Perspectives on FDI, Debt and Economic Growth in Emerging Markets: Evidence from China

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Abstract—**China has been one of the world's most important recipients of FDI and accomplished fast economic growth. This paper aims to explain the factors contributing to the inward FDI in China from 1985 to 2014 with empirical study. The elements studied include international trade, external debt ratio, GDP growth rate, CPI, technology development, labor and wage levels. It shows that debt level, international trade and lifting wages have negative effect on FDI while GDP growth rate, CPI and the abundance of Labor contribute positively to FDI. Granger causality test is performed with policy implications and suggestions presented at the end.**

Index Terms—**FDI, debt, economic growth, emerging market.**

I. INTRODUCTION

During the past several decades, multinational corporations (MNCs) have increasingly invested in production and service facilities in developing countries and lower economic growth rates are associated with higher debt to GDP ratios [1]. In the meantime, developing countries adopted preferential policies to attract foreign direct investment (FDI) in the hope that FDI can help drive the economic growth and bring in advanced technology [2]. However, FDI is a double-edged sword, generating positive as well as negative spillovers. Extant studies focus on the simple issue of whether the presence of FDI contributes to the domestic economy, and have limited policy implications for developing countries. This paper is intended to fill this research gap.

During the last several decades, Chinese GDP growth performance is outstanding with the average of around 9.8 percent annually according to official data. In 1985, China's GDP was $307 billion, 4 percent of U.S. GDP at that time. By 2014, China became the 2nd largest economy with a GDP of $10.238 trillion, 63 percent of U.S. GDP. During the same time period, the inward FDI in China had grown by 60 times, from $1.956 billion to $119.562 billion; while the external debt level had been kept at a low level, the debt-to-GDP ratio was 5.16 percent in 1985, it reached to 15.35 percent in 2001 and gradually reduced to 8.75 percent in 2014. It had been actively debated both inside and outside China on whether this growth performance is sustainable and if China's success can be replicated elsewhere [3]. In this paper, we assess the part played by inward (and heavily export platform based) FDI and the external debt ratio, and how they relate to other

economic factors with empirical study.

As one of the world's most important recipients of FDI, China has successfully attracted many MNCs not only because of the size and growth of its internal market and its abundance of unskilled labor, but also because foreign firms have been enticed by a wide range of policies and incentives laid out by the Chinese government, e.g. generous fiscal schemes favoring foreign-invested enterprises and the establishment of special economic zones. The use of these policies and practices are frequently justified by the existence of higher wages and international trade arising as a by-product of multinational activity. However, the presence and encouragement of foreign firms is necessary but not sufficient for generating the economic growth from FDI; the growth of domestic firms and host country financial status are also critical in determining the actual effects of FDI spillovers [4]-[7].

This paper studies the relationship of FDI and host country economic environment with the auto-regressive linear equation constructed between the inward FDI flow, international trade, GDP growth rate, debt-to-GDP ratio, CPI, domestic technology development status, labor and wage level. Furthermore, granger causality test is performed to find the granger causes for FDI, debt and others from historic data. Policy implications and suggestions are discussed with the concluding remarks presented afterwards.

II. LITERATURE REVIEW

About economic growth and government debt, many researchers have expressed cautionary views with high level of debt [8]. Faraglia et. suggested the composition of government debt with the market approach [9]. Orszag, Rubin and Sinai (2004) made the claim that rising debt levels could alert investors and cause interest rates to spike so that higher return can be guaranteed for investors to keep financing the debt. The interest rate spike would lead to financial market disturbance or "disarray" [10]. Manasse and Roubini (2005) have reviewed the academic literature on sovereign debt defaults and found that exposure to currency risk dominates the probability of debt default or financial crisis. Carment Reinhart and Kenneth Rogoff have analyzed economic data and financial crises across dozens of countries and hundred of years. Their work was published in the book, The Time is Different: Eight Centuries of Financial Folly (2009), and in the journal, American Economic Review, about the Growth in a Time of Debt (GITD) (2010). The conclusion is that there is no association between debt and growth at low or moderate levels of debt, while the economic growth will be negatively impacted when the threshold of

90% (government debt to the GDP) is crossed [11].

