The Productivity Basis for Paraguay's Economic Growth, 1970–96

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Paraguay is distinguished from many cases of Latin American economic development in recent decades. For example, it is one of the few countries in the region that managed to avoid the heavy economic fallout of the 1980s attendant on the external debt crisis. Its average annual rate of growth for the decade was around 2%. While this does not represent a spectacular performance, it was at least positive and was exceeded in fact only by Chile, the region's outstanding success story for the period. Paraguay's relative success was in part the result of its having avoided the sort of macroeconomic instability that plagued many of the nations in the region and especially its Southern Cone neighbours, Argentina and Brazil. Paraguay's annual rate of inflation during the decade averaged around 21% and never exceeded 32%; its government budget registered a surplus in five of the ten years and an accumulated surplus of 92.9 billion guaranies over the 1980–89 period.

The driving force of the economy in the 1970s and 1980s came from two main sources. First, there was the completion of two hydroelectric projects on the borders with Brazil and Argentina, respectively, each of which was important not only for the increase in energy output it permitted but, even more significant for Paraguay, for the employment and income multiplier effects it provided to the economy at large. The second source of the country's economic dynamism derived from a rapid expansion in agricultural production for export. This consisted primarily of cotton and soybeans destined for the Brazilian market and was accompanied by both an expansion in land area under cultivation and an intensification of production on land already being exploited.[1]

By the end of the decade it was becoming evident that, just as other countries in the region were beginning the process of stabilisation and reactivation of their economies in the wake of neoliberal reform, Paraguay was not to enjoy a

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1. See Richards (1994) for a discussion of the structural consequences of this 'booming' activity.

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resumption of the high rates of economic growth it experienced in the pre-crisis 1970s. In fact, a comparison of Paraguayan economic growth with that of other Latin American countries during the 1990s shows it to be a relative laggard, despite the fact that, as already noted, Paraguay avoided the worst of the macroeconomic instability of the previous decade and despite its implementation of a number of neoliberal reforms.

A number of explanations have been advanced for the changed conditions of the Paraguayan economy. Some of these focus on the external, or exogenous, environment faced by agricultural producers, including the regional macroeconomic instability, declining terms of trade and poor growing conditions. Others have emphasised strictly internal conditions such as the exhaustion of the supply of uncultivated land, i.e. the closing of the agricultural frontier, or poor policy choices.[2] Each of these explanations probably captures a portion of the truth. The point the present study wishes to focus on is that the rapid growth of the Paraguayan economy during the 1970s and 1980s was based on factors and conditions that were not sustained in the 1990s and are unlikely to be replicated in the future. In other words, Paraguayan growth in the period 1970–89 was not of the endogenous variety as per the new growth theory. There was little in the booms of the 1970s and early 1980s that could be said to have transmitted a productivity-enhancing dynamic to other sectors of the economy. In fact, a much more relevant model is the vent-for-surplus theory articulated in the 1960s by Myint (1968). According to this argument, which has its roots in classical political economy, some countries are endowed with productive resources for which a limited domestic market fails to provide sufficient demand. International trade, by expanding the available market for these resources, promotes their full employment. In other words, international trade enables the economy to grow to its full employment production frontier. The limiting factor in this growth, however, is that it does nothing necessarily to shift the frontier itself outward. That is, it does nothing to improve the productive potential of the economy. Under these circumstances it would be quite natural to expect the sort of deceleration that the Paraguayan economy has experienced in the 1990s.

Measuring total factor productivity for Paraguay

In what follows an attempt will be made to analyse the productivity basis of the Paraguayan economy over the period 1970–90. This will be done by calculating

2. For a good discussion of what he considers to be complementary explanations for the crisis in the Paraguayan economy see Borda (1994).

annual total factor productivity growth for the period. In the usual fashion we begin with a Solow-type aggregate production function written as:

$$Q = Af(L, K, R) \qquad (1)$$

where Q is total output, L is labour, K is the capital stock, R is the supply of land, and A is a technological constant. The function exhibits diminishing returns to individual productive factors and is typically written in its Cobb-Douglas form as:

$$Q_t = AL_t^{\alpha} K_t^{\beta} R_t^{\gamma} \qquad (2)$$

where $\alpha+\beta+\gamma=1$. In this form, of course, the function is characterised by constant returns to scale. Taking logs of (2) and then differentiating with respect to time yields:

$$\frac{dlogQ}{dt} = \frac{dlogA}{dt} + \alpha\frac{dlogL_t}{dt} + \beta\frac{dlogK_t}{dlogt} + \gamma\frac{dlogR}{dt} \qquad (3)$$

