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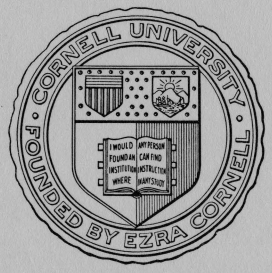

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I. Introduction

As in other Eastern European countries, growth has been the principal economic goal in Yugoslavia since World War II. The gradual introduction of workers' self-management in the 1950s did not diminish this priority because government regulations ensured that social capital would be steadily augmented by the reinvestment of over thirty percent of the gross material product (GMP).[1] While high investment rates have therefore been the trademark of both Yugoslavia and the Soviet bloc countries, Yugoslavia's development strategy has been marked by a significant decentralization of economic decisionmaking and, since 1965, also by high reliance on western technology.[2] Yet, despite the abundance of labor and investment funds, systemic flexibility and easy access to advanced technology, the economy experienced a major slowdown between the 1950s and 1980s. As a result, numerous economic reforms have been increasingly concerned with economic efficiency and the ability of the economy to reduce the large income differentials among the eight disparate republics and autonomous provinces (RAPs) that constitute the Yugoslav Federation.[3]

An examination of the data indicates that the Yugoslav economy indeed grew rapidly until 1960, with real GMP registering an average annual rate of growth of 3.8 percent during the 1948-53 period of the Cominform blockade, intensive collectivization drive and two severe droughts, and the highly acclaimed[4] growth rate of 7.5 percent during the 1953-58 period of "controlled" self-management. The slowdown of real GMP growth to 2.7 percent in 1961 precipitated the 1961 market-oriented economic reform. Growth resumed at 8.2 percent a year during the 1962-64 period but after falling to a mere 1.3 percent in 1965, the government decided to launch the second major reform. This 1965 reform ushered in the system of market self-management which permitted enterprise autonomy, adjustment of relative prices in response

to market stimuli, and the bankruptcy of inefficient firms. The restrictive monetary policy and the inability of a large number of enterprises to adjust rapidly contributed to the low GMP growth (3.7 percent a year) in the 1966-67 period but, as government policies eased, growth resumed at 6.3 percent annually between 1969 and 1973. A new slowdown to 3.8 percent a year occurred in the 1975-76 period, as restrictive monetary and foreign borrowing policies were imposed, a new accounting system exacerbated enterprise liquidity problems, and the first oil shock worked its way through the economy. The passing of the 1976 Law of Associated Labor, which detailed the principles of the 1971 constitutional amendment and the (new) 1974 constitution, marked the political resolve to ensure the success of the new system of associated labor. Investment and foreign debt increased rapidly as individual RAPs could suddenly borrow on the world markets and real GMP grew at an impressive rate of 7.3 percent a year between 1977 and 1979. The increased reliance on foreign technology and raw material imports contributed significantly to the dramatic slowdown in the 1980s, when import restrictions had to be imposed in view of the mounting foreign debt. Real GMP grew at a mere 0.8 percent average annual rate from 1980 to 1985 and it came to a virtual standstill (0.06 percent annual growth) in the 1983-85 period.

This major slowdown of economic growth in the 1980s induced the government to launch an economic stabilization program in 1982. This effort at restructuring the economy and providing strong incentives for growth was joined by the World Bank as well as the International Monetary Fund. However, as the growth record to date indicates, the results of the program have so far been disappointing.

The Yugoslav productivity problem has also attracted the attention of academic economists. Numerous studies, including Frankovic (1967), Bazler and

Madzar (1968), Horvat (1969), Vujkovic (1972), Sapir (1980), Nishimizu and Page (1982), and Bajt (1983), have used industry-level data in an attempt to identify the sources and rate of growth of productivity in Yugoslav industry.[5] Unfortunately, no study has been able to use enterprise-level data and construct variables which would permit a direct examination of the most important issues underlying the recent policy debate and the restructuring of the Yugoslav economy.

In the present paper we use a five-year balanced panel of data on 120 Yugoslav enterprises to examine the effects of some of the most important structural and policy variables on total factor productivity (productive efficiency) of Yugoslav enterprises between 1975 and 1979. The sample is a five percent random sample of Yugoslav Work Organizations of Associated Labor (WOALs) stratified by region and industry. The five-year panel covers the period immediately following the enactment of the 1974 constitution and preceding the 1982 stabilization program. The data hence enable us to examine the determinants of productive efficiency after the constitutional reforms of the mid 1970s were effected and they also permit us to assess whether the policies pursued since 1982 have been firmly grounded in the empirical reality of the late 1970s. In this context, we also test two hypotheses that have been advanced with respect to the productivity (growth) of developing economies in general, and thus have policy relevance both in Yugoslavia and elsewhere.

