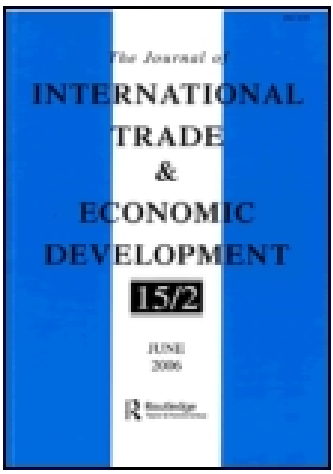

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Rania Ihab Naguib [a]

[a] Plymouth Business School, University of Plymouth , Drake Circus , Plymouth , UK

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The effects of privatisation and Foreign Direct Investment on economic growth in Argentina

Rania Ihab Naguib*

Plymouth Business School, University of Plymouth, Drake Circus, Plymouth, UK

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This paper uses time-series model to estimate the effects of privatisation and Foreign Direct Investment (FDI) on economic growth in Argentina over the period 1971–2000. Unit root tests and cointegration tests are used to ensure that all variables used are stationary and that there exists a long-run relationship among the variables. An error correction model (ECM) is constructed to estimate both the short- and long-run effects of privatisation and FDI on economic growth in Argentina. The evidence suggest that during 1971–2000, FDI had no effect on either short- or long-run economic growth in Argentina, while privatisation had negative significant effects on economic growth in the long run only.

Keywords: privatisation; FDI; economic growth; Argentina

JEL Classifications: F; O; H

1. Introduction

While the economic literature includes many individual empirical studies on Foreign Direct Investment (FDI) and economic growth (e.g. De Mello 1997, 1999; Elshee and Pagen 1999; Urbiztondo 1998), and other studies on Argentina's privatisation, in particular (e.g. Alexander and Corti 1993; Clarke and Cull 1998a, 1998b, 1999; Gerchunoff and Coloma 1993), very few were done on the effects of privatisation on economic growth, in general. Rather, empirical research focused on the effects of privatisation on employment (e.g. Bhaskar and Khan 1995; Cook and Kirkpatrick 1998; Kikeri 1998), its fiscal impact on government budget (e.g. Hemming and Mansoor 1988; Mansoor 1988; Pinheiro and Schneider 1995) or its effects on total and private investment (e.g. Abdou and Moshiri 2009).

The contribution of this paper is that it aims at addressing the gap in the literature in terms of assessing the direct effects of privatisation on economic growth. This paper focuses on exploring the separate effects of both

*Email: rania.naguib@plymouth.ac.uk

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privatisation and FDI on economic growth in Argentina. This paper uses error correction model to investigate the effects of privatisation and FDI on both short- and long-run economic growth in Argentina during 1971–2000.

2. Background and historical trends

The Argentine economy, similar to other developing economies, was characterised by large dominant inefficient state-owned enterprises (SOEs). It faced even more severe macroeconomic problems (such as hyperinflation, high external debts and low growth rates). By 1989, with inflation reaching to 5000% p.a. and Gross Domestic Product (GDP) decreasing for three consecutive years (Gerchunoff and Coloma 1993; Shaikh et al. 1996), the Argentine government headed by President Carlos Menem realised that privatisation, as a part of a comprehensive economic reform programme, is required to address those sever macroeconomic problems.

The Argentine privatisation programme officially started in 1989 with 260 companies in the non-financial sector – most of which were in the infrastructure sector – and 37 companies in the financial sector, with 310,000 workers. The government of Argentina started with privatising its largest and most difficult SOEs (e.g. ENTel and the airline company), most of which were concentrated in the infrastructure sector. The programme was applied in a very fast pace, which led to the privatisation of two-third of the enlisted public enterprises within the first five years.[1] The main privatisation methods applied were the sale of shares in the new companies (e.g. the telecommunication company – ENTel) or via providing concession rights (e.g. highways and railroads) for up to 99 years to operate these new companies (World Bank 1993, 5). The sale of shares was usually partial; at least 51% were sold to private companies, 39% were kept by the government for later sale via public offering in the stock market once the privatised company operates successfully and 10% to the employees.[2] In some cases, the government opted for selling more than 51% of the shares to private companies, such as in the privatisation of ENTel where 60% of the shares were sold directly to a major investor, 10% to the employees and the 30% maintained by the government were later offered in the stock market once the operations of the newly privatised company prove successful and the stock market had become more developed (Gerchunoff and Coloma 1993, 259, 297). By 2000, total proceeds of the Argentine programme were $44.581 billion, and it is considered one of the largest privatisation programmes in the region (World Bank n.d.).

The Argentine government encouraged the participation of FDI in the programme, and in some cases, it specifically required that at least one of the buyers to be a multinational corporation (e.g. the privatisation of the national airline company). The Argentine government, therefore, totally liberalised FDI regulations since the 1990s, which led to an unprecedented

rise in FDI inflows to Argentina that continued even after the privatisation of SOEs was almost finished (Urbiztondo 1998). FDI participation in the Argentine privatisation programme amounted to $27.887 billion, which represented around 63% of total proceeds.[3]

Prior to 1990, the size of FDI inflows to Argentina was relatively insignificant. During 1946–89, the participation of FDI in the economy was limited. In the petroleum sector, for example, though it was dominated by the national company YPF, two foreign companies – Shell and Exxon – equally shared between them one-third of the country's refining and distillation capacity (Gerchunoff and Coloma 1993, 283). In the 1990s, Argentina's economic policies became more outward oriented and FDI policies were liberalised (World Investment Report (WIR) 1992). The application of privatisation – combined with other policies (e.g. Convertibility Act and the deregulation of FDI policies) – offered new investment opportunities and significantly contributed to the impressive increase in FDI inflows to Argentina during the 1990s (Urbiztondo 1998; WIR 1993, 2000; see Figure 1).

Economic growth trends in Argentina, on the other hand, have been relatively volatile and mostly negative up until 1991 (Figure 2). During 1960–2000, Argentina's GDP per capita growth rates had been negative in 16 different years.[4] Using Dobronogov and Iqbal's (2005) approach of analysing economic development, a five-year moving average of GDP per capita growth is created for Argentina (Figure 2). One can distinguish between four economic phases that were influenced by the political regime prevailing at the time:

(1) The domination of populist policies under the *Peronist* rule (1960–75).
(2) Policies of stimulating private investment and agricultural exports during the *Military* rule (1976–83).

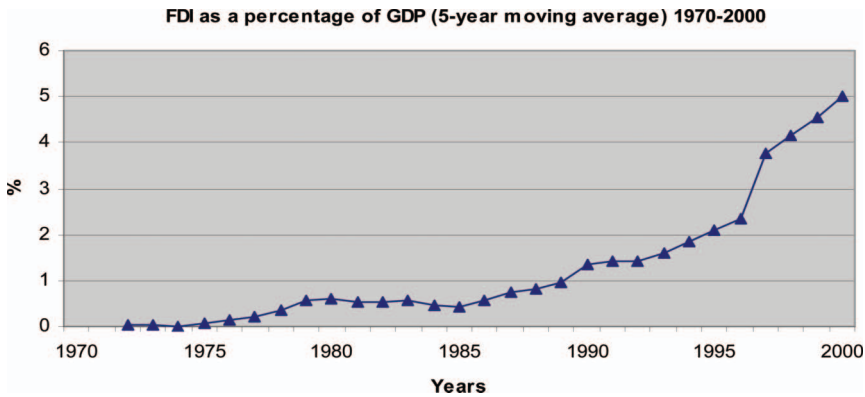

Figure 1. Share of FDI in GDP (1970–2000) in Argentina.
Source: Calculated from the WDI (World Bank 2002).

(3) Attempts to revive the industrial sector during the *Radical Party* rule (1983–9).
(4) Economic reform and privatisation during the rule of the *Justicialist Party* (1989–2000).

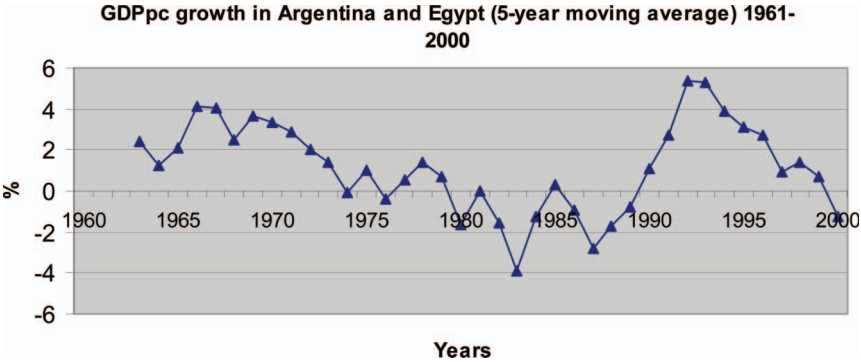

Figure 2. Economic growth in Argentina during 1961–2000.
Source: Calculated from World Development Indicators (World Bank 2002).

