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THE ECONOMICS OF SOVIET SOCIAL INSTITUTIONS

SUMMARY*

In the West, there has of late been a flourishing development of the economic analysis of non-economic institutions such as education, the family, health systems, politics, law and crime, and so forth. The objective of this research project was to extend our understanding of the institutions of Soviet society by the application of methods of economic analysis that have proven fruitful in the study of western social institutions. The institutions selected for study were the family, the education system, and the health system.

From a broad perspective, the common features of these three social institutions are striking. As in a market economy, Soviet citizens make decisions on the basis of the perceived private costs and benefits of the alternatives. The State can heavily influence the terms on which individuals make choices. It tries to give the "right" signals so that the choices made by Soviet citizens are best not only for the individual, but for the society as a whole as interpreted by the State. Nonetheless, overall social outcomes are the end results of millions of Soviet citizens making choices regarding which technical school to apply to, how many children to have, and whether to enter the hospital or take one's chances at home. In the social sphere the Soviet Government cannot command that certain choices be made nearly to the extent that it can in the economy.

Demographic, manpower, economic, social and health care problems of the 1980s will require that the Soviet leadership provide direction and incentives to the Soviet populace to lower birth rate in some areas and raise it in others, to plan to enter certain spheres of employment or be directed to enter another, and so on. The choice is between an attempt at greater interference by the State in socio-economic decision-making, or providing incentives, at the possible expense of investment and economic growth, which encourage the Soviet population to follow a path determined by the State to get through the 1980s.

* Prepared by the National Council.
The Family

Analysis of the "family" focused on identifying the economic, social, and cultural factors that exert the greatest influence on fertility in Soviet families. The principal findings are as follows. First, the variation in the fertility rates of Soviet females is determined primarily by socio-economic conditions such as level of urbanization, education, Republic per capita income, and labor force participation, which together account for 73% of the variation. The cultural influence, as measured by observing Moslem fertility patterns, accounts for only 13% of the variation. Culture plays a larger role than that, however, because certain socio-economic factors -- for example, the difference in the educational levels of Moslem and non-Moslem women -- are also in part the consequence of cultural traditions.

Females with a higher or specialized secondary education have fewer children than those with less education, as in most developed countries. When differences in labor participation rates are taken into account, however, those with higher education have more children than those without. This is true for both Moslem and non-Moslem females, as well as for urban and rural populations. The exception is rural Moslem women with little education whose fertility rises when they acquire secondary education. This is an instance of "premature modernization" sometimes found in developing countries where women acquire the ability to control their fertility before their socio-economic status has motivated them to wish to reduce it. Thus, if the Soviet leadership attempts to increase the fertility rate by encouraging mothers to withdraw from the labor force, it should encourage the ones with higher education. Since these are also the laborers with the highest productivity, however, the loss of output would be large. With respect to Moslem fertility, it should either provide more years of education to fewer Moslem females, or fewer years to more Moslem females.

Education: Wages, Labor Markets, and Professional Manpower

How efficient is the Soviet educational system in meeting manpower requirements of the economy? By adjusting wage rates and structure the leadership has been somewhat successful in creating a broad base of engineering and technical specialists (ITR). On the other hand, there is a problem of a shortfall of positions for qualified ITR in some areas at the same time as there are under-
trained ITR filling advanced positions in others. The Soviet system appears to use wage structure for both allocative and distributive functions, the former using increased wage rates to attract workers to an area of labor shortage, the latter trying to achieve some desired degree of wage equality. In the USSR when there is surplus labor, the wage structure has been distributive; when the labor market is tight, it has served an allocative purpose. The maintenance of adequate labor supply through high wages in high priority branches nonetheless appears to perpetuate a departure from the egalitarian goals pursued in the time of less strained markets.

ITR wage rates are sensitive to both the number of positions available and the supply of specialists, but neither of these seems to be sensitive to wage structure. Indeed, wages appear to play little role in output, production or technology forecasts, or in enrollment levels in professional education programs. Moreover, until recently, the heavy subsidization of education created pervasive demand for places in professional schools. The inference, therefore, is that the number of ITR slots created represents the demand side of the market for specialists, and conditions within this market do influence the wage rates of ITR.

The period of the 11th Five Year Plan will be one of extremely tight labor markets. If the pattern of the past continues to hold in the future, there will probably be a widening of the wage spread once more, and an increase in inequality. The rising relative wages of higher-wage manpower will have to be matched by increase in consumer goods production, which will be difficult in view of the reduced growth rate forecast for the Soviet economy for the next five years.

The Health Care System

The Soviet health care system is in a state of decline. Recent trends in health stock, consumption, and environment have exerted, on the whole, an unfavorable influence on the health of the Soviet population. Moreover, degenerative diseases and accidents are becoming more prevalent. Because of these developments, the magnitude of the tasks facing the health system is burgeoning.

One reason for the deterioration of such health indicators as infant mortality and male life expectancy is that the resources made available to the
health sector have not been increasing quickly enough to cope with expanding needs. In fact, the share of total health spending of the State budget has fallen substantially. Contributing to this problem is a failure to resolve decisively many long-standing issues such as the distribution of medical resources among the elderly and the rest of the population, the planning of the health system on the basis of input indicators (like beds per 10,000 population) or output indicators (like mortality data), and the unsettled conflicts between objectives -- between occupation safety requirements urged by health personnel and production targets defended by managers.

Research on the health care system pursued three additional goals. The first was the further specification of an accounting model of the Soviet health production process, and the first effort to adapt the UN system of socio-demographic accounts to Soviet conditions, to serve eventually as the data base for a Markov chain model of the Soviet health production process. The second was an effort in econometric modelling of the Soviet health care system. (The dependent variable is male life expectancy, and the causal variables include indicators of such factors as medical services, illness patterns, and environment.) The third line of research was the collection of time-series for use in model estimation. These results suggest that the approaches are fruitful and merit further work.
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INTRODUCTION AND GENERAL OBSERVATIONS

Every society is characterized by certain institutional arrangements for organizing its family life, maintaining the health of the population, educating the young, and performing other social functions. The ways in which these institutions operate depend to some degree on the society's economic system. The distinctive feature of the structure of the Soviet economic system is the use of central planning as the allocative mechanism. One of our common interests in this project is the influence of that economic mechanism on the character of its social institutions. Another aspect of this project is the application of some of the tools of economic analysis to these three social institutions: the educational and health systems and the family; that is, we are interested in the extent to which the behavior of these institutions can be explained by the principles of general economic theory employed in the analysis of market-based societies.

The term "planning" is usually applied to the organization of the economic institutions. There is a sense in which the term may be extended to the organization of the other social institutions as well. The state does seek to attain certain goals in the organization of the educational, health and family institutions, and it employs a variety of policy instruments in order to influence the activity of those institutions toward the attainment of those goals. The resource commitments and organizational policies employed for that purpose are specified in the national economic plans. The USSR may therefore be regarded not only as a planned economy but also as a planned society. The usefulness of that formulation is that while all social institutions may be regarded as planned, there is a major difference between the planning of the economy and the planning of the rest of the society. The difference is that economic planning is primarily centralized, while social planning combines centralized and decentralized planning.

The difference may be more sharply drawn by distinguishing between the planning of non-human and human resources. When a thousand Soviet enterprises produce a million pairs of shoes, that outcome is the consequence of a set of directives issued to each of the enterprises. The enterprises serve primarily as executors of decisions made earlier by the central planning authorities.
But when a thousand Soviet students apply for admission to a certain technical school, or when a thousand Soviet mothers give birth to a thousand babies, those outcomes are the consequences of decisions taken by individual persons or families. The outcomes are nevertheless planned, in the sense that the state employs a variety of devices for the purpose of influencing individual decisions in a direction consistent with the national objectives.

Strictly speaking, both centralized and decentralized methods of planning are used for both economic and social planning. In the production sector certain kinds of decentralized decisions are left to individual enterprises, and various instruments like prices are employed to influence those decisions in directions consistent with state objectives. For example, enterprises have some range of choice regarding the quality of their products, and as a method of influencing the enterprises to raise the proportion of higher quality products, they are permitted to charge higher prices for such products. On the other hand, in education and manpower organization, while individual workers are generally expected to make their own decisions on where to seek employment, the ministries have the right to assign recent graduates to specific jobs in other cities for a period of time; the allocation of labor in such cases is the result of centralized decisions rather than of the individual workers. Nevertheless, it is a fair generalization that the planning of non-human resources in the economic institutions is predominantly centralized, while the planning of human resources in the social institutions makes greater use of decentralized methods.

If one thinks of the activities of the social institutions as market-like processes, it is generally the case that centralized planning is employed on the supply side, while the demand side is generated by decentralized planning. That is to say, capacities are centrally planned — sometimes on the basis of "social demand" (the number of places in maternity wards and primary schools), sometimes on the basis of "manpower requirements" (the number of places in technical training programs of various sorts). In both cases, planning at a prior level is often employed as well: demographic policies to influence the fertility rate, for example, and educational policies to assure adequate numbers of qualified potential applicants for the training programs. The instruments by which these policies are pursued, however, will generally be of the decentralized rather than of the centralized or "command" type. The decision to have a baby or to apply to a particular educational institution remains an individual choice,
as in all modern societies, but the private costs and benefits in terms of which individual decisions are made are manipulated by the state in pursuit of its goals: by changes in maternity leave conditions, child support programs, changes in educational subsidies and in the conditions of access to different educational institutions.

The general conclusion of Western analysis of the Soviet economy is that centralized planning is highly inefficient, and the weight of opinion is that decentralization would greatly increase the efficiency of the socialized economy. It may therefore be thought to follow that social planning in the USSR, which is more decentralized, should be more efficient. Our research on the economies of social institutions was not conducted with that question in mind. It is nevertheless interesting to ask what light our research may shed on that question, which we take up in the conclusion to this introduction.

In the following sections, we will address the question: what is distinctive about the economics of our several institutions under Soviet central planning? Here we will address a different, but obviously related, question: how is the outcome, the fulfillment of the social function of the institution, affected by the authoritarian socialist setting of the USSR? This distinctive setting, it should be understood, comprises two aspects: the institutions of Soviet central planning, and the values or social goals toward which these institutions are directed. Although separable conceptually, their effects upon the social outcomes of interest to us are not always distinguishable. Therefore, when we ask how this or that non-economic institution performs differently in the Soviet Union from the way it performs, say, in the mixed capitalist economy of the United States, the possible influence of both of these and, perhaps, of other independent elements ("culture") must be recognized. In brief, we do not observe the effect of central planning alone.

**Education, Wages, and Manpower**

Our research leads us to look for differences in outcomes associated with what we have found to be a fundamental feature of the administration of these institutions in the USSR: the imperfect reconciliation of planners' and consumers' preferences, primarily by non-market means. This is seen particularly clearly in the area of education and professional manpower. That is, the centrally
determined quantity supplied (demanded) will generally not correspond, in the aggregate, to the quantity demanded (supplied) that is determined autonomously by households. The resulting disequilibrium creates a rationing problem that will usually be resolved by non-market means.

Basic industrial skills, as in the United States, are imparted primarily in programs of on-the-job training. In the Soviet Union, however, official policy for more than a decade has been to replace O-J-T with training in separate, though not completely independent, vocational schools. In the U.S., vocational schools are not a major source of skills and are not, in general, highly regarded. Why the difference in approach?

In the Soviet Union, the risk of turnover among newly trained workers and the pressure of short-term production goals have led industrial enterprises to create extremely narrow and short O-J-T programs. This means that for almost any change in job assignments the worker must be retrained. From a long-run perspective, therefore, the traditional system is of very doubtful efficiency. By removing the training programs from the direct control of production enterprises, it is hoped that program content will come to reflect prospective social benefits and costs more accurately.

Why O-J-T in the market economies has not encountered the same difficulty (at least not to the same extent) is a matter of conjecture. Recent human capital theory suggests that the answer lies in the adaptibility of the wage structure. There is evidence that in the American economy wages vary with the status of the trainee-worker in ways that permit a sharing of the costs of training between worker and employer. The trainee's share, paid in the form of reduced wages, varies directly with the external marketability of the skills being acquired. This, of course, reduces the financial risk to the employer of turnover among newly trained workers. In the Soviet Union, the data suggest, training costs are borne almost totally by the enterprise and do not vary with the external marketability of the skills involved. The result, evidently, is pressure to discourage enterprise investment in general training; both the amount and content of training are, from a social perspective, adversely affected by the wage structure within which the Soviet enterprise operates.

Post-secondary education, in general, is also distinctively utilitarian. Outside of the major service sectors (health, education), the training is
narrowly specialized, with curricula related to current production technology. Training is very heavily subsidized: with free tuition and student stipends, the private cost of higher education in the USSR must be among the very lowest in the world. The number of places in each program is determined centrally (or regionally), based upon estimates of the economy's requirements for specialists in different fields. The direct consumption value of Soviet higher education is presumably diminished by its professional orientation; nevertheless, heavy subsidization, the general credential value of the diploma, and steady growth of the population eligible for higher education (by virtue of completion of the 10th grade) have caused the demand for places generally to exceed the exogenously determined supply of places.

This contrasts interestingly with American higher education, where, at the baccalaureate level, professionalization is limited and consumption value presumably high. Subsidization is considerable, but not comparable to Soviet levels; and the supply of places, in the aggregate, is responsive to demand. These circumstances have produced the world's highest proportion of secondary school graduates going on to higher education. There is, however, no mechanism for relating the production of college graduates to changing labor market conditions other than very imperfect market signals and equally imperfect forecasts. The result, in recent years, has been a tendency to over-produce college graduates relative to the objective educational requirements of the job mix in the economy. Market effects of this system include protracted periods of job search by new graduates, displacement of high school graduates from the better paying jobs held by them, and decline in the financial return on investment in higher education.

In the Soviet case, the locus of disequilibrium is not at the graduation but at the admission stage. Excess demand for places in institutions of higher education creates a rationing problem which the Soviets attempt to resolve on meritocratic grounds: admission is by competitive examination offered by each institute. To many Soviet observers, excess demand with this form of non-market rationing is very attractive: it offers "selectivity" to the educational institutions, an assurance of student quality. Unfortunately, it also encourages students to weigh their interest in a particular program (and the career it leads to) against the probability of admission (as gauged by the size and
strength of the applicant pool). Young people are often swayed by the latter factor (better almost any diploma than none at all), and this contributes to subsequent allocation problems: many with costly, specialized education seek employment outside their field of study. This, in turn, elicits another non-market corrective: compulsory assignment of graduates to their first position for a three-year period. Clearly, neither the market-oriented American approach nor the non-market methods of the USSR offers a persuasive resolution of the very difficult social choices posed by the field of education.

Of the three social institutions we have studied, it is in the educational institutions and the related institutions for manpower management that decentralization takes forms that are most similar to markets. The demand for places in educational institutions is determined by the decisions of individual students and their families, and it is heavily influenced by the perceived benefits and costs of acquiring an additional year or more of one kind of schooling or another. The state influences the outcomes in two principal ways: by controlling the "supply," or the number of places in educational institutions, through a centralized planning method; and by setting the prices in terms of which individual benefit-cost calculations are made. The principal prices involved are wage rates and tuition. Wage rates influence educational choice in two ways: they affect (in large part) the perceived benefit of acquiring an additional year or more of a particular kind of education, in the form of the income foregone while attending school. The price of tuition consists of two parts: instructional tuition, the price of which is zero since most education is free in that respect; and the stipend that is paid to most students in technical and higher educational institutions, which is equivalent to a negative price.

One might imagine a system in which the state sought to use the instruments at its disposal -- the setting of supply and relative prices -- in such a manner as to attain an optimal allocation of students among places in educational institutions. It is evident, however, that the actual allocation is far from optimal. The centralized planning of the supply of places for students in technical institutions, for example, is based on enterprise estimates of their future need for specialists of all kinds. It is clear that enterprises have no incentive to economize on the use of future specialists, and that the future wage rates that will have to be paid to these specialists do not influence the
enterprises' estimates. The supply of places in specialized educational institutions is therefore likely to exceed the optimum; excessive resources are allocated to specialized education. On the demand side, the negative price of education -- because of the absence of tuition and the positive stipend -- produces a huge excess demand for admission to many educational institutions. The consequence is that a large number of students delay for several years their permanent entry into the labor force. The inefficiency of the process is compounded by an admissions procedure that permits most students to sit for the entrance examination at only one institution in any one year.