In Section II we identify the relevant structural/policy variables whose productivity effects we estimate. Section III presents the estimating framework, while Section IV contains the results. Policy implications are discussed in Section V.

II. The Institutional Framework

The 1971 constitutional amendment and the 1974 constitution aimed at advancing workers' self-management by breaking existing enterprises into the smallest technically and commercially viable units (the Basic Organizations of Associated Labor - BOALs) and functionally integrating these semi-autonomous groups of workers into higher-level organizations —— the Work Organizations (WOALs) and the Composite Organizations of Associated Labor (COALs). Individual BOALs are expected to be independent in most of their economic decisions, including those on the distribution of BOAL income, investment, exports, and imports. Moreover, inter-BOAL transactions are supposed to be guided by internal market forces (bargaining) within a vertically integrated system.

In practice the WOALs remain the closest analogues to Western enterprises, but the BOALs retain independence which usually exceeds that of individual divisions of Western corporations.[6] The main point of contention since 1974 has been whether the divisionalization of firms into BOALs has increased productivity by augmenting information flows and workers' effort through their greater identification with the workplace, or whether the system has fragmented enterprises into excessively minute units which prevent efficient management and hamper productivity.[7] In this paper, we use information on the size of BOALs within the 120 WOALs and provide econometric estimates which should help resolve this debate.

The conversion of enterprises into BOALs, WOALs and COALs has also altered significantly the degree of industrial concentration in Yugoslavia. Petrin's (1981) and Sacks' (1983) calculations indicate that the 1971-1974 constitutional reform substantially increased the number of firms when the

BOAL is taken as the unit of account, but that industrial concentration increased when the number of WOALs is considered. The Yugoslav economy has of course always been characterized by high industrial concentration, the effects of which have been the subject of a long-term debate by both Yugoslav and western economists.[8] In this paper we use WOAL-specific data on the size of each firm's market share to assess whether the effect of market power on productive efficiency is positive or negative.

One of the principal reasons for the 1974 reform was the acute and seemingly intractable problem of regional differentials. The GMP per capita in Slovenia exceeded that of Kosovo by 292 percent in 1964 but by 1975 this differential stood at 509 percent. Similarly, the relative GMP per capita differential between all the more developed RAPs on the one hand and the less developed ones on the other hand evolved from 55 percent in 1954 to 95 percent in 1975.[9] The internal Yugoslav consensus has been that the limited economic base in the less developed regions has accounted for this ongoing problem. The disagreement between the more and less developed RAPs lies in the specific nature of and remedies for the problem. The more developed RAPs have argued that limited managerial and technical expertise in the less developed RAPs generates lower productive efficiency of their firms and that a larger unrestricted transfer of investment funds to the less developed RAPs would be inefficient. The less developed RAPs have viewed the problem as one of insufficient allocation of investment funds in their regions and they have been contesting the claim that their enterprises are less productive.[10]

In 1976 the Law on the Allocation of Resources to Less Developed Republics and Autonomous Provinces replaced the system of allocating investment funds to less developed RAPs exclusively from the federal tax revenue by a system of pooling of resources. Under this scheme all RAPs

first jointly decide on the proportion (usually 2 percent) of GMP that is to be transfered to the less developed RAPs. One-half of these resources is then channeled through the federal offices and is de facto allocated by the authorities in each of the recipient RAPs. The other 50 percent is channeled to the less developed RAPs in the form of inter-RAP transfers called pooled resources, which are used to fund specific projects that are agreed upon by the donor and recipient RAPs.[11] The more developed RAPs hence have some control over the selection of these projects but they have virtually no control over the (self-) management of the BOALs and WOALs that are thus created.

Since 1982 the more developed RAPs have been arguing that the funds channeled through the federal authorities tend to be wasted on unproductive investments and that the share that is transferred through the federal offices and is allocated by less developed RAPs ought to be reduced from 50 to 40 percent. The less developed RAPs of course oppose this stand. The second major debate that has been launched in the political circles since 1982 is about which RAPs are to be classified as developed. In particular, Serbia claims that it is a less developed republic and it has been trying to stop contributing to the funds for less developed RAPs. Similarly, Bosnia-Herzegovina, which by some indicators ought to be now classified as developed, is contesting the honor of being graduated from the less developed RAP camp.

The debate continues to date and recent legislation indirectly indicates that the influence of the less developed RAPs may again by growing.[12] Since our data set constitutes a stratified random sample of WOALs across all the RAPs, it enables us to provide the first test of the hypothesis that productive efficiency of enterprises varies systematically across the regions.

