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Exports, imports, government consumption and economic growth in upper-middle income countries

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Abstract: Esfahani (1991) shows that the statistically significant correlation between export promotion and economic growth in semi-industrialized countries (SICs) has been mainly attributable to the role of exports in reducing import 'shortages', which have impeded output growth in these countries. As a result, export-promotion policies as a superior development strategy in SICs play an important role in those that cannot secure sufficient foreign aid or investment. Esfahani (1991) also develops a simultaneous equations model to address the simultaneity bias between GDP and export growth rates. In this article we extend the model developed by Esfahani (1991) by incorporating the contribution of government consumption to output growth and test it using a sample of 27 upper-middle income economies.

Key words: exports, imports, government consumption, economic growth, upper-middle income countries

I Introduction

Throughout the 1970s and the 1980s, statistically significant correlations found between export promotion and output growth have provided empirical support for exportpromotion policies as a superior development strategy for middle-income countries that are semi-industrialized (see, for instance, Balassa, 1978, 1985; Feder, 1982; Kavousi, 1984; Michaely, 1977; Michalopoulos and Jay, 1973; Tyler, 1981). The explanation for this observation has been due to externalities of competition in world markets such as a more efficient use of resources, scale economies, as well as various labour training and 'demonstration' effects. Esfahani (1991), however, argues that this explanation neglects the role of exports in SICs as the main source of foreign exchange for the much required importation of intermediate and capital goods. His other contribution to the development literature is in terms of methodology, since he addresses the long recognized simultaneity bias as export growth may itself be brought about by an increase in output.

In the present study we have chosen to incorporate the effect of the expansion of government consumption used an input on output growth. Moreover, we also address the simultaneity bias between output growth and government consumption growth as the demand for government consumption may also be a function of economic growth, as stated by Wagner's (1958) Law of Expanding State Activity. Thus, after specifying equations that relate export growth, import growth, and government consumption growth, we then estimate a four-equation system of GDP, export, import and government consumption growth models simultaneously.

 The article is organized as follows. In section II, a review of the recent literature trade liberalization and economic growth is given. This is followed by the development of a basic model similar to Esfahani's (1991), but extends it to take into account the contribution of government consumption to output. We then test this model using a sample of 27 upper-middle income countries for the period of 2000–08. The data are taken from the 2010 World Development Indicators (The World Bank, 2010). Section IV summarizes the empirical results while the final section gives concluding remarks.

II Literature review

There are two empirical difficulties associated with estimating the impact of trade liberalization on economic growth. First, Brock and Durlauf (2001) argue that much of the modern empirical growth literature is based on implausible assumptions from the perspective of both economic theory and the historical experiences of the countries under study. By allowing for uncertainty in model specification and using an explicit decision-theoretic framework, they show how one can engage in empirical analysis that is relevant to policy suggestions. Second, it is conceptually important to differentiate trade openness, a levels

or state variable, from trade liberalization, a change variable. However, as pointed out by Pritchett (1996) and Harrison (1996), these two are difficult to separate in practice.

The 1990s was characterized by a conviction that trade liberalization or openness was good for economic growth as endorsed by visible and well-promoted cross-country studies (see, for instance, Dollar, 1992; Edwards, 1998; Frankel and Romer, 1999; NBER (1995). However, Rodriguez and Rodrik (2001) criticize these studies rather severely by pointing out the flaw of their measures of openness and their weak econometrics.

Using panel data for over one hundred countries over the period 1950–89 Vamvakidis finds that multilateral liberalizations were associated with higher growth rates, while discriminatory regional trading agreements were not. Another difficulty in establishing an empirical link between liberal trade and growth has to do with the direction of causality. Both Frankel and Romer (1999) and Irwin and Tervio (2002) address this issue when they examine the impacts of the component of openness that is independent of economic growth. They find that this component, which is explained by strictly exogenous variables such as population, land mass, borders, and distances, seems to explain a great deal of the cross-country variations in income levels and growth performance, and thus cautiously conclude that the causality runs from increased trade to higher growth.

In addition, liberal trade policies, in order to have a long-term effect on growth, need to be combined with other good policies such as investment encouragement, allowance for effective conflict resolution, and promotion of human capital accumulation. For instance, Taylor (1998) and Wacziarg (2001) find that investment is a key link, implying that poor investment policies may reduce the benefits of trade liberalization.

More recently, Rodrik et al. (2002) argue that institutions outperform geography and openness as explanations of per capita real income. They use Kaufmann et al.'s (2002) composite index for the 'rule of law', which includes 'perceptions of the incidence of both violent and non-violent crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts' as a measure of institutional quality.