The above figure indicates that during the privatisation era of 1989–2000, Argentina witnessed a temporary increase in economic growth. This paper examines whether privatisation and FDI had any significant effects on economic growth in Argentina. This paper develops as following: Section 3 presents a brief literature review of economic growth theories and models and review of empirical studies on the effects of privatisation and FDI on economic growth. Section 4 presents the methodology and theoretical specification of the model. Section 5 presents the empirical results and Section 6 presents some concluding remarks.

3. Literature review

The literature presents two main growth theories on which most growth empirics are based: the neoclassical growth and endogenous growth. The neoclassical growth, which was pioneered by Solow (1956) and Swan (1956), stipulates that long-run economic growth is solely achieved by exogenous changes in technology, savings and labour. Changes in capital stock will affect short-run economic growth. In this sense, the neoclassical approach regards FDI as addition to the physical capital stock in the economy, and hence it will affect economic growth in the short run only. However, the neoclassical growth theory does point to the possibility of endogenous effects among the three variables of technical progress, capital and labour as 'the rate of technical progress may not be independent of the rate of

accumulation, or ... accumulation may give rise to external economies ... [and] the rate of growth of labour may not be independent of the rate of accumulation' (Swan 1956, 338–9). Hence, one may argue that in an augmented neoclassical model, the accumulation of FDI may give rise to external economies in the form of technological spillovers that are by-products of FDI, and hence FDI can affect long-run economic growth. In addition, FDI helps in closing the gap between domestic investment and domestic savings. In other words, the effect of an increase in FDI is similar to the effect of an increase in savings as FDI is simply foreign savings transferred to the host economy. The effects of privatisation on economic growth can also be explained within the neoclassical context. While the Keynesian model calls for government intervention, the neoclassical model calls for the reduction of government intervention, stipulating that equilibrium and economic growth can be achieved via free market practices. The broad definition of privatisation is 'the act of reducing the role of the government, or increasing the role of the private sector in an activity or in the ownership of assets' (Savas 1987, 3). In this sense, if privatisation leads to less government intervention and the application of more free market practices, then this may lead to economic growth according to the neoclassical school.

The endogenous growth theory, on the other hand, stipulates that long-run economic growth can be achieved by endogenous factors within the system. By differentiating between physical and human capital [i.e. $Y = Af(K, L, HK)$], Romer (1986) and Lucas (1988) argued that the accumulation of human capital in the form of knowledge, know-how and innovation will endogenously induce technological progress and hence achieve sustained economic growth. In this sense, (exogenous) factors such as FDI and privatisation will have endogenous effects on other factors of production (e.g. human capital and technological level), which will lead to long-run (endogenous) economic growth. FDI is usually accompanied by transfer of technology, know-how and training of labour; all of which contribute to the accumulation of human capital and induce technological progress in the host country that will lead to long-run economic growth.[5] Similarly, the effects of privatisation on long-run economic growth can be explained via its effects on the level of innovation in the economy. Private sector is believed to be more innovative than public sector because the former is driven by profit maximisation objectives and therefore is in constant search of new economically profitable production techniques (Gylfason, Herbersson, and Zoege 1998). In that sense, privatisation, which in effect means the reduction of the size of the public sector and the expansion of the private sector, will be accompanied by an increase in the level of innovation and hence will induce long-run economic growth. In addition, privatisation can affect other production factors within the system such as (domestic and foreign) investment. By attracting more foreign investment,[6] privatisation is indirectly inducing the positive spillovers of

investment (i.e. technology transfer, labour training and innovation) which will have endogenous effects on long-run economic growth.

Using a modified neoclassical production function, several empirical studies attempted to investigate the effects of FDI on economic growth within the framework of the endogenous growth theory. The literature includes several studies on the effects of FDI on economic growth. Empirical studies found that FDI could affect economic growth via four main channels. FDI can affect economic growth via affecting *domestic physical capital* through crowding in effects (e.g. De Mello 1999; Fry 1996; Marwah and Klein 1998) and creating linkages with domestic investment (e.g. Borensztein, De Gregorio, and Lee 1998; Markusen and Venable 1997, 1999).

The second channel through which FDI can affect economic growth is through *technology transfer*. Balasubramanyam, Salisu, and Sapsford (1996, 1999) – using cross-section data for a sample of 46 developing countries from 1970 to 1985 – and Kohpainboon (2006) – using cross-industry data for the manufacturing sector in Thailand – found that FDI leads to technological progress due to technology transfer, which will lead to increasing economic growth. It was also found that this effect on technology levels and hence economic growth is augmented in countries that follow export-promotion policies and have a minimum threshold of human capital (Balasubramanyam, Salisu, and Sapsford 1999).

FDI can also affect economic growth via affecting *human capital* in the host country. The main conclusion of empirical studies that were carried out on the effects of FDI on economic growth through its effects on human capital (e.g. Balasubramanyam, Salisu, and Sapsford 1999; Borensztein et al. 1998; De Mello 1999) was that FDI requires a minimum level of human capital in order to have positive spillovers on growth. In addition, FDI does not create human capital per se; rather it augments this threshold level of human capital through the transfer of knowledge.[7] Hanson (1996) provided supporting evidence to the above by proving that the lack of human capital, in the sense of the lack of formal education and training, in addition to political risk, is accounted for the little flows of FDI to developing countries.

The fourth channel through which FDI can affect economic growth is *trade*. One of the prominent examples of how FDI affects economic growth by affecting trade is China. Zhang (2001) argued that FDI affected China's growth by expanding its manufacturing exports, creating linkages with the domestic firms and augmenting human capital through the diffusion of technology.[8] Goldberg and Klein (1997) also found that FDI in Latin America and Asia affected their trade flows with the industrialised countries (i.e. the source of FDI), and hence their economic growth.

Empirical literature on the effects of FDI on economic growth has also suggested the existence of an endogenous relationship (i.e. a bidirectional relationship) between FDI and economic growth. Li and Liu (2005) used panel data for 84 countries over the period of 1970–99 and applying both

single and simultaneous equation models. They identified a significant endogenous relationship between FDI and economic growth since the mid-1980s onwards. They have also found supporting evidence that FDI can promote economic growth directly and indirectly via affecting human capital and technology transfer to the host country.

While there has been a lot of empirical research on the effects of FDI on economic growth, there has not been a lot of research on the direct effects of privatisation on economic growth. Rather, as mentioned earlier, empirical research focused on the effects of privatisation on employment, government budget or investment. One seminal empirical study, however, explicitly addressed the effects of privatisation on economic growth. Plane (1997) used a sample of 35 developing countries over the period 1988–92 and applied Probit and Tobit models to investigate the effects of privatisation on economic growth. Plane (1997) found a significant positive effect of privatisation on economic growth in these countries. He found that, on average, privatisation boosted economic growth in the sampled countries 'by about 0.8 to 1.5 percentage points between the two sub-periods (1988–92/1984–88)' (Plane 1997, 360).

Recently, empirical research (e.g. Bennett et al. 2004; Cook and Uchida 2001; Filipovic 2005; Staehr 2005) started to address the relationship between privatisation and economic growth. Bennett et al. (2004) investigated the effects of privatisation methods on economic growth during 1990–2001 in a sample of 23 transition economies. They used a Cobb–Douglas production function and added to it four privatisation variables: a variable to measure the share of private sector in GDP as a proxy for total privatisation and three dummy variables for each privatisation method (i.e. full, mixed and mass). They estimated their model using both Ordinary Least Squares (OLS) and Generalized Method of Moments (GMM) techniques. Their evidence suggests that economic growth in the sampled countries is significantly affected by mass privatisation in particular, where a 1% point increase in mass privatisation leads to 24% point increase in economic growth.[9] They interpret this effect that mass privatisation leads to the development of capital markets, which are in turn positively correlated with economic growth.

Staehr (2005) used a balanced panel of 25 transition economies over the period of 1989–2001 to investigate the effects of reforms in general (including privatisation) on economic growth in these countries. Staehr (2005) found that while small-scale privatisation without adjoining structural reforms may have positive effects on economic growth in the medium-term, large-scale privatisation without adjoining reforms would, in fact, have negative effects on economic growth.

The above empirical studies imply that FDI and privatisation, individually, may have positive effects on the economic growth in the developing countries. This paper contributes to the literature by investigating the effects of both FDI and privatisation on economic growth using the case of Argentina.