The growing emphasis on a superior export performance[13] and the high reliance of Yugoslav firms on technology imports also lead us to explore the extent to which enterprise export orientation and joint venture production with foreign (western) firms tend to increase productive efficiency. Emphasis on export performance has always been part of Yugoslav policy in view of the limited domestic market. However, the principles of the 1974 constitution, elaborated in the 1977 Law on Foreign Trade and Foreign Exchange, linked each firm's foreign exchange allocation more closely to its export performance[14] and the sentiment that export oriented firms tend to be more efficient has been growing. Numerous western studies have also documented a positive association between exports and growth at the aggregate (national) level in many developing countries.[15] Moreover, Balassa (1985b) has recently argued that the superior growth performance of the outward-oriented newly industrializing counties (NICs) than that of the inward-oriented NICs and of Yugoslavia and Hungary is due to the positive effect of exports on growth. Our data set contains detailed information on the exports of each WOAL and we are therefore able to provide microeconometric foundations for the so far largely macroeconomic debate. The evidence is especially relevant in the context of Yugoslav stabilization policies because the World Bank and IMF have stressed the desirability of an export oriented economic strategy on both foreign exchange and efficiency grounds.

The merits of joint ventures between domestic and foreign (western) firms have been debated in Yugoslavia, the Soviet bloc and other developing countries for decades, but empirical evidence on the subject is scant. The virtual nonexistence of the Yugoslav R&D sector has led many observers to argue that a liaison with technologically advanced foreign partners would improve the technological and managerial know-how (and therefore productivity)

in Yugoslav firms. The arguments against joint ventures have stressed the limited willingness of the foreign firms to share the most advanced technology and their ability to "exploit" the domestic partners through transfer pricing and limited risk-sharing. The Yugoslav official policy toward Yugoslav-foreign joint ventures was benevolent between 1967 and 1978, restrictive during the 1978-84 period, and again liberal since the 1984 Amendment to the Law on Joint Ventures. In view of these policy shifts, our aim in this paper is to establish whether WOALs which operate as joint ventures with foreign partners display a significantly superior productive behavior, ceteris paribus, than other firms. It should be noted that, although some of our data points fall into the restrictive period governed by the 1978 Law on Joint Ventures, all sampled firms established their ventures before 1978 and hence operated under the more liberal principles of the 1967 law.

In sum, the main structural and policy features of the Yugoslav system lead us to estimate the total factor productivity effects of the degree of enterprise (WOAL) divisionalization into BOALs, product market concentration, regional (RAP) differences, enterprise export orientation, and joint venture production with foreign firms.

III. Estimating Framework

Although many studies have examined Yugoslav productive behavior with aggregate (industry-level) data,[16] no estimates of production technology exist at the level of individual enterprises. In the absence of reliable prior evidence, our empirical strategy has therefore been to embed the structural and policy variables into a variety of production function frameworks and test which form of the production function is best supported by the data.

Letting Q = output, K = capital, L = Labor, t = time trend, and Z = a vector of the five structural/policy variables, the production function can be formulated in a general form as

$$Q = f(t, Z)g(L,K) \quad , \tag{1}$$

where g is an input function and f is a disembodied productive efficiency (total factor productivity) function whose value varies over time and across institutional settings. In empirical work we approximate equation (1) by various augmented forms of the Cobb-Douglas, CES, and translog production functions, respectively. We start with the least restrictive specifications permitted by the data and gradually impose constraints that are found acceptable on the basis of appropriate X^2 tests.[17] Letting D represent a (column) vector of industry-specific dummy variables, the final Cobb-Douglas, CES and translog functions on which we base our reported results are of the form:

$$\ell nQ = \alpha_0'D + \alpha_1 t + \alpha_2'Z + \alpha_3 \ell nL + \alpha_4 \ell nK + \varepsilon, \tag{2}$$

$$\ell nQ = \beta_0'D + \beta_1 t + \beta_2'Z - \frac{\nu}{\rho} \ell n[\delta L^{-\rho} + (1-\delta)K^{-\rho}] + \varepsilon, \tag{3}$$

and

$$\ell nQ = \gamma_0'D + \gamma_1 t + \gamma_2'Z + \gamma_3 \ell nL + \gamma_4 \ell nK + \gamma_5 (\ell nL)^2 + \gamma_6 (\ell nK)^2 + \gamma_7 (\ell nK \ell nL) + \varepsilon \ , \tag{4}$$

respectively. In these specifications, α_0', β_0' and γ_0' are (row) vectors of industry-specific intercepts, α_2', β_2' and γ_2' are the (row) vectors of coefficients corresponding to the (column) vector Z of the five structural variables, and ε is the error term.