Simplifying the notation equation (4) may be rewritten as

$$\hat{Q} = \hat{A} + \alpha\hat{L} + \beta\hat{K} + \gamma\hat{R} \qquad (4)$$

where a^ (hat) indicates a proportionate rate of growth. The rate of growth of output then is the weighted sum of the rates of growth in the factors of production plus the rate of change in A. The weights attached to the factor growth rates represent their corresponding marginal physical products. Equation (5) can be easily solved for the rate of change of A to provide us with our measure of total factor productivity as:

$$\hat{A} = \hat{Q} - \alpha\hat{L} - \beta\hat{K} - \gamma\hat{R} \qquad (5)$$

It is clear from equation (5) why total factor productivity has also been referred to by Solow (1957) as the 'residual', since it represents what remains of output growth after the effects of basic input growth have been accounted for. While A(hat) is often identified with technological progress, it really represents what Solow has termed 'a measure of our ignorance'. While technological progress could well enter into its determination, it is clear that it also captures the effects of everything from weather to policy-induced disturbances. That is, A(hat)

captures not only technology changes but also a variety of additional shocks to the economy. In the following section we shall be especially concerned to attempt to explain the behaviour of A(hat) for Paraguay. A preliminary task is to measure it. Towards this end the following estimable version of the aggregate production function is econometrically estimated:

$$\hat{Q} = \lambda_0 + \lambda_1 \hat{K} + \lambda_2 \hat{L} + \lambda_3 \hat{R} + \epsilon \qquad (6)$$

where the λs are parameters to be estimated, ϵ is a well-behaved error, and the other variables have the same meanings as in equation (5).[3] The variables employed in the model expressed by equation (6) are given in log form and two versions are estimated to compare the consequences of imposing the Cobb-Douglas restriction, i.e. $\lambda_1+\lambda_2+\lambda_3=1$. The model is also specified in two versions making use of alternative measures for the growth of labour: labour force growth (model 1) and population growth (model 2).

Before considering the regression results it may be useful to consider how the present specifications compare with those reported by De Gregorio (1992) who conducted a cross-national study of economic growth and productivity for selected Latin American countries for the period 1950–85.[4] De Gregorio's model includes population and capital stock growth as regressors but does not consider land as a separate input.[5] De Gregorio assumes a constant capital-output ratio and constant technology across countries. Estimating several different specifications of the basic model, he arrives at the conclusion that the labour share of national income is between 39 and 58%.

The regression results for the present study's models for Paraguay are given in Table 1.[6] As can be seen from the table, the results are fairly similar across specifications of the model. A test of the restriction of linear homogeneity in factor inputs was not rejected in the case of model 2, while it was rejected in the case of model 1. Generally the results show that growth in each of the primary factor inputs — capital, labour, and land — had a significant impact on real output growth over the 25-year period after consideration Labour's share falls within the range identified by De Gregorio's cross-national study in those specifications where the Cobb-Douglas restriction is imposed. In the

3. Specific definitions and sources for these and all other variables used in the empirical analysis are provided in the Appendix.

4. De Gregorio's sample did not include Paraguay.

5. Given the historically low man:land ratio in Paraguay as compared with other Latin American countries, the alternative specification of the production function to include land is probably justified.

6. The models were estimated via ordinary least squares. T-statistics are given in parentheses.

unrestricted specifications this share would seem to be alternately excessively high (model 2) and excessively low (model 1). Perhaps especially noteworthy is the size of the coefficient for the rate of growth of land the share of which makes up about one-third of the total product. The R-square values indicate that primary factor growth had a substantial effect on economic growth but that a good deal is also left unexplained by the model as specified. This would suggest an important role for 'the residual'.

