# Fiscal Spending and Crowding out Effect: A Comparison between Developed and Developing Countries

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***Abstract***: This paper evaluates the effect of disaggregated fiscal spending (consumption, capital formation and budget deficit) on private investment in both developed and developing countries using a panel data over the period of 2000-09. The results indicate that the elasticity of private investment with respect to government capital formation expenditure is positive in both groups (crowd in effect), but this complementary effect is greater than in the developed countries. Likewise, the elasticity of private investment with respect to government consumption spending is significantly negative in both groups (crowd out effect), but this substitution effect is larger in developed countries. Furthermore, the effect of budget deficit on private investment in developed countries is negative (crowd out effect), while this effect is positive in developing countries (crowd in effect). However, these effects are marginal in both groups.

***Keywords***: budget deficit, government expenditures, private investment

***JEL Classifications***: E22, H50, H62

## 1. Introduction

Private investment is an important channel for the effectiveness of fiscal policy and improving economic growth. Expansionary fiscal policy affects private investment positively (crowding in effect) and can lead to economic growth. However, it can also crowd out private investment by increasing the interest rates. The fiscal policy effect on private investment, therefore, becomes crucial

due to its relevance to sustained economic growth for policy makers in both developed and developing countries. The aim of this paper is to compare the effectiveness of disaggregated fiscal spending (consumption, capital formation and budget deficit) in the context of the validity of the crowding out hypothesis between developed and developing countries during 2000-09. In the next section, we briefly review the theoretical literature and empirical studies. The third section presents data and methodology. In section four, econometric results are discussed. Finally, section five summarises the main findings.

## 2.    Literature Review

To aid in understanding the relationship between fiscal spending, private investment and growth, the following theoretical and empirical analysis highlights three contrasting viewpoints. The neoclassical view assumes full employment and advocates competitive markets over against government intervention. The neoclassical loanable funds theory explains that the balancing of savings and investment will be solved by the interest rate mechanism. In case of an increase in government spending, interest rates have to increase to bring the capital market into equilibrium, dampening private investment. Therefore, the neoclassical school advocates the crowding out effect (Blejer and Khan, 1984; Beck, 1993; Voss, 2002; Ganelli, 2003).

In contrast to this substitution effect, the Keynesian view supports the complementary effect. It assumes that there is unemployment in the economy and that the interest rate sensitivity to investment is low. Thus, expansionary fiscal policy will cause little or no increase in the interest rate, output and income. In addition, this view assumes that government spending increases private investment due to the positive effect of government spending on investor expectations. Therefore, there is a crowding in rather than a crowding out effect (Aschauer, 1989; Baldacci *et al*., 2004).

Between these approaches of substitutability and complementary effects, a third view based on the Ricardian Equivalence Theorem, argues that the budget deficit in any current period will be equal to the present value of future taxation that would be required to finance the budget deficit. Therefore, individuals increase their savings as a household spending decision takes into account their future tax liabilities. This extra saving will increase the national saving and hence, offset any increase in the interest rate. Thereby, private investment is left unchanged. This implies that budget deficits are irrelevant for financial decisions without any crowding out or crowding in effect of fiscal spending (Barro, 1978; Darrat and Suliman, 1991; Ghatak and Ghatak, 1996).

Argimón *et al*. (1997) represented results supporting the existence of a crowding in effect of private investment by public investment through the

positive impact of infrastructure on private investment productivity, for a panel of 14 OECD countries.

Mamatzakis (2001) investigated links between disaggregated measures of government expenditure and private investment in Greece from 1950-98, by using an ECM approach. The results revealed that government consumption affected private investment negatively, while government investment had a positive effect on private investment.

Hermes and Lensink (2001) analysed the existence of a non-linear relation between fiscal policy variables and private investment for LDCs. Their findings showed a reverse U-shape link between health expenditure and private investment, while the relation between defense expenditure and private investment was U-shaped.

Voss (2002) estimated the effect of public investment on private investment for the US and Canada from 1947-1996, applying a VAR model. According to the reported results, innovations in public investment crowded out private investment.

Wang (2005) examined the effect of disaggregated government expenditure on private investment for the Canadian economy from 1961-2004, applying an ECM technique. The empirical findings depicted that public expenditure on health and education had positive impacts while expenditure on infrastructure had negative effects on private investment. Likewise, other expenditure like debt charges and social security had negative, though insignificant effects.