In operationalizing the hypotheses advanced with respect to the structural variables, we include as elements of Z the number of workers per BOAL as well as the number of workers per BOAL squared, the WOAL's sales as a proportion of the total volume of sales on its market,[18] RAP dummy variables, the ratio of the value of WOAL exports to the total value of WOAL sales, and a dummy variable coded 1 if the WOAL is a joint venture with a foreign firm and 0 otherwise. Output is measured as value added in constant 1975 prices, the capital input is approximated by fixed assets expressed in constant 1975 prices and adjusted for capacity utilization, and labor is expressed in unskilled worker equivalents (see Appendix for description).

While the focus of our study is on productive efficiency, it is important to take into account the fact that Yugoslav firms have considerable decision-making autonomy and that several of the explanatory variables in equations (2) - (4) are likely to be endogenous. In particular, although the extent of divisionalization into BOALs was by and large determined by political forces that were exogenous to any given WOAL, L,K and exports/sales are likely to be endogenous regressors. To avoid the asymptotic bias of the ordinary least squares method in this context, we estimate the various production functions by instrumental variables (IVs) with firm dummy variables, time, firm dummy variables interacted with time, percentage change in Yugoslav industrial prices, joint venture dummy variable, OECD imports, Yugoslav imports, the firm's market share, the number of workers per BOAL, and the number of workers per BOAL squared serving as instruments. The use of the IV procedure has led us to employ X^2 tests in selecting the regression best supported by the data.[19]

As can be expected, the use of annual observations has resulted in significant first-order autocorrelation in the residuals. In adjusting for the problem, we have estimated the regressions under the assumption that the first-order serial correlation coefficient is identical for all the firms during the 1975-79 period. Relaxing this homogeneity assumption proved difficult in the presence of only 5 observations on each of the 120 firms.

IV. Empirical Results

As the summary statistics in Table 1 indicate, the sample displays substantial variances in all the relevant variables. Moreover, the mean statistics indicate that the average WOAL exports 12.3 percent of its output, commands 42.4 percent of its product market, and unifies relatively large BOALs that average 316 workers. Ten percent of the sampled WOALs operate as joint ventures with foreign firms. The regional distribution of WOALs reflects the uneven levels of development across the country, with the largest number of firms being located in Croatia and Slovenia (25 and 20.5 percent, respectively) and the smallest number in Montenegro and Kosovo (3.3 and 2.5 percent, respectively). Industry allocation of firms varies from 1.6 percent in energy to 28.3 percent in metal processing.

The X^2 tests based on equations (2) - (4) indicate that the Cobb-Douglas function is superior to the translog at the five percent significance test level and that it dominates the CES function at the ten percent but not the five percent level. Both the Cobb-Douglas and the CES estimates are therefore reported in Table 2. Overall, it is reassuring to find that the estimated coefficients are similar in all three functional forms.

Before examining the estimated coefficients of the structural variables in Table 2, it is worth noting that in both functions the technological parameters display returns to scale which are very close to unity. This result parallels the industry-level estimates of Estrin, Svejnar and Mow (1982) and it supports the assumption of constant returns imposed on an aggregate manufacturing CES function by Sapir (1980) and on industry-level data by Nishimizu and Page (1982). The substitution parameter ρ is estimated to be 0.34 but its standard error is too large to reject the (Cobb-Douglas) hypothesis of $\rho=0$ at conventional significance test levels. This results coincides with that of Estrin, Svejnar and Mow (1982) but it differs from Sapir's (1980) finding of a significantly positive ρ at the level of the entire Yugoslav manufacturing sector.

Turning next to the structural (policy) variables, we find that the estimated coefficient on the share of exports in WOAL revenue is positive but statistically insignificant in the Cobb-Douglas regression and that it is positive but only significant at the 10 percent level in a one-tail test in the CES function. The hypothesis that greater export orientation increases enterprise productivity hence receives virtually no support in our sample.[20]

The effect of a joint venture system of operation is found to be positive but insignificant in both regressions. Our results therefore indicate that there were no systematic differences in productive efficiency between the traditional and joint venture WOALs operating under the principles established by the 1967 regulations on joint ventures.

The hotly debated hypothesis that productive efficiency of Yugoslav WOALs is influenced by the size of their BOALs is also not borne out by our data. In fact, our findings indicate that there is neither a linear nor a quadratic effect of this variable on productive efficiency.

The only structural variable whose coefficient is significantly different from zero is the enterprise market share. Its positive estimated effect suggests that firms with a larger market power tend to generate greater output from a given set of inputs.[21]

Perhaps the most surprising finding of our research is that, upon controlling for inputs and the effects of other structural variables, productive efficiency does not vary significantly across the eight RAPs of the Yugoslav Federation. Indeed, while the coefficients of the industry dummy variables indicate that there is a substantial variation in the intercepts of the two production functions across industries, no such finding is observable across regions.