In some respects the state's ability to manipulate its policy instruments is limited by political and ideological restrictions. The policies of free tuition and student stipends are too endowed with ideological content to be treated as if they were simply value-free instruments. The possibility of varying wage rates to influence individual occupational choice is also limited by notions of an equitable distribution of income. Beyond these limitations, however, it is not clear that the state does in fact view the allocation problem as one of influencing the market-like behavior of individuals by policy instruments, or of finding a proper balance between centralized planning and decentralized managed markets. If one were comfortable with market processes, one would be cheered by a high degree of responsiveness of individuals to price and wage signals. But the responsiveness of Soviet students to such signals is often treated as if that were the problem. The Soviets seem to be of two minds about decentralized planning. One the one hand, it is regarded as entirely appropriate to offer higher wages to induce workers to acquire additional skills or to accept employment in less desirable parts of the country. In this aspect of wage policy the Soviets appear to accept an equity-based, "real cost" theory of earnings differentials. On the other hand, wage competition among enterprises for scarce grades of labor is officially condemned, largely because of its association with "excessive" turnover. The efficient allocative properties of this form of wage differentiation is not at all appreciated. Because of the unwillingness to employ wage (and price) differentiation as a means of narrowing disequilibria in such circumstances, command methods have to be employed instead.

The main difficulty, however, is the extreme complexity of the task of setting prices and wages at such levels as to elicit the desired responses. People
nevertheless do respond to them, as well as to other utility-affecting elements in the choice situation like location, availability of amenities and so forth. Such market-like behavior produces results that depart from what the state intends. Moreover, difficult as it is to understand the full complexity of behavioral relations in the production sector -- how a bonus for exported output will affect the quality of non-exported output -- it is surely much more difficult in social relations generally. In the 1960s for example, a series of measures were introduced to increase greatly the number of women choosing to enter the labor force. The measures were highly successful in what they sought to accomplish. Perhaps the framers of that policy did anticipate that one of the other consequences of those measures would be a decline in the fertility rate. One wonders, however, if there might not have been second thoughts about the female employment policy had the size of the consequent drop in fertility been fully foreseen.

Additional aspects of the interplay between centralization and decentralization emerge from our discussion of manpower planning. Our analysis suggests that the allocative, market-like role of wage structure varies with economic conditions, the tightness of labor supply in particular. During periods of abundant labor, with widespread slack in labor markets, the center successfully manipulates wage policy for primarily distributive (or equity) purposes. When labor markets tighten, relative wages play an allocative role — influencing the distribution of workers among branches of industry. Especially relevant at this point is the fact that these allocative wage movements are, very probably, not centrally determined. They appear to represent an autonomous response of enterprise management: wage competition, often in violation of centrally set wage policy, in response to threatening labor scarcity. Thus, changes in the environment in which the decision units of the economy find themselves can influence the effectiveness of central control.

Health

Medical care is another field in which reliance on the market has been circumscribed in most societies; the Soviet example is distinctive in degree and direction. The utilitarian aspect that is so dominant in post-secondary education is evident in Soviet medicine as well. From its inception, the
Soviet health system has provided above average medical care to population groups perceived to be of political, economic, or strategic significance. The residual population has had access to a 'public' medical subsystem which provides basic care of a relatively low standard.

The contemporary Soviet health service can be divided into preventive and curative branches. Curative medicine is provided in either 'closed' (elite, ministerial, industrial) or 'open' (public) subsystems. In the former access to facilities is governed by place of work or status, whereas in the latter the population is assigned to polyclinics (which provide outpatient care) and hospitals on a territorial basis.

Virtually all finance for the health system comes from the state budget or profits funds of economic enterprises. There are few direct payments by patients. This method of financing has both positive and negative features. On the one hand, the absence of fee-for-service means that Soviet patients do not face a medical care price barrier, and consequently make heavy use of the system. On the other hand, the health sector is subject to relatively tight resource constraints and this has an adverse impact on patient welfare. There are many doctors but medical wages are low (and personnel predominantly female). There are many hospital beds, but the buildings which house them are spartan and inadequately maintained. Many medicines and pieces of equipment are in short supply or of poor quality. Throughout the medical sector bottlenecks exist wherever specialized, modern technology treatment is required. As one might expect, rationing by queue plays an important role in the distribution of these medical services in the public system.

Further complicating the situation is the low priority status accorded consumer oriented sectors of the 'non-productive sphere' in the USSR. They suffer most when plans are underfulfilled in other sectors of the economy. Because of this pattern, the supply to the health system of non-medical goods, such as construction materials, automobiles, and textiles is erratic and frequently insufficient.

On the basis of available evidence it appears that the avoidance of market relations and reliance on planners' preferences in the health field is a mixed blessing. This policy has produced a large system of medical care, but it is one with quantitative, qualitative, and distributional characteristics which probably deviate considerably from what would be desired by a 'voting' population. If information about high usage rates of the few legal fee-for-
Service clinics and pervasiveness of 'under-the-table' payments to medical staff by patients is true, then this would indicate that Soviet consumers are prepared to allocate more resources in order to obtain care which more fully satisfied their individual needs.

It is not evident that a more decentralized system of medical care provision which involved substantial private activity would remedy the current deficiencies. But it does seem to be the case that detailed central planning and financing of medical services, or the non-market responses to the disequalibria this creates, leaves Soviet society with important, unresolved problems.

The Soviet health system, like the education system, is centralized on the supply side; the state determines the number of hospital beds and the number of medical personnel. The demand for health services, however, is determined by the decisions of individual persons and families regarding the maintenance of their health, from eating and drinking practices to the decisions to seek and accept medical care. The state influences those decisions by setting the prices that affect the benefits and costs to individuals of health-related alternatives.

There are important differences, however, in the kinds of tasks faced by the education and health systems. A major source of the complexity of the health production process is that health outputs are the result of the interaction of demographic, consumption, environmental, medical and economic factors. Therefore in order to assess the situation and performance of this social institution many different dimensions must be explored. Likewise, the development of policies and programs to ameliorate existing problems is a difficult task. The execution of a program is often impeded because of the behavior of so many variables outside the control of the Ministry of Health.

Recent trends in health stock, consumption and the environment have exerted, on the whole, an unfavorable influence on the Soviet population's health status. The illness pattern has changed substantially, with degenerative diseases and accidents becoming more prevalent. As a result, the tasks facing the health system have become more challenging.

The deterioration of certain important social indicators suggests that medical programs have not been completely effective in coping with the new illness pattern. Since the mid-1960s age-specific death rates of adult males have risen. Infant mortality began to climb in the 1970s and as a result, life expectancy at birth has fallen. Had the health system been able to compensate
for the unfavorable trends in health conditions it is possible that mortality would not have risen.

The causes of this deterioration in the nation's health are not entirely clear. We do know of several important factors, however, that adversely influence the level of health care: medical coverage is limited; a substantial amount of illness does not receive treatment. The quality of much medical care is low. Different social and political groups in the USSR have unequal access to specialized, modern medicine. Shortages of medicine, equipment and manpower are common in the system.

To a certain extent the specific problems are manifestations of a more general one: the supply of resources to the health sector by the state is insufficient relative to the needs of the population or the desires of health policy makers. During a period when tasks are becoming more complex the share of total health spending in national income has declined slightly and the health share of the state budget has fallen substantially.

It is evident that difficulties confronting Soviet society in the health field require remedial measures. However, the ability of decision makers to design and implement the required policies is limited. Four types of problems constrain effective action.

First, developments in the illness pattern cannot be controlled directly by the Ministry of Health. The aging of the population has been occurring throughout the world and inevitably brings with it an increase in degenerative disease. A certain portion of cardiovascular disease, cancer, and accidents is the product of individual behavior of Soviet citizens. Unhealthy habits, such as smoking or drinking, and inadequacies or irrationality in diets cannot be altered significantly by the activities of medical personnel. Finally, some disease is the by-product of other social and economic programs. It is argued above that mechanization, chemicalization and growing pollution have accompanied rapid industrialization and undermined health status. Obviously control of these developments is also not within the health system.

A second problem is that of confusion over objectives and appropriate measures of them. Should the health system have a preventive or curative orientation? Should the elderly, who suffer a disproportionately high percentage of serious illnesses, receive a larger share of medical services or
should care of infants and the economically active remain highest priority? Should planning of the health system remain on the basis of input indicators, such as beds or doctors per 10,000 population, or should it acquire an output orientation? None of these or other difficult issues have been resolved in the USSR.

Third, there are conflicts between objectives. Within the health sector the desire to reduce inequality in the distribution of medical services is in conflict with that of protecting the health of workers to the maximum, thereby averting illness-related production loss. Numerous examples can be found of contradictions between the aims of the Ministry of Health and those of other state organization. Health policy makers probably would like to reduce drastically sales of alcohol and tobacco products. However, those in agriculture, the food industry or retail trade, not to mention consumers, would oppose such measures. Doctors responsible for occupational health may wish to shut down an unsafe assembly line, but as this would interfere with fulfillment of production plans it can be expected that the factory management, trade unions and party branch would be reluctant to accept such a recommendation. In a socialist society conflicts between health maximization and other objectives should ideally be resolved in a rational manner by a state which reflects the population's desires and priorities. There is little evidence that the Soviet state attempts to sort out these contradictions in a coherent manner.

The final problem is that of severe resources constraints. No society allocates an unlimited amount to health protection. Nevertheless there is a tendency for the real allocation to health to grow, both on a per capita basis and as a share of national resources, in response to aging and the additional illness it generates. There are, however, few signs of a significant increase in the allocation of state resources to the health sector in the Soviet Union. With the decline in the rate of economic growth and the likely maintenance of traditional priorities there is not much scope for improvement in the immediate future. In addition, ideological constraints make it difficult to draw on available resources of consumers by expanding the private sector.

The Family

The health and education institutions are similar in that the supply side
is centrally planned while the demand side is decentralized. The family differs from both in that none of its internal processes are centrally planned. The planners decide how many teachers and doctors there will be, and what and how they will teach and heal. But they do not decide how many marriages and how many children there will be and how the parents will raise the children. In its transactions with the economy, the family and not the planners decide how much and whose labor will be supplied and what consumer goods and services will be purchased with the family's income and wealth. Thus the relationship between family and economy in the USSR is more like that in non-socialist economies than is the case in the relationship between educational and health institutions and the economy.

Although centralized planning plays virtually no role in the functioning of the institution of the family, the state has an obvious and vital interest in the kinds of decisions made in that autonomous unit. The particular decision upon which our research concentrated was the number of children to bear.

Two aspects of the fertility behavior of the population have produced grave concern on the part of the political leadership. One is the sharp decline in fertility since the late 50s, to a current level that is below the population replacement level. The second is the sharp difference in the fertility rates of Moslem and European (Slavic and Baltic) women. A number of the causes of the fertility problem are to be found in the interrelations between the family on the one hand and the health and educational institutions on the other.

The expansion of women's education has contributed in the USSR as elsewhere to the decline in fertility. We found one group of women, however, who responded to an increase in education by having more babies rather than fewer. That group consists of rural Moslem women who have no more than elementary education. When they acquire a bit of secondary education, their fertility rises (though it declines sharply if they persist through the completion of secondary school). We have interpreted that unusual response as a consequence of "premature modernization;" women who have not yet responded to those forces of modernization that cause them to wish to reduce their fertility, use the knowledge they acquire to have more rather than fewer children. The finding illustrates the point made above about the complexity of social behavior. The policy of promoting the education of Moslem girls serves as a decentralized device for accomplishing
two objectives: increasing their labor force participation and reducing their fertility. No state planner could reasonably have been expected to anticipate that the policy would have the opposite effect on the fertility decisions of one substantial group of Moslem women. Now that the underlying behavioral structure is better known, however, it is possible to design a more differentiated policy to attain the end of reducing Moslem fertility. Under that policy a given volume of educational resources would be used to give more education (through secondary school) to fewer Moslem girls, rather than less education to more Moslem girls. Educational effort would also be concentrated in the cities rather than in the countryside, because urban Moslems at all education levels respond to increased education in the usual manner, by restricting fertility.

The health system influences fertility in a variety of ways, one of which has assumed considerable prominence in the past decade -- control over infant mortality. Our research has not dealt with the impact of infant mortality on fertility, but in most countries the relationship is known to be positive: increases in infant (and child) mortality induce families to increase their fertility in order to attain the desired number of surviving children. The relatively slow decline in fertility in Central Asia therefore suggests the possibility that much of the rise of infant mortality may have occurred there, a conjecture that is supported by some other evidence.

Among the ways in which the economy influences fertility, two merit attention. One is family income. Economic theory suggests that a "pure" increase income -- meaning by "pure" that no additional labor is required to earn that added income -- should lead to an increase in fertility. The preliminary findings of some of our research not yet completed provides some weak confirmation of that hypothesis. Provincial-level data show that the higher the level of education of males, the higher the average fertility level in the province. Since males with higher education generally earn more income, those results suggest that the higher level of "pure" income, the more children people have.

The second channel of influence of the economy on fertility operates through the cost of having children. Here we find the impact of some of the most distinctive features of the Soviet economy. The major form of that cost is the time and effort required to manage a home and care for children in the USSR,
a cost that is borne largely by the women. That high cost can be attributed in considerable measure to the system of central economic planning, for in a market economy consumer preferences would without doubt have led to a greater supply of those goods and services that would have made the mother's life easier: less queueing in shops, more prepared foods, larger apartments and so forth. That cost is greatly increased by the extremely high labor-force participation rate of Soviet women. The number of women working outside the home is now close to the demographic maximum, particularly among non-Moslem women. That high labor participation rate is a matter of state policy, designed to provide the maximum possible supply of labor to the economy. Since the future labor supply depends on the number of children being born today, however, that policy has had the consequence of providing short-run gains in the form of the maximal labor effort of women, at the cost of long-run losses in the form of a reduced future population.

The family may be thought of as engaged in two major types of transactions with the state. One is transactions in consumer goods and services, and the other is transactions in labor services. The transactions in consumer goods and services may be described in terms similar to the market-like model we have employed in the case of education and health, the supply of consumer goods is centrally controlled, while demand-side decisions are made by decentralized agents under conditions (primarily prices) influenced by state policy. In the transactions in labor services, however, the family is the supplier and the state is the demander. In this case the demand side is centrally planned while the supply decisions are made by decentralized agents under conditions (primarily wage rates) influenced by state policy.

The supply of labor services has both short-run and long-run aspects. In the short-run, the labor supply is limited by the existing population. We have dealt with some of the issues involved in the preceding discussion of education and manpower planning. In the long run the supply of labor varies with population. It is with this aspect of the institution of the family that our research has been primarily concerned.

Perhaps what is most distinctive about the economics of the Soviet family relative to other countries is the extent to which the state seeks to impose its preferences on family decision making. Many states in the world have no preferences regarding family behavior and consider it inappropriate for a state
to substitute its preferences on these matters for those of individual families. But even in those societies in which state preferences on aspects of family behavior are widely regarded as legitimate, it is rare that the efforts to impose them are as extensive as in the USSR.

There are three kinds of family activity in which the outcomes of family life in the USSR are most heavily influenced by state preferences. They are the supply of female labor services, reproductive behavior and the supply of consumer goods and services.

Soviet mothers participate in the labor force to a degree that is unparalleled among modern nations. The decision to participate or not is based on individual or family preferences, but the private costs and benefits are heavily influenced by such state policies as the promotion of women's education, subsidized child care centers, and Party-based social pressures. In this area the state has been highly successful in attaining its objectives under conditions of decentralized decision-making.

That success has been qualified, however, by certain other outcomes, largely unintended, of the high participation rate. Child behavior specialists for example have been increasingly expressing concern over the impact on young children of the maternal deprivation associated with high participation rates. Other features of family pathology like high divorce rates and juvenile delinquency have been ascribed in part to the extent of mothers' labor participation. But the major qualification is the effect of the successful labor participation on the second outcome -- reproductive behavior.