It has been widely accepted by many that FDI helps drive economic growth. Hymer (1960) explains direct investment can largely be explained by capital movements [12]. Papnek (1973) performs one of the first cross country empirical studies to detect that FDI can increase growth rates [13]. Blomström, Lipsey, and Zejan (1992) find that technology transfers are why FDI causes economic growth. Coe and Helpman (1995) demonstrate the possibility of and find evidence for international R&D spillovers which De Mello (1997) claims occurs with FDI [14]. Other claimed potential beneficial effects of FDI include increased training and skill acquisition (De Mello, 1999) [15]. These results are supported by the firm-level meta-analyses of Havránek and Iršová (2011, 2012) which conclude that FDI has positive spillovers [16]. FDI has positive spillovers when the host country is associated with a higher level of education attainment, openness to international trade and a lower rate of population growth (Batten, 2009) [17], or income, instituional framework and human capital (Meyer and Sinani, 2009) [18].

And specific to China, evidence is shown that FDI has had a positive impact on the economic growth (Sun and Parikh, 2001; Zhang and Felmingham, 2002; Ljungwall and Tingvall, 2010) [19]-[22]. Whalley and Xin (2010) states that China's Foreign Invested Enterprises (FIEs) account for 50% of exports and 60% of imports, and contributed over 40% of China's economic growth [23]. For the impressive growth of the Chinese economy, many reasons have been given, some are not applicable to other countries, such as the one-child policy, major cities close to important international sea routes, geographical links between China and East Asia; some are difficult to implement, such as establishing the rule of law, reducing corruption. What is left are several more general, orthodox and simpler policies such as reducing trade barriers, privatizing government businesses, and encouragement of FDI which is seen by many as crucial in trying to achieve economic growth [24]-[31].

III. DATA AND METHODOLOGY

The data used in this study is primarily drawn from the Wind financial database and the China Economics and Social Development Statistics database. Wind is the leading provider of financial data, information and services in China. Its data is widely cited in media news and reports, research reports and academic papers either in Chinese or in English.
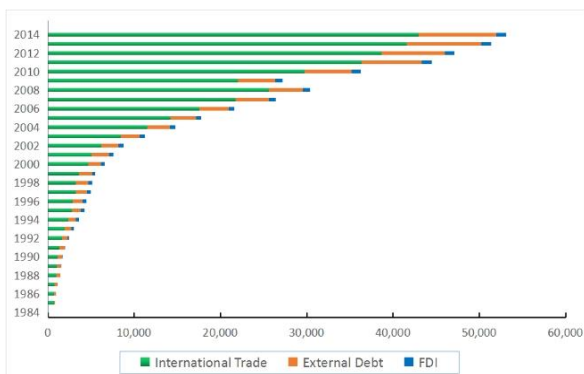

Fig. 1. International Trade, Debt and FDI in China (Unit: 100 million US$).

Fig. 1 displays the relative growth trend of international trade, external debt and FDI from 1985 to 2014, obtained from the Wind database. The international trade data refers to the total amounts of import and export reported each year. The FDI amount is the inward foreign direct investment that is actually collected. Looking at the data, it appears that the FDI has increased along with the international and external debt over the 30 years with only two exceptions: 1999 and 2009 when the Asian financial crisis and global financial crisis occurred respectively. Foreign investors had apparently slowed down the pace in responding to the elevated risks rising from the external environment.
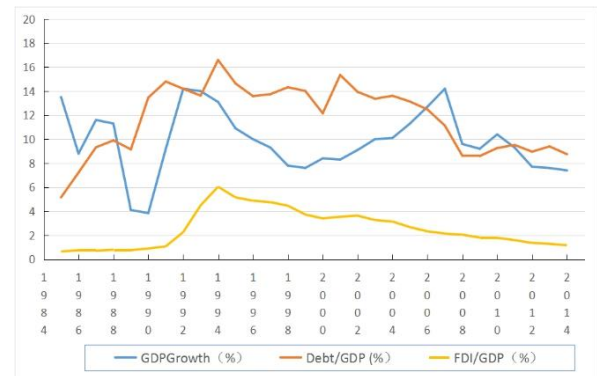

Fig. 2. GDP Growth, Debt and FDI Ratios from 1985 to 2014.