The lack of observed disparity in productive efficiency across regions within the two production function frameworks naturally raises the question as to whether the location of different industries across regions accounts for the strong claim by many Yugoslav economists and policymakers that productive efficiency varies across the RAPs. To test this hypothesis we have estimated the Cobb-Douglas and CES regressions without the industry specific dummy variables. To the extent that the industries are nonrandomly distributed across the regions, the regional dummy variables could reflect the productivity differences which were associated with different industries in Table 2. The results of this exercise are presented in Table 3.

As the estimated coefficients in Table 3 indicate, no regional differentials can be detected in the two constrained regressions. The regional coefficients display varying point estimates but the associated standard errors are again too large to permit the conclusion that systematic regional differences in productive efficiency exist.

Since in both Tables 2 and 3 the joint estimates of the dummy variables for the more advanced RAPs are similar and higher than those of the less advanced RAPs, we have also tested the hypothesis that productive efficiency is the same in all the more developed RAPs and that it differs significantly from that of all the less developed RAPs taken together. Potential collinearity problems inherent in the earlier specifications also suggest that pursuing this test is worthwhile on purely econometric grounds. The hypothesis is operationalized by collapsing all the regional dummy variables into one variable which takes on value 1 in the case of Slovenia, Croatia, Serbia, and Vojvodina, and 0 otherwise.

The results of this test are reported in Table 4 and they show that productive efficiency of the more developed RAPs as a whole is 19-20 percent higher than that of the less developed RAPs and that this differential is statistically significant at the 1 percent significance test level. By taking the North and South as two separate regions, we are thus able to find strong empirical support for the claim that productive efficiency is higher in the northern areas of the country. The other coefficients show great similarity between Tables 2 and 4 and thus confirm that the earlier findings are quite robust.

IV. Policy Implications

Our analysis of productive efficiency in a stratified random sample of 120 Yugoslav firms (WOALs) during the 1975-79 period yields several important policy results. First, we find virtually no support for the hypothesis that productive efficiency is a positive function of the firm's export orientation, ceteris paribus. In particular, once we control for input use, type of industry and the effects of other structural (policy) variables, we are unable to reject the hypothesis that export orientation has no effect on the firm's

productive performance. Our microeconometric evidence thus suggests that the positive correlation found between exports and GNP growth in several comparative studies is not generated by a positive effect of enterprise export orientation on total factor productivity. Our finding is of course consistent with the hypothesis that enterprise export orientation is conducive to allocative efficiency —— a link which at the macro level could manifest itself in a positive correlation between exports and GNP growth. Alternatively, since our export/sales variable is based on instrumental variables, it is possible that the difference in the micro and macro findings comes about because we avoid the endogenity bias that Jung and Marshall (1985) claim is present in the aggregate studies. In either case, our findings suggest that the export bent of the stabilization policies which have been pursued in Yugoslavia since 1982 have to be justified on other grounds than productive efficiency.

A related finding is that WOALs operating as joint ventures with western firms do not display greater productive efficiency than their purely domestic counterparts, ceteris paribus. This lack of support for the hypothesis that joint ventures benefit from superior managerial and technical know-how and hence achieve greater productive efficiency is probably attributable to the fact that virtually all Yugoslav firms rely heavily on western technology —— a practice that may make the efficiency gains of a joint venture setting be limited. Nevertheless, the fact that the 1984 joint venture law relaxed many of the restrictions placed on the foreign partner in 1977 suggests that the Yugoslav decisionmakers believe that in a more liberal environment the benefits of joint ventures can be substantial. In a few years it will be useful to test if the productivity impact of joint ventures is greater under the new system.

Since the constitutional reform of 1974, there has been a major debate in Yugoslavia about whether the legally imposed fragmentation of enterprises into semi-autonomous units (BOALs) has been excessive or insufficient from the standpoint of economic efficiency. Our results clearly indicate that productive efficiency of WOALs is independent of the number of workers per BOAL. Indeed, as Table 1 demonstrates the average BOAL size varies substantially across the 120 WOALs and our finding is hence statistically quite strong. The policy relevance of this result is of course greatly enhanced by the current high-level debate in the Yugoslav government about the desirability of revamping the system of BOALs. The results of this study indicate that such a systemic change ought not to be based on the expectation of a significant gain in productivity.

Product market concentration, which has frequently been found to cause allocative and distributive distortions, appears to have a significant positive effect on productivity. To the extent that this effect is not brought about by above average price increases which are not fully controlled for in the deflation of the value added data, there is a strong indication that any evaluation of the highly concentrated Yugoslav market structure must take into account the tradeoff between productive and allocative efficiency.

