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NOTE

This report summarizes the results of the Council-funded research contract identified on the face page. It consists of an Executive Summary by the Principal Investigator, together with excerpts (prepared by the National Council) from four multi-authored research papers. Complete versions of these papers, including the footnotes, illustrations, and references omitted here, are available from the Council on request.

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EXECUTIVE SUMMARY

I. BACKGROUND AND MOTIVATION FOR THE RESEARCH PROJECT

As in other East 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 and the economy continued to reinvest over thirty percent of its gross material product (GMP). 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 significant decentralization of economic decisionmaking and, since 1965, also by high reliance on western technology. Yet, despite the abundance of labor and investment funds, systemic flexibility and easy access to advanced technology, the economy has experienced a major slowdown between the 1950s and 1980s. As a result, numerous economic reforms have been increasingly concerned with productive and allocative efficiency, as well as the ability of the economy to reduce the large income differentials among the eight disparate republics and autonomous provinces (RAPs), and increasingly also among firms within each region.

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 Cominform blockade, intensive collectivization drive and two severe droughts, and the highly acclaimed 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 it fell 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 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.

The 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.

In order to provide insights into the productivity and growth issues, one of our goals in the project was to estimate econometrically the effects of the main structural and policy features of the Yugoslav firms (WOALs). An examination of the institutional features of the system, which we summarized in our proposal to NCSEER, suggested that we should estimate the total factor productivity effects of (i) the degree of enterprise (WOAL) divisionalization into smaller, semi-autonomous units called the Basic Organizations of Associated Labor (BOALs), (ii) product market concentration (monopoly power), (iii) regional differences, (iv) enterprise export orientation, and (v) the existence of joint venture production with foreign firms.

The other two issues that we analyzed in the research project concern the efficiency of resource allocation and inter-enterprise dispersion in labor (personal) incomes. The academic and policy importance of these issues stems from the fact that if incumbent workers influence the policy of their firms and competitive market forces are weak, it is likely that resources will not be allocated optimally from the social standpoint in that marginal products of inputs will vary across uses. The lack of competition also implies that monopoly rents are likely to exist and be appropriated in part by workers as personal incomes. The observed inter-enterprise dispersion in incomes is likely to reflect these phenomena. In addition, the traditional labor-management theory suggests that labor-managed firms behave in a perverse way by reducing employment when the output price rises.

These potential problems that result from workers' control are inherent in the self-management system per se. In Yugoslavia, they have been exacerbated by two additional factors. First, in the 1950s capital was allocated to firms by planners in a way that created large disparities in (marginal) capital productivities across firms. Since the 1960s, the misallocation of capital continued through the system of bank control by (large) firms. Capital rationing therefore exacerbated the problem of resource misallocation throughout the postwar period. At the same time, interest rates were kept artificially low while other prices and labor incomes were substantially decontrolled in the 1960s and, to a lesser extent, in the 1970s and 1980s as well. This meant that firms with easy access to capital obtained this crucial input at a very low price and appropriated the resulting capital rent. With workers being able to keep a large part of enterprise profit (net income) as personal income, one would expect the inter-enterprise variation in labor incomes to be positively correlated with this capital rental. The second and related factor which has accentuated the degree of resource misallocation and income dispersion is the difficulty of enterprise entry and exit in the Yugoslav setting. Indeed, with easy entry and exit of firms, virtually any rents could be competed away, at least in the long run. However, industrial organization studies of the Yugoslav economy show quite clearly that enterprise entry and exit are limited and that monopoly power is hence substantial.

In order to carry out a useful empirical analysis of factors that determine resource allocation and personal incomes, we first developed a realistic theoretical model of the Yugoslav firm. We then used the model to derive testable hypotheses about resource allocation and income determination and tested these hypotheses with 1965-72 industry-level data as well as a 1975-79 data set on 150 firms (WOALs) and a 1975-86 data set on 20 WOALs.

II. SUMMARY OF RESEARCH FINDINGS

Our research presents econometric evidence on productive efficiency, as well as on employment and wage (personal income) setting behavior in Yugoslav "labor-managed" enterprises. The principal findings may be summarized as follows:

1. Productive efficiency is not affected by (a) the extent

of enterprise export orientation, (b) whether the firm operates as a joint venture with a western firm, and (c) the degree of divisionalization of the firm. In contrast, product market concentration is found to have a significant positive effect on productive efficiency. Finally, productive efficiency is on average estimated to be 19-20 percent higher in the more developed republics and autonomous provinces than in the less developed ones.