Perhaps it was unrealistic of the state leadership to expect that it could attain so high a female participation rate without a consequent decline in fertility. It is more likely that a decline was expected but that its magnitude was not. In particular, it is doubtful that when the state decision was taken around 1960 to push the female participation rate to virtually its maximum, the leadership expected that as a partial consequence the one-child family would become increasingly the norm among European Soviet women by the 1970s. Similarly, it may have been expected that the state's instruments for increasing female labor force participation would be more successful among European than among Moslem women. But it is doubtful that the leadership an-
ticipated the further consequence of a widening differential in the fertility of the two populations. Yet another looming concern is the rising ratio of retirees to active workers, a ratio that is expected to grow to alarming proportions by the beginning of the next century. The ability of the state to influence certain forms of social behavior through decentralized means ought not therefore be regarded as an unmixed blessing. The unintended spillovers into other areas of social behavior may be large and unwelcome.

The third kind of family activity that is heavily influenced by the state is the consumption of normal goods and services. While the state seeks broadly to satisfy families own preferences for consumer goods, the output mix is heavily influenced by central planning, and planners' preferences find expression in that output mix. One outcome is that Soviet families derive less utility benefit from their incomes than would be the case in a more decentralized economy. But there is another outcome that bears more directly on reproductive behavior.

In a normal market economy a rising female labor force participation rate would be accompanied by a change in the structure of demand for consumer goods and services. In particular, there would be a rapidly growing demand for goods and services that substitute for the time and effort formerly devoted by mothers to homemaking and child-care: precooked foods, better services in retail shops, freezers and washing machines, larger apartments in which to keep these appliances, fast-food shops, convenient repair services, throwaway diapers, and so forth. If consumer preferences were sovereign, the production sector would respond to the change in demand, and the greater availability of these goods and services would partially offset the loss of the mother's former homemaking and child rearing services. They would therefore cushion the decline in the fertility rate that normally accompanies a rise in the female participation rate. That is to say, the decline in fertility would be less if the production of consumer goods and services responded to the changing demand structure.

Because of the heavy influence of planners' preferences on the consumer product-mix in the USSR, however, there is no automatic response to the changing structure of the demand. Moreover the planners, being mostly men, are hardly likely to place the same value on those goods and services as do working women. Hence it is reasonable to conclude that the Soviet production section has not responded to the changing structure of demand as a market economy would. The
manifestation of that non-responsiveness is captured in the notion of the "double burden" that Soviet women are said to bear. The consequence is that the decline in fertility, which was inevitable given the high state-induced female labor participation rate, has been even greater than it would have been in a decentralized economy.

Conclusions

These observations on the three social institutions do not offer any firm conclusions on the relative efficiency of centralized and decentralized planning methods. For one thing, the planning of non-human economic resources is not easily commensurable with the planning of human resources. One should expect that the effort by the state to direct the educational and reproductive behavior of a population would be much more difficult than the effort to control the production of shoes. Therefore, the problems we have noted in Soviet social planning offer very little guidance on the question of the relative merits of centralized and decentralized methods of economic planning.

Looking only at social planning, therefore, one must be impressed with the responsiveness of Soviet people to variations in the conditions under which decisions are made. Education decisions are strongly influenced by the perceived benefits and costs of education, and childbearing decisions are strongly influenced by women's wage rates. Such strong market-like responses by individuals offer an opportunity to Soviet policy-makers to guide their behavior in directions desired by the state. On the other hand, we have noted a variety of sharp limitations on the ability of social planners to accomplish that end. Ideological factors limit the range of possible price and wage variations. But more important is the difficulty of determining the set of prices that will lead individuals to choose the desired alternatives. The responsiveness of individual behavior facilitates the operation of real markets, but does not assure the effectiveness of the market-like instruments employed in Soviet social planning.

The general conclusion is that in such social institutions as the family, education, and health, Soviet citizens are similar to those in other countries in that they are generally free to choose among a variety of alternatives, on the basis of their own calculus of the private costs and benefits. They differ from citizens in other countries, however, in their lesser ability to
influence the volume of resources available to them (education, consumer goods), and in the greater extent to which their government manipulates the prices that determine the private costs and benefits. The Soviet state has the capability of greatly influencing social behavior by the centralized control over resources and its decentralized instruments of policy. But it is not at all clear that the state is any more successful or efficient in attaining its goals with respect to social institutions than in attaining its goals in the economy.
INTRODUCTION

1. The subject of this report is the role of market institutions—the wage system, in particular—in the production and allocation of human capital in the Soviet Union. This has been a matter of controversy among Western specialists on the Soviet economy for some time.¹ Some argue that relative wages play a substantial allocative role: that relative wages respond over time to changing relative scarcities of different grades of labor, that employers respond to changing relative wage ratio in staffing decisions, and that students and workers respond to financial costs and benefits (including wages) in choosing occupations and courses of professional instruction. This view builds upon two central phenomena: the substantial degree of mobility enjoyed by labor in the USSR (and the "ultimate sanction", as J.R. Hicks put it², that this allows labor to impose upon wage structure) and, on the other side of the wage bargain, the pressure to economize in the use of labor that exists at the enterprise level.

The facts of the matter allow of a different interpretation as well. Mobility of labor, especially between regions, is subject to major impediments.² The economizing tendency of employers is undermined by dysfunctional incentive systems. Wage structure, it is argued, is controlled centrally with distributive and ideological objectives predominant. At best, relative wages signal long-term priorities (such as for regional development); a reasonably flexible instrument for efficient allocation of labor they are not. Discernible trends in wage structure should therefore be associated with distributive or equity policy of the State rather than with efficient signalling of changing relative scarcities.
2. The actual and potential roles of wage structure in the Soviet economy are questions of considerable interest today. The Soviet economy is entering upon a period of manpower stringency: increments to the population in the working ages are forecast to decline from about 2.7 million in 1976 to only 285,000 in 1985-86.\(^4\) Tightness of aggregate labor supply is accompanied by severe regional imbalances as well. The allocative agenda is therefore substantial, and the mechanisms through which it will be pursued remain unclear. As growth of aggregate labor supply ceases to be a source of economic growth, as improved allocation of existing stocks is relied upon more heavily, the institutions for allocation assume additional importance.

Many institutional alternatives exist, both in theory and in Soviet practice. It is possible, however, to capture an essential aspect of the situation in two broad sets of alternatives: "administrative" or command procedures and market-based approaches in which private incentives are manipulated to produce the desired allocation. As efficient allocation (defined with reference to centrally determined production goals) becomes more vital, especially in a society in which the sectoral and regional growth plans of the center contrast sharply with the occupational, educational, and locational preferences of the majority of the population, the tension between coercive and voluntaristic allocation increases. The ability of the latter to cope with the enormous allocative tasks that exist without violating distributive or other constraints (such as on the division of GNP between
consumption, investment, and defense) may be very limited.

Past experience may illuminate the prospects for alternative approaches. During the postwar period, the Soviet economy has experienced two severe cycles in aggregate manpower supply. These cycles reflect the impact of major demographic episodes of the past (such as war losses) and the steep fertility decline that began in the early 1960's. The first cycle reached a peak in 1954, with an annual increment to the working age population of 2.8 million persons; the trough came in 1960, when there occurred a net decrease of 150,000 in the size of this population. (In Soviet practice, the working ages are 16 to 59 for males and 16-54 for females.)

The second cycle has the 1976 peak and 1986 trough already referred to.

The effect of these cycles is to cause sharp changes in general labor market conditions within relatively short time periods. At the same time, major shifts in the structure of employment have occurred, between major sectors of the economy—industry, agriculture, the services—and within the industrial sector (manufacturing and mining). Compositional change has occurred as well in qualitative aspects of the labor force: educational attainment in general and the supply of formally trained professional manpower in particular, have increased markedly. This combination of sharp swings in aggregate labor supply and substantial, structural and qualitative changes signifies major changes in relative scarcities of different types and grades of labor. If market forces, operating through the wage structure, play an important role in manpower allocation in the USSR, postwar Soviet
history would seem to have provided a background against which those forces should be discernible. What we discover about the allocative role of wage structure in the recent Soviet past may inform our speculation concerning Soviet response to the straitened manpower situation upon which it is now entering.

3. The empirical basis of our analysis of Soviet labor markets is the changing wage and employment structure over the period 1950-1978. The structures we explore involve disaggregation by branch of the economy and by major professional category: Rabochiye (blue-collar workers), ITR's (engineering-technical personnel), and Sluzhashchiye (office and clerical workers). Over the period in question, the wage structure of these three professional groups has been substantially compressed in the sectors (Industry, Construction, and State Agriculture) for which we have sufficiently disaggregated data: the average wage rates of sluzhashchiye and of rabochiye have risen sharply relative to that of the highest paid group, ITR's. Focusing upon rabochiye and ITR's, as we will in much of what follows, we find the following: In Soviet industry as a whole, the ratio of the average rabochiy wage, \( W(R) \), to the average ITR wage, \( W(I) \), increased from .57 in 1950 to .85 in 1978.\(^6\) In construction ("basic construction", excluding subsidiary manufacturing, transport, and service operations of construction enterprises), the increase is even more striking—from .47 in 1950 to .93 in 1978. (Reference is to average monthly money wages, including all bonuses and premia paid out of the enterprise wage
Excluded are those, apparently negligible, bonuses paid from other sources.) Average rabochiy wage rates also rose substantially relative to those of sluzhashchiye in all branches of industry for which we have data during this time period.

The effect of these wage changes was to reduce sharply the relative variation in average wage levels among labor force categories. The extent of the compression of this aspect of wage structure can be gauged from the change in the following measure: the ratio of the absolute difference between the wages of the highest and lowest paid groups to the mean wage of all personnel. In industry, this ratio decreased from .814 in 1950 to .372 in 1978. During the period for which the required data are available for individual branches of industry (1950-66), the same tendency is observed in branch disaggregation.

These changes in wage structure involve substantial changes in the economic positions of different educational groups. According to the 1970 population census, of all of the persons recorded as ITR's, 85.2 per cent had at least a complete secondary education and 78.4 per cent had a specialized secondary, partial or complete higher education. Data are provided for all rabochyiye in industry, but some idea of the disparity in educational attainment can be gained from the data given on those engaged in "physical work" in machine building and metal working, a relatively well-educated branch of industry: 31.1 per cent had a complete secondary education or more, and 5.7 per cent had a specialized secondary, partial or complete higher education.
Sluzhashchiye generally have an intermediate level of education. Comparable percentages for typists and stenographers, apparently the least well educated major occupational group in the sluzhashchiy category, were 59.7 and 8.4. Thus, it is evident that, over the 1950-78 period, money wage rates increased in inverse relationship to the average educational level of these three major occupational categories.

This relationship is the point of departure for our exploration of the functioning of Soviet labor markets and the reflection of changing relative scarcities in the structure of Soviet wages. There can be no doubt concerning the enormous increase in supply of "upper level" or professional manpower in the Soviet economy. Between 1950 and 1978, the number of "specialists" (i.e., holders of diplomas from higher educational institutions, VUZy, and specialized secondary institutions, SSUZy, of which the tekhnikum is the most common form employed in the economy increased by 700 per cent, while total employment grew by about 50 per cent. In industry, construction, and other branches of material production, the growth rate of specialist employment has been much greater: Between 1955 and 1977, the number of specialists employed in industry increased by more than 750 per cent; in construction the increase exceeded 900 per cent. These growth rates may be compared to a figure of 390 per cent for the Soviet economy as a whole over the same time period. As proportions of total employment, the growth of specialist employment is even more striking: In industry and construction, the increase is from about 4 per cent in 1950 to 18-21 per cent in 1978.
4. That such striking increases in absolute and relative supply of "high eds" in material production should have something to do with the decrease in the relative wage levels of the two white collar labor categories (relative to the much less well educated blue collar group) will strike most economists as an eminently reasonable suggestion. Nevertheless, a number of factors must be considered before this explanation is accepted as adequate. These factors relate to movements of demand for "high eds" during the postwar period, the peculiar micro-economics of demand for specialists in Soviet production enterprises, and to the functioning of markets for professional labor more generally.

Consider first the question of demand. The fact that the supply of professional manpower to, and the employment of ITRs in, Soviet production branches have grown rapidly does not by itself imply downward pressure on the relative wage ratio of the occupational groups involved even in a competitive market setting. Before any inference can be drawn concerning direction of changes in equilibrium wage rates, we must know something about demand conditions during the time period in question. One of the early findings of the economics of education in the United States is the apparent stability of the rate of return to investment in college education over a lengthy period in the twentieth century when the (relative) supply of college graduates in the American labor force increased steadily and substantially. The conventional explanation is that, reflecting changes in the structure of economic activity and the pace of technical change in the economy, demand for
college-trained people was also increasing rapidly, and that this prevented any significant decline in the rate of return on a college degree.

This evidence on the role of demand changes poses an obvious question concerning the Soviet case: What was the role of demand? Is it clear that the supply of "high-eds" was increasing more rapidly than demand for their services during this period, which incorporated subperiods of rapid expansion and technical change? Given the rapid pace of investment in much of this period, given the weight of the more "progressive" branches (energy, machine building, chemicals) in postwar Soviet industrial growth, and the rising sophistication of production methods in the rapidly expanding branches, one might well infer that demand for technically trained professionals was increasing strongly, perhaps sufficiently strongly to render unlikely the sharp change in relative earnings shown by the official data for ITRs and rabochiy.

The workings of labor market institutions must also be considered. The main focus of our attention will be upon the sharp change in the relative earnings of ITRs since 1950. It is this change that is the main evidence on the role of changing relative scarcities (of "high eds" and "low eds") in shaping the Soviet wage structure. Now, it must be understood that the term ITR properly refers to a position in an enterprise's table of organization, not to the person, or any qualitative aspect of the person, who occupies that position. The
wage rate associated with the position is determined with reference primarily to the extent of the responsibilities it involves (and/or to the number of persons supervised), and job content is determined by the technology and organization of production that prevail in the enterprise. Traditionally, there have been no advanced educational prerequisites for ITR slots—neither for lower level "technician" slots or higher level "engineer" positions. Apparently, people have been selected for those positions based upon general educational attainment, work experience, successful completion of special training programs provided by the enterprise, and specialized advanced training in SSUZs for technician slots) or VUZs (for engineer slots). (Recent years have seen substantial efforts in many branches to upgrade educational attainment among ITRs, including the replacement of those lacking a VUZ or SSUZ diploma (the so-called "praktiki") with holders of these credentials. Nevertheless, major reliance has been placed upon other background characteristics and upon training for the position within the employing enterprise.)

This suggests that the conventional neoclassical labor market model may not be immediately relevant to the ITR wage phenomenon. ITRs may differ from carpenters or typists in that they do not represent one or several more or less homogeneous skill categories, which skills are acquired before labor market entry. If the ITRs' skills are highly specific to the individual enterprise (reflecting that enterprise's product mix, technology, and organization of production) and are largely acquired within the enterprise, we may be misled
by a model which associates ITRs with skills that are bought and sold in labor markets. Put differently, the long-term decline in the relative earnings of ITRs should not (perhaps) be associated with an increase in the supply of ITRs (relative to demand), because ITRs are enterprise-specific positions, not widely transferrable skills for which a market can be said to exist.

An alternative approach would emphasize the extent to which the technical and managerial skills of the ITRs are transferrable, commanding value in a substantial variety of employments. Whether these skills are acquired in enterprise-administered training programs, on the job, in independent SSUZ or VUZ attended before employment, or in some combination of these alternatives, ITRs (in this view) can be treated as an occupational group (or as a number of such groups). Conventional neoclassical supply and demand analysis can then be applied to movements in the (equilibrium) price and quantity of ITR services.

A very similar opposition of conceptions of contemporary labor markets has emerged in Western labor economics. On the one hand, we have the orthodox neoclassical view, characterized by labor markets for well-defined skills which are acquired before labor market entry. Allowing for adjustment lags and market imperfections, wages tend toward market clearing levels as suppliers (actual and prospective sellers of different skills) and demanders (profit-maximizing employers) make short- and long-run responses to relative wage rates for different skills.
The rival conception combines the ideas of modern institutionalists such as Clark Kerr, Melvin Reder, Piore and Doeringer, Lucas and Thurow. The main ideas are:

(a) The major part of job-required skills are acquired on-the-job, after hiring, not before.