Finally, we find that productive efficiency is on average 19-20 percent higher in the more developed republics and autonomous provinces (RAPs) than in the less developed ones. This estimate is statistically significant when the RAPs are divided into these two blocs, but due to collinearity it loses significance when we try to identify RAP-specific efficiency levels by means of RAP dummy variables. While our visits to the sampled enterprises suggest that productive efficiency is a problem in the less developed RAPs, further research in this important area is clearly needed before the source of regional differences can be fully identified.

FOOTNOTES

1. For the exact definition of Yugoslav GMP see World Bank (1983).

2. Indeed, virtually all technology in Yugoslavia is now imported and domestic research and development is virtually nonexistent [see Prasnikar (1983) and Gomulka and Ostojic (1984)]. In contrast, Soviet bloc countries did not import significant amounts of Western technology until the 1970s and western machinery has never become a dominant feature of these economies [see for instance Fallenbuchl (1983).

3. The six republics are Slovenia, Croatia, Serbia, Bosnia-Herzegovina, Macedonia, and Montenegro. The two autonomous provinces are Vojvodina and Kosovo.

4. See Balassa and Bertrand (1970) and Horvat (1971) for comparative perspectives on Yugoslav economic growth in the 1950s and 1960s.

5. They parallel similar industry-level studies carried out on the Soviet and Eastern European data [see e.g. Weitzman (1970 and 1979), Whitesell (1985), Kemme (1987) and Terrell (1986)].

6. For detailed accounts of the Yugoslav enterprise system see Tyson (1980), Sacks (1983) and Prasnikar and Svejnar (1987).

7. See e.g. Pucko (1974), Pjanic (1983), Tyson (1980), Estrin (1983), and Prasnikar and Svejnar (1987).

8. See Horvat (1971), Petrin (1981), Sacks (1983), Prasnikar (1983), Estrin, Svejnar and Mow (1982), and Estrin and Svejnar (1985).

9. See World Bank (1983). Slovenia and Kosovo are the most and least developed regions, respectively. Overall, Bosnia-Herzegovina, Kosovo, Macedonia, and Montenegro are classified as the less developed regions, while Slovenia, Croatia, Vojvodina and Serbia are considered to be the more developed ones.

10. For an account of some of these debates, see Mihailovic (1981).

11. See Plotz (1975), Arhar (1984) and Prasnikar and Svejnar (1987). In the 1970s the two fractions were 80% and 20%, respectively.

12. The 1986 Law on Foreign Exchage, which eliminates the autonomy of the exporting (i.e. mostly more developed RAP) firms to keep their foreign exchange is a case in point.

13. Yugoslav foreign debt increased from $2 billion in 1970 to $17.9 billion in 1983 and the public policy emphasis on export growth has risen accordingly.

14. The 1986 Law on Foreign Exchange actually eliminates this automatic link by requiring that all foreign exchange be first surrendered to the banking authorities.

15. See Michaely (1977, 1979), Balassa (1978, 1985a), and Jung and Marshall (1985).

16. See e.g. Frankovic (1967), Horvat (1969), Sapir (1980), Nishimizu and Page (1982), Estrin, Svejnar and Mow (1982), and Bajt (1983).

17. In particular, we start with a variety of firm-specific parameters and then test for the acceptability of various industry-specific constraints. The results of these tests are available from the authors upon request.

18. This variable is based on enterprise-level data and it was constructed jointly by the enterprise managers and the Prasnikar research team in 1980-1981.

19. The X^2 test is based on the likelihood function

$$\ell(\beta, G^2 | y) = (2\pi G^2)^{-T/2} |\psi|^{-1/2} \exp\left[-\frac{(y-X\beta)'\psi^{-1}(y-X\beta)}{2G^2}\right],$$

where $E[ee'] = G^2\psi$. Letting H_1 and H_o stand for the unrestricted and restricted specifications, respectively, the X^2 test is based on the formula $\lambda = 2\{\ell n [\text{likelihood } (H_1)] - \ell n[\text{likelihood } (H_o)]\}$. The restricted model is rejected if $\lambda > X^2(J,\alpha)$, with J referring to the restrictions and α the significance level.

20. In this context, we wish to stress that we have used the best available price indices in deflating our data. Nevertheless, a caveat is in order, namely that, if exporting WOALs face a less inflationary product price environment than that captured by the domestic price index, then the lack of a significant positive relationship between exports and productive efficiency may be artificially induced.

21. The usual caveat is in order here as well: if greater market power results in higher output prices and nominal output data are not adequately deflated, the detected positive effect of market power on productive efficiency may be spurious.