Table 1
Equation 6 regression results. Dependent variable: rate of growth of real output

Variable	*Restricted Model 1*	*Unrestricted Model 1*	*Restricted Model 2*	*Unrestricted Model 2*
Constant	0.0019 (2.751)[a]	-0.0043 (-0.911)	0.0018 (2.559)[b]	-0.0013 (-0.213)
K(hat)	0.1189 (2.856)[a]	0.1150 (2.800)[a]	0.1216 (2.878)[a]	0.1224 (2.847)[a]
L(hat)	0.6023 (5.527)[a]	0.2494 (1.739)[c]	0.5813 (5.364)[a]	1.474 (.881)
R(hat)	0.2788 (2.658)[a]	0.2177 (1.925)[c]	0.2971 (2.837)[a]	0.2840 (2.591)[b]
F statistic	10.785	8.008	10.045	6.557
Durbin Watson	1.57	1.678	1.585	1.664
adj. R-square	0.4391	0.4568	0.4198	0.4001

Note: a) b) c) indicate statistical significance at the 0.01, 0.05, and 0.1 levels respectively.

In calculating the size of the residual we limit ourselves to the restricted versions of models 1 and 2 as the preferred specifications. Total factor productivity (TFP) is calculated following equation 5 where the corresponding input coefficients are taken from the regression results in Table 1. Table 2 provides the descriptive statistics on these measures labelled TFP1 and TFP2, respectively.

Table 2
Descriptive statistics for total factor productivity and income growth

Variable	*N*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
TFP1	26	1.75	3.26	-4.47	6.94
TFP2	26	2.64	3.27	-3.39	7.47
GRY	28	5.97	4.32	-3.56	13.19

The values for average total factor productivity growth presented in the table show an average annual rate of increase in the residual for Paraguay of between 1.75% and 2.64%. These estimates are somewhat high relative to the values calculated by De Gregorio for other Latin American countries during 1950–85. The numbers for Paraguay, however, are not implausible, given that its average annual rate of economic growth was also well above the average for the set of countries studied by De Gregorio.[7]

Separating the sample period into pre- and post-1982, we find a substantial deceleration in the rate of growth of the residual. TFP growth for 1970–82 averages around 3% a year, while slowing down to around 0.5% in 1983–96. As population growth rates have not decelerated correspondingly, there has been an inevitable decline in the average standard of living in the latter period. Having arrived at estimates for the growth of the residual in Paraguay, the next task is to attempt to explain its sources.

Explaining the residual in Paraguay

In this section the objective is to specify and test a single-equation model that will help to 'explain' total factor productivity for Paraguay. In keeping with our primary concern to explore the effects of the largely externally-induced stimulus given to economic growth during this period, the empirical model will be specified in a way that allows us to test some of the hypotheses outlined in our opening section. In particular, it was argued there that Paraguayan economic

7. The country with the highest annual rate of economic growth in De Gregorio's sample, Brazil at 7.5 %, also had the highest rate of productivity growth, 2.4 % annually. In general, De Gregorio finds a positive relationship between the two variables and concludes from this that 'productivity growth is not driven by an exogenous process' (p.69).

growth over the period under consideration was largely a function of booming activity in a narrow range of 'new' cash crops for export, along with the construction of the two hydroelectric projects. These booms were aided by government policies of both a micro (sectoral) and a macro character. The micro-sectoral policies included the colonialisation policies that encouraged the settlement of the nation's agricultural frontier. Macro policies avoided the extreme budget deficits and monetary expansion that plagued virtually all of Paraguay's neighbours during the 1970s and 1980s. In the regression model below due consideration will be given to including regressors able to represent these policy choices. Sectoral policies will be proxied by the combined rate of growth of Paraguay's 'booming' agricultural lines of production, i.e. cotton and soybeans. This measure certainly captures more than can be expected to be the consequence of the state's colonialisation programme as such. It also captures the effects of other government policies designed to promote rural productivity, e.g. infrastructure development, as well as productivity-enhancing efforts that are undertaken entirely by the producers themselves.

Where macro-level policies are concerned, the model includes government (consumption) spending as an explanatory variable. Government spending often has an ambiguous effect on development and growth. On the one hand, such productivity-enhancing benefits as are derived from education and social capital (infrastructure) would not be available, or would be available in greatly reduced quantities, if there was a reduced role for government spending in the economy. On the other hand, as pointed out repeatedly by policy reformers in recent years, high levels of government consumption have had an adverse effect on the productivity levels of many Latin American countries. In part this stems from the inability or unwillingness of many governments to tax or bond-finance their spending programmes. The inflationary consequences of money-financed government budgets then have a discouraging effect on private investment spending and, thereby, productivity. Even when deficits are not incurred, it has been argued, excessive government involvement which displaces private sector activity will have a detrimental effect on productivity inasmuch as government agencies have less compelling reasons to seek efficiency gains than do private, profit-maximising firms.