While the literature on the effects of trade liberalization on growth has been voluminous, that on the impacts of government consumption on growth has been relatively more modest. Dao (1995) develops a simultaneous equations model to test 'Wagner's law' of the growth of government consumption with income while taking into consideration the possibility of a feedback effect of the size of government consumption on the growth of income. He finds that for the 1980–91 period government consumption per capita tended to increase as middle-income economies grew, supporting 'Wagner's law'. His regression results show that the provision of government consumption is always subject to diseconomies of scale in middle-income economies with large populations, regardless of the degree of publicness in consumption. He also finds that while previous studies have found the demand for government services to be priceinelastic, results of the simultaneous equations estimation in his study show that such demand is unitary elastic for middle-income countries.

More recently, Dao (2012) specifies and estimates a simultaneous equations model consisting of two government expenditure growth equations and a GDP growth equation to investigate the impact of the growth of the share of various government expenditure programmes in the GDP on economic growth while taking into consideration the major issue of potential simultaneity. Using two samples of the 28 developing economics, he finds that per capita GDP growth depends upon the growth of per capita public health expenditure in the GDP, of per capita public spending on education in the GDP, population growth, that of the share of total health expenditure in the GDP, and the share of gross capital formation in the GDP

The present article integrates both Esfahani's (1991) and Dao's (1995) models to test 'Wagner's law' of the growth of government consumption with income as well as the impact of growth on trade while taking into account the feedback effect of both trade and government consumption on the growth of income using a sample of 27 upper-middle income economies. The basic model is developed in the next section to which we now turn.

III The basic model

In deriving the GDP growth equation, we shall make use of the traditional approach of introducing G as an 'input' in the aggregate production function $Y = f(L, K, G, M, X)$ where Y is GDP, L is labour, K is capital, G is government consumption, M is imports of agricultural raw materials, fuels, ores and metals as intermediate goods, and X is exports. In order to capture the externality effects of exports on output in terms of more efficient use of resources, scale economies, and labour training and 'demonstration' effects, we add as input manufactured exports. Let tx be the share of manufactures in total exports. Manufactured exports then will simply be tx X. To account for the extent of the import shortage, following Esfahani (1991) we include another variable, rmM, where rm is the residual term in the regression of total import-GDP ratio on its determinants such as log of GDP per capita, its square, the log of the size of the labour force, its square, and the log of area and its square. The rationale for the inclusion of the residual of this regression is that it captures how much a country's share of imports in the GDP deviates on its 'expected' value. The greater the import shortage translates into a lower share and thus a lower value for rm.

The aggregate production function can now be rewritten as:

$$Y = f(L, K, G, M, r_m M, X, t_x X) \qquad (1)$$

By totally differentiating this function and manipulating the expression one gets the 'standard form':

$$y = \alpha_K (I/Y) + \beta_L l + \alpha_G (G/Y) g + \\ \alpha_M (M/Y) m + \alpha_{rM} r_M (M/Y) m + \\ \alpha_X (X/Y) x + \alpha_{tX} t_X (X/Y) x \qquad (2)$$

Where a lower case letter implies the growth rate of the variable, I is investment, αi is the marginal product of factor i in the economy, and βL is the elasticity of aggregate output with respect to labour.

In deriving the per capita growth of government consumption equation we shall make use of the following model of the share of government consumption in the national income:

$$G/Y = \theta_0 + \theta_1 \log Y_{pc} + \theta_2 (\log Y_{pc})^2 + \\ \theta_3 \log L + \theta_4 (\log L)^2 \qquad (3)$$

Rewriting G/Y as Gpc/Ypc and differentiating equation (3), one obtains:

$$(G/Y) g_{pc} = (G/Y) y_{pc} + \theta_1 y_{pc} + \\ \theta_2 \log Y_{pc} y_{pc} + \theta_3 l + \theta_4 \log L l \qquad (4)$$

Similarly, the per capita growth of exports equation is derived as follows:

$$(X/Y) x_{pc} = (X/Y) y_{pc} + \eta_1 y_{pc} + \\ \eta_2 \log Y_{pc} y_{pc} + \eta_3 l + \eta_4 \log L l \qquad (5)$$

And the per capita growth of imports equation is:

$$(X/Y)\, m_{pc} = (X/Y)\, y_{pc} + \gamma_1 y_{pc} + \gamma_2 \log Y_{pc}\, y_{pc} + \gamma_3 l + \gamma_4 \log L l \quad (6)$$

Since the aggregate production function is assumed to exhibit constant returns to scale, we can rewrite equation (2) as

$$Y_{pc} = \alpha_K\,(I/Y) + \beta_L\, l + \alpha_G\,(s_G)\, g_{pc} + \\ \alpha_M\,(s_M)\, m_{pc} + \alpha_{rM} r_M\,(s_M)\, m_{pc} + \\ \alpha_X\,(s_X)\, x_{pc} + \alpha_{tX} t_X\,(s_X)\, x_{pc} \quad (7)$$

where si is the share of the ith input in the GDP.