(b) The structure of the table of organization and job content are largely determined by the technology of production.

(c) Wage differentials and promotion criteria are strongly influenced by conventional notions of equity. The former are commonly based upon the complexity of job content and the latter upon seniority.

(d) The wage structure responds very slowly to changes in market conditions, and then only to progressive, long-term shifts. Shorter run changes in relative scarcities have virtually no effect on relative wages: Employers react by varying recruitment efforts, hiring standards, and/or training programs. In the "internal labor market" of the large enterprise, wage structure represents a body of understandings and expectations that is not substantially altered without cost.

(e) Given the table of organization, job content, wage structure and the reliance on training within the firm, queues form for positions at different levels. The order in which people are hired (i.e., position in the queue) is determined by prospective training costs as estimated by the employer. These estimates are based on "signals" (as Spence calls them).
background characteristics, of which educational attainment is assumed to be the most important. In apparently significant aspects, the latter model (approximately Lester Thurow's "job competition" model) reproduces Soviet labor market conditions, especially those relating to technicians and engineers:

(a) The literature on manpower planning makes evident that tables of organization at the ITR level are designed on the basis of "normative coefficients", relating ITR slots of different sorts to blue collar staff levels or to output levels, with account being taken of the technical level of the enterprise. No indication has been found that, given the technology of the enterprise, the table of organization is influenced by relative wage rates. Nor is there any suggestion that the technology of production is selected with reference to the relative scarcities or wage rates of different grades of labor. (Piore and Doeringer find no evidence of such sensitivity in U.S. firms.) This dominant role of fixed coefficient planning, with emphasis on technical characteristics of the production process, imply very low wage elasticity, as implicit in the second model.

(b) A second important aspect is the existence of a centrally determined wage structure, subject to "reform" at lengthy
intervals. In this structure, wage rates are assigned to different slots as previously indicated—on the basis of job "complexity" and/or the extent of supervisory responsibilities. Again, descriptions of the wage-setting process assign no explicit role to relative scarcities. Technical aspects dominate the process.

(c) For most of the postwar period, primary reliance has been placed upon training within the enterprise to produce the desired skill mix, at both the blue collar and professional levels. Seniority is accepted as a major determinant of promotion.

5. The import of these considerations is that institutional considerations complicate the relationship between changing relative scarcities and changing relative wages. If the number and content of ITR slots are determined independently of relative wages, if relative wages are so strongly influenced by institutional factors, it is no longer evident that the enlarged supply of SSUZ and VUZ graduates did cause or even could have caused such striking changes in relative wages over relatively short periods of time. If, through on-the-job training or through the planned professional manpower supply system (which purport to link enrollment levels in SSUZy and VUZy to staffing requirements of Soviet enterprises) demand for professionals creates its own supply, it is not clear how supply can so substantially outpace demand as to produce the remarkable change in wage structure that has occurred. If the vastly
increased supply of graduates means only that ITRs receive more of
their preparation for their assignments in formal educational institu-
tions before going to work and less of it at the enterprise after accepting
employment, the source of substantial downward pressure on ITR wages
(relative to rabochiy wages) is not clear. It should be emphasized that
the revolution in educational attainment which we are discussing
involved much of this sort of substitution, as opposed to net increase
in the population of ITRs. The enormous increases (already described)
in the numbers of VUZ and SNUZ graduates employed in Soviet industry,
1950-78, translate into an increase from 10.4 to 16.4 per cent in the
ratio of ITRs to total employment. Is it self-evident that a change
of this magnitude should lower the average wage ratio of ITRs from 178
per cent to 118 per cent of that of blue collar workers? This question,
as we have indicated, seems the more apt when we consider factors that
were operating to increase demand for ITRs relative to blue-collar
workers: technological progress in most branches of Soviet industry
and disproportionate growth of technically advanced branches in which
the ratio of ITRs to rabochiye is relatively high.

A third factor, related to the institutional elements just
discussed, and bearing upon the linkage between relative scarcities
and relative wage rates, is the microeconomics of the employment
decision. In the preceding paragraphs we have indicated the basis
for skepticism concerning the wage elasticity of demand for labor of
different grades. The roles of technologically and institutionally
imposed constraints were stressed. Within the framework of these
constraints, the underlying thrust of the enterprise toward profit maximization (or cost minimization for any given output level) was taken for granted. (An exception is suggested by the evidence, of a not very persuasive nature, of Doering and Piore that American engineers take account of average wage rates, but not of relative wage rates of different categories of labor, in designing new facilities.\textsuperscript{18} ) There are grounds for suspecting that this fundamental economizing tendency is, in an important aspect of employment decision-making, very weak if not oppositely directed in the Soviet enterprise. The point is that the Soviet enterprise has strong incentives to seek a larger rather than a smaller wage bill (or approved wage fund).\textsuperscript{19} The managerial wage scale and important bonuses vary directly with the size of the wage fund that has been approved by higher organs (i.e., the Ministry) and incorporated into the enterprise's annual plan. Enterprises are widely reported to respond to this circumstance with efforts to enlarge staff and to upgrade the table of organization\textsuperscript{20}—requesting engineer slots when technicians might serve as well, etc. It is also possible that enterprises which are finding it difficult to meet requirements for skilled blue collar workers attempt to reclassify highly skilled operative positions as ITR slots. (In succeeding sections, we shall be considering the changing relationships between the average wage rates of different categories of labor in different sectors of the economy. It may be appropriate at this point to observe that behavior of the sort described may affect wage relationships in ways
that, in some cases, are not immediately obvious. For example, upgrading the ITR staff would obviously raise the average ITR wage, $W(I)$, and decrease the ratio of average rabochiy wage, $W(R)$, to $W(I)$. Expansion of the ITR staff would do the opposite if, as seems likely, it principally involved addition of slots at the lower (technician) level. Transfer of upper level rabochiy slots to lower level ITR slots would tend to lower the mean values of both $W(I)$ and $W(R)$, raise the mean wage for both groups taken together, and very probably lower the ratio, $W(R)/W(I)$. This last surmise follows from the assumption that the ITR wage distribution is relatively dense at the lower (technician) end and the rabochiy wage distribution is relatively thin at the upper (highly skilled) end. Shift of a slot from the best paid rabochiy group to the lower tail of the ITR distribution could have these effects if the newly created ITR slot does indeed pay more than the rabochiy slot which was eliminated. We assume that this is the case because, by hypothesis, we are dealing with practices whereby enterprise managers attempt to increase their total wage funds. Possibilities such as this should be kept in mind when considering the effects of employment changes on relative wages, as we will be doing.)

Officials at higher levels, of course, are aware of this sort of behavior and have ways of opposing it. Nevertheless, the literature suggests that their efforts have not been entirely successful, and that professional staffs at production enterprises tend to be larger and more costly than they would be in the absence of the dysfunctional
incentive to which we have referred. Therefore, at a very consequential level of employment decision-making—that relating to determination of the size of the enterprise wage fund—we do not anticipate the consistent, conscientious economizing tendency that, in the aggregate, causes relative wages to adjust to relative scarcities.

Shorter run behavior is another matter. Given its (approved) wage fund, the typically strong pressure to meet production targets presumably generates equally strong pressure to expend the wage fund in a manner which is (privately) efficient. In this regard, it should be noted that, in Soviet economic administration, the enterprise wage fund represents the most effective, the principal means of control of enterprise behavior in the field of employment: once approved, violation of the ceiling it represents is not easily justified and, if not justified, is severely penalized.

This implies a tendency to expend the wage fund so as to attract and retain the staff which is required to meet production targets. And this will involve "meeting the market" for labor of different grades, sometimes by means which are not officially approved (such as "adjusting" locally-controlled output norms and upgrading of workers or their positions\textsuperscript{22}) but which do not violate the wage fund ceiling. Under these circumstances, increasing (relative) supply of "high-ed" manpower would be translated into reduced pressure to "drift" ITR wages upward. ITR wages would tend to rise less rapidly than those of labor force categories (such as skilled rabochiye) in greater scarcity.
6. The foregoing discussion leads us to conclude that the conventional link between the greatly increased stock of SSUZ and VUZ graduates in Soviet economy and the decrease in the earnings of ITRs and sluzhashchie in the production sector relative to those of blue collar workers is subject to question on several grounds. First, it neglects the probably substantial growth of demand for professionally trained manpower over the period in question. Second, it seems implicitly to accept a neoclassical view of labor market operation, in which production skills are priced and allocated by the interaction of buyers and sellers who respond flexibly to changing relative scarcities and prices. An alternative view emphasizes the rigidities in industrial wage structures, the importance of occupational training provided by the employer after hiring decisions are made, and the role of educational attainment in the employer’s ranking of prospective employees. Third, we observed that the reward structure of the Soviet enterprise generates both incentives and disincentives for efficient staffing decisions. The implicit assumption of the neoclassical model that the firm will tend to produce whatever output(s) it decides upon at the lowest attainable total cost is subject, in the Soviet context, to important qualification. Finally, there is ample evidence that distributive considerations have had a substantial influence upon Soviet wage structure. Changes designed to reduce earnings differentials often coincide with shifts in relative scarcities, posing a central analytic problem in the discussion that follows.
7. In the following sections, we attempt to shed light upon these issues by examining, in differing degrees of disaggregation, Soviet wage, employment, and educational data for the period 1950-1978. Our method, essentially, is to identify apparently substantial trends or tendencies in the relationships among these variables and to evaluate their consistency with the operation of labor markets which play a substantial allocative role.

This attempt to make sense of wage and manpower movements is subject to serious drawbacks. Most important, perhaps, is the degree of aggregation of most of the data we will use: using national data for sectors of the economy or even for 16 or 17 branches of industry, the effects of changes in the regional or product composition of the branch aggregates is lost to us. Adjustment lags are also unknown; we can only hope that the time horizons over which we observe wage and employment changes are sufficiently long that all fundamental relationships have had ample opportunity to work themselves out. Finally, we might note that our objective of relating changes in relative scarcities of different grades of labor to changes in relative wage rates would be especially well served by information relating specifically to newly hired personnel: the levels at which they were hired and the associated wage rates. Such data being totally unavailable, we make use instead of movements in total employment and in the average wage level for all personnel in the particular category in question.

This brief list by no means exhausts the problems posed by the incomplete, highly aggregated data set with which we will work. In attempting the following analysis, we implicitly assume that the
swings in labor market conditions that occurred in the 1950-78 period were so substantial and so unevenly distributed over this time period that they would make themselves felt in our wage data if, indeed, wage structure served to accommodate the economy to changing relative scarcities of different grades of labor.
II. MAJOR TRENDS, 1950-78

1. In this section, we examine wage and employment developments in industry as a whole over the 1950-78 period. During this period, the number of white collar workers (ITR's plus sluzhashchiye) per 100 blue collar workers in industry increased from 16.5 to 20.7. The relative wage of white collar workers decreased from 143.6 to 110.5 per cent of the average wage of blue collar workers.

What we take as our primary hypothesis associates these changes with sharply reduced relative scarcity of persons with white collar skills. Whether produced by decentralized market behavior or by efficiency-minded central planners, the inverse movement of factor proportions and of relative factor prices represents rational adaptation to altered relative scarcities. Thus, relative wage rates are seen as playing an allocative role, serving as efficient signals to both suppliers and demanders of factor services. (The notion that relative wages play a substantial allocative role would appear to be implicit in the notion that they vary with changing relative scarcities. If market forces cause equilibrating changes in relative prices, those forces presumably reflect economizing behavior by actors in the market. If the equilibrating changes represent decisions by price administrators at the center, their effort to track equilibrium price relationships presumably has an allocative purpose which is justified by an allocative effect. Therefore, those who posit a relationship between relative scarcities and relative wages would also tend to assign an allocative role to relative wages.)
Table 1. Average monthly wage rates (rubles per month) and employment indices, Soviet industry: 1950-78*

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<tbody>
<tr>
<td>1. Rabocheiye (r./mo.)</td>
<td>68.7</td>
<td>76.2</td>
<td>89.8</td>
<td>101.7</td>
<td>130.6</td>
<td>160.9</td>
<td>176.1</td>
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<tr>
<td>2. Index (1950 = 100)</td>
<td>100.0</td>
<td>110.9</td>
<td>130.7</td>
<td>148.0</td>
<td>190.1</td>
<td>234.2</td>
<td>256.3</td>
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<tr>
<td>3. ITRs (r./mo.)</td>
<td>120.8</td>
<td>126.4</td>
<td>133.0</td>
<td>148.4</td>
<td>178.0</td>
<td>199.2</td>
<td>208.4</td>
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<tr>
<td>4. Index (1950 = 100)</td>
<td>100.0</td>
<td>104.6</td>
<td>110.1</td>
<td>122.9</td>
<td>147.3</td>
<td>164.9</td>
<td>172.5</td>
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<tr>
<td>5. Sluzhashchiye (r./mo.)</td>
<td>63.6</td>
<td>67.8</td>
<td>73.2</td>
<td>85.8</td>
<td>111.6</td>
<td>131.3</td>
<td>142.7</td>
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<tr>
<td>6. Index (1950 = 100)</td>
<td>100.0</td>
<td>106.6</td>
<td>115.1</td>
<td>134.9</td>
<td>175.5</td>
<td>206.5</td>
<td>224.4</td>
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<td>7. Ratio: Line 1 ÷ Line 3</td>
<td>.569</td>
<td>.603</td>
<td>.675</td>
<td>.685</td>
<td>.734</td>
<td>.808</td>
<td>.845</td>
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<th>Employment</th>
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<tr>
<td>8. Rabocheiye: Index (1950 = 100)</td>
<td>100.0</td>
<td>127.0</td>
<td>150.3</td>
<td>183.3</td>
<td>207.5</td>
<td>222.6</td>
<td>233.9</td>
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<tr>
<td>9. ITRs: Index (1950 = 100)</td>
<td>100.0</td>
<td>129.0</td>
<td>157.2</td>
<td>224.9</td>
<td>288.7</td>
<td>335.7</td>
<td>377.1</td>
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<tr>
<td>10. Sluzhashchiye: Index (1950 = 100)</td>
<td>100.0</td>
<td>105.3</td>
<td>113.0</td>
<td>136.0</td>
<td>160.6</td>
<td>161.3</td>
<td>159.9</td>
</tr>
<tr>
<td>11. ITRs per 100 Rabocheiye</td>
<td>10.4</td>
<td>10.6</td>
<td>10.8</td>
<td>12.9</td>
<td>14.1</td>
<td>15.3</td>
<td>16.4</td>
</tr>
</tbody>
</table>

Sources: TsSu SSSR, Trud v SSSR (Labor in the USSR), Moscow, 1968, pp. 81, 140; TsSU SSSR, Narodnoye khozyaystvo SSSR v 19 godu, statisticheskiy yezhegodnik (The Economy of the USSR in 19, A Statistical Annual), Moscow, 1960-78. Volumes in this series that were used are those for 1965, 1970, 1975, and 1978. (Employment and wage data from these volumes occasionally differ slightly.)

* Data refer to average annual employment of industrial-production personnel only. Rabocheiye are blue-collar workers; ITRs are engineering and technical personnel; Sluzhashchiye are office and clerical workers.
Table 2. Average annual percentage rates of change of wage rates and employment levels, Soviet industry: 1950-78

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<tr>
<td>Rabochiye</td>
<td>2.00</td>
<td>3.36</td>
<td>2.50</td>
<td>5.13</td>
<td>4.26</td>
<td>3.05</td>
<td>3.42</td>
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<tr>
<td>ITRs</td>
<td>0.56</td>
<td>1.43</td>
<td>1.81</td>
<td>3.70</td>
<td>2.28</td>
<td>1.52</td>
<td>1.97</td>
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<tr>
<td>Sluzhashchiye</td>
<td>1.07</td>
<td>1.71</td>
<td>3.06</td>
<td>5.40</td>
<td>3.30</td>
<td>2.81</td>
<td>2.93</td>
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<tr>
<td>Rab.:ITR ratio*</td>
<td>1.17</td>
<td>2.28</td>
<td>0.82</td>
<td>0.87</td>
<td>1.94</td>
<td>1.50</td>
<td>1.42</td>
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<tbody>
<tr>
<td>Rabochiye</td>
<td>4.89</td>
<td>3.66</td>
<td>3.64</td>
<td>2.57</td>
<td>1.42</td>
<td>1.70</td>
<td>3.08</td>
</tr>
<tr>
<td>ITRs</td>
<td>5.22</td>
<td>4.04</td>
<td>7.33</td>
<td>5.12</td>
<td>3.06</td>
<td>3.95</td>
<td>4.85</td>
</tr>
<tr>
<td>Sluzhashchiye</td>
<td>1.04</td>
<td>1.42</td>
<td>3.67</td>
<td>3.38</td>
<td>0.09</td>
<td>-0.26</td>
<td>1.69</td>
</tr>
<tr>
<td>ITR:Rab. ratio**</td>
<td>0.29</td>
<td>0.37</td>
<td>3.62</td>
<td>1.79</td>
<td>1.65</td>
<td>2.34</td>
<td>1.64</td>
</tr>
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* Average annual percentage change in the ratio of average rabochiy wage to average ITR wage.