2. Enterprise employment appears not to vary systematically with output prices and interest rates, but it increases in response to currency (Dinar) devaluations. Employment seems to exceed the level that would correspond to the maximization of workers' incomes (at least in the less developed regions), but this "overemployment" is not necessarily socially inefficient, given the low wages (and labor productivity) elsewhere in the economy.

3. In recent years, when wage and price controls have frequently been imposed, wages (personal incomes of workers) have not been found to vary systematically with prices and interest rates. However, the wage effects of various structural variables have been substantial. In the 1965-72 period of market self-management, when government intervention in enterprise decision-making was minimal, one finds a positive link between output prices and workers' incomes.

4. The sizable dispersion in workers' incomes that was observed in the 1965-72 market self-management period appears to

be related more to the system of labor-management than to capital rationing and incorrect pricing during the previous period of planning.

The principal implications of these findings relate to the policies aimed at the efficiency of resource use and enterprise behavior in a relatively decentralized, socialist system with worker participation. These may be summarized as follows:

5. Recent Yugoslav policies have placed emphasis on export orientation and liberal approach toward joint ventures with western firms. These policies may yield important benefits (e.g. in reducing foreign indebtedness) but, as our results indicate, they ought not to be justified by expected gains in productive efficiency. Similarly, our findings suggest that the ongoing debate about the desirability of changing the system of enterprise divisionalization should not be guided by expectations of gains or losses in terms of productive efficiency. Finally, while allocation of investment funds among the republics and autonomous provinces may in part be guided by political and social factors, our study indicates that differences in productive efficiency are significant and ought to be taken into account.

6. The hypothesis of perverse employment behavior, which is frequently attributed to labor-managed firms in the theoretical literature, finds relatively little support in our data. Most of our tests suggest that Yugoslav firms simply do not adjust employment in response to variations in output prices and cost of capital. The important implication of this finding is that the

system has to rely on enterprise entry and exit for employment creation and other adjustments in labor allocation. Since government regulations have seriously hindered the process of enterprise creation and capital mobility, the employment fixity at the enterprise level translates into a rigidity of resource allocation throughout the economy.

7. Interest rate and exchange rate policies have been important elements of the stabilization policies of the 1980s. While devaluations have been effective in increasing employment (and presumably output), interest rate variations appear to have been too insignificant to have an impact.

8. The Yugoslav experience from the 1965-72 period suggests that, in a relatively unconstrained labor-managed system, workers' incomes indeed reflect the profitability of firms and fluctuate with exogenous factors. The evidence from the more recent years indicates that the government can be effective in controlling the extent to which (measured) workers' incomes adjust to economic forces. On the basis of this evidence, there is a strong presumption that the removal of income controls would give rise to significant income differentials. Since several Soviet bloc countries are seriously contemplating the introduction of significant forms of worker participation in management and "profits", the Yugoslav experience has broader ramifications.

STRUCTURAL FACTORS AND PRODUCTIVE EFFICIENCY IN YUGOSLAV SELF-MANAGED FIRMS

by

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(Excerpts)

I. INTRODUCTION

The Yugoslav productivity problem has attracted the attention of academic economists. Numerous studies[4] have used industry-level data in an attempt to identify the sources and rate of growth of productivity in Yugoslav industry. 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

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[4]References, omitted from these excerpts, are available in the complete version of each paper summarized here.

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[1] we identify the relevant structural/policy variables whose productivity effects we estimate. Section III presents the estimating framework, while Section IV contains the (empirical) results. Policy implications are discussed in Section V.

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V. POLICY IMPLICATIONS

Our analysis of productive efficiency in a stratified random sample of 120 Yugoslav firms (WOALs) during the 1975-79 period

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[1]Sections II-IV are omitted from these excerpts.

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 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 decision-makers 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 independent of the number of workers per BOAL. Indeed 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.

EMPLOYMENT AND INCOME DETERMINATION IN YUGOSLAV LABOR-MANAGED FIRMS

by

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(Excerpts)

I. INTRODUCTION

In this paper we provide an econometric analysis of the employment and wage (personal income) setting behavior of Yugoslav firms during the 1975-1985 period. This period is of considerable interest because it was marked by rapid economic growth as well as considerable investment and foreign borrowing in the mid to late 1970s, followed by economic slowdown, fall in real incomes and economic stabilization program in the 1980s. Moreover, unlike the 1960s and early 1970s, when enterprises displayed relatively autonomous (self-managed) behavior, the period since the mid 1970s has been characterized by a new organization of firms and considerable intervention by various authorities in enterprise decisionmaking. Finally, since 1985, when the Yugoslav government

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abandoned the stabilization program, there has been a search for a new set of economic policies which would stimulate growth and alleviate the problem of falling incomes and significant unemployment. Our analysis should hence be useful for a better understanding of enterprise behavior during this tumultuous period and for the choice of appropriate economic policies at present.