Kustepli (2005) investigated the effectiveness of fiscal policy in view of the crowding out hypothesis in Turkey from 1967-2003, applying a VAR method. The findings showed that government spending crowded in private investment, while budget deficits crowded it out.

Afonso and St. Aubyn (2008) evaluated the macroeconomic effects of public investment and private investment through VAR analysis, for 14 European Union countries plus Canada, Japan and the US from 1960-2005. The results mostly pointed to the existence of positive effects of both public and private investment on output. On the other hand, the crowding in effects of public investment on private investment vary across countries, while the crowding in effect of private investment on public investment is more generalised.

Hussain *et al*. (2009) investigated a long-run association between private investment and government expenditure in Pakistan from 1975-2008, using a VECM method. The result showed that current expenditure such as defense and debt servicing crowded out private investment while development expenditure such as infrastructure, health and education crowded in private investment.

Kollamparambil and Nicolaou (2011) used quarterly data from 1960-2005 to analyse the nature of and relationship between public and private investment

in South Africa, using a VAR model. Their findings indicated that although public investment was not "crowding in/out" private investment, it exerted an indirect impact on private investment through the accelerator effect. Hence, any increase in government spending on infrastructure and social sectors seems likely to enhance private investment in that country. Therefore it is suggested that a more proactive fiscal policy increases the investment-GDP ratio stimulating higher growth rates.

## 3.    Data and Methodology

*In order to test the effectiveness of fiscal spending considering the "crowding out" hypothesis, we used the one-way error terms component of panel data regression models as follows:*

$$LI_{it} - \alpha_0 + \alpha_1\ LP_{it} + \alpha_2\ LGDP_{it} + \alpha_3\ LGI_{it} + \alpha_4\ LGC_{it} + U_{it} \qquad \text{Model (1)}$$

$$LI_{it} - \alpha_0 + \alpha_1\ LP_{it} + \alpha_2\ LGDP_{it} + \alpha_3\ BD_{it} + U_{it} \qquad \text{Model (2)}$$

$$U_{it} - \mu_i + \varepsilon_{it}$$

where:
*LI* denotes the logarithm of real private investment;
*LP* is the inflation rate;
*LGDP* is the logarithm of real income (gross domestic product);
*LGI* is the logarithm of real government investment expenditure;
*LGC* is the logarithm of real government consumption expenditure; and
*BD* denotes the real government deficit.

Likewise, $\mu_1$ are time invariant country specific effects and $\varepsilon_{it}$ is a random noise error term.

However, these model specifications are based on Kustepeli (2005) with some adjustments, in that we used inflation rate instead of interest rate, because of the unavailability of the interest rate data in some countries. As well, model (2) is considered as semi-logarithmic due to the budget deficits including negative numbers. The period is from 2000-09 considering the availability of data. In addition, data are annually, 2000 constant price (USD) extracted from the World Bank. The studied countries include 23 developed countries[1] and

15 developing countries.[2] However, these countries are homogenous in terms of economic circumstances, since the selected developing countries include major oil exporting countries for which the World Bank's classification of them is 'middle-income'. Also, the selected developed countries are members of the OECD.

The method used is the Panel Data Technique. Benefits of panel data estimation reported by Baltagi (2005) are as follows: (1) controlling individual heterogeneity; (2) panel data give more informative data, more variability, less co-linearity among the variables, more degree of freedom and more efficiency; (3) this method is useful to identify and measure effects that are simply not detectable in pure cross section or pure time series data; (4) it is more suitable to study the dynamics of adjustment; (5) the panel data model is able to study more complicated behavioural models that pure time series or pure cross section models cannot study.

Panel data fixed effect estimation assumes that the difference between cross sections is captured by a different intercept for each cross section. But, in random effect estimation, features of cross sections are non-observable and randomly distributed and captured by the error terms that contain two parts (constant part and varies over time part). Also, for distinguishing between fixed effects and random effects models, we applied the Hausman test (1978). The null hypothesis in this test states that the random effects estimator is correct (Baltagi, 2005).

