Business, Management and Economics Research
ISSN(e): 2412-1770, ISSN(p): 2413-855X
Vol. 4, Issue. 2, pp: 15-19, 2018
URL: http://arpgweb.com/?ic=journal&journal=8&info=aims

Academic Research Publishing Group

Original Research Open Access

Predictability between the Number of Foreign Direct Investment Contracts and Actually Utilized Foreign Direct Investment in China

Chen Li
School of Tourism and Economic Management (International Trade Specialty 2015-3), Chengdu University, Chengdu, China

Abstract

Actually utilized foreign direct investment (AUFDI) and the number of FDI contracts are two indicators that could be used to assess the performance of foreign investments in an area. This paper mainly aims to investigate if these two statistical variables could be used to predict each other in the long run as well as in the short run. Data were monthly time series and spanned 2002-2016. The Augmented Dickey-Fuller and Phillips-Perron tests indicated two series were integrated of order one. Both the Engle-Granger and Johansen tests did not detect a cointegrating vector. Hence, the study constructed a first-differenced lagged vector-autoregression model, within which estimated short-term coefficients were statistically insignificant. Log AUFDI did not Granger cause log FDI contracts and vice versa. Therefore, changes in foreign investment contracts and changes in actually used foreign investment could not forecast each other either during a short term or a long term. This paper suggests that the market orientation in foreign investments is growing. For purposes of foreign investment statistics, while actually used foreign direct investment definitely measures the investment level, the contract number must be treated with care.

Keywords: Cointegration; Contract; Foreign direct investment; Equilibrium; Dynamic; Unit root.

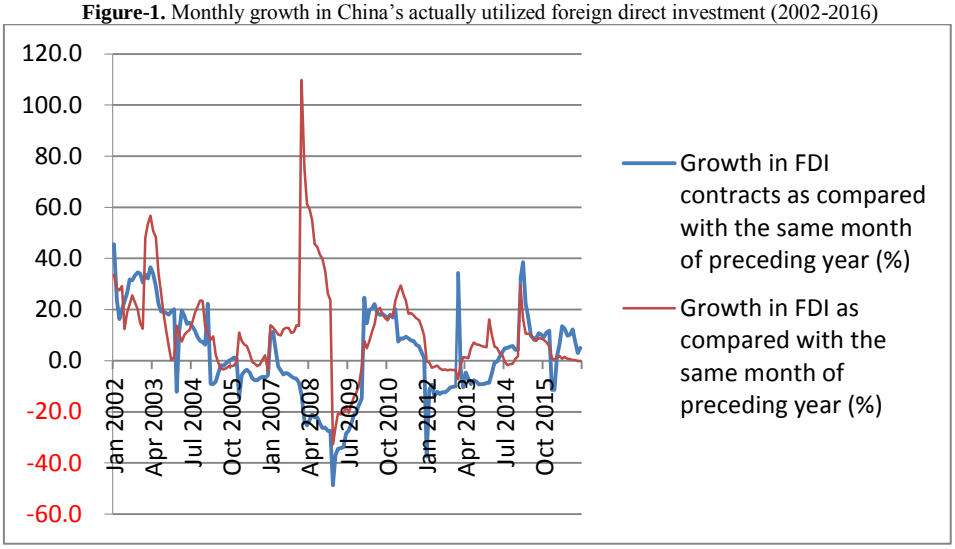
1. Introduction

In 2016, the number of foreign direct investment (FDI) contracts in China reached 27,900. Actually utilized FDI (AUFDI) was 126 billion US dollars (NBSC, 2017). Demand for foreign investments and regional disparities in AUFDI sizes would induce or even force local authorities to sing as many foreign FDI contracts as possible. Market power leads or encourages the inflow of foreign investments. A comparison of FDI determinants between China and India suggests that market growth determines both countries' FDI inflows, in particular, market size is important to China's FDI (Zheng, 2009). Compared with those in 2002 and 2010, the 2016 FDI contracts grew by -18.4% and 1.80%, respectively. The 2016 FDI grew by 138.9% and 19.2%, respectively. It seems that AUFDI grew much faster than FDI contracts did. By casual view of Figure 1, we could find that growth in AUFDI and FDI contracts appeared to move together over time; however, since 2004, AUFDI has generally grown more quickly than FDI contracts. Particularly, during 2007-2009, AUFDI grew positively, whereas FDI contracts grew negatively.