4. Methodology and the model

It is argued that countries with low levels of physical and human capital will follow the neoclassical model in the sense that, at the beginning, growth will be affected by physical capital only, and hence FDI will be regarded as an accumulation to the physical capital and affects short-run economic growth. However, in order to sustain this growth, physical capital needs to be accumulated, and by investing in education, the augmentation of human capital follows (Graca, Jafarey, and Philippopoulos 1994, 3).[10] The transition from neoclassical growth to sustained growth will eventually depend on the saving behaviour prevailing in the economy. This implies that the effects of FDI in countries with low levels of human capital will follow the neoclassical growth model, while in countries with high levels of human capital they will follow the endogenous growth model. One of the indicators that are used to measure human capital in several empirical studies (e.g. Barro 1991, 2000; Borensztein, De Gregorio, and Lee 1998; Li and Liu 2005) is secondary school average attainment of the population above 25 years old. Borensztein, De Gregorio, and Lee (1998) found that, within an endogenous growth framework, FDI would have positive effects on economic growth in countries with a minimum initial threshold of secondary school attainment of 0.52 [as calculated from Barro–Lee (1993) education data set].

In 1975, the average secondary school attainment ratio was 0.472 in Argentina.[11] In addition, the time period covered by this study is relatively short. Data on FDI inflows are available from 1970, and privatisation has only been applied in 1989 in Argentina. Hence, a neoclassical growth model seems more appropriate to explain the effects of FDI and privatisation on economic growth in Argentina during 1971–2000.

Empirical literature includes two methodologies of modelling economic growth (De Mello 1997, 10–4). The first is known as 'growth accounting', where variables such as FDI and privatisation are considered as additional inputs in an augmented neoclassical production function.[12] Empirical research indicates that economic growth is also determined by other factors such as the level of openness (Edwards 1998; Vamvakidis 2002) or degree of export orientation (Balasubramanyam, Salisu, and Sapsford 1996, 1999), privatisation (Bennett et al. 2004; Cook and Uchida 2001; Plane 1997; Staehr 2005) and external (foreign) debt (Lin and Sosin 2001; Pattillo, Poirson, and Ricci 2002). Hence, an augmented neoclassical production function will look as follows:

$$Y = Af(K, L, HK, F, X, Priv, D) \tag{1}$$

where Y is the output measured by GDP, A is a constant that captures the technological progress, K is the domestic capital stock, L is the labour, HK is the human capital, F is the FDI stock, X is the exports, $Priv$ is the privatisation and D is the external debt. In other words, the growth accounting methodology reflects the supply side of the economy.

The second methodology is using an intertemporal utility maximisation framework of private consumption, which models the demand side of the economy.[13]

The aim of this research is to investigate the effects of FDI and privatisation on economic growth as measured by growth in output per capita (i.e. GDP per capita). Hence, the growth accounting methodology is followed. Furthermore, growth accounting is conventionally used by empirical studies that follow the neoclassical growth model (De Mello 1997, 10).

Data on active employed labour force are not readily available (Ramirez 2006). Alternative variables such as total labour force or population of working age may be used. However, the unit root tests on these two alternative variables indicate that, for the case of Argentina, they may be I(2) or higher, as will be reported in the following section. Many empirical studies (e.g. Li and Liu 2005; Pattillo, Poirson, and Ricci 2002; Vamvakidis 2002) use population to proxy for labour. Hence, the above production function becomes:

$$Y_t = Af(K_t, Pop_t, FDI_{t,} HK_t, X_t, Priv_t, D_t) \tag{2}$$

In addition, long time-series data on FDI stock are not available; rather data on FDI inflows are more recorded. However, Kinniburgh and Ribeiro (1986) suggest that stock data can be derived by simply accumulating annual flow data. The same concept can also apply on deriving data on domestic capital stock.

The above model is similar to that used by Ramirez (2006) except that it adds privatisation and external debt ratio to the explanatory variables. Economic growth is measured by growth in GDP per capita. Hence, weighing the above function with population and taking logs to ensure the linearity of the above function, growth in GDP per capita is represented by:

$$\begin{aligned}\Delta gdppc_t = {} & \alpha + \beta \Delta kpc_t + \gamma \Delta fdipc_t + \delta \Delta hk_t + \eta \Delta xppc_t + \lambda \Delta privpc_t \\ & + \mu \Delta xdebtrat_t + \varepsilon_t\end{aligned} \tag{3}$$

where lower-case letters denote the natural logs of the relevant variables.

All variables are per capita, except for *xdebtratio* which is external debt ratio to GDP. Growth rates are calculated by the first difference (i.e. $\Delta y_t = y_t - y_{t-1}$).[14]

The parameters α, β, γ, etc. represent the elasticity of growth in GDP per capita with respect to each explanatory variable. The model is estimated over period 1971–2000, which includes the privatisation era in most of the developing countries that was during late 1980s to 2000. By 2000, privatisation in most of the developing countries was finished or reached to a halt. Data for privatisation proceeds are collected from the International Finance Corporation (IFC) privatisation database and calculated in constant 1995 US$.

Privatisation in Argentina officially started in 1989, but the IFC privatisation database record a transaction in 1988. The observations for 1971–87 are, hence, given zero values. Data on human capital are obtained from World Development Indicators (WDI, World Bank 2002). Annual data are available for 1990–2000. Data for the remaining time period (i.e. 1971–89) are available in five-year intervals. Since human capital is considered as a relatively time-invariant variable (Islam 1995), one may assume a constant growth rate in the enrolment ratio over each five-year interval. Hence, the missing values for human capital can be linearly estimated. Data for all other variables are collected from the WDI and are calculated in constant 1995 US$. Constant values are calculated by dividing current values over the GDP deflator.[15]

Given that time series for macroeconomic variables such as GDP usually exhibit time trends (i.e. their mean and variance depend on time and the covariance is not constant; Harris and Sollis 2003; Maddala 2001). In such cases, the series is non-stationary or I(1) (i.e. any sudden shock will not fade over time). Including a non-stationary variable in the model will result in spurious regression.[16] Hence, before estimating the model, we need to test for unit root (i.e. test whether a series is non-stationary [I(1)] or stationary [I(0)]).

To test for unit root, we apply the Dicky–Fuller (DF) and augmented Dicky–Fuller (ADF) tests on each variable. The DF test estimates the following model:

$$\Delta y_t = \gamma + \delta t + \alpha y_{t-1} + \varepsilon_t \tag{4}$$

While the ADF test estimates the following model:

$$\Delta y_t = \gamma + \delta t + \alpha y_{t-1} + \sum_{j=1}^{k} \lambda_j \Delta y_{t-j} + e_t \tag{5}$$

The null hypothesis of the DF and ADF tests is $\alpha = 1$ (i.e. unit root) and hence y_t is non-stationary (i.e. I(1)), while the alternative hypothesis is $\alpha < 1$ (i.e. no unit root), and hence y_t is stationary (i.e. I(0)). One of the limitations of the DF and ADF tests is their weak power especially in small samples. Furthermore, rejecting or accepting the null hypothesis will also depend on the number of lags used. Using too many lags will lead to over acceptance of the null hypothesis, while using too few lags may lead to over rejection. In addition, the inclusion of deterministic trends affects the results of the DF and ADF tests.[17] A sequence of steps is suggested by Perron (1989) and reported in Harris and Sollis (2003) whereby a general specification of DF test is applied that includes both intercept (γ) and time trend (t). If the null hypothesis of a unit root is not rejected under the general specification of the test, 'testing continues down to more restricted specifications'[18] (i.e. specification with intercept but no time trend, then specification with no intercept or time trend). Testing stops as soon as the null hypothesis of unit root is rejected.[19]

Once unit root tests establish that all variables are non-stationary at levels, to ensure obtaining non-spurious regression results, it is necessary to determine whether the variables are cointegrated and there exists a long-run relationship among them. This can be done by applying Johansen's test for cointegration (Maddala 2001). The aim of this research is to investigate the effects of FDI and privatisation on economic growth. Therefore, the cointegration tests are applied on *gdppc, kpc, hk, fdipc* and *privpc*. Once a cointegration relationship is estimated, an error correction model will be estimated to capture both short- and long-run effects on economic growth.

5. Empirical results

5.1. Unit root tests

Data for all variables (except privatisation) are collected from the WDI (2002), while privatisation data are obtained from the IFC. Table 1 reports the results of the DF and ADF tests with intercept and no time trend (τ_γ), and with intercept and time trend (τ_δ) for the above variables using four lags and applying both the Schwarz Bayesian (SB) and Akaike Information (AI) criteria.

