime).

In Model 1 (Table 2), estimated with annual data, the threshold point is at a value of -0.3826 which, interpreted in terms of the debt value, is around 68% of GDP. The estimated results for the sub-samples (low-debt and high-debt regimes) show that FDI has a positive and significant influence on economic growth when the external debt threshold is below 68% of GDP. The results indicate that, below this threshold level (low-debt regime), a 1% rise in inward FDI increases the growth rate of GDP per capita by around 0.19%; whereas if the level of debt/GDP is above 68% (high-debt regime), the FDI effect is insignificant. In both regimes (i.e. regardless of the level of external debt) inflation has a significant and negative impact on growth, while the rule of law has a significant and positive effect on growth. Furthermore, in the low debt regime, initial GDP and crisis have a negative effect on growth but financial development (M_2) and democracy have a positive effect. In the high debt regime, trade openness has a positive impact on growth but inflation and human capital exert a negative impact on growth.

[11]We also entertained variants of the model specifications which excluded the effect of institutions and/or financial development, but the results were found to be consistent. Hence, we only report the results with full set of covariates for each regression.

In Model 2, which utilises five-year non-overlapping averaged data, the results are not changed much as the threshold of debt/GDP is around 69% (with threshold point of -0.4866) and FDI exerts a significantly positive effect on growth below that threshold, but otherwise its effect is insignificant (in the high debt regime). The results imply that, in the low-debt regime, a 1% rise in FDI increases the growth rate of GDP per capita by around 0.07% over the five-year period. The control variables exhibit similar effects as those in Model 1 apart from minor changes. For instance, human capital has a significant but positive impact on growth in the low debt regime although retains its negative effect in high debt regime; and the rule of law exerts a positive effect on growth in the high debt regime only.

Taken together, the results confirm the existence of a debt contingency effect in the relationship between FDI and growth. The positive impact of FDI on growth is significant and robust as long as the level of external debt is below a threshold rate, estimated to be around 68-69% of GDP. When external debt exceeds this threshold, the effect of FDI on growth remains positive but is not significant. Among the control variables, the negative effect of inflation on growth stands out as being the most significant. These results provide support for the prevalence of a financial repression effect having a direct negative impact on growth. It is also noteworthy that financial crisis undermines growth in the low debt regime, but its influence is not significant in the high debt regime. An explanation for this seemingly perverse (though plausible) outcome is that the growth is generally retarded in the high debt regime and therefore the crisis effect on growth could be negligible. The results also indicate that the direct effect of financial development on growth is not robustly significant, although this is not inconsistent with the theoretical predictions of the model which suggests that its role is more indirect in terms of enabling the FDI-induced growth effect via its influence on the absorptive capacity of the recipient economies.

5.2.2. Threshold effect of financial development vs. external debt

A second inference drawn from the theoretical model is that financial development serves to mitigate the negative influence of the debt contingency effect on the FDI-growth nexus. As a

consequence, we infer that the effect of debt overhang on the FDI-growth nexus diminishes with greater financial development. In turn, FDI should have a more significant impact on growth in financially more developed regimes than in financially less developed regimes.

To test this assertion empirically, we proceed as follows: First, we determine that there is no threshold effect of debt on growth if financial development is high enough. Second, we check that FDI has a significant and positive effect on growth in financially more developed regimes. Testing these effects using the Hansen approach requires that financial development (FIN hereafter) is treated as a threshold variable. Once a threshold of FIN is determined (i.e. the null of linearity - of the threshold of FIN - is rejected), the sample can be split according to high- and low-FIN regimes. Then, to test the null hypothesis of no threshold effect of debt in high-FIN regime, attention is focussed solely on the high-FIN subsample to determine the existence (or lack) of a debt threshold.

Given our primary interest in determining threshold values of FIN while using the same data and model specification as in Table 2, we report only the p-value of each threshold in Table 3. The proxy for FIN is M_2, and the evidence shown in the upper panel of Table 3 confirms the existence of a threshold effect of FIN, which is statistically significant at 1% level on both sets of data. Accordingly, the sample is split into low- and high-FIN regimes. Crucially, as shown in the lower panel, the results suggest that that a debt threshold is not binding in the high-FIN regime as the bootstrapped p-values are above 0.1. This result confirms that the influence of the external debt threshold limiting the transmission of FDI effects on growth diminishes as financial development increases. Furthermore, the estimation results confirm that FDI has a positive and significant effect on growth in the high-FIN regime but an insignificant effect in the low-FIN regime.