Note that since the area of a country does not change over time, the growth version of this variable is excluded from the model as its value will be zero everywhere. We can now estimate simultaneously equations (4)–(7) using two-stage least squares. Equations (4)–(6) are used in the first stage to obtain fitted values to replace the actual values of the endogenous variables (sG) gpc, (sM) mpc and (sX) xpc. These fitted values are then used in the second stage to estimate equation (7). The software algorithm is the nonlinear system estimation method of SPSS.

IV Empirical results

Results of the regression of the share of imports in the GDP on the log of per capita GDP, its square, the log of area, its square, the log of the labour force, and its square show that only the log of per capita GDP and its square are statistically significant, but the coefficient estimate of the log of per capita GDP does not have the expected positive sign.[1] These results are similar to those found by Esfahani (1991).

Using a backward elimination stepwise method we arrive at a revised model and note that the log of area is now statistically significant and its coefficient estimate does have the expected negative sign as area reduces the need for imports because countries with larger areas are usually endowed with a greater variety of complementary natural resources and within them there is a greater opportunity for different regions to trade with each other rather than importing from abroad.

We next use the residuals of the above regression to estimate equation (2). As in the case of Feder's (1982) study, by multiplying the export growth rate by the export share in GDP, we are able to capture the influence of the relative importance of exports in the economy on the impact of export promotion on GDP growth rate. However, the coefficient estimate of the variable tX (sX) x, which is used to capture the impact of manufactured exports on GDP growth rate, has the unexpected negative sign. This may be an indication that non-manufactured exports may have larger externality effects than manufactured ones. Krueger (1983), for example, finds that in many instances exports of upper-middle income countries have lower direct labour coefficients per unit of international value added than import competing products, while one would expect that it should be the other way around given the factor endowments of these countries relative to those of their trading partners. In this OLS regression we also find that the government consumption growth rate variable is not statistically significant even though its coefficient estimate has the expected positive sign.

The results of the OLS regression based on equation (2) would yield unbiased estimates of the externality effect of both export and government consumption growth if external conditions and government policy exclusively determined export performance and the contribution of government consumption to output growth. Nevertheless, as Esfahani (1991) points out, it is hard to assume that export performance is independent from GDP growth and, as indicated by Dao (1995), the demand for government services is itself a function of income growth as postulated by Wagner's law. An increase in productivity or in the

availability of resources in a country may lead to an increase in output growth, which in turn may result in more export growth.

As indicated in the previous section, we can handle the simultaneity bias problem by simultaneously estimating equations (4), (5) and (6) with a per capita version of equation (2), that is, with equation (7). We note that equation (7) is not only compatible with (4), (5) and (6), it contains one less parameter than (2), which results in higher estimation efficiency.

Table 1 Regression results for 27 upper-middle income countries
Simultaneous equation for GDP growth

	Coefficient Estimate	t-Statistic
Intercept	−3.549	−1.733
k^*	0.245	2.948*
$s_X x_{pc}$	0.674	4.227*
$t_X s_X x_{pc}$	−0.271	−0.689
$s_M m_{pc}$	−0.161	−1.212
$r_M s_M m_{pc}$	−0.181	−0.419
$s_G g_{pc}$	2.211	3.038*

Source: Author's own elaboration.
Notes: Single-equation adjusted $R^2 = 0.767$
    *Significant at the 1 per cent level.

Results of the 2SLS of equation (7) are reported in Table 1. We note that the goodness of fit of the model to the data is very good as indicated by the high value of 0.767 of the adjusted coefficient of determination. We also observe that the investment-GDP ratio variable is now highly statistically significant, unlike the case in which single equation of (2) is estimated by OLS. A one-percentage point increase in the value of this variable is expected to lead to a 0.245 per cent increase in per capita GDP growth rate. This is a greater impact than that estimated by OLS single equation estimation. The magnitude of the effect of per capita export growth is somewhat less (0.674 as opposed to 0.788). Nevertheless, it is still considerable relative to the effect of the share of investment in the GDP. Table 2 presents the regression results when tXsXxpc is excluded from the model. We note that the role of manufactured exports is not statistically significant in explaining cross-country variations in per capita GDP growth rates. In fact, removing this variable from the model causes the per capita import growth rate variable to become statistically significant at the 5 per cent level even though the coefficient estimate of the latter has the unexpected negative sign. We next re-estimate the model while excluding the rMsMmpc variable and finds that the regression results remain unaffected, as reported in Table 3. This finding suggests that uppermiddle income countries included in this sample may not have experience import shortage, at least for the period under study, which is from 2000 to 2008.