Nonetheless, in China, FDI contracts could frequently be governed by local authorities; hence, their changes may forecast those of AUFDI. FDI relies on land property rights that are either state-owned or collectively owned. Foreign investors who intend to invest in industry and/or business on a state-owned lot must acquire the land use right from local governments. A collectively-owned lot must be first sold to the city authority, then its land use rights can be transferred to investors. Moreover, protection of intellectual property rights in China positively and dramatically influences FDI (Awokuse and Yin, 2010). FDI has positively impacted industrial productivity level and growth; hence, it could easily receive supports from the government (Zhao and Zhang, 2010).

This paper aims to examine the long-term and short-term predictive effects between the number of FDI contracts and actually utilized FDI. We anticipate that test results could provide empirical evidence for the market-orientated FDI and the efficacy of FDI contract indicator.

Figure-1. Monthly growth in China's actually utilized foreign direct investment (2002-2016)



2. Methodology

This study tested for a time series unit root using both the ADF and PP tests (Dickey and Fuller, 1979; Dickey *et al.*, 1984; Phillips and Perron, 1988). Two *I*(1) series may be cointegrated, implying a long-term equilibrium. Hence, we tested for cointegration using the Engle-Granger test (Engle and Granger, 1987). Also, the Johansen trace test was used. (Johansen, 1988). We can construct an error correction mechanism (ECM) for the *I*(1) but cointegrated variables. An ECM model in logarithms is

$$\Delta \log y_t = \sum_{i=1}^{j} \alpha_k \Delta \log x_{t-k} + \varphi z_{t-1} + u_t$$

Where $x = (x_1, x_2, .., x_j)$. k is the lag length. z_{t-1} is the error correction term and can be obtained from the Johansen test. φ is called the adjustment coefficient. The ECM model could reveal the long-term and short-term elasticity between variables.

We can construct a vector autoregressive model (VAR) in first differences for the *I*(1) but not cointegrated variables (Engle and Granger, 1987). A VAR model in logs can be formulated as

$$\Delta \log y_t = \sum_{i=1}^{j} \alpha_k \Delta \log x_{t-k} + u_t$$

The VAR model could reveal the short-term elasticity between variables.

Moreover, we could test for Granger causality from x_t to y_t within either the ECM or VAR model. The non-Granger causality test hypotheses that all estimated coefficients on x_t jointly equal to zero (Granger, 1969;1980), that is

$$\alpha_k = 0$$

Wald-χ^2 is used to test if the null hypothesis mentioned above holds.

3. Data

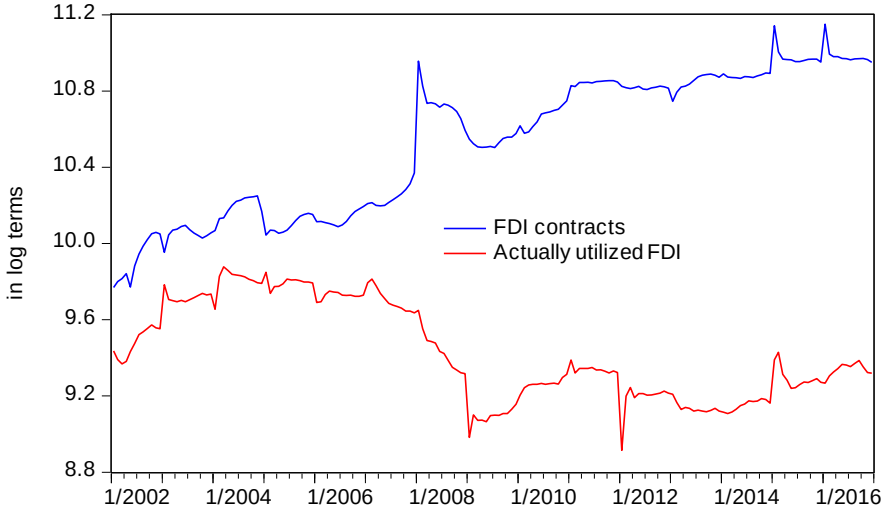
Data contained two monthly time series: the number of FDI contracts (*FDICONTRACT*) and actually utilized FDI (*AUFDI*). Data excluded foreign loans. Data was collected from the website of the National Bureau of Statistics of China (NBSC, 2017). Available AUFDI records began from 1999. Some observations for FDI contracts missed during 1999-2001. Hence, the time series applied span 2002 to 2016. Removal of end observations could be expected to lead to more actuate test results. Series variables were in log terms and seasonally adjusted by the X13-additive method. Table 1 statistically describes the data. Normality is rejected for both series. Figure 2 plots the series.