[Table 3 here]

Collectively, the results (of Tables 2 and 3) confirm that existence of a debt contingency effect in the FDI-growth nexus, revealing a positive association between the two below a

debt-to-GDP ratio of 68-69% but an insignificant (albeit positive) effect above that threshold rate. Additionally, the results confirm that a higher level of financial development can mitigate the debt overhang effect on the FDI-growth nexus. Significantly, these findings indicate that financial development serves as a catalyst representing the absorptive capacity which host countries should aim to achieve as a minimum threshold level before they can accrue growth benefits from FDI inflows.

5.2.3. Robustness check

To check for the robustness of our results we consider alternative proxies for financial development and financial repression, represented by private credit over GDP and interest rate spread (between deposit and lending rates), respectively. The availability of data for these measures (both collected from the World Bank) restricts the sample size for robustness estimation. Additionally, to account for the potential endogeneity of some explanatory variables (such as FDI, financial development and trade openness) we use the Caner and Hansen (2004) threshold estimation method which allows for the use of instrumental variables.

Previous studies (Alfaro *et al*. 2004; Kim *et al*. 2013) have treated FDI as potentially endogenous since fast growing economies tend to attract more FDI inflows. Furthermore, the endogeneity of financial development and trade openness cannot be ruled out as these variables are also influenced by economic growth and those factors (such as macro policies and legal foundations) which are not accounted for in the regressions. We use lagged values of FDI, trade openness and financial development, as well as initial GDP, real interest rate, legal origins (British and French) and population as instruments. Our criteria for the validity of instruments is based on using (i) the Hansen's J test to check that the chosen instruments are orthogonal to the error terms; and (ii) the Kleibergen-Paap rk Wald F statistic to check whether there is the weak instruments problem.[12]

[12] According to the "rule of thumb" (Staiger and Stock, 1997), a weak instruments problem exists if the F-statistic is less than ten.

Table 4 reports the main findings. First, the results indicate that the choice of instruments is valid given that the p-value of the Hansen's J test is greater than 0.05, and there is no weak instruments problem since the F value is also larger than 10. Second, the p-values of nonlinearity confirm the existence of a debt threshold which is found to be around 61-68% of GDP. Finally, FDI has a positive and significant effect on growth in the low debt regime; while its effect remains insignificant in the high debt regime.

[Table 4 here]

To sum up, our results are consistent and robust with regard to using the Caner and Hansen (2004) threshold estimation method to address the potential endogeneity of the explanatory variables in the threshold estimation and after introducing alternative proxies to represent the effects of financial development and financial repression.

6. CONCLUSION

It is now generally recognised that FDI brings growth benefits to developing countries depending on the absorptive capacity of these economies to assimilate the benefits stemming from the technology transfer and spillover effects associated with such investment. Although previous studies have examined the importance of specific factors that influence the absorptive capacity of host countries and explored a variety of explicit thresholds as contingencies in the FDI-growth nexus (in particular the importance of financial development and institutional environment), these issues have been investigated without due respect to the constraint on growth that a country's debt burden could conceivably impose. In this paper, we have proposed a theoretical mechanism to allow for the influence of debt overhang in a model of FDI-growth and shown that the distortionary impact of financial repression (as a means to reduce the burden of debt) can limit the positive effect of FDI on growth. We also conduct empirical analysis to highlight the existence of a debt contingency effect in the FDI-

growth relationship.

Using threshold estimations on panel data for 39 less developed economies, and controlling for a well-established set of growth determinants, our empirical results reveal a robust influence of a debt threshold effect on the association between FDI and economic growth. A threshold level of external debt is found to be around 61-69% of GDP (consistent across different models) below which FDI exerts a positive and significant effect on growth. Such a growth-enhancing effect diminishes when economies face an increasing burden of external debt that goes beyond that threshold level.