Unit root tests on Working Population variable (LWpop) and its first difference (DLWpop) could not reject the null hypothesis of non-stationarity; indicating that this variable could be of I(2) or higher integration order. The same result was obtained when the unit root tests were performed on Total Labour Force (LL) variable. Using any of these two variables in the regression would have produced spurious results. Hence, following the example of previous empirical studies, as indicated earlier, Population was used to proxy for Labour. The results of the restricted version of the ADF (τ_γ) contradict those for the unrestricted version (τ_δ) for LPOP (Table 1). However, following the suggested sequence of steps by Perron (1989), we accept the results of the general specification (τ_δ) since the null hypothesis can be rejected. Hence, LPOP is I(1).

Similarly, the model reported in equation (3) used privatisation flow (*priv*) rather than privatisation stock (*privs*) as the former is I(1) in levels, while the latter is not as indicated by the results of the unit root tests reported in Table 1. Hence, all variables used in equation (3) are I(1) in levels, which ensures non-spurious regression results.

5.2. Cointegration and long-run relationship

Table 2 reports the results of Johansen's test with restricted intercepts and no trends for Argentina's model.

The cointegration tests indicate that the null hypothesis of no cointegration can be rejected at the 5% significance level. There exists

Table 1. Unit root tests for Argentina's model.

Variable[a]	τ_γ		τ_δ		I
	SB (lags)	AI (lags)	SB (lags)	AI (lags)	
LGDP	−0.66 (0)	−0.66 (0)	−1.79 (0)	−1.79 (0)	I(1)
DLGDP	−4.83** (0)	−4.83** (0)	−4.75** (0)	−4.75** (0)	
LK_{stock}	−1.07 (1)	−1.07 (1)	−2.30 (1)	−2.30 (1)	I(1)
DLK_{stock}	−3.07** (0)	−3.07** (0)	−1.85 (0)	−1.85 (0)	
LL	2.24 (1)	2.24 (1)	−0.12 (1)	−0.12 (1)	I(2) or higher
DLL	−1.06 (0)	−1.06 (0)	−2.39 (0)	−2.39 (0)	
LWpop	1.25 (1)	1.25 (1)	−1.98 (1)	−1.98 (1)	I(2) or higher
DLWpop	−1.45 (0)	−1.45 (0)	−1.96 (0)	−1.96 (0)	
LPOP	−5.73** (4)	−5.73** (4)	1.19 (4)	1.19 (4)	I(1)
DLPOP	−0.67 (1)	−0.67 (1)	−6.18** (3)	−6.18** (3)	
$LFDI_{stock}$	−2.27 (0)	−1.96 (1)	−2.15 (1)	−2.15 (1)	I(1)
$DLFDI_{stock}$	−3.37** (0)	−3.37** (0)	−3.90** (0)	−3.90** (0)	
$LFDIpc_{stock}$	−2.28 (0)	−1.98 (1)	−2.16 (1)	−2.16 (1)	I(1)
$DLFDIpc_{stock}$	−3.38** (0)	−3.38** (0)	−3.89** (0)	−3.89** (0)	
LHK	−1.14 (4)	−1.14 (4)	−1.78 (4)	−1.78 (4)	I(1)
DLHK	−3.01** (3)	−3.01** (3)	−2.97 (3)	−2.97 (3)	
LXP	0.10 (0)	0.42 (2)	−2.32 (0)	−2.88 (1)	I(1)
DLXP	−5.07** (1)	−5.07** (1)	−5.10** (1)	−5.10** (1)	
LPRIV	−0.25 (1)	−0.25 (1)	−1.84 (1)	−2.52 (3)	I(1)
DLPRIV	−9.50** (0)	−9.50** (0)	−9.40** (0)	−9.40** (0)	
LPrivS	−0.93 (2)	−0.93 (2)	−2.60 (2)	−2.60 (2)	I(2) or higher
DLPrivS	−2.05 (1)	−2.68 (3)	−1.99 (1)	−2.70 (3)	
Privdum	−0.56 (1)	−0.56 (1)	−2.00 (1)	−2.00 (1)	I(1)
DPrivdum	−11.18** (0)	−5.79** (1)	−10.95** (0)	−5.69** (1)	
LXDEBTratio	−2.96* (0)	−2.96* (0)	−2.49 (0)	−2.49 (0)	I(1)
DLXdebtRat	−5.49** (0)	−5.49** (0)	−5.65** (0)	−5.65** (0)	

Notes: τ_δ is the general specification of the test that includes both time trend and intercept. τ_γ is a restricted specification of the test that includes intercept and no time trend. Numbers in parentheses are the numbers of lags used in the ADF tests. Critical values for τ_γ are: −3.00 (at 5% significance level) and −2.63 (at 10% significance level); critical values for τ_δ are: −3.60 (at 5% significance level) and −3.24 (at 10% significance level) [Source: Harris and Sollis (2003, 43)]. (**) denotes significant at 5% and (*) denotes significant at 10%. L denotes natural log of the adjacent variable and DL denotes the first difference of the adjacent variable. [a]In equation (3), the variables are in per capita form. The tests are performed on individual time series before they were transformed into per capita forms. A combined variable (e.g. LXPpc) of two I(1) series (e.g. LXP and LPop) will also be I(1).

only one cointegrating vector and there is a long-run relationship among growth in GDP per capita (*gdppc*), domestic capital stock per capita (*kpc*), privatisation proceeds per capita (*privpc*), human capital (*hk*) and FDI stock per capita (*fdipc*). Table 3 presents the normalised coefficients of the cointegrating vector for Argentina and their statistical significance.

Table 2. Johansen's cointegration test (ARGENTINA), 1971–2000, for series *gdppc, kpc, privpc, hk* and *fdipc*.

Null	Alternative	Statistic	95% CV	Eigenvalues
Part A: LR test based on maximal eigenvalue of the stochastic matrix				
$r = 0$	$r = 1$	161.90**	34.40	0.99547
$r \leq 1$	$r = 2$	22.27	28.27	0.52400
$r \leq 2$	$r = 3$	13.21	22.04	0.35612
$r \leq 3$	$r = 4$	6.46	15.87	0.19367
$r \leq 4$	$r = 5$	5.87	9.16	0.17758
Part B: LR test based on trace of the stochastic matrix				
$r = 0$	$r \geq 1$	209.70**	75.98	0.99547
$r \leq 1$	$r \geq 2$	47.80	53.48	0.52400
$r \leq 2$	$r \geq 3$	25.53	34.87	0.35612
$r \leq 3$	$r \geq 4$	12.32	20.18	0.19367
$r \leq 4$	$r = 5$	5.87	9.16	0.17758

Notes: (**) indicates statistical significance at 5%. Test performed using Microfit v 4.1. r is the number of cointegrated relationships among the tested variables.

Table 3. Normalised cointegrating vectors: coefficients normalised on *gdppc*.

Specification	*gdppc*	*Kpc*	*fdipc*	*privpc*	*hk*	*intercept*
(1)	−1.000	0.86357	0.0046895	−0.012721	−0.068310	−0.092573
		(21.2254)***	(0.050698)	(5.6579)**	(0.17001)	(0.0046)
(2)	−1.000	0.86111	−0.005919	–	−0.13103	0.25294
		(20.5513)***	(0.079315)		(0.60775)	(0.033623)
(3)	−1.000	0.73784	–	−0.010698	0.18657	0.15337
		(25.1485)***		(2.1587)	(0.66197)	(0.018421)

Notes: (**) denotes statistical significance at 5%. χ^2 statistic is reported in between the parentheses.

The estimations for the normalised coefficients are obtained using Microfit v. 4.1. The program offers an option for testing restrictions using Likelihood Ratio (LR) test.[20] Hence, individual restrictions of the form $a = 0$ are tested for each estimated coefficient,[21] and the resulted χ^2 statistic is reported in between the parentheses.

The estimated cointegrated vector indicates that only capital stock and privatisation have significant effects in the long run. It seems that most of the effects in the long run result from the accumulation of domestic capital, as the coefficient is relatively large (i.e. 0.86) and statistically significant at 1% significance level.

FDI coefficient, on the other hand, is statistically insignificant, while the coefficient of privatisation is statistically significant yet exhibits a negative sign, which implies a negative effect on GDP in the long run. In Argentina, 50% of the privatisation proceeds are generated from the privatisation of the energy

sector, which includes the national petroleum company YPF. FDI participation constituted large part of the privatisation in Argentina (e.g. in the privatisation of YPF, FDI constituted 87% of the generated proceeds). Alfaro (2003) found that FDI in primary sector[22] tends to have negative effects on the economy. Hence, *privpc* may be picking up the effects of FDI,[23] which may reflect the existence of multicollinearity problem between privatisation and FDI variables. The following subsection addresses this issue.