On the other hand, we find that per capita government consumption growth is highly statistically significant and its coefficient estimate does have the expected positive sign. As far as the feedback from per capita GDP growth to export, import and government consumption growth is concerned, we note that the interaction term between per capita GDP growth rate and log of per capita GDP exerts a strong and positive impact on per capita import growth rate.

Table 3 Regression results for 27 upper-middle income countries

Simultaneous equation for GDP growth ($t_X s_X x_{pc}$ and $r_M s_M m_{pc}$ excluded)

	Coefficient Estimate	t-Statistic
Intercept	−3.351	−1.712
k^*	0.232	2.938*
$s_X x_{pc}$	0.663	4.329*
$s_M m_{pc}$	−0.213	−1.954**
$s_G g_{pc}$	2.285	3.257*

Notes: Single-equation adjusted R^2 = 0.779
   *Significant at the 1 per cent level.
   **Significant at the 5 per cent level.

Export Growth Equation (5)

	Coefficient Estimate	t-Statistic
Intercept	4.069	4.352
$y_{pc} \ln Y_{PC}$	0.105	0.103
y_{pc}	−1.621	−0.172
l	−0.645	−1.176
$l \ln LABOUR$	−0.013	−0.058

Import Growth Equation (6)

	Coefficient Estimate	t-Statistic
Intercept	6.415	6.976
$y_{pc} \ln Y_{PC}$	2.166	2.147**
y_{pc}	−20.930	−2.253**
l	−1.081	−2.005**
$l \ln LABOUR$	−0.071	−0.326

Notes: **Significant at the 5 per cent level.

Government Consumption Growth Equation (4)

	Coefficient Estimate	t-Statistic
Intercept	0.859	5.279
$y_{pc} \ln Y_{PC}$	−0.085	−0.478
y_{pc}	0.574	0.350
l	−0.211	−0.873
$l \ln LABOUR$	0.020	0.474
urb	−0.037	−0.175

Source: Author's own elaboration.

Table 2 Regression results for 27 upper-middle income countries

Simultaneous equation for GDP growth ($t_X s_X x_{pc}$ excluded)

	Coefficient Estimate	t-Statistic
Intercept	−3.590	−1.777
k^*	0.243	2.965*
$s_X x_{pc}$	0.657	4.223*
$s_M m_{pc}$	−0.209	−1.891**
$r_M s_M m_{pc}$	−0.260	−0.631
$s_G g_{pc}$	2.281	3.206*

Source: Author's own elaboration.
Notes: Single-equation adjusted R^2 = 0.772
   *Significant at the 1 per cent level.
   **Significant at the 5 per cent level.

V Summary and conclusion

In this article, I test a model which is more comprehensive than that developed by Esfahani (1991) in the sense that it incorporates government consumption growth as an additional factor explaining per capita GDP growth using a sample of 27 upper-middle income economies. The following concluding remarks may be made:

1. When taking account of the simultaneity bias, 2SLS estimation of the system of four growth equations yields superior results such as the statistical significance of the investment-GDP ratio in explaining cross-country variations in per capita GDP growth rates as opposed to this variable not having a significant effect when using OLS estimation.

2. Manufactured exports do not seem to exert a statistically significant effect on per capita output growth, suggesting that non-manufactured exports may have larger externality effects than manufactured ones. This finding is consistent with Krueger's study in which exports of upper-middle income countries in several cases have lower direct labour coefficients per unit of international value added than importing competing products. Thus, governments in these countries may need to encourage more non-manufactured exports relative to manufactured ones if their goal is rapid per capita output growth.

3. The evidence does not seem to support Wagner's law of expanding state activity when 2SLS nonlinear estimation of the system of four growth equations is applied to the data.

4. Unlike Esfahani (1991) we did not find that the major contribution of exports to the GDP growth rate is to give relief to the import shortage confronted by many upper-middle income economies, at least for the period considered by this study, that is, from 2000 to 2008. On the other hand, we do find, like Esfahani (1991) that the share of manufactures in total exports does not seem to enhance the externality effect. This may be due to distortions in both factor and product markets of the manufacturing sector in many upper middle-income countries having an offsetting effect to any external economies of participation in international markets. A policy implication of the latter result is that governments in upper-middle income economies need to devise ways of reducing these distortions in order to further promote economic growth.

5. Like Esfahani (1991), this study also finds that area has a negative effect on the share of total imports in the GDP and this variable is strongly significant relative to the log of GDP per capita and the square of the latter variable.

6. The role of government consumption growth in promoting output growth is significant and positive. Governments in middle-income countries need to devote more resources toward the expansion of government consumption in order to encourage economic growth and development. This is an aspect that has been neglected in the economic development literature.

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Note

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