As shown in Fig. 2, China's GDP growth rate has been jumping around between 4% and 15% with the average of 9.8% since 1985. In recent years the GDP growth rate has been stabilizing at around 7%. The FDI-to-GDP ratio has the average of 2.5% and steadily declined since 1994 when it reached the peak of 6%. During the last several years the FDI-to-GDP ratio stays at about 1.2%. The external debt-to-GDP ratio ranges from 5% to 17% with the average of 11.7%. In recent years the external debt-to-GDP ratio is below 10%. Considering that China has the largest foreign reserve holdings, the government debt-to-GDP ratio is modest and well below that observed in most studies of OECD economies (see Wu Yanrui, 2014).

To further analyze the data, the natural logarithm system is used to model the relationship between FDI, government debt, international trade, GDP and CPI, science and technology status, local wages and unskilled labor. The following auto-regressive linear equation is constructed:

$$\ln(\text{FDI}) = \alpha * \text{DR} + \beta * \ln(\text{Tr}) + \gamma * \text{GR} \\ + \eta * \text{CPI} + \lambda * \text{Pt} + \eta * \text{Wg} + \delta * \text{L} + \mu \quad (1)$$

In which we have defined the following variables:

FDI: inward foreign direct investment with the unit of 100 million US$;

DR: debt ratio or the external Debt-to-GDP ratio with the unit of %;

Tr: the international trade or the total amounts of import and export with the unit of 100 million US$;

GR: GDP growth rate with the unit of %;

CPI: consumer price index with the year of 1978 as the base of 100;

Pt: the number of patent approved in China each year, we use it to reflect the science and technology development

status;

Wg: the wage level, we use the urban resident annual income per capita with the year of 1978 as the base index of 100;

L: labor, we use the reported total number of people employed in China.

IV. RESULTS AND ANALYSIS

A. Result of Auto-regressive Linear Equation

Eviews software is used to perform the analysis using the ordinary least square method. The result is listed as below.

$$\ln(FDI) = -17.08DR - 0.01\ln(Tr) + 0.08GR + \\ 0.008CPI + 5.50e^{-7}Pt - 0.001Wg + 4.86e^{-5}L - 0.71 \quad (2)$$

From the R square value (0.98) and F statistics (177.16), we can see the estimated equation is pretty good. According to the calcualted regression result, increased debt level, international trade and lifting wages have negative effect on FDI whereas GDP growth rate, CPI and the abundance of Labor contributes positively to FDI. Particularly, the debt-to-GDP ratio has the largest weighted impact to the inward FDI flow.

B. Unit Root Testing

Based on the time series data above, Augmented Dickey-Fuller unit root testing (ADF) is conducted to verify the stability of the time series. Table I shows that for variable Ln(FDI), Ln(T), DR, GR, CPI, Pt, Wg and L, the critical value of unit root test statistics at 1%, 5%, and 10% significance levels are less than the value of T-statistic, and therefore the null hypothesis cannot be rejected, namely variable Ln(FDI), Ln(T), DR, GR, CPI, Pt, Wg and L are non-stationary series. For each variable in the first order difference, the critical value of unit root test statistics are greater than the value of T-statistic. Hence after the first order difference, the time series of delta Ln(FDI), Ln(T), DR, GR, CPI, Pt, Wg and L are stable with the same integration order level, which meets the co-integration test requirement.

TABLE I: ADF UNIT ROOT TESTING RESULT

Variable	T-statistic	1% level	5% level	10% level
Ln(FDI)	1.308130	-2.653401	-1.953858	-1.609571
rLn(FDI)	-2.394054	-2.650145	-1.953381	-1.609798
DR	-0.971244	-3.679322	-2.967767	-2.622989
r(DR)	-4.623990	-3.689194	-2.971853	-2.625121
GR	-1.125028	-2.647120	-1.952910	-1.610011
rGR	-4.963861	-2.650145	-1.953381	-1.609798
Ln(T)	-0.048969	-3.679322	-2.967767	-2.622989
rLn(T)	-4.692393	-3.689194	-2.971853	-2.625121
CPI	-1.503250	-3.699871	-2.976263	-2.627420
rCPI	-3.286388	-3.699871	-2.976263	-2.627420
Pt	3.538898	-2.669359	-1.956406	-1.608495
rPt	-3.242472	-2.660720	-1.955020	-1.609070
L	0.168814	-2.674290	-1.957204	-1.608175
rL	-3.359837	-2.679735	-1.958088	-1.607830
Wg	2.552074	-4.309824	-3.574244	-3.221728
rWg	-4.066836	-4.323979	-3.580623	-3.225334

Next, the residual (et) is inspected according to the estimation results and the residual time series. Table II displays the result of Augmented Dickey-Fuller unit root testing on the residual.

