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Foreign direct investment and output growth volatility: A worldwide analysis

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ABSTRACT

The decades preceding the recent financial crisis and global downturn were a period of unusually mild output volatility for many developed and developing market economies. We analyse data from 85 countries and report findings consistent with the hypothesis that foreign direct investment had a stabilising effect on output during the era of the "Great Moderation". These findings are consistent with, but not a direct test of, the theory that relates the waning of output volatility during these decades to the international diversification of net worth and a corresponding reduction in the strength of the Financial Accelerator.

1. Introduction

The decades preceding the financial crisis and global downturn were a period of unprecedented stability for the US economy. Namely, there is considerable evidence that US GDP growth after 1984 became less volatile than in previous decades (e.g., Kim & Nelson, 1999; McConnell & Perez-Quiros, 2000); indeed, that the contrast was sufficiently marked to characterise these changes as "The Great Moderation", an appellation that became current around the turn of the century. Moreover, such moderation was not confined to the US; similar changes in output growth volatility have been detected for a number of other developed market economies (e.g., Dalsgaard, Elmeskov, & Park, 2002; Mills & Wang, 2003; Stock & Watson, 2003), suggesting that declining output growth volatility may have been a more general development. Most recently, Ćorić (2012), using annual GDP data, analyses growth volatility for 98 countries over the period 1961–2007, and reports: significant reduction in GDP growth volatility in almost two thirds of these countries which, according to World Bank data for 2007, account for 55% of world population and 76% of world GDP; that "volatility moderation" took place in economies at all income levels; that different countries had different turning points and so the year 1984 is not a global turning point in output growth volatility. These findings inform the question addressed by this paper; namely, why did so many countries across the world experience reduced output volatility in the decades preceding the current global downturn? Although we cannot dismiss the possibility that the explanation(s) is (are) unique for each country, consistency in findings for the US economy, a larger number of developed economies and, most recently, for economies accounting for most of the world's output suggests the possibility of some common explanation(s).

New facts stimulated the search for theoretical explanation, which focussed primarily on changing volatility in the US economy. This literature includes studies which point to decrease in the frequency and severity of exogenous economic shocks,

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studies which consider improvements in economic policy, and studies which point to some structural change as a cause of reduced volatility (e.g., Ahmed, Levin, & Wilson, 2004; Benati & Surico, 2009; Blanchard & Simon, 2001; Canarella, Fang, Miller, & Pollard, 2010; Gali & Gambetti, 2009; Guerron-Quintana, 2009; Justiniano & Primiceri, 2008; Stock & Watson, 2002). In contrast, in this paper we analyse changing volatility across the world focusing on the possible role of foreign direct investments (FDI) in this process.

Namely, building on Bernanke, Gertler, and Girlchrist's (1999) Financial Accelerator framework, Portes (2007) develops a general equilibrium model according to which international diversification through FDI provides economic agents with a smoother time path of net worth, which results in a less volatile external finance premium and, hence, less volatile aggregate output. The Financial Accelerator describes a process by which relatively small initial economic shocks can be amplified and propagated by financial market imperfections. In a closed economy, agents' net worth has a completely domestic origin. In this case, and taking the level of capital market imperfections as given, the strength of the Financial Accelerator depends directly on the correlation between GDP changes and agents' net worth. In contrast, in an integrated open economy agents' net worth may consist of both domestic and foreign assets, in which case only part of net worth is directly influenced by domestic GDP changes, while the remaining foreign component is directly influenced by foreign GDP changes. Accordingly, by increasing the international diversification of net worth, FDI tends to reduce the volatility of output growth. Portes (2007) simulations suggest that the evolution of FDI can account for about 20% of the observed decline in US output growth volatility. Since increase in FDI is a global phenomenon (e.g., Lane & Milesi-Ferretti, 2007) rather than affecting the US specifically, we investigate this hypothesised effect of FDI on GDP growth volatility for a large number of countries.[1]

The paper is organised as follows. Section 2 describes the model and data. Section 3 presents the results of empirical analysis. Section 4 reports checks on the robustness of our findings. Section 5 concludes.