Parallel to these practical and institutional developments, there has been growing academic interest in the actual economic performance of labor-managed firms. In particular, the large literature, started by Ward (1958), predicts *inter alia* that an income per worker maximizing firm will (a) reduce employment and output in response to an increase in output price and (b) increase employment and output when fixed costs rise. While this perverse behavior has been questioned, until recently it has not been subject to a rigorous test. Our paper presents the first test of the Ward thesis using Yugoslav firm-level data. However, as in Svejnar and Tutu (1988), we go beyond the confines of the Ward model and analyze enterprise behavior in a broader conceptual framework. This framework allows for agents other than workers (e.g. the government) to influence enterprise policies and hence codetermine the employment and wage behavior of the firms.

The paper is organized as follows: Section II[1] presents the theoretical framework which we use for modelling the behavior of Yugoslav firms in the period under study. Section III discusses the data and the variable definitions, while section IV contains

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[1]Sections II-IV are omitted from these excerpts.

the econometric specification and the empirical results. The conclusions are drawn in Section V.

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V. SUMMARY AND CONCLUSIONS

As could be expected, the various approaches to the analysis of the employment behavior of Yugoslav firms do not yield identical results. On the one hand, the nonlinear estimates in Tables 2-5[1] and the loglinear approximations to a reduced form labor demand equation (Table 11) suggest that the firms operate somewhat to the right of their marginal product curves of labor and display employment fixity in the presence of output price fluctuations. On the other hand, the linear approximations to the nonlinear employment equations (Tables 4-10) suggest that firms in the more developed RAPs may operate to the left and those in the less developed RAPs to the right of the marginal product curve of labor. These two sets of findings are not completely at odds with one another but we intend to undertake further research in order to achieve a more complete reconciliation of these results. Our preliminary inclination is to place more weight on the first set of results because they do not require the assumption that $(W-W^d)/W^d$ be small. Indeed, in our data this relative wage differential is large (in excess of 30 percent) and the findings in Tables 4-10 may hence be biased.

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[1]All tables are omitted from these excerpts.

In terms of public policy, the loglinear labor demand equation suggests that the exchange rate policy (Dinar devaluation) had a positive impact on employment but that the limited interest rate variation had no employment effect.

The loglinear wage (personal income) equations found no impact of prices and interest rates on wages. However, the effect of several structural/behavioral variables was found to be significant.

MARKET IMPERFECTIONS, LABOR-MANAGEMENT AND EARNINGS DIFFERENTIALS IN A DEVELOPING COUNTRY: THEORY AND EVIDENCE FROM YUGOSLAVIA

by

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(Excerpts)

I. INTRODUCTION

Widening inter-firm and inter-industry income differentials have been a major problem faced by Yugoslavia since the late 1950s. The problem gradually became so serious that it partially motivated the major reforms of the country's unique system of market self-management in the early 1970s and the interruption of the stabilization and restructuring program in the mid 1980s. The existence of substantial inter-firm and inter-industry variations in income for given skill types has been established for Yugoslavia by numerous studies. For example, Estrin [1981] reports that in 1969 the ratio of the highest to lowest incomes for a given skill type across sectors normally exceeded 2:1, with the largest differentials being observed for skilled blue-collar

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workers. Indeed, the inter-sectoral ratio of earnings for a given job typically exceeded 2.2:1 during the late 1960s and early 1970s. In general, studies show that average inter-sectoral differentials are very large in comparison to other countries, even when one has controlled for skill and regional characteristics. The phenomenon also contrasts with the marked stability in the inter-industry wage structure in other countries (see e.g. Krueger and Summers [1986]).

A large number of observers both within and outside Yugoslavia have pointed to capital immobilities and inappropriate capital allocation and pricing in the context of workers' self-management as the source of the wage dispersion. This literature, henceforth referred to as the "capital school," points to an environment in which self-managed firms face inefficient rationing of scarce capital. There is dispersion in capital-labor ratios between firms and industries beyond the control of the enterprises themselves, and the rental price of capital is set below the scarcity value. Given that labor-managed firms choose their labor incomes subject to their individual parameter sets, workers appropriate the resulting rents as personal income and wide income differentials appear.

In this study we follow Vanek and Jovicic's [1975] pioneering paper in formulating the problem in terms of "imputed capital rentals, "defined by these authors as the product of the capital-labor ratio and the difference between the marginal revenue product and cost of capital. Vanek and Jovicic's [1975] approach has been backed by considerable empirical work, and it is this formulation and widely quoted findings which we reassess in this paper. Their conclusion is that imputed capital rentals are the sole detectable source of Yugoslav income differentials and that the appropriate policy is to charge for capital at a shadow (market clearing) price. We argue that these strong propositions derive from a failure to consider adequately alternative sources of income dispersion and from a narrow specification of the capital school hypothesis.