Our results also indicate that the external debt threshold effect is non-existent in financially more developed regimes relative to financially under-developed regimes, implying that increasing financial development serves to mitigate the effect of the debt threshold on the FDI-growth nexus. This highlights a role for financial development absorptive capacity in terms of enhancing the capability of FDI to promote growth.

The main policy implications of our findings are that (i) host countries should avoid an excessive build-up of external debt as a crucial requirement for developing economies that rely on FDI as an important vehicle for enhancing economic growth and development; and (ii) development at the same time needs to cater for improving the financial absorptive capacity of the recipient economies to accrue growth enhancing benefits from FDI.

References

Abzari, M., Zarei, F., & Esfahani, S. S. (2011). Analyzing the link between financial development and foreign direct investment among D-8 group of countries. *International Journal of Economics and Finance*, *3*(6), 148.

Acemoglu, D., Johnson, S., & Robinson, J. A. (2005). Institutions as a fundamental cause of long-run growth. *Handbook of economic growth*, *1*, 385-472.

Agbloyor, E. K., Abor, J., Adjasi, C. K. D., & Yawson, A. (2013). Exploring the causality links between financial markets and foreign direct investment in Africa. *Research in International Business and Finance*, *28*, 118-134.

Aguiar, M., Amador, M., & Gopinath, G. (2009). Investment cycles and sovereign debt overhang. *The Review of economic studies*, *76*(1), 1-31.

Ahlquist, J. S., & Prakash, A. (2010). FDI and the costs of contract enforcement in developing countries. *Policy Sciences*, *43*(2), 181-200.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2004). FDI and economic growth: the role of local financial markets. *Journal of International Economics 64*(1), 89-112.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2010). Does foreign direct investment promote growth? Exploring the role of financial markets on linkages, *Journal of Development Economics*, 91, 242-256.

Amendolagine, V., Boly, A., Coniglio, N. D., Prota, F., & Seric, A. (2013). FDI and local linkages in developing countries: Evidence from Sub-Saharan Africa. *World Development*, *50*, 41-56.

Azariadis, C., & Drazen, A. (1990). Threshold externalities in economic development. *The Quarterly Journal of Economics, 105*(2), 501-526.

Azman-Saini, W. N. W., Baharumshah, A. Z., & Law, S. H. (2010a). Foreign direct investment, economic freedom and economic growth: International evidence. *Economic Modelling, 27*(5), 1079-1089.

Azman-Saini, W., Law, S. H., & Ahmad, A. H. (2010b). FDI and economic growth: New evidence on the role of financial markets. *Economics Letters, 107*(2), 211-213.

Balasubramanyam, V. N., Salisu, M., & Sapsford, D. (1996). Foreign direct investment and growth in EP and IS countries. *The Economic Journal*, 92-105.

Barro, R. J. & Lee, J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of Development Economics, 104*, 184-198.

Bayar, Y. & Kılıç, C. (2014). Effects of sovereign credit ratings on foreign direct investment inflows: Evidence from Turkey. *Journal of Applied Finance and Banking, 4* (2), 91-109.

Blanchard, O. J. (1985). Debt, deficits, and finite horizons. *The Journal of Political Economy 93*(2), 223-247.

Blomstrom, M., Lipsey, R. E., & Zejan, M. (1992). What explains developing country growth?. *NBER Working Paper*, 4132.

Borensztein, E., De Gregorio, J., & Lee, J. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics, 45*(1), 115-135.

Calvo, G. A. (1998). Growth, debt and economic transformation: The capital flight problem. In *New Theories in Growth and Development* (pp. 251-269). Palgrave Macmillan UK.

Caner, M., & Hansen, B. E. (2004). Instrumental variable estimation of a threshold model. *Econometric Theory*, *20*(5), 813-843

Chung, K. (2010). Foreign Debt, Foreign Direct Investment and Volatility. *International Economic Journal*, *24*(2), 171-196.

Clements, B., Nguyen, T., & Bhattacharya, R. (2003). External debt, public investment, and growth in low-income countries. *IMF Working Paper,* 3-249.