In the case of Paraguay both the cases for and against government spending could be made in principle. The Paraguayan government has certainly undertaken significant infrastructural improvements which have helped to stimulate the expansion of agricultural production and marketing. It could also reasonably be argued that the state has failed to provide sufficient public goods relative to the national need. It is also true that the government continues to support some state enterprises for which there is no good economic argument.[8]

8. The case of Petropar, the state petroleum monopoly, leaps to mind.

Explanations for the residual have traditionally focused on such factors as improvements in technology and human capital. Availability of data for Paraguay allows us to consider only one of these and only in an imperfect way. Ideally we would like to have some measure of the educational attainment of the economically active population. For Paraguay, however, this data series is not available for the entire period covered by the study. Human capital improvements, therefore, are proxied in the model by data on school enrolment.

An especially significant question that we want to explore in this research concerns the possibility that Paraguay's recent export booms have imparted a productivity-augmenting dynamic to the economy as a whole. New growth theory argues precisely the possibility that productivity advance is endogenous to the growth process and is likely to be the outcome of export-related production carried out under conditions of increasing returns and typified by important spillover effects. The usual presumption is that these effects are more typical of secondary manufacturing production than of primary or agricultural production. It seems possible in principle, however, that they might apply to the latter type of activity, especially where it provides stimulus to agriculture-related industry. An expansion in the export-related production of soybeans, for example, could stimulate the emergence of competitive conditions for producing a large number of processed goods that are soy derivatives. Even in the likely case that new growth theory has very limited applicability to Paraguay and other primary-product exporters, it would seem important to include a consideration of export growth in the model, if for no other reason than to establish limits to the much discussed export-led growth hypothesis in whatever theoretical form it has been presented.

The specific regression model is summarised in equation (7).

$$TFP = \theta_0 + \theta_1 GBOOM + \theta_2 GED + \theta_3 GREX + \theta_4 GGOV + \theta_5 VRAIN + \epsilon \quad (7)$$

The new variables are each annual rates of growth (with the exception of VRAIN) and are defined as follows: GBOOM is a measure of the combined rate of growth of Paraguay's 'booming' commodities; GED is a measure of educational attainment; GREX is real exports; GGOV is government expenditures; VRAIN is a measure of the variance of rainfall.[9] The inclusion of the last variable is based on the idea that in a heavily agriculture-based economy such as that of Paraguay, weather conditions will play an important role in any

9. Again, consult the Appendix for a more specific description of the variables, how they are measured, and their corresponding data sources.

model attempting to explain the residual. In particular, we would expect especially adverse climatic conditions (i.e. a high value for VRAIN) to have a negative effect on both economic growth and productivity.

Inspection of the correlation matrix for the right-hand side variables given in equation (7) revealed no statistically significant correlations among any of the regressors.[10] The model was estimated via ordinary least squares and was found to be plagued by serial autocorrelation as evidenced by the Durbin-Watson statistic. It was respecified, therefore, as a second-order autoregressive process and retested by maximum likelihood estimation. Two versions of the model were tested employing the alternative measures of total factor productivity based respectively on different measures for labour growth. Finally, inasmuch as the dependent variable represents the estimated residuals from a prior estimation, the model was also alternatively specified without an intercept term. The results of the regressions are given in Table 3.

This shows that the results are very similar across the alternative specifications of the model. As expected, the parameter estimates for the growth in booming commodities and educational stock (θ_1, θ_2 respectively) have positive signs and are each statistically significant. The parameter estimate linking government spending to productivity growth, (θ_4), perhaps surprisingly, is also positive and significant at .05. The estimate for growing conditions (θ_5) has the expected negative sign in two of the four specifications, but in neither of these cases is statistical significance indicated.

Perhaps the most interesting outcome revealed in Table 3 is the 'non-result' with respect to export growth. The parameter estimate is not significant in any of the specifications and, in fact, turns out to be negative in one case. From this result it is hard to conclude that Paraguayan exports have played a 'leading' role in the economy in the sense described by new growth theory or in older theories that have laid much stress on the dynamic contribution made by foreign trade.