** Average annual percentage change in the ratio of ITR employment to rabochiy employment.

Sources: See Table 1.
As we indicated in the preceding section, this interpretation of the increase in the ratio of blue collar to white collar wages involves more than relatively rapid rightward shift in the supply curve of professionally qualified manpower. Not only must we reckon with the evidence that demand for such labor increased rapidly over this time period; we must also consider developments in the market(s) for blue collar labor.

2. The available evidence does appear to support the view that changing market relationships contributed to the relative wage changes mentioned above; those relationships did indeed shift in ways consistent with the observed change in wage structure. The evidence we refer to includes the following:

(a) There has occurred an enormous increase in the absolute and relative supply of VUZ and SSUZ graduates, especially in industrial specialties. Over the period 1950-78, the number of SSUZ and VUZ graduates employed in the entire Soviet economy increased at an annual average rate of 7.8 per cent p.a. In Industry, the growth rate was in excess of 10 per cent p.a. (1955-1977). Over the same period, the number of blue collar workers grew at a rate of only 3.1 per cent p.a. Perhaps most telling, the number of white collar positions in industry grew at an annual average rate of 3.9 per cent p.a. Adding in all of those who developed the necessary qualifications for these professional positions by other means (training programs on the job, etc.), it is evident that the number of persons qualified for professional positions in Soviet industry has grown much more
rapidly than has the number of such positions. It might also be noted that the massive expansion in complete secondary education has greatly altered the distribution of aspirations among younger members of the Soviet industrial labor force. The proportion that feels itself qualified for and aspires to white collar work has increased greatly: the proportion that accepts the prospect of a blue collar career has shrunk. This effect of educational attainment upon expectations, combined with the slow pace at which job content has progressed in the direction of greater complexity, has produced morale, turnover, and supply problems at the blue collar level which receive frequent comment in the Soviet press.1

(b) The Soviet system of planning for professional manpower begins with requests or requisitions (zayavki) submitted by employer enterprises.2 Based upon forecasts of their prospective needs for specialists in different fields and levels, enterprises estimate the net additions to staff they will have to make over a five-year time horizon. Collated over enterprises and ministries, zayavki are converted into enrollment plans for SSUZy and VUZy. On paper, at least, the system would appear to offer prospects of avoiding the gross imbalances of supply and demand which characterize markets for so many professionals in the U.S. In practice, however, the system is defective in several important ways. Most relevant at this point is the system's bias toward overestimation of prospective demands.3 Bearing no financial responsibility for the training they are signalling, not even being obligated to employ the professionals they have asked to have trained, there is a tendency to abuse the system. Inflated requests are submitted, especially for engineering
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specialties which the enterprise uses extensively. In part this behavior represents "hoarding in advance"—an effort to assure an ample supply and, perhaps, a measure of selectivity among applicants. It also appears to be related to enterprise efforts to upgrade the table of organization, as discussed previously. The effect is to undermine the system's ability to maintain a moving balance between demand and supply, both in the aggregate and by level and field of specialization. Despite efforts by manpower planners to counteract these biases, it is commonly conceded in the Soviet literature that flaws in the zayavka system contribute to overproduction of specialists in the U.S.S.R.

(c) Recent years have brought numerous explicit references to the overproduction, or excess supply, of engineers in many specialties. Attention is called to the very high ratios of engineers and technicians to blue collar workers that distinguish major branches of Soviet manufacturing from their counterparts in Western Europe and the United States. The increasingly frequent employment of engineers and technicians in blue collar slots presumably also reflects shifts in relative scarcities, at least on a regional basis. In some cases this phenomenon is justified as a natural and desirable consequence of the "scientific-technical revolution" that the Soviet economy is said to be experiencing. Whatever merit there may be in this explanation, other factors appear to be more significant: anomalies in the wage structure which allow the professional higher earnings as a skilled rabochiy than as an ITR and local imbalances between demand and supply of specialists (i.e., lack of vacancies in specific professional specialties).
(d) Especially telling evidence of growing relative supply during this period is provided by the behavior of manpower administrators and of employers. The Soviet economic press calls frequent attention to the negligence of many employers in fulfilling their obligations to newly hired young specialists. Work within their field of specialization, housing and other amenities are often not provided. (These failures release the young specialist from obligatory assignment to the enterprise, if the specialist is employed under such assignment.) The resulting turnover of young specialists is said to be of little concern to enterprise managers because of the ease with which replacements can be found, if they are in fact needed.

(e) Growing slack in the market for specialists is also indicated by the widespread non-enforcement of the compulsory three-year job assignments to which newly graduated specialists are subject by law. In many specialties, both industrial and other, the regulation is so commonly and easily evaded as to render suspect the economic rationale of the assignment regulation at this level: Employers either do not need it to meet their needs for specialists or they prefer to take their chances on finding in the open market employees whose service at the enterprise is free of compulsion.

Evidence such as this represents strong support for the view that, during the 1950-78 period, the supply of professionals specialized to material production and of those whose complete general secondary education qualified them for white collar employment has increased substantially more rapidly than has demand for such services.
Furthermore, the evidence—employment of diploma holders as blue collar workers, the expansion of vocational school programs at the expense of complete general secondary education (the main path to higher education in the U.S.S.R.), the increasing resort to "administrative measures" and "organized recruitment" in the assignment of young labor force entrants at the rabochiy level—strongly suggests that the scarcity of potential professionals has decreased substantially in comparison with the scarcity of would-be blue collar workers.

Such generalizations, we realize, must be viewed with some caution. Regional variation has been neglected and what is true of some specialties is not true of others. Nevertheless, we feel that certain directions of change over the past 30 years can safely be inferred from the available evidence. One is toward substantially reduced relative scarcity of "high eds" relative to "low eds", of those qualified for and aspiring to ITR and sluzhashchiiy positions relative to those qualified for and aspiring to rabochiy positions. The position that the observed, long-term increase in the ratio of blue collar to white collar (average) wages reflects altered relative scarcities of high-ed and low-ed labor cannot be discarded on the grounds that increased supply of high-eds was not associated with decreased relative scarcity. Demand for high-eds presumably increased substantially, but the evidence indicates that supply increased considerably more rapidly. This despite a manpower planning system that attempts to keep demand and supply of specialists in continuous balance.
3. The broad wage and employment trends of this period are also consistent with an equalitarian "distributive model", in which money wages either play no important allocative roles or are so far from their equilibrium relationships that even substantial change is possible without allocative effect. In such an economy, there will be queues for entry into some employments and exit from others. Even substantial adjustment of the distribution of rents being earned (both positive and negative) can be made for distributive purposes without affecting the allocation of labor. In this model, the monopsonistic control of the state over wage structure is used to assure excess supply of labor to high priority sectors and occupations, with both quantitative and qualitative purposes in mind. (Excess supply permits "selectivity", a favored means of allocating quality among competing uses.) In this model, then, people queue within one branch or occupation for openings in other branches or occupations. As long as enterprises' demand for labor in different skills and occupations is not sensitive to relative wage rates, monopsonistic control over wage structure can be used to implement the center's priority ordering of branches in the manner described. When and if distributive policy dictates a change in the distribution of rents, this can be achieved by relative wage changes with little allocative effect, provided that the structure of the enterprise's table of organization is not sensitive to relative wages. In this model, then, there is wage elasticity on the supply side of labor markets but not on the demand side; the state's monopsony power is used not to locate an equilibrium structure of wage rates but to achieve a
pattern of excess supply (positive and negative) across branches, occupations, and skill grades that reflects the center's production priorities. As the relative supplies of labor in different occupations change (supply curves shifting with changes in income, educational attainment, urbanization, etc.), wage structure can be changed to reflect distributive objectives without excessively diminishing excess supply to high priority sectors. Therefore, what we may be observing in the marked change in the average wage relationships among rabochiye, sluzhashchiye, and ITR's is an adjustment of economic rents, which is of no allocative significance: Quantities demanded are largely unaffected because enterprise tables of organization are insensitive to wage structure; quantities supplied may be affected but not in any significant way because the disequilibrium structure of relative wages creates queues in a manner desired by those who design the wage structure.

The center is therefore free to pursue distributive goals such as the reduction of wage differential between occupational groups, especially differentials that are not of an equalizing or compensating sort. Thus, differentials intended to compensate for unfavorable climate or working conditions could be preserved or even augmented. Those, however, which are in the nature of economic rents, inherited from an earlier time and serving no intended allocative or distributive purpose, may be reduced or eliminated without undesired allocative effect. Special scrutiny might well be given to differentials unfavorable to the blue collar work force. Among these none would appear
more suspect than those associated with relatively favorable working conditions for which one qualifies by educational attainment, the cost of which has been almost entirely borne by the State.

4. Disaggregation by subperiods and by employment categories illuminates these alternatives. We refer in particular to the relationship between sluzhashchyi and ITR wage changes and to the temporal distribution of changes in the relationship between blue- and white-collar wage levels. (The latter aspect will be discussed in succeeding sections.)

The ratio of the average wage rate of sluzhashchiye, $W(S)$, to that of ITR's, $W(I)$, increased from .526 in 1950 to .685 in 1978. This rather substantial change in wage relatives is not easily reconciled with the competitive-relative scarcity model: On the supply side, it would appear that the educational expansion of the past several decades has increased the potential supply of office and administrative personnel at least as rapidly as it has the potential supply of engineering and technical personnel. (We refer to potential supply, i.e., the number of persons qualified for the class of white collar professions, rather than actual supply, since the latter cannot be observed. The relative scarcity argument is expressed in terms of changing numbers of persons educationally qualified for different positions, not in terms of the numbers of persons actually offering their services for different positions.) This is suggested by the apparently lower educational requirements of the major sluzhashchyi
occupations, by the major expansion of complete secondary education
(more than half of all typists and secretaries had 10th grade educations
according to the 1970 census\textsuperscript{8}); and by the particularly rapid growth
of the category of SSUZ programs (ekonomika) which supplies personnel
for upper level administrative positions. (Between 1950 and 1975,
the number of SSUZ graduations in ekonomika increased by almost 700
per cent; graduations in "technical specialties", which excludes
ekonomika, increased by 443 per cent. The extraordinary expansion of
training is perhaps better illustrated by the increase in the share
of ekonomika graduations in all SSUZ graduations: from 8.3 per cent
in 1950 to 18.0 per cent in 1975.\textsuperscript{9}) On the demand side, the picture
is quite different: campaigns to reduce paperwork and administrative
staffs in industry and very slow growth of sluzhashchiy employment--
1.7 per cent p.a. vs. 8.1 per cent for total industrial employment,
and 4.9 per cent p.a. for ITR employment. One must infer that the
relatively slow growth of sluzhashchiy employment reflected demand
conditions, not supply constraints; further it seems evident that the
population of qualified persons expanded very rapidly during this
period.

Comparing these demand, supply, and employment developments with
those of ITR's, it seems evident that market conditions should have
produced less upward pressure on \( W(S) \) than on \( W(I) \). Nevertheless,
as we have seen, \( W(S) \) increased substantially relative to \( W(I) \).
The cost-minimizing enterprise is being encouraged to economize on
the category of labor which would appear to be increasing in relative
supply. Thus, whether produced by changing relative scarcities through market activity or by the central authorities in order to signal altered relative scarcities to employers, the change in the ratio $W(S)/W(I)$ seems quite inappropriate.

Furthermore, these wage movements seem inappropriate as a signal to young people who are choosing between educational programs leading to either слушашчиy or ИТР positions. To these prospective students, who are making a discrete, one-time choice, it is the absolute difference between average wage levels, rather than the ratio of average wage levels, that is the relevant signal. (Rational investment in human capital would be strongly influenced by the expected difference between the present values of earning streams in alternative occupations. Current average earnings in different occupations presumably represent the most widely used evidence on the magnitudes of these differences.) The absolute difference, $W(I)-W(S)$, remained virtually unchanged, in real terms, between 1950 and 1978: In current rubles, the difference increased from 57.2 rubles to 65.7 rubles. The best Western estimate puts the growth in consumer goods prices in the U.S.S.R. between 1950 and 1975 at 8 per cent. This is understood to be a conservative estimate of consumer price change over this period and, of course, it does not extend to 1978, the omitted years being ones of evident inflationary pressure. Allowing for these aspects, the 15 per cent increase in the average wage difference in current rubles is virtually non-existent in real terms. Therefore, to the extent that prospective
earnings can be expected to influence professional choice, at this level of aggregation it does not appear that the wage system was used to signal students concerning relative scarcities in different occupational groups.

5. The distribution of wage and employment changes over time also poses problems for the allocative hypothesis. If the principal cause of the observed changes in wage structure is, as our primary hypothesis asserts, change in the relative scarcity of professional manpower, we would expect to find that periods of relatively large change in employment structure were also periods of relatively large change in relative wages. This is not the case. If the 1950-78 period is divided into five five-year periods and a concluding three-year period, we find that, for industry as a whole, periods of relatively large increases in the employment ratio, N(I)/N(R), tended, if anything, to be periods of relatively small increase in the wage ratio, W(R)/W(I). In the construction sector, the rank ordering of the six periods by the magnitude of each of these changes is almost perfectly inverse: large increases in N(I)/N(R) are associated with small increases in W(R)/W(I).

If the large increases in N(I)/N(R) reflect larger increases in the supplies of qualified personnel, we would expect them to be accompanied by diminished growth of W(I) and relatively large increases in the wage ratio, W(R)/W(I). What we observe is more consistent with period-to-period variation in demand for white collar
personnel causing variation about a long-term, upward trend in \( W(R)/W(I) \), perhaps originating in distributive policy. In the succeeding sections we examine several developments during the 1950-78 period that bear on these alternatives.

6. When we examine the 1950-78 data from this perspective, one of the striking features is the surge in sluzhashchiy wages, \( W(S) \), during the 1960's. Between 1960 and 1970, \( W(S) \) increased at an annual average rate of 4.31 per cent. This may be compared with 1.41 per cent p.a. in the preceding decade and 3.12 per cent p.a. between 1970 and 1978. Perhaps more revealing is the relationship between growth rates of sluzhashchiy and rabochiy wages: Only during this decade does the former exceed the latter. In fact, during the 1950-60 decade, \( W(S) \) had grown at a rate little over half of \( W(R) \), 1.41 vs. 2.71 per cent p.a. The 1960-70 period apparently represents a substantial departure from the long-term trend, going back to the prewar period, of raising the ratio of rabochiy wages to those of sluzhashchiya: from 0.90 in 1940 to 1.23 in 1978. Is this exceptional episode understandable in terms of conventional labor market analysis? Apparently, it is, providing important support for the role of market forces in shaping Soviet wage structure.

Employment data show that the 1960-70 decade was one of extraordinarily rapid growth of white collar employment in industry. Employment of ITR's and sluzhashchiye combined grew at annual average
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percentage rates of 3.4 per cent during 1950-60, 5.5 per cent during 1960-70, and 2.6 per cent during 1970-78. Only during the 1960-70 did the white collar growth rate exceed that of blue collars, and then by a substantial margin: 5.5 per cent p.a. vs. 3.3.