Corden, W. M. (1989), Debt relief and adjustment incentives, in: J. A. Frankel, M. Dooley, and P. Wickham, eds., *Analytical Issues on Debt* (Washington, D. C., International Monetary Fund), 258-278.

Cohen, D. (1993). Low investment and large LDC debt in the 1980's. *The American Economic Review*, *83*(3), 437-449.

Cohen, D. (1995). Large external debt and (slow) domestic growth: a theoretical analysis. *Journal of Economic Dynamics and Control*, *19*(5), 1141-1163.

Cordella, T., Ricci, L. A., & Ruiz-Arranz, M. (2010). Debt overhang or debt irrelevance? *IMF Staff Papers*, *57*(1), 1-24.

Damijan, J. P., Knell, M. S., Majcen, B., & Rojec, M. (2003). Technology transfer through FDI in top-10 transition countries: How important are direct effects, horizontal and vertical spillovers? *William Davidson Institute Working Paper 549*

Durham, J. B. (2004). Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth. *European economic review*, *48*(2), 285-306.

Eberhardt, M., & Presbitero, A. F. (2015). Public debt and growth: Heterogeneity and non-linearity. *Journal of International Economics*, *97*(1), 45-58.

Elbadawi, I., Ndulu, B. J., & Ndung'u, N. (1997). Debt overhang and economic growth in Sub-Saharan Africa. *External finance for low-income countries*, 49-76.

Fergusson, L. (2006). Institutions for financial development: What are they and where do they come from? *Journal of Economic Surveys, 20*(1), 27-70.

Ford, T. C., Rork, J. C., & Elmslie, B. T. (2008). Foreign direct investment, economic growth, and the human capital threshold: Evidence from US states. *Review of International Economics, 16*(1), 96-113.

Giovannini, A. & De Melo, M. (1991). Government revenue from financial repression. *World Bank Working Paper, 533.*

Girma, S. (2005). Absorptive capacity and productivity spillovers from FDI: A threshold regression analysis. *Oxford bulletin of Economics and Statistics*, *67*(3), 281-306.

Hansen, B. E. (1996). Inference when a nuisance parameter is not identified under the null hypothesis. *Econometrica, 64*(2*),* 413-430.

Hansen, B. E. (2000). Sample Splitting and Threshold Estimation. *Econometrica, 68*(3), 575-603

Haslag, J. H., & Koo, J. (1999). Financial repression, financial development and economic growth, *Federal Reserve Bank of Dallas Working Paper, 9902*.

Hermes, N., & Lensink, R. (2003). Foreign direct investment, financial development and economic growth. *The Journal of Development Studies, 40*(1), 142-163.

Herndon, T., Ash, M., & Pollin, R. (2014). Does high public debt consistently stifle economic growth? A critique of Reinhart and Rogoff. *Cambridge journal of economics, 38*(2), 257-279.

Herwartz, H., & Walle, Y. M. (2014). Determinants of the link between financial and economic development: Evidence from a functional coefficient model. *Economic Modelling, 37*, 417-427.

Hsu, C., & Wu, J. (2006). FDI and economic growth: Revisiting the role of financial market development. *Department of Economics, National Central University*.

Huang, L., Liu, X., & Xu, L. (2012). Regional innovation and spillover effects of foreign direct investment in China: A threshold approach. *Regional Studies, 46*(5), 583-596.

Hwang, J. T., Chung, C. P., & Wang, C. H. (2010). Debt overhang, financial sector development and economic growth. *Hitotsubashi Journal of Economics*, 13-30.

Kinoshita, Y., & Lu, C. H. (2006). On the role of absorptive capacity: FDI matters to growth. *William Davidson Institute Working Paper, 845*.

Kim, D., Lin, S., & Suen, Y. (2013). Investment, trade openness and foreign direct investment: Social capability matters. *International Review of Economics and Finance, 26*, 56-69.

Krugman, P. (1988). Financing vs. forgiving a debt overhang. *Journal of Development Economics, 29*(3), 253-268.

Krugman, P., Obstfeld, M., & Melitz, M. J. (2012). *International Economics: Theory and Policy*. (9th eds) Pearson Education Limited.