In fact, traditional models of a labor-managed market economy identify numerous sources of income differentials and link them to the particular systemic operation of the labor market in such an economy. In this literature, income per worker is the enterprise maximand as well as an endogenous variable which in equilibrium equals the marginal revenue product of labor. Inter-firm income differentials therefore develop whenever firms face differing economic circumstances. In essence, the problem in this type of economy is the inability of workers to move into firms where incomes are higher and thereby reduce or eliminate earnings differentials. Under capitalism, competitive forces equalize the wage paid to a common labor type in different industries, although complete equalization may be prevented by compensating differentials and frictions. Under self-management, disturbances lead to a dispersion of incomes and marginal value products of labor which will not be eliminated by labor mobility because, in order to maintain their own incomes, existing members of labor-managed firms can prevent the recruitment of additional worker-members. Entry and exit of firms is needed to transfer labor between uses and in the interim income differentials arise.

This broader formulation of the problem, henceforth referred to as the "labor school," appears fruitful for understanding the Yugoslav economy, which has been characterized by a low degree of enterprise entry and exit (see Sacks [1983] and Petrin [1984]). It suggests that Yugoslav income differentials have many causes, including inter-enterprise and inter-industry differences in demand and cost conditions as well as the degree of product market monopoly power. The analysis is not inconsistent with that of the capital school; it is broader for it points attention to additional factors which could cause dispersion of earnings.

Labor school theorists have traditionally argued that resource misallocation under labor-management must be cured by rapid entry and exit of enterprises into different product markets (see, in particular, Vanek [1970]). This implies that Yugoslav policy-makers should encourage entrepreneurship and factor mobility, as well as enforcing bankruptcy on declining firms. In contrast, capital school proponents, such as Vanek and Jovicic, have proposed a single country-wide charge on fixed assets as a means of eliminating the dispersion in the marginal product of capital and labor incomes. Of course, enterprise specific taxation based on capital assets could provide a second best solution to the problem of income differentials. If the authorities could gather sufficient information at the enterprise level, discriminating capital charges could be used to tax away all rentals accruing to labor. But this is not the same as the capital school proposal of a single country-wide charge on fixed assets, which we will argue below derives from an inappropriate formulation of the rent generating process.

Our empirical strategy is to relate earnings to imputed capital rentals and proxies for labor value marginal products. In this way, we seek to evaluate the importance of capital rents as compared to rents from product and labor market misallocations as sources of Yugoslav income differentials. We first use the data set from Vanek and Jovicic's [1975] study and then estimate more flexible functional forms on a broader Yugoslav sample.[1]

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IV. CONCLUSIONS

Our tests of the capital and labor schools hypotheses suggest that both are important but that labor school factors are the more important ones. In particular, labor's marginal products and product market concentration ratio appear to be better correlates of personal incomes than imputed capital rentals. Our results hence point to labor immobilities and product market rents rather than imputed capital rentals as the main source of inter-industry income differentials.

However, we do not infer from our results that Yugoslav

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[1]Sections II-III are omitted from these excerpts.

capital markets are competitive, or that such imperfections as there are do not have a major effect on earnings. Our earnings equations use the Vanek-Jovicic framework and they are not reduced forms. The impact of capital rationing on incomes may be transmitted via the marginal products of labor. The labor school in fact merely stresses that allocative problems generate differences in labor marginal products and it is broad enough to encompass capital market imperfections along with other environmental factors. What our results indicate is that the possible misallocation of capital does not influence earnings in the manner proposed by the capital school.

Needless to say, the employment immobilities, which are at the heart of the labor school, might indeed stem from the system of labor-management but they could also be non systemic and reflect Yugoslavia's level of development and the degree of regional integration. With these caveats in mind, our policy proposals involve encouraging labor mobility between firms, rapid entry and exit of firms across industries, and strong anti-trust measures.

ESTIMATES OF STATIC AND DYNAMIC MODELS OF WAGE DETERMINATION IN LABOR-MANAGED FIRMS

by

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(Excerpts)

1. INTRODUCTION

When the Yugoslav system of labor-management was allowed to operate in a relatively free market environment in the 1960s and early 1970s, large inter-firm and inter-industry wage differentials emerged. These differentials received considerable attention from labor and comparative systems economists, and they were found to persist even when skill, region and job characteristics were taken into account (see e.g. Wachtel (1973), Dirlam and Plummer (1973), World Bank (1975), Estrin (1981, 1984), and Lydall (1984)). Our paper develops the previous modelling of this issue (see Vanek and Jovicic (1975), Estrin (1984), Estrin and Svejnar (1985)) and uses modern applied methodology to estimate first a dynamic approximation to the derived earnings equation and second a version of a full dynamic model of the labor-managed firm.