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APPENDIX: Data and the Variables

The data were gathered by a research team led by Janez Prasnikar in 1980-81. The firms were selected as a 5% stratified (by region and industry) random sample of work organizations (WOALs) . All values are in thousands of dinars. The variables used in our empirical work are defined as follows:

Q = value added = total labor costs + total capital costs + surplus = Revenue - material costs

K = capital = fixed capital at historical cost (purchase value of capital)

L = labor = number of unskilled worker equivalents given by

$$L = \sum_{i=1}^{8} \left(\frac{I_i}{I_1} L_i\right) ,$$

where, L = number of unskilled equivalent workers in the firm, I_i = average income of skill i in the Yugoslav industry, L_i = number of workers in the ith skill group in the firm.

Export/revenue = the value of firm's exports/firm's revenue

Market share = proportion of firm's sale on its own market (i.e. market as identified by the enterprise Director and the research team).

Labor/BOAL = number of workers/number of BOALs

Joint venture dummy = 1 for firm operating as a joint venture with a foreign partner and 0 otherwise.

Table 1

Summary Statistics of Relevant Variables

	Mean	Standard Deviation
L	1338.1	2161
K	532610.3	2365020
Export/Revenue	0.123	0.14
Market Share (in %)	42.4	28
Joint Venture Dummy	0.1	-
Labor/BOAL (in workers)	316.4	333
Regional Dummies:		
Slovenia	0.205	-
Croatia	0.250	-
Vojvodina	0.141	-
Serbia	0.166	-
Bosnia/Herzegovina	0.116	-
Montenegro	0.033	-
Macedonia	0.067	-
Kosovo	0.025	-
Industry Dummies:		
Energy	0.016	-
Metallurgy	0.096	-
Non-Metal Processing	0.100	-
Metal Processing	0.283	-
Chemicals & Paper	0.108	-
Wool	0.075	-
Textile, Leather & Rubber	0.266	-
Food and Tobacco	0.083	-

Notes: All variables are defined in the Appendix. Values are in thousand of dinars and they are expressed in constant (1975) prices.

Table 2

IV Estimates of the Cobb-Douglas and CES Production Functions for 120 Yugoslav Firms in the 1975-79 Period
(Values in Parentheses are Asymptotic Standard Errors)

Cobb-Douglas		CES	
Intercept (Miscellaneous Industries in Kosovo)	2.160 (0.340)	Intercept (Miscellaneous Industries in Kosovo)	1.688 (0.105)
ℓnL	0.735 (0.060)	Labor Share δ	0.461 (0.311)
ℓnK	0.212 (0.040)	Substitution Parameter ρ	0.341 (0.290)
		Returns to Scale ν	0.935 (0.034)
Exports/Revenue	0.001 (0.002)	Exports/Revenue	0.003 (0.0017)
Market Share	0.003 (0.001)	Market Share	0.003 (0.001)
Joint Venture Dummy Variable	0.042 (0.078)	Joint Venture Dummy Variable	0.046 (0.079)
Labor/BOAL	-0.00003 (0.00020)	Labor/BOAL	-0.995 E-5 (0.172 E-3)
$(Labor/BOAL)^2$	0.1 E-7 (0.3 E-7)	$(Labor/BOAL)^2$	0.1 E-7 (0.3 E-7)
Regional Dummy Variables:		Regional Dummy Variables:	
Slovenia	0.201 (0.185)	Slovenia	0.187 (0.184)
Croatia	0.234 (0.185)	Croatia	0.219 (0.183)
Vojvodina	0.299 (0.192)	Vojvodina	0.283 (0.191)
Serbia	0.150 (0.188)	Serbia	0.148 (0.183)

Table 2 (continued)

	Cobb-Douglas		CES
Bosnia/Herzegovina	0.086 (0.196)	Bosnia/Herzegovina	0.090 (0.193)
Montenegro	0.042 (0.240)	Montenegro	0.032 (0.242)
Macedonia	-0.109 (0.211)	Macedonia	-0.139 (0.214)
Industry Dummy Variables:		Industry Dummy Variables:	
Energy	0.557 (0.266)	Energy	0.661 (0.245)
Metallurgy	0.675 (0.226)	Metallurgy	0.726 (0.232)
Non-Metal Processing	0.296 (0.187)	Non-Metal Processing	0.312 (0.196)
Metal Processing	0.491 (0.178)	Metal Processing	0.481 (0.184)
Chemicals & Paper	0.679 (0.185)	Chemicals & Paper	0.683 (0.192)
Wood	0.390 (0.192)	Wood	0.384 (0.203)
Textile, Leather & Rubber	0.474 (0.179)	Textile, Leather & Rubber	0.480 (0.181)
Food & Tobacco	0.521 (0.189)	Food & Tobacco	0.536 (0.203)
Time Trend	0.073 (0.025)	Time Trend	0.076 (0.032)
First-Order Autocorrelation Coefficient	0.494 (0.037)	First-Order Autocorrelation Coefficient	0.508 (0.036)
N	480	N	480