As noted, the results are robust across alternative specifications of the dependent variable and with respect to the presence of the constant term. It is natural to ask how it performs with respect to modifications of the independent variables. The measure of educational stock, for example, given in the model is secondary-level enrolments. When this measure is replaced by other possible measures such as primary, tertiary, or combined enrolments, statistical significance is not indicated. A possible explanation of this result is that secondary level school enrolments are a better measure of the 'stock' of educational resources than any other alternative and available measure. Secondary-level enrolments capture the addition to the stock of human capital that has attained at least a primary-level education. Primary-level enrolments, on

10. This is somewhat surprising for the relationship between GBOOM and VRAIN, given that we would expect to find an inverse relationship between these variables.

the other hand, represent a poor estimation of the quality of the labour force since it is not adjusted for drop-outs nor weighted for the grade level completed. Tertiary-level enrolments are also inadequate, since only a small percentage of the labour force is involved in post-secondary education. This is not to suggest that tertiary-level education is unimportant to Paraguay's prospects for economic development, but only that, given the present structure of the economy, it does not appear to be substantively related to productivity growth.

Table 3
Regression results for equation 7

Variable	*TFP3*	*TFP3*	*TFP5*	*TFP5*
Constant		-0.0028		-0.0021
		(-0.746)		(-0.552)
GBOOM	0.0081	0.0082	0.0078	0.0079
	(5.561)[a]	(5.586)[a]	(5.491)[a]	(5.435)[a]
GED	0.0195	0.0219	0.0182	0.0199
	(1.872)[c]	(1.994)[c]	(1.741)[c]	(1.810)[c]
GREX	-0.0083E-2	0.0009	0.0005	0.0012
	(-0.052)	(0.415)	(0.316)	(0.579)
GGOV	0.0111	0.0134	0.0119	0.0136
	(2.497)[a]	(2.473)[b]	(2.729)[a]	(2.535)[b]
VRAIN	-0.0060E-2	0.0002	-0.0044E-2	0.0001
	(-0.786)	(0.540)	(-0.575)	(0.403)
D.W.	1.838	1.851	1.86	1.87
R^2		0.682		0.6436

Note: a) b) c) indicate statistical significance at the 0.01, 0.05, and 0.1 levels respectively.

A final potentially interesting model to investigate concentrates attention on the question of agricultural productivity more narrowly considered. As already noted, Paraguay's booming agricultural activity, which helped propel the country to one of Latin America's highest growth records in the 1970s and early 1980s, was largely the result of a process of crop substitution away from more traditional lines of domestic production in favour of a narrower range of crops destined for export. The important crops in question are cotton and soybeans. Important considerations to take into account in any discussion of productivity concerning these crops are the radically different social and technical conditions under which each is produced. Cotton is produced in Paraguay primarily by

small producers using relatively unsophisticated, labour- intensive techniques. Soybeans, on the other hand, are produced by much larger and better capitalised agro-enterprises. The crops are also produced in distinctive geographic zones of the country, with soybeans dominating the border regions (with Brazil) and cotton more typically found in the interior (*minifundista*) regions. Growing conditions (e.g. soil quality, rainfall) are likely to be important determinants of relative productivity and are also likely to differ across these regions of crop concentration.

Unfortunately annual data do not exist for several of the relevant series that would logically be considered in an analysis of sectoral productivity, such as average size of holding, sectoral infrastructural characteristics, etc. The following regression model therefore makes use of the series for which annual observations do exist for the period 1970-96. The general form of the model to be estimated separately for cotton and soybeans is expressed as:

$$PROD = a_0 - a_1 VRAIN + a_2 ELEC + a_3 TOTPRO + a_4 YR + e \quad (8)$$

where PROD is productivity measured in terms of output per hectare, VRAIN is a measure of the variability of annual rainfall in relation to average rainfall for the entire period under consideration, ELEC is annual production of electricity, TOTPRO is total annual production of the particular crop, and e is a well-behaved error term. VRAIN is hypothesised to carry a negative sign in the above specification, inasmuch as either excessive or insufficient rainfall would be expected to have negative consequences for productivity. ELEC is included in the model as a proxy for rural infrastructure development and is expected to be positively related to productivity levels.[11] TOTPRO measures the total production of each crop and is included as a means of capturing the scale effects of production. Finally, YR is a time trend term. The regression results are reported in Table 4.