TABLE II: RESIDUAL TESTING RESULT

Residual	T-statistic	1% level	5% level	10% level
e_t	-5.772282	-2.650145	-1.953381	-1.609798

As the T-statistic value of -5.772282 is less than the critical value of unit root test statistics at 1%，5% and 10% significance levels, the residual (et) is considered as a stationary series. The results show that during the period from 1985 to 2014, Ln(FDI) has co-integration relationship with Ln(T), DR, GR, CPI, Pt, Wg and L with the co-integration vector of (-0.01, −17.08, 0.08, 0.008, 5.50e-07, -0.001, 4.86E-5). Thus there is a long-term equilibrium relationship between Ln(FDI), Ln(T), DR, GR, CPI, Pt, Wg and L.

C. Error Correction Model

To study the short-term dynamic relationships between the above variables, ECM (Error Correction Model) is utilized and Table III shows the following result:

TABLE III: ECM ESTIMATION RESULT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.567654	0.203632	-2.787642	0.0114
D{ln(T)}	-0.020974	0.359545	-0.058334	0.9541
D(GR)	0.043970	0.015010	2.929382	0.0083
D(DR)	-9.080595	20.84822	-0.435557	0.6678
D(CPI)	0.008597	0.002610	3.293701	0.0036
D(Pt)	3.94E-07	6.43E-07	0.613880	0.5462
D(Wg)	-0.001586	0.001653	-0.959770	0.3486
D(L)	-1.13E-05	2.34E-05	-0.483048	0.6343
ECM	-0.834451	0.208629	-3.999693	0.0007

Hence the estimated equation is below:

$$D\{\ln(FDI)\} = -0.57 - 0.02D\{\ln(T)\} + 0.04D(GR) \\ -9.1D(DR) + 0.009\,D(CPI) + 3.9e^{-7}D(Pt) - \\ 0.002D(Wg) - 1.1e^{-5}D(L) - 0.83ECM(-1) \quad (3)$$

From the value of -0.83 for the ECM (lag 1), it represents that when the short-term fluctuations deviated from its long-term equilibrium, a subsequent reversed (0.83) adjustments will be made to set the unbalanced state back to equilibrium.

D. Granger Causality Test

To further analyze the cause-effect relationship between the variables of Ln(FDI), Ln(T), DR, GR, CPI, Pt, Wg and L, the Granger causality test is performed with Eviews and Table IV displays the result:

From the result, it's clear that at Lag 1 the null hypothesis is rejected. The probabilities that the external debt-to-GDP ratio doesn't granger cause Ln(FDI), and the ln(FDI) doesn't granger cause the external debt-to-GDP ratio are both below 1%, hence the external debt-to-GDP ratio and Ln(FDI) are considered as the Granger cause for each other. This means that a good portion of the external debt is linked to the foreign direct investment at year one, hence they are the cause for each other.

TABLE IV: GRANGER CAUSALITY TEST RESULT

Null Hypothesis:	Lags: 1		Lags: 2		Lags: 3	
	F-Stat.	Prob.	F-Stat.	Prob .	F-Stat.	Prob.
DR does not Granger Cause ln(FDI)	8.513	0. 0072	1.315	0.288	1.010	0.409
ln(FDI) does not Granger Cause DR	38.292	2.0E-6	19.58	1.0E-5	8.016	0.001
GR does not Granger Cause ln(FDI)	3.590	0.069	16.94	3.E-05	6.571	0.003
ln(FDI) does not Granger Cause GR	0.002	0. 966	0.150	0.861	1.576	0.226
CPI does not Granger Cause ln(FDI)	1.4377	0.2413	1.4085	0. 2648	0.2122	0.8868
ln(FDI) does not Granger Cause CPI	16.994	0.0003	6.3775	0.0063	3.2801	0.0422
CPI does not Granger Cause DR	*14.708*	*0.0007*	*5.9649*	*0.0082*	*2.3079*	*0.1074*
DR does not Granger Cause CPI	0.8655	0. 3608	0.4960	0.6153	0.4182	0.7419
GR does not Granger Cause DR	4.7487	0.0386	4.7706	0.0185	4.3216	0.0167
DR does not Granger Cause GR	0.7776	0.3859	0.0540	0.9476	2.1694	0.1234
Wg does not Granger Cause ln(T)	1.5919	0.2183	4.4861	0.0226	3.9859	0.0224
ln(T) does not Granger Cause Wg	9.1276	0.0056	5.5224	0.0110	3.7713	0.0270