However, before estimating the above empirical models, an important step is to test for unit roots with stationary covariates. Hence, we used the Im, Pesaran and Shin (IPS) unit root test that assumes the series is non-stationary. Thus, being unable to reject the null hypothesis implies that variables have a unit root (it means that they are non-stationary). If all variables are integrated of order (1), then, they are co-integrated (Engle-Granger, 1987). Moreover, in order to ascertain the existence of the co-integration relationship between variables, this paper applied the IPS unit root test for the residuals of estimated regressions. If the estimated residuals are stationary, then the variables are co-integrated.

## 4.    Empirical Results

Table 1 presents the results of the Im, Pesaran and Shin (IPS) unit root test. This unit root test assumes that series are non-stationary. The results of IPS testing show that all variables are stationary after the first differencing. In other word, all variables are integrated of order (1). Hence, they are co-integrated (Engle-Granger, 1987).

Table 1: IPS Unit Root Test for Variables

| | Developing Countries | | | | |
|---|---|---|---|---|---|
| Variables | Level | Prob. | First Difference | Prob. | Result |
| LI | 0.80 | 0.79 | -2.74 | 0.003 | I(1) |
| LGI | 0.94 | 0.82 | -2.13 | 0.016 | I(1) |
| LGC | 0.28 | 0.61 | -1.68 | 0.048 | I(1) |
| BD | -0.97 | 0.16 | -1.96 | 0.024 | I(1) |
| LGDP | 3.87 | 0.99 | -1.73 | 0.041 | I(1) |
| LP | -0.79 | 0.21 | -3.34 | 0.0004 | I(1) |
| | Developed Countries | | | | |
| Variables | Level | Prob. | First Difference | Prob. | result |
| LI | 3.55 | 0.99 | -7.54 | 0.000 | I(1) |
| LGI | -0.14 | 0.44 | -1.90 | 0.028 | I(1) |
| LGC | 2.12 | 0.98 | -7.006 | 0.000 | I(1) |
| BD | -0.48 | 0.31 | -3.70 | 0.001 | I(1) |
| LGDP | -0.33 | 0.36 | -4.75 | 0.000 | I(1) |
| LP | -1.17 | 0.12 | -2.42 | 0.007 | I(1) |

Source: Computed from data extracted from the World Bank (Year 2000-2009)

Table 2 reports the results of the Im, Pesaran and Shin (IPS) unit root test on the residuals of estimated regressions to test the existence of co-integration between variables. It is obvious that the null hypothesis in which the residuals series have unit root, is rejected. Thus the existence of a long-run relationship between variables is confirmed.

Table 2: IPS unit root test for residuals

| | Developing Countries | | |
|---|---|---|---|
| Model | statistic | prob | result |
| (1) | -2.08 | 0.018 | I(0) |
| (2) | -4.22 | 0.000 | I(0) |
| | Developed Countries | | |
| Model | statistic | prob | result |
| (1) | -5.30 | 0.000 | I(0) |
| (2) | -2.53 | 0.005 | I(0) |

Source: Computed from data extracted from the World Bank (Year 2000-2009)

Table 3 represents Hausman test results. The null hypothesis implied that RE is a better method for estimating. The results indicate that in developing countries, FE and RE are better methods for estimating the models (1) and (2), respectively. As well, in developed countries FE is the preferred model for both models.

Table 3: Hausman test

| Developing Countries | | | |
|---|---|---|---|
| Model | Chi-square | prob | result |
| (1) | 18.69 | 0.0009 | FE |
| (2) | 1.067 | 0.784 | RE |
| Developed Countries | | | |
| Model | Chi-square | prob | result |
| (1) | 28.59 | 0.000 | FE |
| (2) | 19.03 | 0.0003 | FE |

Source: Computed from data extracted from the World Bank (Year 2000-2009)

Tables 4 and 5 present the results of estimations in developed and developing countries. The findings imply that the elasticity of private investment, with respect to public investment, is positive and significant in both developing and developed countries, since a percent increase of public investment led to increased private investment, to 0.31 and 0.095 percent respectively. This means that the elasticity of private investment with respect to public investment in developing countries is larger than in developed countries. Likewise, the elasticity of private investment with respect to public consumption is negative and significant in both groups, since a percent increase of public consumption led to decreased private investment to 0.18 and 0.29 percent, respectively. This means the elasticity of private investment with respect to public consumption in developed countries is greater than in developing countries. In addition, the effect of budget deficit on private investment in developing countries is significantly positive, while in developed countries it is significantly negative. However, these effects are tiny in both groups.