5.3. *Multicollinearity tests*

Given that FDI participation in Argentina accounts for 63% of total privatisation proceeds, there is high possibility that multicollinearity exists. Gujarati (1988, 299) suggests a simple detection method for multicollinearity. By examining the correlation matrix of the estimated variables, 'if the correlation coefficient between two regressors is high, ... in excess of 0.8, then multicollinearity is a serious problem'. Table 4 reports the estimated correlation matrix for the above variables.

Table 4. Estimated correlation matrix of the long-run relationship variables.

	gdppc	kpc	fdipc	privpc	hk
gdppc	1.0000				
kpc	0.14553	1.0000			
fdipc	0.13742	0.98729	1.0000		
privpc	0.12613	0.55250	0.56139	1.0000	
hk	0.084016	0.95663	0.94191	0.52236	1.0000

The correlation coefficient between *fdipc* and *privpc* is 0.56, which is not too high as suggested by Gujarati (1988), and hence, multicollinearity may not be a serious problem. However, Gujarati (1988) points out that correlations are a sufficient but not a necessary condition for multicollinearity. Multicollinearity may still exist even if correlations are low.

Maddala and Lahiri (2009) points out that when more than two explanatory variables are involved, a more appropriate multicollinearity test is to see if $R_y^2 < R_i^2$, a rule known by Klein's rule, where R_y^2 is the squared multiple correlation from the regression of the dependent variable y on the explanatory variables x_is, while R_i^2 is the squared multiple correlation from the regression of variable x_i on the other explanatory variables. When this rule was applied, R_y^2 of the above long-run relationship when estimated using OLS[24] was found to be 0.06, while R_{privpc}^2 was found to be 0.32, which may indicate a serious problem of multicollinearity.

Maddala and Lahiri (2009) argue, however, that this method is also useful as an indication rather than confirmation of possible serious

multicollinearity problem. Rather, one should examine the standard errors and the *t*-ratio or the stability of the estimated coefficients when one of the variables is dropped to make a conclusion regarding multicollinearity. Examination of standard errors and *t*-ratios in Table A4 (i)–(iii) does not indicate a serious multicollinearity problem between FDI and privatisation variables. Furthermore, when the long-run cointegrated relationship was re-estimated once after dropping *privpc* and then *fdipc*, as shown in specifications (2) and (3) in Table 3, the estimated coefficients were relatively stable, which may indicate that multicollinearity between these two variables may not represent a serious problem.

In light of the above discussion, it is difficult to draw a definite conclusion regarding multicollinearity between *privpc* and *fdipc*. Still, as a final test, the cointegrated relationship was re-estimated using a privatisation dummy (*Privdum*) rather than *privpc*, after the unit root tests found that *Privdum* is I(1) in levels (see Table 1), and the cointegration test found that there exists only one cointegrating relationship between the variables in the long run, as indicated by Table 5.

The results of the re-estimated cointegrated vector (Table 6) are similar to that of the results of Table 3; long-run economic growth in Argentina is still positively affected by the accumulation of domestic capital (*kpc*) and negatively affected by privatisation. The evidence indicates that FDI still have insignificant effects on economic growth. One may argue, hence, any possible multicollinearity between FDI and privatisation may not be posing a serious problem on estimation and that the negative effects of privatisation on long-run economic growth may be due to other factors.

Table 5. Johansen's cointegration test (ARGENTINA), 1971–2000, for series *gdppc, kpc, privdum, hk* and *fdipc*.

Null	Alternative	Statistic	95% CV	Eigenvalues
Part A: LR test based on maximal eigenvalue of the stochastic matrix				
$r = 0$	$r = 1$	166.72**	34.40	0.99614
$r \leq 1$	$r = 2$	16.33	28.27	0.41986
$r \leq 2$	$r = 3$	13.16	22.04	0.35519
$r \leq 3$	$r = 4$	6.70	15.87	0.20017
$r \leq 4$	$r = 5$	4.01	9.16	0.12499
Part B: LR test based on trace of the stochastic matrix				
$r = 0$	$r \geq 1$	206.92**	75.98	0.99614
$r \leq 1$	$r \geq 2$	40.21	53.48	0.41986
$r \leq 2$	$r \geq 3$	23.87	34.87	0.35519
$r \leq 3$	$r \geq 4$	10.71	20.18	0.20017
$r \leq 4$	$r = 5$	4.01	9.16	0.12499

Notes: (**) indicates statistical significance at 5%. Test performed using Microfit v 4.1. *r* is the number of cointegrated relationships among the tested variables.

Table 6. Normalised cointegrating vectors: coefficients normalised on *gdppc*, specification using *Privdum*.

Specification	gdppc	kpc	fdipc	privdum	hk	intercept
(1)	−1.000	0.85134	0.0076809	−0. 077408	0.018962	−0.34368
		(22.3730)***	(0.15181)	(10.4591)***	(0.014048)	(0.071966)

Notes: (***) denotes statistical significance at 1%. χ^2 statistic is reported in between the parentheses.

Saba and Manzetti (1997) argue that, for the Argentine privatisation programme to be implemented quickly, the majority of the power and decision of privatisation had to be concentrated within the executive branch. This had indeed accelerated the application of privatisation and removed many obstacles; however, they argue that it also increased corruption. They also claim that favouritism took place in some privatisations (e.g. the privatisation of the Airline company and the telecommunication company), which resulted in limited proceeds than what could have been actually achieved.[25] Furthermore, the speedy application of the privatisation programme meant that in some cases, there were no prior regulatory frameworks established, such as in the case of telecommunication (Alexander and Corti 1993; World Bank 1993). Rather, regulatory reforms were carried out after the start of privatisation in the 1990s, and yet, the newly established regulatory agencies were considered by some (e.g. Pastor and Wise 1999) as lacking enforceability and objectivity due to their susceptibility to political influences or private firms' agenda. Empirical studies (e.g. Staehr 2005) found that large-scale privatisations that are carried out without the adjoining application of structural and regulatory reforms lead to negative effects on economic growth.

5.4. *Error correction model*

The residual of the long-run relationship (i.e. error correction term; *EC*) is an I(0) variable, and it is used to construct an error correction model. The advantage of using error correction models is that they capture the short- and long-run effects of the determinants of economic growth (Hendry 2000; Maddala 2001). The error correction model for equation (3) now becomes:

$$\Delta gdppc_t = \alpha + \beta \Delta kpc_{t-i} + \gamma \Delta fdipc_{t-i} + \delta \Delta hk_{t-i} + \eta \Delta xppc_{t-i} + \lambda \Delta privpc_{t-i} + \mu \Delta xdebtrat_{t-i} + \varphi EC_{t-1} + \varepsilon_t \quad (6)$$

where i is the number of lags. EC_{t-1} is the lagged residual of the cointegrated relationship. It is calculated using the normalised long-run coefficients reported in Table 3 (specification 1).

Given that the various multicollinearity tests performed above did not provide a conclusive evidence of a serious multicollinearity problem, the error correction model will be estimated using the residual of the long-run relationship that was estimated using *privpc*. Furthermore, because the error correction model uses variables measured in first difference, such transformation of variables reduces the possibility of serious multicollinearity problem (Gujarati 1988).

Parameters α, β, γ, δ, η, λ and μ represent short-run elasticities for growth in GDP per capita with respect to changes in the explanatory variables. The coefficient of the error correction term (φ) is an adjustment parameter that reflects the speed of correcting the deviation of the current economic growth from its long-run relationship with the explanatory variables.

Equation (6) is run with a maximum of two lags for each variable due to the shortness of the time period covered. The general model is estimated, and then *F*-tests are applied on blocks of insignificant coefficients to test whether these coefficients are jointly insignificant and, hence, their variables can be dropped from the model. This approach is called the 'general-to-specific' approach. It is recommended that when applying this approach to examine both the individual and joint significance tests and not to use large blocks of variables so that a variable that may be relevant to the model is not dropped inadvertently. The 'General-to-Specific' approach has been proven successful in deriving a unique representative model.[26]

Table 7 presents the results of the best error correction model that are estimated over the period of 1971–2000 for Argentina using the 'General-to-Specific' approach. *F*-Tests do not allow for deleting any further variable from the above model. Deleting any further variable from the model will result in misspecification, and hence, the estimated coefficients will be biased.