The results for both cotton and soybeans are very similar. In each case they indicate the importance over time of the extension of rural infrastructure represented by electrification, as evidenced by the positive and statistically significant value attached to ELEC. There is also evidence of economies of scale inasmuch as the sign of TOTPROD is positive and significant. The one important difference between the two cases concerns the result with respect to VRAIN. In each case the parameter estimate has a negative sign, as would be expected. Only in the case of cotton, however, does the result appear as significant at a reasonable level of statistical significance. This is not an entirely

11. Other specifications of the model that included alternatively fertiliser usage, commercial vehicles, and rail transport were tried with less interesting results than those reported here. Electricity usage was also included as a regressor in the aggregate productivity models discussed earlier but did not emerge as statistically significant.

unexpected result, given that the smaller, labour-intensive cultivators of cotton would be expected to be more vulnerable to weather-related disruptions than soybean producers who could utilise irrigation and other methods to shield themselves from such disruptions.[12] As will be argued below, this difference has important policy implications.

Table 4
Regression results for equation 8

Variable	*PROD (cotton)*	*PROD (soybeans)*
CONSTANT	2911.175 (3.730)[a]	4531.179 (3.027)[a]
VRAIN	-0.475E-3 (-1.868)[c]	-0.086E-3 (-0.263)
ELEC	0.752E-3 (2.600)[b]	1.240E-3 (2.159)[b]
TOTPROD	1.190 (4.845)[a]	0.666 (2.500)[b]
YR	-30.040 (4.845)[a]	-45.069 (-2.200)[b]
F-stat.	11.076	18.165
D.W.	1.897	1.936
adj. R^2	0.608	0.768

Note: a) b) c) indicate statistical significance at the 0.01, 0.05, and 0.1 levels respectively.

Policy implications

What are the policy implications that follow from this analysis of the residual for Paraguay? Perhaps most obvious is the fact that the source of Paraguay's productivity gains in the past has been in the countryside. For the foreseeable

12. These would include the use of hybrid varieties of seed and chemicals and mechanical methods of cultivation. Irrigation is not widely employed in Paraguayan agriculture.

future there is no reason to expect this to change, especially given the greater tendency to liberalisation of trade both within the regional economy at the level of Mercosur and beyond. Paraguay's comparative advantage lies in the production of agricultural commodities, and there is little doubt that the country currently lacks even the basic infrastructure, such as asphalted highways, to integrate the rural economy.[13]

Secondly, the evidence from the regression analysis suggests that there are gains to be realised by increasing the stock of human capital. This is hardly a novel insight, but it has a particular significance in the Paraguayan case. First, the expansion of cash crop production has demanded greater knowledge on the part of the direct producers of these products. Moreover, the transformation of Paraguayan agriculture in recent years has been accompanied by a concentration of land holdings as well as increased mechanisation and sophistication of the production process in a way that has decreased employment opportunities for unskilled labour. The result has been an increase in rural-urban migration.[14] As urban employment opportunities tend to require higher levels of education and skill than basic agricultural work we can continue to expect to see an important pay-off to educational effort.

The fact that government expenditures are identified as positively related to productivity growth is consistent with the above policy observations.[15] The provision of public and quasi-public goods is the necessary province of government. The additional fact that Paraguay has been subject to dictatorship for most of the period under consideration has probably made a positive contribution in this context. Under such circumstances the state was not allowed to become a wider arena of political-economic contestation than that dictated by the limited range of intra-Colorado Party interests.[16] There was never a need then to resort to inflationary finance to cover large government budget deficits, a frequently cited source of inefficiency.

This is not to suggest that the Stroessner dictatorship was, on balance, a

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13. Note recent data from *ABC Color* with respect to Paraguay's relative endowment of social infrastructure capital as compared with the other Southern Cone economies. Paraguay is a poor fifth out of five countries (Argentina, Brazil, Chile, Uruguay, Paraguay) in terms of electricity, roads, and telephones. *Supplemento Económico*, 25 October 1998.