Kumar, M. S. & Woo, J. (2010). Public Debt and Growth.(Fiscal Affairs Department)'. *IMF Working Papers*

Lorentzen, J. & Barnes, J. (2004). Learning, upgrading, and innovation in the South African automotive industry. *The European Journal of Development Research, 16*(3), 465-498.

Nicholson, M. W., & Lane, S. C. (2013). The next step in African Development: Aid, investment, or another round of debt?. *International Journal of Economics and Finance, 5*(6), 104.

Nunnenkamp, P. (1991). Developing countries attractiveness for foreign direct investment-debt overhang and sovereign risk as major impediments?. *The Pakistan Development Review, 30*(4), 1145-1158.

Okada, K., & Samreth, S. (2014). How does corruption influence the effect of foreign direct investment on economic growth?. *Global Economic Review*, *43*(3), 207-220.

Pattillo, M., Poirson, M., & Ricci, M. (2004). What are the channels through which external debt affects growth?. *IMF Working Paper 4-15*.

Radelet, S., & Sachs, J. (1998). The onset of the East Asian financial crisis. National Bureau of Economic Research *Working Paper 6680*.

Reinhart, C. M. (2012). The return of financial repression. *Financial Stability Review*, (16), 37-48.

Reinhart, C.M., Kirkegaard, J., & Sbrancia, B. (2011). Financial repression redux. *Finance and Development, 48*(2), 22-26

Reinhart, C. M., & Rogoff, K. (2009). *This time is different: Eight centuries of financial folly*. New Jersey: Princeton University Press.

Reinhart, C. M., & Rogoff, K. (2010). Growth in a time of debt (digest summary). *American Economic Review, 100*(2), 573-578.

Reinhart, C. M., & Sbrancia, M. B. (2015). The liquidation of government debt. *Economic Policy*, *30*(82), 291-333.

Roubini, N., & Sala-i-Martin, X. (1992). Financial repression and economic growth. *Journal of Development Economics*, *39*(1), 5-30.

Slesman, L., Baharumshah, A. Z., & Wohar, M. E. (2015). Capital inflows and economic growth: Does the role of institutions matter?. *International Journal of Finance and Economics*, *20*(3), 253-275.

Staiger, D. & Stock, J. H. (1997). Instrumental variables regression with weak instruments. *Econometrica*, *65*(3), 557-586.

Todaro, M. P. & Smith, S. C. (2011) *Economic development*. 11th edn. Essex: Pearson Education Limited.

Tu, Y., Xiao, T., & Zhao, X. (2012). Technology spillovers of FDI in ASEAN sourcing from local and abroad. *China Finance Review* International, *2*(1), 78-94.

Valencia, F., and Laeven, L. (2012). Systemic banking crises database: An update. *IMF Working Paper 12-163*.

World Bank. (2016) *External Debt*. Retrieved from http://data.worldbank.org/topic/external-debt [01/12/2016].

Appendix I

Assume that private agents with identical consumption-investment behaviours maximise their utility over two periods. In the first period, agents receive their incomes (considered as fixed and exogenous after-tax-revenue), invest in domestic and foreign assets, and use the rest for consumption. Agents then utilise their second-period income and after tax return from first-period investment for consumption. It is assumed that the country is small and so its savings or investment cannot affect the world interest rate. Government expenditure increases private agents' utility, but it enters exogenously as an additive function as private agents cannot control it. Government raises its revenue through financial repression which is represented as a tax θ on the value of foreign investment[13].

The representative private agent's utility U and consumption in the two periods, C_1 and C_2, are given as follows:

$$U = \max_{C_1 C_2} U_i(C_1 C_2) + U_g(G) \tag{1}$$

$$C_1 = W_1 - (D + F) \tag{2}$$

$$C_2 = W_2 + (1 + \mathrm{r}^*)(1 - \theta)F + (1 + r)D \tag{3}$$

where W_1 and W_2 are the private agent's incomes in the two periods; G is government spending; r and r^* are the domestic and world interest rates respectively; D and F are the holdings of domestic and foreign assets by private agents; and θ is revenue (tax) from financial repression. For simplicity, uncertainty and transaction costs are not taken into account. Also, for same reason, there is no distinction between interest and principal repayment. Private agents require the same return from both types of assets, hence D and F

[13]In order to simplify the model, it is assumed that there are no transaction costs and uncertainty, and the only source of tax revenue for government expenditure is through a form of financial repression which has a distortionary effect on capital flows.

are perfect substitutes.