Looking at sluzhashchiye alone, the acceleration of employment growth is even more striking: From a per annum growth rate of 1.23 per cent in 1950-60, to 3.58 per cent in 1960-70, and then a sharp drop to -.04 per cent in 1970-78. (If 1959 and 1969 are used as the boundaries between the three periods, the acceleration of the 1960's is more striking. The growth rates of sluzhashchiy employment in the three periods then are 0.96 per cent in 1950-59, 4.27 per cent in 1959-69, and -0.34 per cent p.a. in 1970-78.)

Thus, the data for sluzhashchiye in industry as a whole show rising (relative) price and quantity over the 1960-70 period. In a market context this combination would suggest demand growth as the dominating market force. The available data on supply changes during this period do not indicate otherwise: From what we know of the supply side of this "market", it is difficult to infer any consequential change during the 1960-70 period in comparison with earlier and later years. That is, the number graduating each year from complete secondary school was substantially greater in 1960-70 than it had been in 1950-60, and substantially smaller than it was in 1970-78. The same goes for annual graduations from SSUZ and VUZ programs in ekonomika. Therefore, what little relevant evidence we
have does not indicate any distinctive developments on the supply side which could explain the enormous expansion of sluzhashchiy employment in industry during the 1960's. (Note that between 1950 and 1978, the number of sluzhashchiye employed in Soviet industry increased by 476,000. Between 1959 and 1969, the number employed increased by 449,000. Although shifts occurred in classification of slots between sluzhashchiiy and ITR categories, the extraordinary growth of sluzhashchiiy positions in the 1960's cannot be explained this way. The relatively rapid growth of ITR employment in the same decade is persuasive evidence of this.)

We thus are led to infer that the distinctive growth of sluzhashchiiy employment in Soviet industry in the 1960's originated in exogenous expansion of enterprise tables of organization, i.e., in an increase in demand. We know of no retreat during this period from the policy of denigrating paperwork and discouraging the growth of employment devoted to it. Nevertheless, the substantial expansion of the 1960's occurred, producing, apparently, the upward pressure on relative wages that the market model would lead us to anticipate. Indeed, if there is an aspect of this episode which might arouse the suspicion of market-oriented analysts it is the strength of the apparent wage effect. Given the enormous increases that had occurred in the stocks of suitably educated personnel, one might have anticipated highly elastic supply to sluzhashchiiy positions and less severe upward wage pressure.
Reviewing the 1950-78 period as a whole, we observe long-term trends toward relative increase in the supply of secondary school graduates and "high eds" who make up most služashchiye; decrease in the ratio of služashchiye to total industrial employment; and decrease in the ratio of average služashchiy wages to blue collar wages. Given the general, demand-restricting policy of discouraging služashchiy employment, the long-term decrease in the average wage of služashchiye relative to that of rabočhiye is consistent with the conventional market model. During the 1960's, for reasons that are not clear, služashchiye employment grew relatively rapidly—more rapidly than blue-collar employment; supply of educationally qualified people continued to grow rapidly; and average služashchiy wage rose relative to that of rabočhiye. Inferring an exogenous increase in demand for služashchiye from the sharp increase in number of slots, the temporary reversal of the downward pressure on the relative wages of služashchiye is also as predicted by the conventional market model.

The long-term trend in the relationship between W(S) and W(R) can also be reconciled with a disequilibrium monopsonistic model serving a not unlikely distributive objective: raising the earnings of blue collar operatives relative to those of "paper shufflers". However, the substantial deviation from this trend in 1960-70 cannot be explained in this way. We would infer that, whatever the role of distributive policy in shaping the long-term shift in relative wages, demand-led market forces made themselves felt in the 1960-70 increase in the ratio of W(S) to W(R). What remains unclear is why the 1960-70
surge in demand for *sluzhashchiye* should have had so strong a wage effect.

7. The ITR series also shows an interesting temporal pattern, beginning with the 1950-60 period. This period is unique in that ITR employment grows only very slightly more rapidly than does *rabochiy* employment (4.63 vs. 4.27 per cent p.a.). Considering the rate of capital formation in industry during this period, the above average growth rate of the huge and ITR-intensive machine building branch, and the long-term policy of raising the ITR/ *rabochiy* ratio in industry, the failure of the number of ITR slots to grow substantially more rapidly than *rabochiy* slots seems surprising.

If there are such things as markets for ITR's, one might expect them to have been quite tight during this period, with demand strong (for the reasons given) but inadequate supply, the latter limiting the expansion of ITR employment. The conventional market model would therefore lead us to expect significant upward pressure on ITR wage levels. This, evidently, did not occur. The average monthly wage of ITR's grew very slowly, both before and during the wage reform of 1956-60. (During 1950-55, the annual average rate of increase of W(I) was only 0.56 per cent p.a.; during 1950-60, the rate was 1.43 per cent p.a. These rates are very low not only in comparison with their later levels, but also in comparison with the rate at which blue-collar wages were rising.) At this level of
aggregation, it is not clear why the growth rate of blue collar wages should have been higher, and substantially higher, than that of ITR's during this period.

8. During the 1960-70 period, the growth rate of ITR employment accelerates, to 6.27 per cent p.a. for the decade. This is quite high in comparison with other periods and in comparison with the annual average growth rate of rabochiy employment (which was barely half as great, at 3.28 per cent p.a.).

Wage movements during this period were also distinctive. The annual average growth rate of rabochiy wages continues to exceed that of ITR's, but the ratio of the latter to the former is higher than in any other period. Indeed, the growth rates converge to such an extent that the absolute gap between W(I) and W(R) increases in current rubles: from 43.2 rubles per month in 1960 to 47.4 rubles per month in 1970. Over the 1950-78 period as a whole, the absolute difference between the average monthly wages of ITR's and rabochiye decreased from 52.1 to 32.3 rubles per month.

One might, as in the sluzhashchiy case, look to very strong demand for ITR's, inferred from the increase in the growth rate of ITR slots, as the explanation for the unusually high growth rate of W(I) during this period.

It is not really evident that an increase in the growth rate of W(I) from 4.63 per cent p.a. in 1950-60 to 6.27 per cent p.a. in 1960-70 should have such an effect on the growth rate of W(I).
We confront again the question of the degree of elasticity of supply which, in a market context, determines how much effect on price a given change in demand will have.

The best indicator that we have of this appears to be given by the relationship between changes in white collar employment and changes in the number of VUZ and SSUZ graduates (or "specialists") employed in industry. Our reasoning is as follows: When the number of specialists employed is increasing substantially more rapidly than the number of white collar slots, we may infer that employers are having no difficulty in locating suitable candidates for ITR and sluzhashchiye slots. (We combine ITR's and sluzhashchiye into a "white collar" category in this discussion because specialists are extensively employed in both of these job categories, and the published employment statistics do not indicate the nature of the slot occupied by the employed specialists. This means that our market indicator is flawed in that a more than negligible number of "specialists"--i.e., of VUZ and SSUZ diploma holders--are employed as rabochiye.) The difference between the incremental numbers of specialists employed and white-collar slots created indicates the extent to which the educational level of the white collar staff is being upgraded: If the difference is positive and large, "praktiki", occupants of ITR slots who lack the VUZ or SSUZ diploma which has come to be associated with their particular positions, are being extensively replaced (often by their own completion of a VUZ or SSUZ program) by diploma holders. This may be viewed as evidence of slack in white collar
markets: staffs are not growing fast enough to absorb newly hired specialists as net additions to the work force.

On the other hand, when the number of ITR slots created outpaces the addition of specialists, enterprises are presumably finding it more difficult to fill ITR slots with fully qualified people. In "internal" labor markets, training programs must be mounted at some cost and/or less than fully qualified personnel must be assigned to ITR jobs. In "external" labor markets, there will be competition among enterprises for qualified people, newly entering the job market or mobile from other enterprises. Upward pressure on white collar wage rates is likely, effectuated in part by upgrading of slots and by other measures made familiar under the heading of "wage drift". It is likely that his wage pressure will apply to both ITR's and sluzhashchiye. As the practice of reclassification of slots between these two categories indicates, there is substantial overlap of skills and responsibilities between them. This suggests significant substitution possibilities, which would, even in the short run, cause wage movements in the two categories to be related.

The 1960-70 period is distinguished by its very low ratio of incremental employment of specialists to incremental growth of white collar positions. During this decade, the number of specialists added exceeded the number of white collar slots added by only six per cent. When allowance is made for specialists, especially SSUZ graduates, taking rabochiy jobs and for both SSUZ and VUZ graduates
### Table 3. Changes in employment of white-collar personnel and of specialists in Soviet industry; graduations in industrial specialties, 1950-1977.

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<tbody>
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<td>Absolute increase in employment</td>
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<tr>
<td>(1) of white-collar personnel (thous.)</td>
<td>412</td>
<td>422</td>
<td>1,047</td>
<td>1,010</td>
<td>606</td>
<td>334</td>
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<tr>
<td>(2) Of specialists (thous.)</td>
<td>n.a.</td>
<td>930</td>
<td>858</td>
<td>1,321</td>
<td>1,614</td>
<td>831</td>
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<tr>
<td>Approximate number of specialists</td>
<td></td>
<td></td>
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<tr>
<td>(3) graduated (thous.)</td>
<td>(600)</td>
<td>(1,100)</td>
<td>(1,400)</td>
<td>(2,200)</td>
<td>(2,800)</td>
<td>(1,200)</td>
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<tr>
<td>Ratio: line 2/line 1</td>
<td>2.20</td>
<td>0.82</td>
<td>1.31</td>
<td>2.66</td>
<td>2.49</td>
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</tr>
<tr>
<td>Ratio: line 3/line 1</td>
<td>1.46</td>
<td>2.61</td>
<td>1.34</td>
<td>2.18</td>
<td>4.62</td>
<td>3.59</td>
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White-collar workers = ITRs plus sluzhashchye.

Specialists are graduates of specialized secondary and higher educational institutions (SSUZy and VUZy, respectively.


Line 3 - Based upon graduations in industry-related specialties in two or more years of each time period. Data are given by TsSU SSSR, Narodnoye obrazovaniye, nauka i kultura v SSSR (Public Education, Science, and Culture in the USSR), Moscow, 1977, pp. 178, 250; Narodnoye khozyaystvo SSSR v 1972 godu, p. 646;...v 1978 godu, p. 480.
taking "non-production" jobs at industrial enterprises (providing medical, educational, and other services not directly related to the production activity of the enterprise), one may infer a tight market for qualified white collar personnel. In both the preceding five-year period and the subsequent seven-year period, the incremental ratio (of specialists to white collar slots) is well over two-to-one. In 1960-70, it is very close to one and in 1960-70 we see distinctive upward pressure on the relative wage ratio of both ITR's and sluizhashchiye.

The thrust of this interpretation appears to be supported by relevant educational statistics. Data are published giving the number of VUZ and SSUZ graduations (separately) in approximately 20 different "groups of specialties". It is possible, albeit imprecisely, to distinguish those groups of programs which supply professional manpower to industrial ministries from those whose graduates would principally be headed for other sectors of the economy. (Because of the "non-productive" activities of industrial enterprises and the manufacturing activities of other sectors, this association will be approximate, at best.) These data permit us to estimate the absolute numbers of graduations in the "industrial" specialties during the time periods that we have been considering. They indicate that the ratio of accumulated graduations to additional white-collar slots created was especially low in 1960-70. Crude as this measure is, it lends support to the view of the 1960-70 period as distinctive for relative tightness of professional labor markets. This should alter our conception of the functioning of Soviet white collar labor markets.
9. The 1960-70 acceleration of white collar wage gains and position-creation is the most prominent feature of the temporal pattern of wage and employment developments in the 1950-78 period. In the cases of both sluzhashchiye and ITR's, the wage acceleration was accompanied by acceleration of employment growth. There was also an apparent tightening of markets for specialists, as indicated by a distinct decrease, at the margin, in the ratio of specialists employed to white collar positions created. Which (if either) of these factors was the principal cause of the acceleration of white collar wage gains (relative to blue collar) is a question of some relevance to our study: If the former, support would be found for the conventional neoclassical model in which wages attach to skills rather than to slots, and "ITR" represents a skill category; i.e., it would be appropriate to think of markets for ITR's and sluzhashchiye as such, in which accelerating demand could be expected to exert upward pressure on relative wage rates. If, instead, the relative wages of ITR's and sluzhashchiye were responding not to strong demand for ITR's and sluzhashchiye but to tight markets for specialists (the preferred, but by no means the only, occupants of ITR and sluzhashchiye slots), support would be found for a "job competition" model: the terms ITR and sluzhashchiye would apply, in the first instance, to positions rather than to skills; the rate of change in the number of such positions would be largely independent of the supply of credential-bearing specialists and would be a measure
of demand for the latter. Developments in markets for specialists would allocate specialists and influence white collar wage rates, but they would not determine the level of white collar employment. The number of ITR positions would be determined independently, without regard to wage structure; it would not, as in the neoclassical model, be a market outcome. Nor would the relative wage levels of ITR's and rabochiyen be significantly a function of employment structure.

As indicated, the 1960-70 developments in industry do not permit us to distinguish empirically between these two interpretations because we have simultaneously accelerating ITR employment and apparent excess demand for specialists. The construction sector, however, offers a different combination of conditions in the 1960-70 period:

(a) decleration of the growth rate of ITR employment, from 9.5 per cent p.a. in 1950-60 to 7.8 per cent p.a. in 1960-70;
(b) rapid rise in the employment ratio, \( N(I)/N(R) \);
(c) tightening (by our indicator) of the market for construction specialists; the ratio of new white collar slots created to net increases in specialists employed was 0.93 in 1955-60, 1.21 in 1960-70, and 0.69 in 1970-77;
(d) rapid increase in the average ITR wage rate in construction: \( W(I) \) increased at annual average rates of 1.4 per cent in 1950-60, 3.8 per cent in 1960-70, and 0.67 per cent in 1970-78. \( W(R) \) continued to grow more rapidly than \( W(I) \) in 1960-70, but the difference between the rates shrank during this period.
These developments suggest the following points:

(a) The rapid rise in the employment ratio, N(I)/N(R), is not associated with rapid increase in the wage ratio, W(R)/W(I). A model in which increasing relative supply of ITR's, as an occupational category, is the dominant market force, does not apply.

(b) To the extent that demand is determining, the combination of slowdown in the growth rate of N(I) and rapid increase in W(I) indicates that it is not demand for ITR's per se that is at issue.

(c) Although the growth rate of N(I) declined in 1960-70, its relationship to incremental employment of specialists indicates a shift to relative scarcity of the latter. This satisfactorily explains the marked increase in W(I) in construction during this period.

In sum, the growth of ITR employment is not determined by the supply of specialists, but the behavior of ITR wages appears to be tied to the relative scarcity of specialists. It appears to be appropriate to speak of a market for specialists, but not of a market for ITR's: the former represent a scarce factor of production that is allocated by market processes; the latter does not. The notion that the decisive element in the long-term rise in the wage ratio, W(R)/W(I), is the increased supply of ITR's and consequent increase in the employment ratio, N(I)/N(R), appears to be erroneous. The
III. Disaggregation by Branch 1950-66

1. Employment and wage data, disaggregated by branch of the economy may shed additional light upon the allocative role of wage movements in the postwar Soviet economy. The data we refer to were published in the 1968 volume Trud v. SSSR (Labor in the U.S.S.R.)¹, a rarely issued statistical compendium of the General Statistical Administration. Average annual employment levels (closely equivalent to man-years rather than to physical persons employed) and average monthly wage rates are given in the following detail: (a) by branch of industry (17 branches) plus construction and state-sector agriculture (state farms and "subsidiary agricultural enterprises"); (b) by occupational category: blue collar workers (rabochiy) and ITR's; (wage but not disaggregated employment data are given for sluzhashchiye); (c) data in this detail are given for 1950, 1955, and each year in the period 1960-1966.