Table-1. Descriptive statistic of the data

Definition	Number of FDI contracts onwards from January	Actually utilized FDI onwards from January (US$ million)
Log variable	*FDICONTRACT*	*AUFDI*
Mean	10.53	9.43
Median	10.68	9.62
Maximum	11.74	10.69
Minimum	7.99	7.24
Std. Dev.	0.83	0.82
Skewness	-0.84	-0.74
Kurtosis	3.18	2.72
Jarque-Bera	21.56	17.36
Probability	0.00	0.00
Period	January 2002-December 2016	

Note: Series variables were in log terms.
Raw data were not seasonally adjusted in this Table.

Figure-2. Accumulated number of FDI contracts and actually utilized FDI in China (seasonally adjusted by X13-additive)



4. Empirical Results

The ADF and PP tests consistently showed that both *FDICONTRACT* and *AUFDI* were integrated of order one, i.e. *I*(1) (Table 2). Both the Engle-Granger test and the Johansen test showed no cointegration (Tables 3, 4). Thus, there wasn't a long-term equilibrium existing between these two variables.

Hence, we estimated VARs within which Granger causality was tested (Table 5). All the estimated short-term coefficients regarding the effects between *FDICONTRACT* and *AUFDI* were statistically insignificant. Wald-χ^2 tests showed that all non-Granger causality hypotheses were easily accepted at the 10% level. Overall, there were no short-term effects between these two variables.

Table-2. The unit root tests

Log variable	Level	*k*	First difference	*k*
	ADF			
FDICONTRACT	-2.78	2	-5.10***	10-
AUFDI	-1.76	12	-3.74**	11
	PP			
FDICONTRACT	-3.26	4	-14.9***	2
AUFDI	-2.22	2	-17.1***	2

Notes: *k* denotes a value of lag. For the ADF tests, *k* was selected using the *t*-statistic. (Ng and Perron, 2001) For the PP tests, *k* was determined by the Newey-West method (Newey and West, 1987).
k was chosen between 2 and 12 following (Ng and Perron, 1995). Figure 2 shows that both series were mean nonzero and contain a trend; hence, test equations contained the trend and constant (Hamilton, 1994; Hendry and Juselius, 2000).
**, ***indicates rejection of a unit root in first differences at 5% and 1% levels, respectively.

Table-3. The Engle-Granger tests

Log dependent variable	z_α	*P*-value*	Critical value**
FDICONTRACT	-15.22	0.17	-33.73
AUFDI	-14.85	0.18	

Notes: Test equations included the trend and constant.
The lag was chosen using AIC.
*MacKinnon *P*-values (MacKinnon, 1996).
**5% finite-sample critical values (Haug, 1992).

Table-4. The Johansen cointegration trace test

r	*k*	Trace	5% O-L*	5% C-L**
0	3	24.78	25.32	26.1
≤1		1.94	12.25	12.6

Notes: Hypothesis 4 in the Johansen test was used (Hendry and Juselius, 2001; Johansen and Juselius, 1990).
The lag *k* was chosen using AIC, while considering serial correlations. Portmanteau *Q* for up to lag 4=1.01 (*P* = 0.99).
*Osterwald-Lenum asymptotical critical values (Osterwald-Lenum, 1992).
**Cheung-Lai finite-sample critical values (Cheung and Lai, 1993).

Table-5. Estimates of VARs in first differences and Granger causality tests

Variable	Lagged term	*FDICONTRACT*	*AUFDI*	Wald-χ^2 statistic (*P*-value)
FDICONTRACT	t-1	-0.14 (-1.76)	0.06 (0.84)	1.01 (0.80)*
	t-2	-0.09 (-1.16)	-0.03 (-0.43)	
	t-3	0.01 (0.08)	0.00 (0.05)	
AUFDI	t-1	0.04 (0.54)	-0.27 (-3.50)	1.55 (0.67)**
	t-2	0.10 (1.19)	-0.14 (-1.72)	
	t-3	0.05 (0.63)	0.00 (-0.06)	
Error		0.01 (1.68)	0.00 (-0.15)	
R-squared		0.03	0.08	
Adj. *R*-squared		-0.01	0.05	
F-statistic		0.84	2.39	
Akaike AIC		-2.74	-2.77	
Portmanteau *Q* for up to lag 4		0.95 (*P* = 0.91)		

Notes: Variables were in log terms and seasonally adjusted using the X13-Additive method.
The lag length was chosen using AIC, while taking serial correlations into account.
t-statistics are in parentheses.
*For Granger causality tests, the Wald-χ^2 statistic was estimated for all lagged terms on *AUFDI* jointly equaling to zero.
**The Wald-χ^2 statistic was estimated for all lagged terms on *FDICONTRACT* jointly equaling to zero

5. Concluding Remarks

Actually utilized FDI in China appeared to grow generally more quickly than the number of FDI contracts did. Whether FDI contracts would effectively translate into FDI is meaningful for economic managers. An increase in AUFDI could motivate more FDI contracts signed than usual.