Table 4: Results of Regressions for Developing Countries

| Dependent Variable: LI | | | |
|---|---|---|---|
| Variables | Model (1) | Model (2) | Result |
| LGI | 0.31 * | ------- | Crowd in effect |
| LGC | -0.18 * | ------ | Crowd out effect |
| BD | ----- | 0.00031 * | Crowd in effect |
| LGDP | 0.98 * | 1.05 * | |
| LP | -0.029 * | -0.036 * | |
| C | -3.05 * | -2.63 * | |
| AR(1) | 0.42 * | ------- | |
| $R^2$ | 0.9765 | 0.8189 | |
| $\overline{R^2}$ | 0.9758 | 0.8136 | |
| F (prob.) | 0.000 | 0.000 | |
| D.W | 2.006 | 1.74 | |

*denotes that variable is significant at 5% level.
Source: Computed from data extracted from the World Bank (Year 2000-2009)

Table 5: Results of Regressions for Developed Countries

| Dependent Variable: LI | | | |
|---|---|---|---|
| Variables | Model (1) | Model (2) | Result |
| LGI | 0.095 * | ------- | Crowd in effect |
| LGC | -0.29 * | ------ | Crowd out effect |
| BD | ----- | -0.0018 * | Crowd out effect |
| LGDP | 1.40 * | 1.21 * | |
| LP | -0.0017 | -0.004 | |
| C | -4.48 * | -8.34 * | |
| AR(1) | 0.46 * | 0.90* | |
| $R^2$ | 0.9869 | 0.9639 | |
| $\overline{R^2}$ | 0.9863 | 0.9631 | |
| F (prob.) | 0.000 | 0.000 | |
| D.W | 1.98 | 2.14 | |

*denotes that variable is significant at 5% level.
Source: Computed from data extracted from the World Bank (Year 2000-2009)

## 5.    Conclusion

Private investment is a main transmission channel through which fiscal policy affects economic growth, since  the impact of fiscal policy on economic growth depends, to a large extent, on whether or not the fiscal expansion crowds out private investment.

This paper has compared the effect of disaggregated fiscal spending (consumption, capital formation and budget deficit) on private investment in developed and developing countries using a panel data method from 2000-09. The findings indicate that the elasticity of private investment with respect to public investment is significantly positive in both group countries (crowd in effect), supporting the capital accumulation process in this way.  Moreover, this elasticity is greater in developing countries than in developed countries. This is because, in most developing countries, infrastructures are not fulfilled. Furthermore, financial markets are imperfect and the availability of credit in developing countries is insufficient for private investment, facing liquidity constraints and differential borrowing rates. In this case, public investment expenditure has a greater stimulating effect on private investment.

By contrast, the elasticity of private investment with respect to government consumption is significantly negative in both groups (crowd out effect). In developed countries this is larger than in developing countries, because governments in developed countries finance consumption expenditure by taxing the private sector. Thus, a tax increase will also diminish after tax-returns on private investments, providing economic agents with the incentive to revise

their investment decisions downwards. Hence, any increase in government consumption in these countries, has a greater negative effect on private investment. Likewise, the effect of a budget deficit on private investment in developed countries is negative (crowd out effect), while for developing countries it is positive (crowd in effect). However, these effects are tiny in both groups.

Overall, the results of this study might have important policy implications. Most significantly, it shows that governments need to be aware of the fact that their expenditure and policies need to be carried out carefully, since any increase in government spending on infrastructure especially in developing countries, is likely to enhance private investment, while cuts in public investment could severely impinge on private capital accumulation and growth prospects. Hence, this study suggests that governments make policies to control their consumption expenditures and allocate more resources to public investment to encourage the private sector and stimulate higher growth rates.

## Notes

[1]  Canada, US, Australia, Austria, France, Germany, Greece, Italy, Switzerland, UK, Spain, Portugal, Netherlands, Iceland, Ireland, Norway, Finland, Belgium, Luxembourg, Sweden, New Zealand, Denmark.
[2]  Egypt, Indonesia, Algeria, Venezuela, Iran, Kuwait, Tunisia, Colombia, Malaysia, Kazakhstan, Brazil, Argentina, Trinidad and Tobago, Bolivia, Russia.

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