The branch disaggregation that Trud provides, it must be noted, is considerably less detailed than those employed by Western labor economists in similar inquiries. Our Soviet disaggregation offers many fewer branches. It also includes branches of very different sizes and homogeneity of activity, from the enormous and highly heterogeneous branch called "machine building and metal-working", which accounted for 28 per cent of total industrial employment in 1950, to the presumably more homogeneous "cement" branch, with 0.3 per cent of industrial employment in 1950.
2. The 1950-66 period is an appropriate span for our purposes: both employment and wage structures changed substantially in the directions which applied in the 1950-78 period as a whole. With respect to wage structure, the ratio of the average wage per rabochiy, $W(R)$, to the average wage per ITR, $W(I)$, changed as follows (over the period 1950-66): In industry as a whole, it increased from 0.57 to 0.70; in construction ("basic" constructions, as previously defined), it increased from 0.47 to 0.73; in State agriculture, the increase was more modest: from 0.43 in 1950 to 0.52 in 1966.

The number of ITR's, $N(I)$, per 100 average annual blue collar workers, $N(R)$, changed over the same period as follows: In industry and construction there were increases of 29 and 76 per cent, respectively. In State agriculture, this ratio decreased, presumably reflecting the large-scale conversion of collective into State farms (primarily in the period 1957-61). Because of the major structural changes in State agriculture that occurred during this period, developments in this sector bear a particularly weak relationship to the labor market phenomena we are exploring. Employment and wage changes in State agriculture will therefore receive little attention in the discussion that follows.
3. Employment and wage patterns at the start of the 1950–66 period may briefly be described as follows. The distribution of ITR's across branches was highly unequal. The number of ITR's per 100 rabochiye was much higher in industry (10.45) than it was in construction (6.79) or in State agriculture (4.12). Within industry, Light Industry (6.78), building materials (6.58), and the wood products group (6.66) had relatively few ITR's per 100 rabochiye; core branches of heavy industry had much higher ratios: electric power production (19.04), machine-building and metal-working (15.08), and chemical (precise figure not available) had the highest ratios in the set of branches for which we have data.

Inter-branch inequality in wage levels was less pronounced but followed a pattern similar to the one just observed. Heavy industry tended to have higher wage rates. State agriculture, construction, Group B (light industry and foods), building materials and the wood products group were relatively low wage sectors, for both blue collar workers and ITR's. As the last remark suggests, there was in 1950 very strong correlation across branches between W(R) and W(I): The simple Pearson correlation coefficient is 0.93 (with a t value of 10.7).
4. Before turning to the changes in wage and employment patterns over the 1950-66 period, we might consider the initial pattern in 1950 from the perspective of our underlying question: Are there any major features of the 1950 distributions which tend to support or to refute any of the alternative hypotheses we are considering concerning the role of market forces and the allocative role of wages?

One aspect that may attract attention is the very limited cross-sectional variation in wage structure, \( W(R)/W(I) \), especially in relation to variation in employment structure, \( N(I)/N(R) \). Because of the strong correlation between \( W(R) \) and \( W(I) \) across branches, variance in the wage ratio is quite small: the coefficient of variation\(^2\) of \( W(R)/W(I) \) is one-fourth of that of \( N(I)/N(R) \). This may cause doubts concerning the allocative role of relative wage levels (which has been questioned in the American economy, as we have indicated, in the work of Pine and Boeringer\(^3\)). Such doubts are encouraged by the absence of a statistically significant cross-sectional relationship between the magnitudes of the two ratios. That is, there is no evident tendency for those branches which pay (e.g.) relatively more to ITR's (relative to rabochiye) to employ relatively fewer of them.

To be sure, reasoning such as this is not very persuasive. Interbranch differences in production functions and elasticities of substitution cannot be ignored. One might note, however, that even within industry, groups that presumably have similar technologies (light industry, in particular, which is disaggregated into four branches), the expected direct relationship between \( N(I)/N(R) \) and \( W(R)/W(I) \) does not appear,
A second facet of the 1950 pattern is the identity of the low and high wage branches. In general, the pattern appears to conform to that found in the market economy of the U.S. in the same year. Referring to the wages of production workers, both economies show mining, metallurgy, machinery and chemicals as relatively well paid branches; wood products, food, and clothing industries have relatively low pay scales. The major divergence in branch orderings is in the placement of construction: relatively high in the U.S. (about 117 per cent of the average in manufacturing) but relatively low in the U.S.S.R. (about 82 per cent of the average in industry). This discrepancy may, in part, reflect the particular irregularity of construction employment in the U.S. (which is compensated for in the realized wage rate). But it also may reflect the particular role which the construction sector plays in the Soviet economy: it serves as a transitional occupation for large numbers of young people (especially males) on their way from agriculture to industry and other primarily urban activities.

Perhaps more persuasive evidence of the operation of market forces—especially of the role of productivity in determining relative wages—is provided by the available data on background characteristics of workers in different branches. Human capital theory predicts that wage rates will vary with education, experience, and other productivity enhancing characteristics. Soviet data for a more recent year, in which the ranking of branches by average wage level was virtually identical to that of 1950, bring this out.
The relatively low-wage branches have below average levels of education, experience, average age, or—a proxy for one or more of these variables—proportion of male workers. Thus, in the food industry in 1959, 54.4 per cent of all personnel had less than seven years of education, compared to 49.1 per cent in all of industry. In construction, the corresponding proportion was 54.3 per cent, in building materials it was 57.3 per cent; in logging, the largest component of the wood products group, it was 67.2 per cent; and on Sovkhozy, the predominant component of State agricultural employment, it was 75.6 per cent. Corresponding percentages in several relatively high wage branches:

chemicals: 45.0 per cent
Machine building and metal working: 39.7 per cent

Coal and ferrous metallurgy, the two highest paid branches in our tabulation, had unimpressive educational attainment levels 53.4 and 53.3 per cent with less than seven years of education.

Some of the low wage branches are characterized by low average levels of experience as well, but several are not. Illustrative data are the following 1967 figures on the proportion of all workers and employees in the branch having less than five years of experience:

All industry: 19.9 per cent
Construction: 24.0
Light industry: 25.0
Food industry: 19.5
Correlated with average experience is average age in the branch. Again, construction and light industry are shown to have relatively young labor forces. Finally, two of the low paid branches—foods and light industry—are characterized by very high proportions of females. There is reason to believe that sex has an independent, and negative, effect on earnings—other background characteristics held constant.

This brief survey suggests that much, but certainly not all, of the pattern of inter-branch wage variation coincides with variation in background characteristics which have been shown to be relevant to earnings in market economies. In most cases, the work forces of low paid branches are characterized by distinctly low average age, low average experience, and/or high proportions of females.

5. As has already been indicated, 1950-66 saw a pronounced cycle in the demographic base of the labor force—the population in the able-bodied aged. Adaptation to this cycle affected the various sectors of the economy and branches of industry in quite different ways. For example, total agricultural employment followed a cycle with very similar shape, much greater amplitude, and turning points lagged 1-2 years. (Reference is to smoothed plottings of annual
percentage rates of change, all of which were negative in this sector after 1956). The construction series repeats this shape and shows similar amplitude (about 4-5 points between peak and trough). However, it never shows less than 3 per cent (positive) annual growth during this period and its turning points are lagged a further 2-3 years behind the agricultural employment series. The behavior of, and relationship between, these series appears to reflect a vital element in the overall adaptation to the demographic cycle, construction serving as intermediary between agriculture and urban non-agricultural manufacturing and service branches.

One presumably major and intended result of this pattern is the absence of such a cycle and much less year-to-year variability in the growth rate of total industrial employment. To be sure, there was substantial variation within and between branches of industry—contrast the machine building and metal-working series (consisting of two periods of almost perfectly stable growth rate, 1950-60 and 1961-66, at 5.3 and 6.5 per cent annual growth rates, respectively) with light industry (sharply declining, 1955-63, followed by sharp recovery). It therefore appears that analysis of rates of change for the 1950-66 period as a whole (in which only the end points of time series play a role) is not ruled out by strong cycles that would render such discussion of annual average rates of change meaningless. On the other hand, there clearly is sufficient periodicity to major underlying series to render advisable examination of developments in separate time periods. Fortunately, the years for which all of our wage and employment give data—1950, 1955, 1960, 1966—provide close correspondence to the turning points
of the underlying manpower supply series).

6. Within the sectors for which we have sufficiently disaggregated employment and wage data--industry and construction--major employment developments in the 1950-66 period may be summarized as follows. Total employment increased rapidly in both branches: at 3.9 per cent p.a. in industry and 5.1 per cent p.a. in construction. Employment of ITR's grew considerably more rapidly: by 5.7 per cent p.a. in industry and 8.6 per cent p.a. in construction. As a result, the number of ITR's per 100 rabochye increased from 10.45 to 13.48 in industry and from 6.79 to 11.97 in construction. Outpacing this change in occupational structure was the growth of employment of professionals with advanced education: In industry, the number of SSUZ graduates employed increased at an annual average rate of 13.7 per cent between 1955 and 1966; in construction organizations, the rate over the same period was 16.9 per cent p.a. Both of these rates were substantially higher than that applying in the rest of the Soviet economy: 8.1 per cent p.a. 11

Employment of VUZ graduates in these sectors grew less rapidly, but considerably faster than did the number of ITR positions. Over the (full) 1950-66 period, the growth rate was 9.9 per cent p.a. in industry and 10.7 per cent p.a. in construction. In the rest of the economy, the corresponding rate was again 8.1 per cent p.a. 12

Between 75 and 90 per cent of these specialists, depending upon the sector and the year, were "engineers" (in the case of VUZ
graduates) or "technicians" (SSUZ graduates). That is, they had specialized, production-oriented training. The 1950-66 period, therefore, saw substantial change in the ratio of ITR to blue collar positions: up 29 per cent in industry and 76 per cent in construction. At the same time, very rapid upgrading of ITR staffs occurred as the numbers of formally trained "technicians" and "engineers" employed in industry and construction grew especially rapidly. Relating changes in these aspects during this interval with rates of change in the remainder of the 1950-78 period, it appears that the ITR/rabochiy ratio rose somewhat more rapidly during the latter period (1966-78), but that the rate of growth of "specialist" employment, and the rate of upgrading of the ITR work force, went at a considerably faster pace during the first part of the period (1950-1966). Our conclusion is that if we are interested in the relationship, if any, between changes in the proportions of ITR’s in the work force and in the supply of diploma holders, on the one hand, and changes in the relative wage rates of ITR’s and rabochiy on the other, the 1950-66 period shows sufficient change on the employment side to make it suitable for study.

7. Facilitating investigation of these relationships is substantial inter-branch variation in employment patterns over the 1950-66 period. In terms of major sectors, employment growth may be characterized as follows: Total employment grew especially rapidly (relative to the rate for industry as a whole) in most of heavy industry and in construction. Within heavy industry, fuel production and metallurgy (represented in our data by coal mining and ferrous metallurgy,
respectively) grew relatively slowly; rapidly expanding were the electric power, chemicals, machine building and metal-working, and building materials branches. Major sectors whose total employment was growing much more slowly were the wood products group (logging, woodworking, paper and cellulose), the foods group, and light industry (textiles, clothing, and shoes). Within product groups, there are relatively small branches whose growth rate differs markedly from that of the group as a whole (meat products in the foods group, for example), but the following generalization is useful: Fast growing: Heavy industry minus fuels and metals; slowly growing: Group B plus wood products.

This pattern of growth rates applied, with very few exceptions, to employment of both rabochye and IT]R's. That is, for this period as a whole, branch growth rates of N(I) and N(R) are strongly correlated. (The simple Pearson correlation coefficient is 0.62 for the 20 branches for which we have data, with a t value of 3.35.) However, it is also important to note (a) that the growth rate of N(I) exceeded that of N(R) in most branches and (b) that the variance of N(I) growth rates is somewhat greater than that of N(R) growth rates. This means that, in general, in those branches in which the growth rate of N(R) is relatively high (low), that of N(I) is relatively higher (lower). Since the branches in which both growth rates were relatively high tended to be branches in which N(I)/N(R) was high initially (i.e., in 1950), employment growth patterns for the period tended substantially to increase the inter-branch inequality of N(I)/N(R) ratios.
To summarize the branch employment changes over the 1950-66 period: Both N(R) and N(I) increased in all branches; growth rates were strongly correlated and were distinctly low in foods, light industry, wood products, fuels and metals. N(I) grew more rapidly than N(R) in almost all branches, inter-branch inequality of N(I)/N(R) increasing in the process.

These diverse employment patterns, and the wage changes that accompany them, shed light upon the allocative role of Soviet wages. If there is a behavioral relationship between the changing relative scarcity of professional (i.e., engineering and technical) manpower and its (relative average) wage, we would expect this relationship to appear in disaggregated branch data. And if there is such a relationship, it presumably originates in "economizing" behavior analogous to that implicit in the neoclassical model. Concerning the response of employers to change in relative wage rates, we anticipate that pure substitution effects would dominate whatever response there is. The nature of output planning leads us to doubt that there will be either significant scale effects (i.e., that change in the relative prices of different grades of labor will significantly affect output plans and hence the demand for different grades of labor) or price effects (i.e., effects of labor cost changes on product price, hence upon output rates and the demand for different grades of labor).
9. When we turn to wage developments at the branch level for the 1950-66 period, we find that in all 20 of the branches for which we have data, the average wage rate of rabochiye, W(R), rose relative to that of ITR's, W(I). The differences in growth rates, W(R) - W(I), range from 10.3 per cent in the chemical branch to almost 70 percentage points in construction. Therefore, the ratio of wage rates W(R)/W(I), the relevant signal for employers optimizing with respect to employment structure, increased in every branch, i.e., ITR's were becoming less costly relative to blue collar workers in every branch.

If, in every branch, the only important factor in these changes was sharply increased supply of professionals relative to blue collars, our neoclassical model would predict more extensive employment of professional relative to blue collar labor—i.e., a rising N(I)/N(R) ratio in every branch. This is not the case; the employment ratio, N(I)/N(R), decreased in several branches (in State agriculture, in three branches of light industry, and in one branch of the food group) and was unchanged in another (the large residual branch, "foods other than sugar, meat, and fish"). Evidently the very simple hypothesis we have proposed does not satisfactorily cope with changing wage and employment relationships at the branch level.
10. What additional elements may be involved can be explored by closer examination of changes in these relationships. We observe the following: (a) Some evidence of a positive (cross-sectional) relationship between the magnitudes of changes in \( N(I)/N(R) \) and \( W(R)/W(I) \). The simple Pearson correlation coefficient (on unweighted percentage changes in the two ratios) is +0.34. The t value, with 17 degrees of freedom, is 1.49, which would be significant at the .20 level. Spearman's rank order correlation coefficient is +0.30. The Z value is 1.27, significant at the .20 level.

This may seem to be consistent with our neoclassical model—larger changes in relative prices being associated with large changes in factor proportions. But this relationship, which is not unqualified even within a given production function, will hold across production functions only if (i) scale and price effects on factor proportions can be safely ignored (which we have assumed), and (ii) there are not substantial inter-branch differences in the elasticity of substitution between grades of labor. We have no information on the latter aspect and must, accordingly, remain skeptical about the correlations referred to. (b) Although we are not in a position to disentangle the several elements referred to above, we can speculate as follows. Demand for ITR's during this period appears to have been increasing most rapidly in heavy industry: the pace of capital investment was high here as was, presumably, the rate of technological progress; the rate of growth of blue collar employment was highest in this area, and, since a main
function of ITR's is supervision, this too would affect the demand for ITR's. As indicated, technical change was presumably "ITR-using", meaning that it tended to raise the marginal productivity of ITR's relative to that of other grades of labor. Therefore, the pace of output growth of most of these branches combined with what appears to be a reasonable surmise on the nature and branch distribution of technical change suggest that in these branches, increases in the employment of ITR's should be high relative to changes in the (relative) wage of ITR's.

When we examine the branch pattern of changes in the two ratios, we find some confirming evidence: In machine building and metal working, electric power, building materials, and construction we find relative small increases in \( W(I) \) associated with relative large increases in \( N(I) \); in light industry and the largest food branch, there were relatively large increases in \( W(I) \) and small increases in \( N(I) \). There are, however, numerous exceptions to this generalization. Again, we cannot have much confidence in it.