Similarly, we find that the GDP growth rate is the granger cause for Ln(FDI) at lag 2 and 3. When the foreign investors see the increase of output from the last year, there's strong motive for them to invest more in subsequent years. However, the analysis finds that Ln(FDI) is not the granger cause for the GDP growth rate.

It's also interesting to find that Ln(FDI) is the granger cause for CPI at lag 1, 2 and 3. When the foreign investment comes in, it's been exchanged into the Chinese currency, which causes more RMB issued. That leads to the inflation and increase of CPI.

In addition, it shows that GDP growth rate is the granger cause for the external debt-to-GDP ratio at lag 1, 2 and 3. With the economic development and GDP growth achieved, the external debt would be easier to obtain. The reverse effect does not exist according to the result above.

Finally, Ln(T) is the granger cause for the wage at lag 1, 2 and 3. With the development of international trade activities, MNCs have hired more and more employees who usually get better pay than in domestic firms. To compete with MNCs, domestic firms will raise the wages, thus the urban resident income level is lifted as a whole.

V. CONCLUDING REMARKS

Over the past several decades China has been one of the world's most important recipients of FDI. A widely held belief is that FDI is an important factor for the outstanding economic growth in China. And the generous fiscal schemes and incentives favoring foreign-invested enterprises laid out by Chinese government seemingly provide evidence for this position. Another common view is that the developing country should favor increased debt level for more economic growth. Our overall findings dispute these views.

Based on the Economics and Social Development data for the last three decades, the FDI and debt issues are analyzed and the auto-regressive linear equation is constructed to study the relationship between inward FDI flow, external debt level, GDP growth rate, CPI, technology development status, local technology status, labor and wage level. Granger causality test is performed to find the granger cause for FDI, Debt-to-GDP ratio, economic growth and wages.

From the above analysis, we find Ln(FDI) has co-integration relationship with Ln(T) , DR, GR, CPI, Pt, Wg and L with the co-integration vector of (-0.01, –17.08, 0.08, 0.008, 5.50e-07, -0.001, 4.86E-5). There is a long-term equilibrium relationship between FDI , international trade, debt-to-GDP ratio, GDP growth rate, CPI, number of patent approved, wage level and labors. When the short-term fluctuations deviated from its long-term equilibrium, a subsequent reversed (0.83) adjustments will be made to set the unbalanced state back to equilibrium.

Further analysis shows that the increase of FDI flow and GDP have led to the increase of external debt level. This implies that the government intents to raise more debt when a higher GDP growth rate or FDI goal is achieved, or more external debt is obtained when the foreign investors see a better GDP growth rate or increase the investment. This explains that the host country government have leveraged the external debt for more economic growth. On the other hand, the increase of external debt-to-GDP ratio has negative impact for the inward FDI flow according to the regression result based on the three decades data in China. Foreign investors are more likely to invest when they see a relatively low debt level and hence become more confident with the financial environment in host country.

It's also interesting to find that the CPI rise has been a by-product of inward FDI flow. The hot money flowing into

the host country will cause inflation, and the increase of CPI has a negative impact on the external debt level. When CPI increases, the cost goes up for host country government to borrow and carry on the development projects, thus the government tends to raise less debts.

Our study suggests that rising debt-to-GDP ratio can significantly affect the growth of FDI. Furthermore, FDI and economic growth tend to cause inflation, rising CPI and host country debt-to-GDP ratio. This suggests that transplanting Chinese style policies that favour FDI to other developing countries to further their development on the basis of this belief will likely cause similar inflation impact on their economy. Developing countries should monitor their souvergin debt status closely as maintaining the modest debt level will be beneficial for the economic growth.

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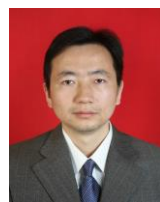
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