The results indicate that economic growth, in a given year, seems to respond elastically to current changes in domestic capital stock. A 1% increase in the growth of capital stock per capita will lead to 7% increase in economic growth in the same year, *ceteris paribus*. The positive effect of growth in domestic capital is consistent with the evidence reported by the previous empirical studies (e.g. Nunnenkamp and Spatz 2003; Vamvakidis 2002; Zhang 2001).[27] The high elasticity of growth in output with respect to growth in domestic capital is interpreted as an indication of the existence of endogenous growth. It is also noted that, in models that follow growth accounting methodology, high capital elasticity estimates reflect the effects of FDI externalities (De Mello 1997, 12).

The lagged effect of growth in capital stock per capita, surprisingly, seems to have a negative significant effect on economic growth in Argentina (i.e. -2.7575). In a study on economic growth in Mexico, Ramirez (2006) reports positive large effects of lagged growth in domestic capital on Mexico's economic growth. However, he also points out that, even though growth in domestic capital is lagged, there could be possible simultaneity

Table 7. Error correction models, dependent variable $\Delta gdppc$, 1971–2000.

Variable	Argentina
Constant	−0.02827 (−3.0123)***
Δkpc_t	6.9987 (7.0702)***
Δkpc_{t-1}	–
Δkpc_{t-2}	−2.7575 (−2.7143)**
$\Delta fdipc_t$	−0.09102 (−3.6683)***
$\Delta fdipc_{t-1}$	–
$\Delta fdipc_{t-2}$	0.10469 (3.1737)***
$\Delta xppc_t$	–
$\Delta xppc_{t-1}$	0.19004 (2.5177)**
$\Delta privpc_t$	–
$\Delta privpc_{t-2}$	0.0030527 (0.80334)
Δhk_t	–
Δhk_{t-1}	0.17752 (1.804)*
Δhk_{t-2}	0.38129 (3.0459)***
$\Delta xdebtrat_t$	−0.060938 (−3.6231)***
$\Delta xdebtrat_{t-1}$	−0.069895 (−3.5218)***
$\Delta xdebtrat_{t-2}$	–
EC_{t-1}	−0.34783 (−2.1545)**
Observations	28
R^2	0.92958
Adjusted R^2	0.88117
F-Statistic	(11,16) = 19.20***
Diagnostic problems[a]	None

Notes: [a]Diagnostic problems refer to the four diagnostic tests performed by Microfit for SC, FF, NM and HSC. *t*-Ratios in parentheses. (***) indicates significance at 1%, (**) indicates significance at 5% and (*) indicates significance at 10%.

bias (Ramirez 2006, 814). In this case, the negative effect of domestic capital can be due to the effect of externalities induced by other determinants such as FDI. FDI can be complementing domestic investment by transferring new technology to, and creating linkages with, the domestic investment. However, the degree of complementarity can phase out depending on how fast technology is transferred to domestic firms (De Mello 1997). Possible simultaneity bias and the speed of the transfer of positive externalities can explain why and when FDI has positive lagged effect on economic growth; domestic capital would have negative lagged effect (see Table 4). One may argue that the net effect of growth in capital stock on economic growth will be positive, as the size of the short-run coefficient of Δkpc_t is larger than that of the lagged variable. Hence, in the long run, growth in capital will have positive significant effects on economic growth in Argentina.

The model also indicates that a 10% increase in the growth of FDI stock per capita, in a given year, leads to 0.9% decrease in the same year's economic growth in Argentina. FDI can have negative effects on economic growth if the remittances of FDI profits exceed the value of new FDI inflows

and hence create negative effects on the balance of payments and/or if FDI is crowding out domestic investment (Nunnenkamp and Spatz 2003). Moreover, the effects of FDI on economic growth will depend on the sector in which it takes place. FDI in the primary sector tends to have negative effects on economic growth, while FDI in the manufacturing sector tends to have positive effects (Alfaro 2003). Hence, the immediate negative effects of FDI on the economic growth of Argentina can be attributed to the fact that the majority of FDI inflows to Argentina were directed to the petroleum sector,[28] and accounted for 87% of the privatisation proceeds of the petroleum company YPF.[29]

On the other hand, the results also indicate that lagged growth in FDI has positive effects on economic growth. A 10% increase in the growth of FDI stock per capita, in a given year, will lead to 1% increase in economic growth after two years. The estimated coefficients for the current FDI and the lagged FDI variables, however, are of the same size but opposite signs (i.e. -0.09 and 0.10, respectively). This may imply that the overall effect of FDI on Argentina's economic growth in the short run is null. A Wald test[30] is performed to test the restriction (i.e. null hypothesis) that $\gamma_0 + \gamma_2 = 0$.[31] The result of the Wald test cannot reject the null hypothesis. Hence, one may conclude that the overall effect of FDI on short-run economic growth in Argentina is zero.

Economic growth is also affected by the degree of openness of the economy (Edwards 1990). Growth in exports is one of the proxies used by empirical studies (e.g. Nair-Reichert and Weinhold 2001; Ramirez 2006) to measure openness. Growth in exports is expected to affect economic growth directly via exerting positive effects on the trade balance. It is also expected that growth in exports will have indirect effects on economic growth by attracting export-led domestic and foreign investment (Ramirez 2006, 807).

According to the results, a 10% increase in the growth of exports per capita ($\Delta xppc_t$) in a given year will lead to a 1.9% increase in economic growth of the following year. A positive significant coefficient of exports growth is regarded as an indication that the country is applying export-promotion policies (Ramirez 2006).

The regression results indicate that privatisation has no significant effect on short-run economic growth (Table 7), while, in the long run, it has significant negative effect on GDP per capita (Table 3). As indicated earlier, the negative sign of the long-run *privpc* coefficient may be capturing the effects of other factors, such as the weakness of the regulatory reforms (e.g. Pastor and Wise 1999).

The results of the error correction models also indicate that growth in human capital has significant positive effects on short-run economic growth in Argentina. A 10% increase in the two-year lagged growth rate of human capital will lead to 3.8% increase in economic growth, *ceteris paribus*. In the long run, however, human capital has insignificant effect on Argentina's GDP per capita. Empirical studies have reported similar conflicting effects

of human capital on economic growth in developing countries. While some empirical studies (e.g. Dollar and Kraay 2002; Edwards 1998; Li and Liu 2005) reported positive significant effects of human capital on economic growth, others (e.g. Benhabib and Spiegel 2000; Islam 1995; Nunnenkamp and Spatz 2003; Zhang 2001) reported insignificant (positive and sometimes negative) effects of human capital on economic growth. Such conflict in reported results can be attributed to the quality of proxies used in reflecting the quality of human capital stock in a given country.

The estimated results of the error correction model also indicate that current and lagged growth in external debt ratio has negative significant effects on short-run economic growth in Argentina. A 10% increase in the growth of current external debt ratio will lead to a decrease in economic growth by 0.6%, *ceteris paribus*, while a 10% increase in the lagged growth of external debt will decrease economic growth by 0.7%, *ceteris paribus*. Theoretically, external debt may have positive effects on economic growth within neoclassical models, if reasonable levels of debt are used to finance investment (Pattillo, Poirson, and Ricci 2002). However, external debt can also have negative effects if the rate of debt accumulation is higher than the rate of investment (Lin and Sosin 2001). Argentina had high external debt ratios (e.g. 85% in 1989) and the rate of debt accumulation was faster than the rate of new investment. It was such high levels of foreign debt that required some intervention in the form of economic reform policies to reduce the debt levels. Hence, the estimated negative effect is what to be expected for the case of Argentina.

The coefficient of the lagged error correction term (EC_{t-1}) is negative and statistically significant. The negative coefficient indicates the speed of adjustment required to return to the long-run relationship. In Argentina, the deviation between current growth and the long-run relationship will be corrected by 34.8% in the following year.

To sum up, the results of the estimated error correction model in Table 7 estimate the determinants of economic growth in Argentina during 1971–2000. The adjusted R^2 indicates that the estimated error correction model explains 88% of the changes in economic growth. Diagnostic tests indicate no problems of serial correlation (SC), wrong functional form (FF), non-normality (non-NM) or heteroscedasticity (HSC). These results, however, should be interpreted cautiously, as data availability limits us to 30 observations. Longer time series could yield different results.

6. Conclusion

The aim of this paper is to measure the effects of FDI and privatisation on economic growth in Argentina. The privatisation era in most of the developing countries was mainly from late 1980s to 2000. Hence, a time-series error correction model for economic growth over the period 1971–2000 is constructed using the general-to-specific approach. The advantage of

error correction models is that they combine both the short-run and long-run effects on economic growth.