14. Out-migration from the Paraguayan countryside is by no means a new phenomenon. What has changed in recent years is the switch in destinations from international, e.g. Buenos Aires, to national metropolitan areas. Migration has thus come to have less of a social safety-net value today than it had in previous years. For details on Paraguay's international migration see Richards, 1996.

15. It is interesting to note that this is a finding that contradicts the conclusion reached by De Gregorio in his cross-national study of Latin America.

16. The predatory interests of the military and party elite were served in other ways than via abuse of the budget, primarily by participation in the nation's abundant smuggling activities.

positive factor in Paraguayan economic development. On the contrary, the dictator's lack of a developmentalist vision and his severe repression of the real and imagined opposition had the effect of stunting not only the nation's rights-based political development but also entrepreneurial risk-taking. Human capital formation was extremely limited. Physical infrastructure investment took place, but in a way that promoted very limited and ultimately unbalanced and unsustainable growth. What it does assert, however, is that the lack of political openness facilitated a degree of fiscal and monetary control that the other Southern Cone economies found so elusive.

The present and immediate future do not look nearly so optimistic in this regard. Since 1990 the state has become a wider open arena of political contestation, particularly among factions of the Colorado Party. Electoral success has been rewarded with the power to confer public favours on political supporters, particularly in the form of public sector employment which has grown disproportionately to any other budgetary category. Not surprisingly, this growth has been accompanied by increases in the budget deficit which has reached historic peaks in relation to the gross domestic product. Conscious of the inflationary threat, the present government has given priority to fiscal reform designed to bring the government accounts into balance. This reform is a combination of tax reform designed to increase fiscal collections and cuts in state spending. The important point for the present discussion is that Paraguay faces the difficult task of increasing its commitment to the provision of the public and quasi-public goods alluded to earlier, along with maintaining budgetary balance.

The regression results also suggest that the budget balancing act must take into account the equity considerations attached to the cotton (*minifundista*) versus soybean (*latifundista*) distinction. As cotton producers appear to be more vulnerable to weather-related disruptions than soybean producers, budgetary provisions should be made to provide them with at least the minimal degree of insurance which they currently lack. Failure to do so will result in a continuance of the current rural-urban migratory flows which carry their own social and budgetary consequences.

Finally, with respect to our important 'non-finding' regarding the dynamic contribution of international trade, the following is worth noting. Paraguay's pattern of international trade is best described by classical trade theory involving static comparative advantage. There is nothing in that model pointing in the direction of the dynamic benefits of production for international exchange, nor that even suggests a linkage (aside from resource flows) between traded goods sectors or between traded and non-traded goods sectors.

A look at trade data, for example, shows that more than two decades after its take-off in cotton production Paraguay is still as likely to be a net importer of cotton textiles as a net exporter, with this line of production accounting for only a very minor portion of its overall export-related production. Moreover, it depends very heavily on foreign sources for inputs including cotton seed. The

cotton boom has thus demonstrated scant potential for forward and backward linkage.[17]

An important question to ask then is: can anything be done as a matter of policy to increase the productivity contribution of Paraguayan exports? At the micro or sectoral level we need to return to our earlier emphasis on the provision of infrastructure and human capital accumulation as important means of improving the productivity of export-related activities. The aim here is not only to provide for more efficient production of the primary output itself, but also to stimulate related industry in the form of technological and pecuniary externalities. Only under such circumstances would economic growth begin to take on the characteristics associated with the endogenous growth perspective. Paraguay's conformity to the classical model of international trade also suggests an additional avenue by which its economic growth is potentially constrained. Paraguay is subject to the shocks and vicissitudes of an economy dependent on primary goods. These include domestic supply-side factors, such as weather, as well as demand variables emanating from the regional and global economy. We can also reasonably ask whether anything can be done to mitigate the costs of these shocks and vicissitudes? The recommendation here is that Paraguay should seek greater diversity in its trade, including its trading partners. Within the context of multilateral fora such as Mercosur, there is little that a small country can do to obtain more favourable terms for its traded goods. The chances of successful negotiation are enhanced insofar as a larger number of such small countries are included within the union. The inclusion of Bolivia and Chile, for example, in Mercosur would serve the useful purpose of improving Paraguay's negotiating position with respect to Argentina and Brazil.[18]

Another important factor for improving Paraguay's regional trading relationships is, once again, that of infrastructure. Paraguay's transportation, energy and communications networks are much more developed towards the south and east of the country than to the north and west. The completion and improvement of the Transchaco highway, for example, linking Paraguay with Bolivia and thereby providing access to Peruvian markets (and Pacific port facilities) would go a long way towards greater economic integration for many of the smaller countries of the region.