Assuming perfect capital mobility, investors require that after tax returns on domestic and foreign assets are equal so that equilibrium in the private agents' portfolio implies that:

$$(1 + \mathrm{r}^*)(1 - \theta) = 1 + r \tag{4}$$

This suggests that the tax θ on foreign asset returns proportionally reduces the interest paid on domestic debt, and financial repression therefore exerts a distortion which drives the domestic interest rates below the world interest rate.

Maximising utility with respect to consumption in equations (1)-(3) yields the first-order condition:

$$U_1(C_1 C_2) = (1 + \mathrm{r}^*)(1 - \theta) U_2(C_1 C_2) \tag{5}$$

where U_1 and U_2 are the marginal utilities with respect to the first and second period consumptions respectively. This condition highlights the impact of financial repression on the intertemporal terms of trade faced by private agents.[14]

Assuming that government expenditure is financed by domestic borrowing (D) and external debt (E), the respective budget constraints in the first and second periods are:

$$G = D + E \tag{6}$$

$$(1 + r^*)E + (1 + r)D = (1 + r^*)\,\theta F \tag{7}$$

Equation (7) illustrates that income from the financial repression tax has to be equal to the cost of government's domestic and foreign debts. Using (4), (6) and (7), we get

[14]The model here does not seek to explain the relationship between financial repression and cost of distortion on the optimal decisions of private agents. For more details, see Giovannini and de Melo (1991).

$$G = \theta(F + D) \tag{8}$$

Equation (8) implies that the distortionary effect of interest rate renders government an income which is proportional to the total holdings of assets by private agents in the first time period. More importantly, the model highlights that governments can exercise the means of financial repression to affect foreign investment by driving a wedge between domestic and foreign interest rates, rather than rely on levying a tax on private agents' income from investing in foreign assets. Therefore, assuming that $G = \theta D$ approximately holds and using (6), the government's budget constraint is transformed into:

$$E + D = \theta D \tag{9}$$

For simplicity, we normalise government expenditure to be unity, so that the relationship between financial repression and external debt is expressed as:

$$\theta = \frac{1}{1-E} \tag{10}$$

Turning to the relationship between FDI and economic growth, we assume that each firm has access to the following production technology:

$$Y_t = A_t K_t^{\beta} L_t^{1-\beta} \tag{11}$$

where A_t stands for technology; K_t denotes capital as the weighted average of both domestic (with proportion α) and foreign capital $(1-\alpha)$.[15]; L_t labour is entirely supplied

[15] The relationship between FDI and host countries' financial market is well documented by several studies (e.g. Agbloyor *et al.*, 2013 and Abzari *et al.*, 2011).

by residents in domestic country; and $\beta \in (0,1)$. Following, Hsu and Wu (2006), assume technological progress of domestic country is driven by international diffusion of foreign technology, which measures as the function of FDI:

$$A_{t+1} = A_t + (A_t^* - A_t)\varphi(k_t)\psi(M_t) \quad (12)$$

Assuming a linear additive utility function of the form of the overlapping generation model[16]:

$$U = \ln C_1 + \delta \ln C_2 \quad (13)$$

The lifetime budget constraint faces each private agent is:

$$C_1 + \frac{C_2}{1+r} = (1 - tax)W_1 \quad (14)$$

The optimal consumption path (C_1, C_2) is derived by maximising (13) subject to(14) to yield the first order conditions:

$$C_1 = \frac{(1-tax)W_1}{1+\delta} \quad (15)$$

$$C_2 = \frac{\delta(1+r)(1-tax)W_1}{1+\delta} \quad (16)$$

In equilibrium

[16]For simplicity, the model here does not include the utility gain from government expenditure.