Hence, we are interested in if a long-term equilibrium exists between FDI contracts and AUFDI, and if they could forecast each other in the long term as well as in the short term. Cointegration tests did not suggest a long-term relationship, which implies that movements of these two statistical elements differ dramatically over time. FDI contracts greatly rely on local government's support. The AUFDI is a realized investment, which depends more on market power than on the administration.

VAR estimates and Granger causality tests did not show any short-run effects between changes in FDI contracts and changes in AUFDI. Local authorities tended to govern the FDI contracts signed, which may detain the short-term link. Reasons supporting this argument include the state or collective ownership of land property rights. Additionally, foreign exchange control could restrain the inflow and outflow of profits earned on an FDI, which may impose a significant effect on the rooting of an investment in a city.

On the other hand, free from being influenced by FDI contracts, quick growth in AUFDI suggests that market-orientated power is typically enhancing.

Overall, changes in FDI contracts and AUFDI did not have an effect on each other either in the short term or long term. Hence, the contract number could rarely disclose the performance of FDI in a province, county or city. Test results would contribute new empirical evidence for the increasing market power in FDI.

6. Acknowledgement

This study was supported by Chengdu University, Chengdu, China. The author is grateful to the School's teachers and colleagues who kindly contributed their suggestions. For data and any comments please send email to chenli_cloris@163.com.

References

Awokuse, T. O. and Yin, H. (2010). Intellectual property rights protection and the surge in FDI in China. *Journal of Comparative Economics*, 38(2): 217-24.

Cheung, Y. W. and Lai, K. S. (1993). Finite-sample sizes of johansen's likelihood ratio tests for cointegration. *Oxford Bulletin of Economics and Statistics*, 55(3): 313-28.

Dickey, D. A. and Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(386): 427-31.

Dickey, D. A., Hasza, D. P. and Fuller, W. A. (1984). Testing for unit roots in seasonal time series. *Journal of the American Statistical Association*, 79(386): 355-65.

Engle, R. F. and Granger, C. W. J. (1987). Cointegration and error correction: Representation, estimation and testing. *Econometrica*, 55(2): 251-76.

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, 37(3): 424-38.

Granger, C. W. J. (1980). Testing for causality. *Journal of Economic Dynamics and Control*, 2(4): 329-52.

Hamilton, J. D. (1994). *Time series analysis*. Princeton University Press: Princeton, New Jersey.

Haug, A. A. (1992). Critical values for the zα-phillips-ouliaris test for cointegration. *Oxford Bulletin of Economics and Statistics*, 54(3): 473-80.

Hendry, D. F. and Juselius, K. (2000). Explaining cointegration analysis: Part i. *Energy Journal*, 21(1): 1-42.

Hendry, D. F. and Juselius, K. (2001). Explaining cointegration analysis: Part ii. *Energy Journal*, 22(1): 75-120.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, 12(2-3): 231-54.

Johansen, S. and Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration--with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52(2): 169-210.

MacKinnon, J. G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics*, 11(6): 601-18.

NBSC (2017). Statistical data: Monthly statistics - foreign economy. Available: http://data.stats.gov.cn/easyquery.htm?cn=A01

Newey, W. K. and West, K. D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica*, 55(3): 703-08.

Ng, S. and Perron, P. (1995). Unit root tests in arma models with data dependent methods for the selection of the truncation lag. *Journal of the American Statistical Association*, 90(429): 268-81.

Ng, S. and Perron, P. (2001). Lag length selection and the construction of unit root tests with good size and power. *Econometrica*, 69(6): 1519-54.

Osterwald-Lenum, M. (1992). A note with quantiles of the asymptotic distribution of the maximum likelihood cointegration rank test statistics. *Oxford Bulletin of Economics and Statistics*, 54(3): 461-72.

Phillips, P. C. B. and Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75(2): 335-46.

Zhao, Z. and Zhang, K. H. (2010). FDI and Industrial Productivity in China: Evidence from Panel Data in 2001–06. *Review of Development Economics*, 14(3): 656–65.

Zheng, P. (2009). A comparison of FDI determinants in China and India. *Thunderbird International Business Review*, 51(3): 263-79.