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17. The situation for soybeans, Paraguay's other 'booming' commodity sector, is no better. The ratio of total value in exports of soy-based oil cake to raw soybean exports in 1995 was .215. The same ratio for Brazil in the same year was more than ten times larger at 2.68.

18. These two countries currently enjoy the more limited status of associate members of the union.

Summary and conclusion

This article has shown that during the period 1970-96 Paraguay experienced rates of economic growth in excess of those enjoyed by most other countries in Latin America. The bulk of this growth occurred between 1970 and 1982, and there has been a significant deceleration during the 1990s. The sources of productivity advance over the twenty-six-year period include increases in agricultural productivity measured in terms of yields per hectare and increases in the human capital stock proxied by secondary school enrolment. Levels of government spending (consumption) are found to be positively related to productivity growth, confounding the expectations of many who advocate a reduced role for government in developing economies. Export growth is found *not* to have any significant relationship to productivity growth, confounding the arguments advanced by many economists, including the new growth theorists, who point to the dynamic contribution of international trade.

If Paraguay is to resume its high levels of growth and development, it must dedicate resources to the accumulation of social capital that will stimulate new investments in productive activities in both the rural and non-rural sectors of the economy. Especially important would seem to be the potential contribution of infrastructure capital both to enhance productivity directly and to provide better trading options within the region and globally. For this the state must first find the technical means and political will to resolve its current fiscal crisis.

Does the Paraguayan case provide any lessons for other transition societies? It would appear that it does. One lesson is that strong export growth alone is neither a sufficient condition for, nor evidence of, sustainable productivity growth. For exports to provide a productivity dynamic to the economy at large there must be strong backward and forward linkage effects combined with technological and/or pecuniary externalities. With export booms led by primary commodities with few such effects, Paraguay would seem to provide a negative object lesson in this regard.

A second lesson to be derived from the Paraguayan example is more concerned with the political economy. Democratic transition inevitably creates an expanded area of political contestation. Elections create constituencies that can alter the size and composition of public expenditures in ways that are not in the best interests of long-run productivity growth. Public employment expansion that comes at the expense of human capital and infrastructure improvements is a case in point. For Paraguay and other transition societies, the process of democratic institution-building will clearly have positive or negative implications for productivity and living standards depending on the nature of the institutions. What ought to be evident is that elections alone are not sufficient. In the absence of a system of democratic checks and balances, and a developing civil society, elections become just another mechanism for achieving power and dividing the spoils.

Appendix: Data and their sources

Q(hat): Growth in GDP measured in constant (1990) prices, *International Financial Statistics Yearbook*, International Monetary Fund.

K(hat): Growth in net fixed investment in constant (1982) prices, *Cuentas Nacionales*, Banco Central del Paraguay.

L(hat): Alternatively, growth in the labour force and population growth.

R(hat): Growth in arable land under cultivation, *FAO Production Yearbook*, FAO.

GBOOM: Combined annual rate of growth in soybean and cotton production. Data measured in metric tons and taken from *FAO Production Yearbook*, FAO.

GED: Growth in educational stock measured as growth in secondary school enrolment.

GREX: Growth in exports of goods and services deflated by an index of export prices, *International Financial Statistics*, IMF; *Cuentas Nacionales*, BCP.

GGOV: Growth in government consumption to GDP ratio, *International Financial Statistics*, IMF.

VRAIN: Defined as squared annual deviation of rainfall from the mean for the period 1970-96: Direccion de Meteorolgia e Hidrologia Gerencia Tecnica, Paraguay. For equation (8) this variable is calculated on the basis of average data taken from weather stations identified as located in zones of particular importance for the two crops (cotton, soybeans).

PROD and TOTPROD: Kilograms per hectare and total production for cotton and soybeans, respectively. *FAO Production Yearbook*, FAO.

ELEC: Total industrial consumption of electricity measured in thousands of kilowatts. Administración Nacional de Electricidad (ANDE), Asunción.

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