$$\frac{C_1}{C_2} = \frac{1}{\delta}\frac{1}{1+r} \tag{17}$$

As we consider that foreign investors (MNEs) borrow α from the domestic financial market (and bring the rest $(1-\alpha)$ from their home country), the unit cost of capital (or the average interest rate) for foreign investors is $R = (1-\alpha)r^* + \alpha r$. Then, combining (11), (13), and (17) and following Kinoshita and Lu (2006) and Hsu and Wu (2006), the equilibrium capital and output equations can be specified as follows:

$$k_t = \left[\frac{A_t\beta}{1+R}\right]^{\frac{1}{1-\beta}} = \left[\frac{A_t\beta(1-\theta)}{(1-\alpha\theta)(1+r)}\right]^{\frac{1}{1-\beta}} \tag{18}$$

$$y_t \equiv \frac{Y_t}{L_t} = A_t^{\frac{2-\beta}{1-\beta}}\left[\frac{\beta(1-\theta)}{(1-\alpha\theta)(1+r)}\right]^{\frac{1}{1-\beta}} \tag{19}$$

To obtain the growth rate of output per capita g^t, divide both sides of equation (19) by y_{t-1} and take the logarithmic form:

$$\begin{aligned} g^t &\equiv ln\left(\frac{y_t}{y_{t-1}}\right) \\ &= \left(\frac{2-\beta}{1-\beta}\right) ln\left(\frac{A_t}{A_{t-1}}\right) \\ &= \left(\frac{2-\beta}{1-\beta}\right) ln\left[1 + \frac{1}{A_{t-1}}(A^*_{t-1} - A_{t-1})\varphi(k_{t-1})\psi(M_{t-1})\right] \end{aligned}$$

which is approximately

$$g^t \cong \left(\frac{2-\beta}{1-\beta}\right) \ln\left\{1 + \frac{1}{A_{t-1}}(A^*_{t-1} - A_{t-1})\varphi\left[\frac{A_{t-1}\beta\left(1-\frac{1}{1-E}\right)}{\left(1-\frac{\alpha}{1-E}\right)(1+r)}\right]^{\frac{1}{1-\beta}}\psi(M_{t-1})\right\} \tag{20}$$

In the above derivation we use the fact that $ln\left(\frac{x}{y}\right) = ln\left(1 + \frac{x-y}{y}\right)$.

Appendix II

Country list			
Bangladesh	Burundi	Cambodia	Cameroon
Central African Republic	Congo	DR Congo	Egypt
El Salvador	Gambia	Ghana	Guatemala
Haiti	Honduras	Indonesia	Kenya
Laos	Lesotho	Liberia	Mali
Morocco	Mozambique	Myanmar	Nepal
Nicaragua	Pakistan	Papua New Guinea	Paraguay
Philippines	Moldova	Rwanda	Senegal
Sierra Leone	Sri Lanka	Sudan	Tajikistan
Togo	Uganda	Zimbabwe	

Table 1 Summary statistics

Variable	Observations	Mean	St. Dev.	Min	Max
GDP growth per capita (%)	856	1.7609	4.3237	-24.7831	20.6168
FDI (% of GDP)	911	2.2954	6.6166	-65.4109	85.9631
Debt (% of GDP)	911	57.0323	42.4887	10.0009	319.2577
Human capital	782	4.3166	1.9894	0.5636	11.1
Conflict	911	0.7146	1.0710	0	3
Crisis	911	0.0472	0.2122	0	1
M_2 (% of GDP)	899	21.5692	32.8815	-81.702	544.2376
Private credit (% of GDP)	883	19.1298	12.4869	0.7241	103.6323
Democracy	738	3.0318	1.4245	0	6
The rule of law	738	2.65378	1.0801	0	6
Corruption	815	2.207466	0.99109	0	5
Inflation (%)	911	0.8153	9.2609	-0.1145	237.731
Trade openness (% of GDP)	911	64.1725	38.3518	12.4078	315.0892