The World Bank (1993, n.d.) often described the Argentinean experience with privatisation as a 'successful' experience. Although it is not actually clear how the World Bank measures success, one may assume that the success of the Argentinean privatisation programme is measured in terms of the amount of privatisation proceeds generated (i.e. $44.581 billion by 2000) and the speed it was applied and the government's commitment to finish the programme within the specified time agreed with the World Bank. The Argentinean government did indeed privatise almost all of its SOEs and welcomed the participation of FDI inflows. One, therefore, would expect that privatisation and FDI would then have positive effects on the economic growth of Argentina. The results of the estimated models in this paper, however, report the opposite.

The results indicate that while growth in current FDI stock per capita is found to have negative effects, growth in the lagged FDI stock per capita (i.e. two-year lag) is found to have a positive effect. However, the estimated short-run coefficients for FDIpc stock are equal in value but have opposite signs, suggesting an overall effect of zero. A Wald test could not reject the hypothesis that the overall effect of FDI in the short run is zero. Moreover, in the long run, the results of the cointegration vector indicate that FDI has insignificant effects on economic growth. Hence, over 1971–2000, the reported evidence suggests that FDI had no significant effects on economic growth in Argentina.

Privatisation, on the other hand, is found to have negative effects on long-run economic growth only. The negative effects of privatisation can be explained by the state of the adjoining reforms. Staehr (2005) found that large-scale privatisation that are carried out without adjoining reforms will lead to negative effects on economic growth. In Argentina, there were no regulatory agencies prior to privatisation. The government of Argentina started in establishing the regulatory agencies in 1990; after it had already privatised two major SOEs (i.e. the national telecommunication company, ENTel, and the national airline company, AA). Although the establishment of these agencies was relatively quick, Pastor and Wise (1999) argue that the established agencies lacked real power and were influenced by political factors and private investors' agendas.

The sectoral distribution of privatisation may also explain the negative effects of privatisation in Argentina. In Argentina, the majority of privatisation was in the energy and infrastructure sectors (i.e. 50% and 39%, respectively). It is argued that economic growth is led by investing in the manufacturing sector. Furthermore, one may argue that the negative effect of privatisation is reflecting the negative effects of FDI on economic growth given that 63% of privatisation proceeds are in the form of FDI, and that most of these FDI participations were in the petroleum sector which is characterised with high profit remittances.

One should be cautious in interpreting the results of the time-series error correction models, however, because of the shortness of the time period covered and the possibility of multicollinearity between privatisation and FDI variables (even though the multicollinearity tests were inconclusive). Structural break tests may also be needed given the surge of the FDI inflows post-1990.

Furthermore, the results of the time-series models apply to Argentina only. These results might not be robust for other developing countries. Time-series models do not allow for the effects of cross-country differences. Country-specific characteristics may better explain the differences in economic growth determinants. Therefore, panel data models can be used to overcome the shortness of the time period covered, to account for the cross-country effects and to obtain more generalised conclusions for the determinants of economic growth in the developing countries. In addition, panel data models offer more variability that leads to less collinearity among variables and provide more reliable and efficient estimates (Harris and Sollis 2003, 189). Hence, further research is needed to address the above issues.

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Notes

1. See Table A2 in Appendix 1 for major privatisation between 1989 and 2000.
2. See the World Bank (1993, 6–7) and Harteneck and McMahon (1996, 75).
3. Argentinean privatisation was more open to FDI than the Egyptian programme, where FDI participation in the Egyptian privatisation programme amounted to $1 billion (i.e. 22% of total privatisation proceeds).
4. See Table A1 in Appendix 1.
5. See Borensztein et al. (1996), De Mello (1999) and Balasubramanyam, Salisu, and Sapsford (1999).
6. Sader (1993, 1995) found that privatisation in developing countries attracts more FDI inflows to these countries.
7. Kebede (2002) argued that the availability of minimum level of human capital is also a prerequisite for trade to affect economic growth positively.
8. Enos and Yun (2002) identified FDI as the major vehicle of technology transfer. They can transfer product-related and/or organisational techniques.
9. See Bennett et al. (2004, 37).
10. A similar argument is presented in Grossman and Helpman (1994, 26).
11. Using the same method followed by Borensztein, De Gregorio, and Lee (1998) and Li and Liu (2005), secondary school average attainment of population above 25 years old is calculated as follows: Assuming that 10% of the population above 25 years old attended secondary school, out of which 75% completed the six years of secondary school while the remaining (i.e. 25%) has gone through the first three years only. In this case, secondary school attainment is

$0.10 \times (6 \times 0.75 + 3 \times 0.25) + 0.9 \times 0 = 0.53$. Barro and Lee's (2000) international data on education attainment [www.cid.harvard.edu/ciddata/ciddata.html] indicate that in 1975, 14.8% of population above 25 years old in Argentina attended secondary school, out of which 6.3% completed secondary school.

12. The term 'augmented neoclassical function' was used by Mankiw, Romer, and Weil (1992) when they added human capital variable to the neoclassical production function.
13. Given a production function of $y = Ak_d^{\beta}H^{1-\beta}$ where the function is in per capita terms, k_d is the domestic capital and β is the share of domestic physical capital. H is the overall stock of knowledge in the host country and is represented by: $H = [k_d k_w^{\alpha}]^{\eta}$ where k_w is foreign-owned capital, and α and η are the marginal and intertemporal elasticities of substitution between foreign and domestic capital, respectively. The intertemporal optimisation framework combines the supply and demand sides of the economy, by maximising private consumption as follows:

$$\max \int_{t=0}^{\infty} u(c)e^{-\rho t}dt$$
$$\text{s.t. } \dot{k}_d = Ak_d^{\beta+\eta(1-\beta)}k_w^{\alpha\eta(1-\beta)} - c,$$
$$k_d(0) \geq 0$$

where ρ is the rate of time preference of the utility maximiser and c is the private consumption (see De Mello 1997, 12–3 for more details).

14. See Appendix 1 for the definition of variables and the expected sign of their coefficients.
15. More details on data construction and variables definition are reported in Appendix 1.
16. In order to obtain meaningful causal relationships, time-series models assume that the variables included are stationary (i.e. their means, variance and covariance are constant and are independent of time; Harris and Sollis 2003, 26–7).
17. Having both the constant and time trend (i.e. deterministic trends) in the unit root test 'increases … the critical values, making it harder to reject the null hypothesis, even when it should be rejected' (Harris and Sollis 2003, 46).
18. See Harris and Sollis (2003, 47).
19. For more details, see Harris and Sollis (2003, 41–57).
20. As Maddala (2001, 203) pointed out that LR test requires large number of observations. Given our small sample, the test results should be viewed with care.
21. $a = 0$ is the null hypothesis of the test (i.e. the estimated coefficient, a, is equal to zero or is statistically insignificant).
22. Some activities in the petroleum sector, such as extraction and drilling, are classified as primary sector.
23. When *privpc* is removed from the long-run relationship, the sign of the estimated long-run coefficient of *fdipc* changed to negative, which supports the above argument.
24. See Tables A4(*i*) and A5 in the Appendix.
25. When ENTel was offered for privatisation, three successful bids were received. The first highest bid was from a Spanish company, the second highest bid was from an American company and the third highest bid was from a French company. ENTel was divided into two sub-companies and was privatised to the Spanish and the French companies. Favouritism led to accepting the third highest bid over the second highest bid. The privatisation of AA was also

problematic as there were claims that some officials asked for bribes (Saba and Manzetti 1997, 364). The whole process of privatising AA was problematic that the government had to buy some of the privatised shares back.

26. See Hendry (2000) for more details on the 'General-to-Specific' approach.
27. These empirical studies use the share of investment in GDP as a proxy for domestic capital stock, a common accepted practice used in the literature due to the lack of data on capital stock.
28. International organisations, such as the World Bank, include petroleum as part of the primary sector.
29. The privatisation of YPF represents the largest privatisation transaction in the Argentine privatisation programme.
30. The Wald test statistic (W) is given by: $W = (\text{RRSS} - \text{URSS})/(\text{URSS}/n)$ (Maddala 2001, 176).
31. γ_0 is the coefficient of $\Delta fdipc_t$, while γ_2 is the coefficient of $\Delta fdipc_{t-2}$.

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Appendix 1.

Table A1. Selected macroeconomic indicators for Argentina during 1960–2000.