2. Empirical model and data description

The hypothesised negative relationship between stocks of FDI assets and liabilities and GDP growth volatility is tested by a panel linear regression model:

$$GDPvolatility_{i,t} = \alpha_i + \beta FDI_{i,t} + Q_{i,t}\gamma + \varepsilon_{i,t} \quad (1)$$

where *GDPvolatility* represents the standard deviation of GDP growth; α_i stands for the country-specific fixed effects; *FDI* is the share of FDI in GDP and β is the corresponding parameter to be estimated; Q is a $1\times k$ vector of k control variables and γ is the corresponding $k\times 1$ vector of parameters to be estimated; ε is the error term; and i and t index country and time periods, respectively. All continuous variables are in natural logarithms. The fixed-effects help to address endogeneity caused by omitted country-specific variables, which may be important in this study since the number of control variables is limited by data availability. However, it is also possible that more stable economic conditions attract FDI and vice versa. Hence, in addition to fixed-effects panel estimation we also use instrumental variable estimators to address the potential endogeneity of *FDI*.

We use this model to analyse a panel of non-overlapping averages of annual data. To avoid arbitrary selection of the time span, which is characteristic of previous studies, we test for structural changes in the GDP growth volatility of 85 countries over the period 1961–2005. In particular, following Sensier and van Dijk (2004) we use linear regression to test for breaks in the mean of the absolute values of demeaned GDP growth rates. For each country separately, we consider the following linear regressions with m breaks ($m+1$ regimes),

$$|y_t - \bar{y}| = \alpha_j + \varepsilon_t \quad t = T_{j-1}+1, \ldots, T_j \quad (2)$$

for $j = 1,\ldots,m+1$, where y_t denotes GDP growth rate at time t and $\bar{y}$ is the corresponding mean GDP growth rate. α_j is the constant in the jth regime and ε_t is the regression error at time t. The m-partition $(T_1,\ldots,Tm)$ represents the break points for different regimes (by convention, $T_0 = 0$ and $T_{m+1} = T$). These points are treated as unknown and are estimated by Bai and Perron's (1998) method for detecting multiple structural breaks.[2] Bai and Perron (1998) proposed several tests for multiple structural breaks with unknown break points. Following Bai and Perron (2003) we sequentially test the hypothesis of l versus $l+1$ breaks using $\sup F_T(l+1|\,l)$ statistics. The value of the trimming parameter is set to 0.2, which implies that the number of observations between two breaks must be equal to at least 9 years. To impose the minimum structure on the data we use the most general specification that allows for autocorrelation and heterogeneity in the regression model residuals as well as for different distributions of regressors and error terms in the different subsamples (regimes).[3]

[1] We also considered the possibility that portfolio investment should work in the same direction. We tested for this possibility and obtained very similar results when portfolio investments are taken into account. However, portfolio investments are usually considered by the literature to be much more volatile than FDI. Since we use annual data (data at higher frequencies are not available) volatility of portfolio capital flows at monthly and/or quarterly frequencies can be averaged out at annual level. Hence we do not report the results from this additional investigation, but they are available on request.

[2] All tests were implemented using the Bai and Perron (2003) GAUSS code.

[3] According to Bai and Perron (2003), in the presence of multiple breaks there are cases when it is very difficult to reject the null hypothesis of 0 versus 1 break in the model but not difficult to reject the hypothesis of 0 versus a higher number of breaks. The sequential procedure breaks down in such cases. Following Bai and Perron's (2003) recommendation, in the cases when the sequential procedure suggests no breaks we consider the results of UDmax and WDmax tests. If these tests indicate the presence of at least one break, the results of the *supF*(*1*|*0*) test are ignored and the number of breaks is selected according to the results of the *supF*(*2*|*1*) and *supF*(*3*|*2*) tests.