Table 2 Threshold estimations using external debt as threshold

	1		2	
	Non-averaged annual data		Non-overlapping five-year averages	
p-value of threshold	0.002***		0.013**	
	q<=-0.3826	q>-0.3826	q<=-0.4866	q>-0.4866
FDI	0.1642***	0.0809	0.0715***	0.0507
	(0.0376)	(0.0684)	(0.0238)	(0.0327)
Initial GDP	-0.0040***	-0.0175	-0.0046**	-0.0211
	(0.0015)	(0.0148)	(0.0020)	(0.0269)
Human capital	0.0037	-0.0275***	0.0100**	-0.0311***
	(0.0043)	(0.0081)	(0.0048)	(0.0112)
Conflict	0.0055	0.0035	0.0057	0.0108
	(0.0133)	(0.0066)	(0.0167)	(0.0893)
Trade openness	-0.0006	0.0289**	0.0013	0.0345
	0.0053	(0.0136)	(0.0072)	(0.0359)
Crisis	-0.0295**	0.0117	0.0560	0.0118
	(0.0126)	(0.0164)	(0.2697)	(0.0109)
Inflation	-0.0091**	-0.0179*	-0.0244***	-0.0138
	(0.0041)	(0.0103)	(0.0046)	(0.0129)
M_2	0.0309**	0.0099	0.0509***	0.0126
	(0.0128)	(0.0166)	(0.0093)	(0.0117)
Rule of law	0.0066***	0.0227***	0.0029	0.0320***
	(0.0016)	(0.0057)	(0.0022)	(0.0117)
Democracy	0.0005***	-0.0064	-0.0012	-0.0048
	(0.0016)	(0.0048)	(0.0023)	(0.0057)
Control of corruption	-0.0022	0.0042	0.0014	0.0008
	(0.0018)	(0.0043)	(0.0024)	(0.0057)
Constant	-0.0542	-0.3829***	0.0201	-0.4098**
	(0.0353)	(0.1049)	(0.0520)	(0.1799)
N	545	164	94	35

Note: ***p value < 0.01; ** p value < 0.05, * p value < 0.1. Estimation is by Hansen (2000) method. Dependent variable is per capital GDP growth (log differenced). All explanatory variables (except institutions, conflict and crisis) are represented in natural logarithm form. Robust standard errors are reported (in parenthesis below coefficient estimates) to correct for heteroskedasticity. q is the threshold determined by using external debt, which represents the point at which the split into low-debt and high-debt regimes. N denotes the number of observations.

Table 3 Threshold results (using financial development and external debt as thresholds)

	1		**3**	
Data	*Non-averaged annual data*		*Non-overlapping five-year average*	
p-value of FIN threshold	0.000***		0.001***	
Regimes	low-FIN	high-FIN	low-FIN	high-FIN
FDI	0.0702	0.1145***	0.0524	0.0543**
	(0.0573)	(0.0061)	(0.0424)	(0.0218)
N	524	185	102	27
p-value of debt threshold	0.247		0.595	
Threshold effect of debt	No		No	

Note: ***p value < 0.01; ** p value < 0.05, * p value < 0.1. Estimation is by Hansen (2000) method. Dependent variable is GDP growth per capita. FIN is financial development (proxied by log of M_2) used as a threshold to determine the split into high-FIN and low-FIN regimes. The other explanatory variables (the results of which are not reported apart from FDI) are the same as in Table 2. N denotes the number of observations. The p-value of debt threshold shown is for the sub-sample of high-FIN regime only.

Table 4 Threshold estimations for robustness check

	1		**3**	
	Non-averaged annual data		Non-overlapping five-year averages	
p-value of threshold	0.0390**		0.0230**	
	q<=-0.4376	q>-0.4376	q<=-0.4020	q>-0.4020
FDI	0.1085***	0.0913	0.2138***	0.0309
	(0.0409)	(0.0132)	(0.0338)	(0.0640)
N	276	100	79	27
Kleibergen-Paap rk Wald F statistic	66.387		11.042	
p-value of Hansen J statistic	0.1614		0.0622	

Note: ***p value < 0.01; ** p value < 0.05, * p value < 0.1. Dependent variable is GDP growth per capita. The explanatory variables are the same as in Table 2 except that financial development and financial repression are proxied by private credit/GDP and interest rate spread, respectively. Estimation is by Caner and Hansen (2004) method. The estimates are reported for FDI only with heteroscedastic-robust standard errors in parenthesis. q is the threshold determined by using external debt, which determines the point of the sample split into high-debt and low-debt regimes. N denotes the number of observations.