Table 3

IV Estimates of the Constrained Cobb-Douglas and CES Production Functions for 120 Yugoslav Firms in the 1975-79 Periods
(Values in Parentheses are Asymptotic Standard Errors)

Cobb-Douglas		CES	
Intercept (Kosovo)	2.500 (1.968)	Intercept (Kosovo)	2.167 (1.482)
ℓnL	0.749 (0.230)	Labor Share δ	0.686 (0.280)
ℓnK	0.218 (0.051)	Substitution Parameter ρ	0.096 (0.309)
		Returns to Scale ν	0.976 (0.123)
Exports/Revenue	0.002 (0.002)	Exports/Revenue	0.003 (0.002)
Market Share	0.003 (0.001)	Market Share	0.003 (0.001)
Joint Venture Dummy Variable	0.090 (0.033)	Joint Venture Dummy Variable	0.084 (0.115)
Labor/BOAL	-0.2E-4 (0.6E-7)	Labor/BOAL	-0.5E-4 (0.3E-3)
$(\text{Labor/BOAL})^2$	0.1E-7 (0.6E-7)	$(\text{Labor/BOAL})^2$	0.1E-7 (0.4E-7)
Regional Dummy Variables:		Regional Dummy Variables:	
Slovenia	0.228 (0.512)	Slovenia	0.218 (0.309)
Croatia	0.249 (0.345)	Croatia	0.247 (0.258)
Vojvodina	0.317 (0.504)	Vojvodina	0.308 (0.294)
Serbia	0.187 (0.399)	Serbia	0.182 (0.252)
Bosnia/Herzegovina	0.084 (0.359)	Bosnia/Herzegovina	0.087 (0.244)

Table 3 (continued)

Montenegro	0.131 (0.262)	Montenegro	0.136 (0.319)
Macedonia	-0.067 (0.434)	Macedonia	-0.085 (0.312)
Time Trend	0.071 (0.138)	Time Trend	0.079 (0.147)
First-Order Autocorrelation Coefficient	0.554 (0.036)	First-Order Autocorrelation Coefficient	0.552 (0.036)
N	480	N	480

Table 4

IV Estimates of Regionally Constrained Cobb-Douglas and CES Production Functions for 120 Yugoslav Firms in the 1975-79 Period
(Values in Parentheses are Asymptotic Standard Errors)

	Cobb-Douglas		CES
Intercept (Miscellaneous Industries)	2.199 (0.292)	Intercept (Miscellaneous Industries)	1.788 (0.777)
ℓnL	0.731 (0.057)	Labor Share δ	0.494 (0.565)
ℓnK	0.217 (0.039)	Substitution Parameter ρ	0.306 (0.444)
		Returns to Scale ν	0.934 (0.034)
Exports/Revenue	0.001 (0.002)	Exports/Revenue	0.002 (0.002)
Market Share	0.003 (0.001)	Market Share	0.003 (0.001)
Joint Venture Dummy Variable	0.038 (0.076)	Joint Venture Dummy Variable	0.043 (0.076)
Labor/BOAL	-0.6 E-4 (0.2 E-3)	Labor/BOAL	-0.5 E-4 (0.2 E-3)
$(\text{Labor/BOAL})^2$	0.1 E-7 (0.3 E-7)	$(\text{Labor/BOAL})^2$	0.1 E-7) (0.3 E-7)
Developed RAPS Dummy Variable	0.196 (0.065)	Developed RAPs Dummy Variable	0.193 (0.066)
Industry Dummy Variables:		Industry Dummy Variables:	
Energy	0.550 (0.269)	Energy	0.637 (0.243)
Metallurgy	0.655 (0.225)	Metallurgy	0.694 (0.172)
Non-Metal Processing	0.281 (0.187)	Non-Metal Processing	0.299 (0.112)
Metal Processing	0.472 (0.180)	Metal Processing	0.465 (0.094)

Table 4 (continued)

Chemicals & Paper	0.650 (0.187)	Chemicals & Paper	0.654 (0.115)
Wood	0.377 (0.194)	Wood	0.373 (0.117)
Textile, Leather & Rubber	0.467 (0.181)	Textile, Leather & Rubber	0.473 (0.055)
Food & Tobacco	0.482 (0.190)	Food & Tobacco	0.495 (0.115)
Time Trend	0.074 (0.025)	Time Trend	0.075 (0.030)
First Order Autocorelation Coefficient	0.503 (0.037)	First Order Autocorrelation Coefficient	0.516 (0.037)
N	480	N	480