The existing literature offers two explanations of the large

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wage dispersion, each related to specific institutional characteristics of the Yugoslav economy. The first school of thought, referred to as the "labor school", suggests that wage differentials derive from product and labor market imperfections which are transmitted to earnings via the unique Yugoslav system of workers' self-management (see e.g. Lydall (1984)). The second group of observers, referred to as the "capital school", sees income dispersion as stemming from rents attributable to capital rationing by the authorities during the pre-1965 period of planning. Although in principle these hypotheses are not mutually exclusive, they have normally been treated as such and no rigorous attempt has been made to evaluate their relative importance in explaining the observed wage dispersion. Hence the formal microeconomic models of Wachtel (1972, 1973) and Estrin (1984) focus exclusively on the labor school approach, while the more <u>ad-hoc</u> research in the capital school tradition has either failed to test for, or has failed to isolate, any significant determinants of wages other than capital rents (see e.g. Vanek and Jovicic (1975), Rivera-Batiz (1981), Stallerts (1981)).

In tackling this specific Yugoslav issue, the paper strives to bridge two methodological camps that have analyzed the dynamic behavior of firms. On the one hand, economic theorists have developed tightly specified models of intertemporal optimization which have so far not been used widely in applied work. In fact, most empirical researchers have preferred to avoid the tight structure of the formal models and relied instead on <u>ad hoc</u>

(flexible) approximations to the dynamic estimating equations. The problem in the literature is hence that the theoretical models are perhaps based on too restrictive assumptions to be widely accepted among applied researchers, while the approximations in most empirical work are often seen as too loose for a clear-cut theoretical interpretation.

In this paper, we use both of these approaches to tackle the substantive issue that we investigate. In particular, we first estimate a general approximation to a dynamic earnings equation under labor-management and then present a formal dynamic model together with estimates of its relevant coefficients. This strategy permits us to compare the results of the two approaches and draw more meaningful conclusions.

The paper is structured as follows: In Section II[1] we develop a general formulation of the enterprise optimization problem given rationing of capital in an earlier period, and provide estimates of the reduced form and various approximations to the system as a whole. The findings permit a preliminary evaluation of the relative impact of the different sources of income differentials. However, the approach follows the mainstream applied literature in that it remains ad-hoc with respect to dynamic adjustment. In Section III we therefore present a formal intertemporal specification of the problem in which the dynamic estimation equation is derived explicitly from intertemporal optimization. On this basis, a simultaneous equation

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[1]Sections II-III are omitted from these excerpts.

dynamic system is estimated from which inferences about the relative importance of the capital and labor schools can be drawn. General conclusions and policy implications are outlined in the fourth section.

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IV. CONCLUSIONS

In this paper, we have attempted to contribute to three substantive issues. The first concerns the traditional way of evaluating the impact of capital rentals in Yugoslavia. Previous approaches based on the assumption that the capital-labor ratio or the capital stock were exogenous, had been shown to generate biased estimates of the capital rental. We have sought to model the rent generating process directly, in the context of both static and dynamic models of enterprise behavior. The approach has implications for the analysis of labor-managed firms outside Yugoslavia, and for enterprises in Soviet-type economies more generally.

Secondly, we have sought to contribute to the empirical methodology in this area. To that end, assumptions were made to derive a log-linear version of an earnings equation which theory suggested would be highly non-linear, particularly by comparison with profit-maximizing firms. Dynamics were added to this equation in an *ad hoc* way. Though the results were good in econometric terms, the underlying model was a bit loose for an entirely convincing interpretation of the findings. In contrast, a nonlinear model derived from a first order condition of the intertemporal income maximization problem was also estimated. The parameters from this model had well-defined interpretations but the econometric results were less satisfactory. Even so, the two approaches yielded a consistent pattern.

The central finding of the paper, derived from both loglinear approximation and the nonlinear model, is that, contrary to previous results, capital rentals actually play an insignificant role in explaining the wide inter-industry earnings variation in Yugoslavia over the period of market self-management. Estimates suggest that, over the whole period, less than 0.1% of earnings could be attributed to capital rents. This suggests that Yugoslav policy-makers, rather than focussing on capital allocation by the state to correct earnings dispersion, should concentrate on liberalizing labor and product markets.