Year	GDP growth (% p.a.)	GDPpc growth (% p.a.)	Exports (% GDP)	Imports (% GDP)	Inflation (% p.a.)	External debt (% GDP)[a]	Exchange rate[b]
1960	NA	NA	7.60	7.60	NA	NA	NA
1961	5.43	3.52	5.99	5.99	13.39	NA	NA
1962	−0.85	−2.46	4.69	9.38	28.32	NA	87.17E–13
1963	−5.31	−6.72	7.89	7.89	23.90	NA	13.87E–12
1964	10.13	8.57	5.56	5.56	22.20	NA	14.04E–12
1965	10.57	9.05	6.23	4.15	28.63	NA	16.96E–12
1966	−0.66	−2.02	6.65	4.99	31.91	NA	20.92E–12
1967	3.19	1.76	7.50	5.00	29.20	NA	33.34E–12
1968	4.82	3.32	6.48	5.40	16.21	NA	35.00E–12
1969	9.68	8.06	6.40	6.40	7.57	NA	35.00E–12
1970	3.05	1.46	5.60	4.74	13.59	18.39	37.92E–12
1971	5.66	3.89	6.01	6.61	34.73	18.78	45.22E–12
1972	1.63	−0.08	7.20	6.84	58.45	19.50	50.00E–12
1973	2.81	1.09	7.61	5.71	61.25	13.75	50.00E–12
1974	5.53	3.80	6.90	6.29	23.47	10.53	50.00E–12
1975	−0.03	−1.64	5.82	5.98	182.93	14.73	36.58E–11
1976	−2.02	−3.55	9.18	5.92	443.97	18.13	14.00E–10
1977	6.93	5.32	9.62	7.33	176.00	20.16	40.76E–10
1978	−4.51	−5.91	8.61	5.72	175.51	22.86	79.58E–10
1979	10.22	8.60	6.51	6.33	159.51	30.25	13.17E–09
1980	4.15	2.60	5.06	6.48	100.76	35.29	18.37E–09
1981	−5.69	−7.11	6.92	7.37	104.48	45.32	44.03E–09
1982	−4.96	−6.39	9.09	6.52	164.78	51.76	25.92E–08
1983	3.88	2.31	9.15	5.84	343.81	44.16	10.53E–07
1984	2.21	0.67	7.59	4.76	626.72	61.77	67.65E–07
1985	−7.59	−8.97	11.74	6.27	672.18	57.62	60.18E–06
1986	7.88	6.28	8.16	6.32	90.10	47.28	94.30E–06
1987	2.91	1.41	7.87	7.58	131.33	52.61	21.44E–05
1988	−2.56	−3.94	9.53	6.21	342.96	46.62	87.53E–05
1989	−7.50	−8.76	13.06	6.58	3,079.81	85.15	0.04
1990	−2.40	−3.68	10.36	4.63	2,313.96	44.03	0.49
1991	12.67	11.19	7.68	6.08	171.67	34.47	0.95
1992	11.94	10.46	6.60	8.31	24.90	29.87	0.99
1993	5.91	4.51	6.96	9.32	10.61	27.34	1.00
1994	5.84	4.43	7.56	10.60	4.18	29.19	1.00
1995	−2.85	−4.14	9.70	10.07	3.38	38.29	1.00
1996	5.53	4.17	10.46	11.05	0.16	40.94	1.00
1997	8.11	6.74	10.56	12.72	0.53	43.85	1.00
1998	3.85	2.55	10.41	12.90	0.92	47.35	1.00
1999	−3.40	−4.60	9.80	11.49	−1.17	51.29	1.00
2000	−0.52	−1.74	10.78	11.42	−0.94	51.30	1.00

Source: WDI CD-ROM (2002)

Notes: [a]Calculations are based on constant 1995 US$. [b]LCU per US$.

Table A2. Selected major privatisations in Argentina since 1989.

Company/ sector	Structure/units	Year	Percentage and method	Proceeds ($ bil.) Cash	Proceeds ($ bil.) Debt	FX in $ bil.	Buyers
ENTel	Telecom Argentina, S.A. (Northern Area)	1990	60% – competitive bidding	0.1	2.3	1.80	STET/France Consortium
		1992	30% – IPO	1.2	–	–	
	Telefónica Argentina, S.A. (Southern Area)	1990	60% – competitive bidding	0.114	2.7	2.03	Telefónica Español Consortium
		1991	30% – IPO	0.830	–	0.364	
AA		1989–92	57% – competitive bidding	0.260	1.61	1.30	Iberia Airline Consortium
Petroleum	YPF's drilling areas and distillation facilities	1990–9	Various	21.563	–	18.75	Various foreign and local buyers
Electricity/ power utilities	SEGBA for Greater Buenos Aires and Agua y Energía. Restructured into new business units covering, power plants, distribution and transmission	1992–8	Various	3.295	1.932	3.649	Various foreign and local buyers
Natural gas	Restructured into 2 regional gas transportation and 8 regional distribution companies	1992, 1994, 1998	Various	1.031	1.541	1.430	Various foreign and local buyers
Waterworks	Obras Sanitarias de la Nación	1992	30-year concession	–	–	–	Foreign and local investors
	Obras Sanitarias Mendoza	1998	95-year concession (70%)	0.133	–	0.133	French/American/ Italian Consortium
	Aguas del Gran Buenos Aires, S.A.	2000	Concession (BOT)	0.120	–	n.a.	n.a.
Banks/finance	6 banks/financial entities were privatised between 1992 and 1999	1992–9	Various	0.951	–	0.58	Foreign and local investors

Source: World Bank privatisation database for data until 1999 and IFC privatisation database for 2000 data. World Bank (1993), Gerchunoff and Coloma (1993) and Harteneck and McMahon (1996) for information about the restructured units (i.e. column 2).

A2. Variable definitions

- $\Delta gdppc_t$ = growth in GDP per capita
- Δkpc_t = growth in domestic capital stock per capita. The sign of its coefficient is expected to be positive as an increase in the stock of physical capital leads to an increase in economic growth.
- $\Delta fdipc_t$ = growth rate in FDI stock per capita. FDI may have positive or negative effects on economic growth depending on the nature of its spillovers. If FDI complements domestic investment, participates in augmenting human capital and facilitates the transfer of appropriate technology, then it is expected to have positive effects. However, if FDI leads to substantial transfers of profits from the host country, transfer of inappropriate capital or crowding out domestic investment, then it can have negative effects on economic growth (Ramirez 2006). In addition, the effects of FDI on economic growth depend on the sector in which it takes place. FDI in manufacturing tend to have positive effects on growth, while FDI in the primary sector tends to have negative effects (Alfaro 2003) Hence, the sign of the coefficient may be either positive or negative.
- Δhk_t = growth rate in human capital. Secondary school enrolment as a percentage of population of official secondary school age (i.e. gross enrolment ratio) is used to proxy for human capital. The coefficient is expected to be positive.
- $\Delta xppc_t$ = growth in exports as a measure of the export orientation of the country. Countries that follow export-promotion policies are expected to grow faster than countries that follow import-substitution policies (Edwards 1990). Hence, the expected sign of the coefficient is positive.
- $\Delta privpc_t$ = growth in privatisation proceeds per capita as a measure of the size of the privatisation programme applied in the country. Large privatisation programmes reflects the shrinkage of the size of the public sector, and therefore, its coefficient is expected to be positive.
- $\Delta xdebtrat_t$ = growth in external foreign debt as a percentage of GDP. In neoclassical models, external debt is expected to have positive effect on economic growth if it is in reasonable levels and if it is used to finance investment (Pattillo, Poirson, and Ricci 2002). On the other hand, external debt may also have negative effects on economic growth if it is accumulated by a higher rate than the rate of investment (Lin and Sosin 2001; Pattillo, Poirson, and Ricci 2002). Hence, the sign of the external debt coefficient can be either positive or negative.

Table A4. OLS Estimation, dependent variable *gdppc*, 1971–2000 [for multicollinearity tests].

Specification	*kpc*	*fdipc*	*privpc*	*hk*	*intercept*	R^2
(i)	0.313	−0.016	0.003	−0.351	7.206	**0.06**
	(0.774)	(−0.290)	(0.291)	(−0.986)	(2.14)**	
(ii)	0.2098	–	0.002	−0.345	8.1546	0.06
	(1.093)		(0.263)	(−0.989)	(10.49)***	
(iii)	0.312	−0.014	–	−0.353	7.210	0.06
	(0.787)	(−0.262)		(−1.01)	(2.18)**	

Notes: **denotes statistical significance at 5%; ***denotes statistical significance at 1%; *t*-statistic is reported in between the parentheses.

Table A5. OLS Estimation, dependent variable *privpc*, 1971–2000 [for multicollinearity tests].

Specification	*kpc*	*fdipc*	*hk*	*intercept*	R^2
	−0.92	0.712	−0.731	1.676	**0.32**
	(−0.11)	(0.611)	(−0.067)	(0.023)	

Note: *t*-statistic is reported in between the parentheses.