(c) If we construct a 3 x 3 contingency table in which changes in each of the two ratios are classified as low (including negative), medium, and high, and place each branch in one of the 9 cells, the only patterns that emerge are the following:

(i) Most of heavy industry (machine building, coal, electric power, ferrous metallurgy) is in the column for low increases in the wage ratio, \( W(R)/W(I) \); (ii) none of Group A is in the row for low increases in the employment ratio, \( N(I)/N(R) \); (iii) Most of Group B was in the row for low \( N(I)/N(R) \) increase, but with considerable scatter over the wage change columns. In other words, light industry
tended strongly to have low increases in the number of ITR's employed per rabochiy, but with no apparent relationship to change in relative wages. Heavy industry (but not all of Group A) tended to have small gains in W(R) relative to W(I), with average or higher increases in the relative employment of ITR's. Group A branches (including the wood products branches and building materials) plus construction were scattered over all three wage change columns but do not appear in the "low N(I)/N(R) increase" row. In short, each of the two major groups of branches shows "system" with respect to change in one of the ratios but not with respect to the other.

These patterns suggest that the distribution of branches over the nine cells of our matrix is not entirely random; there is an important systematic component. Second, the systematic component seems primarily to relate not to the relationship between the magnitudes of changes in factor proportions and relative wages but to the sector of the economy to which the branches belong. Third, the systematic effect of sector seems to relate to one ratio or the other, but not distinctly to the relationship between them. (Group B is largely in one column, but dispersed over rows; Group A does not appear in one row, but is scattered over columns; the core branches of heavy industry are concentrated in one column, but appear in two of the rows.) This suggests that distinct wage and employment policies are being pursued with respect to recognizable groupings of branches; that the wage policy has some systematic effect upon the W(R)/W(I), but that this ratio, per se, plays no important allocative role. This view is supported by the very strong cross-sectional correlation between rates of change of
blue collar and ITR wage levels and by the almost equally strong correlation between rates of change of blue collar and ITR employment.

II. In this interpretation, the observed changes in the wage and employment ratios are incidental to more substantial and significant changes in the inter-branch wage structure and distribution of manpower. In the branches whose share of total employment was being increased (almost all from Group A), their shares of total ITR employment increased especially rapidly. This presumably reflects technological change and qualitative aspects of the development program under which these branches (electric power, chemicals, machinery, etc.) were favored. In those branches (mostly from Group B) whose overall wage level was being raised relative to industry as a whole, the wages of rabochiye increased especially rapidly. This combination of circumstances produces the branch patterns of changes in the employment ratio, \( \frac{N(I)}{N(R)} \), the wage ratio, \( \frac{W(R)}{W(I)} \), and the (weak and apparently insignificant) positive relationship between changes in them.

Can these branch patterns of employment and wage changes be satisfactorially explained in terms of our neoclassical model? Not very easily, it would appear. (i) In much of heavy industry we see rapid employment growth (electric power, chemicals, cement, machinery) and relatively slow wage growth. In a neoclassical context, this would suggest strong supply relative to demand, (ii) In Group B and wood products we see slow employment growth and rapid increase in relative wage leve, This suggests strong demand relative to supply,
Both of these inferences seem difficult to defend. Consider first the market for blue collar workers. All branches relied overwhelmingly upon on-the-job training for the production of skilled workers. Branch specialization, therefore, was presumably not very great. To the extent that background characteristics were related to prospects for skill acquisition, it appears that Group B and wood products would have made lesser demands on their prospective employees. Especially during a period of rapid influx from agriculture of young people with limited education, it would seem that supply to branches characterized by youth and/or low educational attainment would be rising relatively rapidly. Comparing also planned growth rates of capital investment and output, it is not likely that Group B (plus wood products) would be the sector in which tight blue collar labor markets would be pushing wages up at an above average pace.

Looking separately at the ITR markets, Group B (and wood products) again does not appear to be the area of particular demand pressures. The manpower planning literature stresses the role of blue collar employment in projecting demand for ITR's. This, of course, would mean relatively weak demand in Group B and strong demand in most of Group A. In addition, the literature indicates that the latter sector was the main locus of ITR-intensive technical change.

On the supply side, the only data we have to go on are graduations in relevant specialties, in relation to the size of the ITR stock. Graduations in the specialties of energy, metallurgy,
machine building and instrument making, and electronics we will associate with the heavy industry component of Group A. Graduations in food and consumers' goods specialties we associate with Group B. Over the 1950-65 period, graduations at the VUZ and SSUZ levels combined in the two groups of specialties increased at about the same rate: 3.5 per cent p.a. in the Group A specialties and 3.3 per cent p.a. in the Group B specialties. In absolute terms, the Group A growth rate was much higher: the number of annual graduations increasing by 169,000, compared to 31,000 in Group B.

Perhaps the best measure at our disposal of the changing relative scarcities of professionals in these two areas is the ratio of graduates to the level of employment of ITR's. If attrition rates in the two sectors are similar, this ratio indicates the degree to which graduations meet replacement needs and, perhaps, contribute to upgrading of staff. Throughout the 1950-65 period, this ratio (of specialists produced to "stock" of ITR's employed) was substantially higher in the Group A specialties (branches) than in the Group B specialties (branches): 9.7 per hundred in 1950 vs. 4.8 per hundred in 1950; 13.5 per hundred in Group A in 1965 vs. 9.2 per hundred in the Group B specialties (branches). The relevant interpretation would appear to be that the relative scarcity of specialists for Group A was less throughout the period, but that the change (reduction) in relative scarcity of specialists was greater in Group B. That is, in Group B there was more rapid increase in the availability of specialists relative to replacement needs. In this sense, and considering only the replacement component of demand,
it appears that a greater "loosening" of the market for ITR's was occurring in Group B than in Group A.

12. We would draw the following inferences from the foregoing:
(a) The observed pattern of wage and employment changes at the branch level is not satisfactorily explained by a neoclassical model in which variation in supply of presumably specialized ITR's is the decisive market influence. (b) To the extent that sectoral employment and wage policies are at work—policies that are not constrained by labor market conditions—the Group A (producers' goods) vs. Group B (consumers' goods) dichotomy does not provide a fully satisfactory basis for distinguishing the affected branches. That is, the dichotomy tells little about the ranking of branches either by growth rate of employment or by growth rate of average wages.

An alternative approach to the relationship between wage and employment changes over this period emphasizes inter-branch differences in demand. Assume a high degree of substitutability of workers in each employment category across the branches included in our survey. (Considering the limited sectoral coverage of our data and the high degree of mobility of both rabochyi and ITR's among branches—as reported by turnover data—this is not an unreasonable assumption.) Inter-branch differences in supply cease to play a role, and differences in demand become decisive. In a dynamic setting, rapidly expanding branches bid labor away from other branches in which it could readily be employed. It is,
of course, not required that every rabochiy and ITR be equally capable of (or desirous of) employment in every branch for this to produce a significant, direct relationship between rate of growth of employment and rate of wage increase. 14

As the preceding section would suggest, this hypothesis finds no confirmation in the data we are considering. Correlation between rates of change of employment and of wage level yields nothing. The Spearman rank order correlation coefficients are -0.04 and -0.09 in the ITR and rabochiy cases, respectively. Needless to say, neither coefficient approaches statistical significance. The same is true of Pearson product moment correlation coefficients (on the magnitudes of percentage of changes in wages and employment for each labor force category).

13. We have explored several market-oriented approaches to inter-branch wage changes between 1950 and 1966. The results varied but in no case were they strongly persuasive.

The alternative we have suggested to these allocative interpretations of the observed changes in wage structure is a distributive hypothesis. As we have already indicated, the well known and long-standing Soviet policy of reducing income differences between "social groups"—"mental" and "physical" workers included—provides an alternative explanation of the major shift in relative wages we are discussing: the long-term decrease in \( W(I) \) relative to \( W(R) \). Support for an important distributive role appears at a number of points: In the continuity of the wage shift, notwithstanding
important changes over time in the relative supply of specialists; also in the fact that the wage shift occurred in all branches, including those in which the employment ratio shifted toward decreased relative employment of ITR's.

If the policy of reducing earnings inequalities extended to inter-branch differences as well, this should be reflected in our data in the form of negative correlation between the level of wages in the initial year of the period (1950) and the (percentage) rate of increase in wages (of each class of labor) over time. Such correlation is indeed shown by the data: Among rabochiye, the Pearson product moment correlation coefficient (between 1950 average wage and percentage increase in average wage, 1950-66) is -0.45, which is significant at the .05 level. The Spearman rank order correlation coefficient is -0.52 which is also significant at the .05 level.

(Both calculations were made for our full set of 20 branch observations.)

Among ITR's, the evidence points in the same direction but is statistically weaker. Both correlation coefficients have the right (negative) sign, but the product moment coefficient (of -0.25) has a t value of only 1.09, significant at the .30 level. The rank order correlation coefficient is -0.44, significant at the .10 level.

This relationship (between initial levels and percentage changes) was not sufficiently strong to prevent increase in the variance of wage rates, across branches, of either rabochiye or ITR's. Coefficients of variation remained very much as they had been, however: that of rabochiye decreased from .309 to .282, that of
ITR wages increased from .271 to .307. If an equalitarian distributive purpose was involved, its effect was to limit the growth of inequality during a period of substantial increase in money wage rates, rather than actually to reduce inter-branch inequality.

Within branch inequality, as measured by the absolute difference $W(I) - W(R)$, decreased in most branches. The direction of change in the difference and its size at the end of the period (1966) do not appear to be related to the growth rate of ITR employment in the branch: In five of the 9 branches with distinctly high $N(I)$ growth rates, the difference in wage rates was relatively large; in the other four it was not. Therefore, if rapid growth of $N(I)$ is an indicator of strong demand (rather than supply), the absolute wage difference, $W(I) - W(R)$, was not obviously being used as a signal for the acquisition of relevant skills and credentials. Wage and employment data for the period as a whole (1950-66) therefore appear to provide clearer evidence of distributive than of allocative function. This applies to both inter-branch and inter-category wage structure. This inference finds interesting support within the low wage (level), low (employment) growth sectors: wood products, food, and light industry. In the latter two sectors, reductions in the wage difference, $W(I) - W(R)$, were small or negligible (not exceeding 16 per cent in any of the branches). In all three branches of the wood products group, the absolute reductions in $W(I) - W(R)$ were substantial (25 to 54 per cent). This sector is distinguished from the other low-wage, low growth sectors in only one discernible way: In 1950, its ITR's were less poorly paid in comparison with the all-industry average. This was associated with
very low percentage increase in \( W(I), 1950-66, \) and the greatest reductions in \( W(I)-W(R). \) (In timber and woodworking, the smallest differences in the entire distribution were attained.) This is more easily reconciled with (horizontal) distributive considerations than it is with an allocative function, given what we know of relevant labor market conditions.
IV. Disaggregation by Period, 1950-1966

In the preceding section, wage and employment changes at the branch level were considered over the 1950-66 period as a whole. In effect, only beginning and end year conditions were considered. This long-term perspective provided clearer evidence of distributive than of allocative influence upon cross-sectional wage changes. In this section, we explore the possibility that allocative effects have been obscured by neglect of changes in labor market conditions within the period. As previously noted, the years 1950-66 comprise three subperiods which are quite distinctive in this regard. In particular, we noted a strong cycle in underlying manpower supply and associated swings in flows through the educational system and in labor supply to different sectors of the economy. To the extent that these swings impacted upon the branches and labor force categories included in our data, any role that the wage system may have played in accommodating to these swings should be revealed in wage and employment data for appropriately determined periods. The published data constrain us to the three periods 1950-55, 1955-60, and 1960-66. Fortunately, the 1955 and 1960 boundary years coincide closely (although not perfectly) with the upper and lower turning points, respectively, of the cycle in the able-bodied population. Thus, we have three periods to work with, each distinctive in terms of underlying manpower dynamics and each long enough for those differentiating conditions to make themselves felt.
Table 4: Wage levels, 1950, and percentage rates of change, 1950-1966, by branch of industry.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Levels, 1950</th>
<th>Percent change in wage level</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Industry</td>
<td>68.7</td>
<td>120.8</td>
</tr>
<tr>
<td>Electric power</td>
<td>72.1</td>
<td>141.2</td>
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<tr>
<td>Coal</td>
<td>120.6</td>
<td>182.5</td>
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<tr>
<td>Ferrous metallurgy</td>
<td>95.6</td>
<td>167.6</td>
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<tr>
<td>Chemicals</td>
<td>73.0</td>
<td>125.0</td>
</tr>
<tr>
<td>Machinery and metal-working</td>
<td>74.4</td>
<td>120.1</td>
</tr>
<tr>
<td>Wood products</td>
<td>59.9</td>
<td>106.5</td>
</tr>
<tr>
<td>Timber</td>
<td>60.8</td>
<td>108.0</td>
</tr>
<tr>
<td>Woodworking</td>
<td>56.1</td>
<td>98.6</td>
</tr>
<tr>
<td>Paper and cellulose</td>
<td>73.9</td>
<td>137.7</td>
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<tr>
<td>Building materials</td>
<td>59.1</td>
<td>109.7</td>
</tr>
<tr>
<td>Cement</td>
<td>72.9</td>
<td>140.8</td>
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<tr>
<td>Other</td>
<td>58.2</td>
<td>106.2</td>
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<tr>
<td>Light industry</td>
<td>52.0</td>
<td>87.0</td>
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<tr>
<td>Textiles</td>
<td>57.1</td>
<td>96.4</td>
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<tr>
<td>Cotton cloth</td>
<td>60.8</td>
<td>108.5</td>
</tr>
<tr>
<td>Other textiles</td>
<td>53.2</td>
<td>88.2</td>
</tr>
<tr>
<td>Clothing</td>
<td>43.3</td>
<td>76.2</td>
</tr>
<tr>
<td>Shoes, furs, etc.</td>
<td>46.2</td>
<td>79.4</td>
</tr>
<tr>
<td>Food</td>
<td>51.2</td>
<td>90.0</td>
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<tr>
<td>Sugar</td>
<td>47.6</td>
<td>97.2</td>
</tr>
<tr>
<td>Meat</td>
<td>50.5</td>
<td>89.5</td>
</tr>
<tr>
<td>Fish</td>
<td>75.1</td>
<td>161.0</td>
</tr>
<tr>
<td>Other foods</td>
<td>45.6</td>
<td>78.6</td>
</tr>
<tr>
<td>Construction</td>
<td>56.5</td>
<td>119.8</td>
</tr>
<tr>
<td>State agriculture</td>
<td>36.0</td>
<td>84.3</td>
</tr>
</tbody>
</table>

W(R) = Average monthly wage rate of rabochye.

W(I) = Average monthly wage rate of ITRs.

Source: TsSU SSSR, Trud v SSSR (Labor in the USSR), Moscow, 1968, pp. 140-145.
### Table 5: Employment levels, 1950, and percentage rates of change, 1950-66, by branch of industry.

<table>
<thead>
<tr>
<th>T.E.</th>
<th>Rabocheye</th>
<th>Percent change in employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1950</td>
<td>1966</td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>------</td>
</tr>
<tr>
<td>All Industry</td>
<td>15,316.8</td>
<td>10.45</td>
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<tr>
<td>Electric power</td>
<td>184.3</td>
<td>79.04</td>
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<tr>
<td>Coal</td>
<td>858.5</td>
<td>9.75</td>
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<tr>
<td>Ferrous metallurgy</td>
<td>742.6</td>
<td>10.39</td>
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<tr>
<td>Chemicals</td>
<td>469.0</td>
<td>n.a.</td>
</tr>
<tr>
<td>Machinery and metal-working</td>
<td>4,293.3</td>
<td>15.08</td>
</tr>
<tr>
<td>Wood products</td>
<td>2,201.5</td>
<td>6.66</td>
</tr>
<tr>
<td>Timber</td>
<td>1,211.5</td>
<td>6.31</td>
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<tr>
<td>Woodworking</td>
<td>817.4</td>
<td>6.83</td>
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<tr>
<td>Paper and cellulose</td>
<td>133.4</td>
<td>7.79</td>
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<td>Building materials</td>
<td>672.6</td>
<td>6.58</td>
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<tr>
<td>Cement</td>
<td>45.3</td>
<td>10.33</td>
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<tr>
<td>Other</td>
<td>627.3</td>
<td>6.33</td>
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<tr>
<td>Light industry</td>
<td>2,670.3</td>
<td>6.78</td>
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<tr>
<td>Textiles</td>
<td>1,399.1</td>
<td>5.33</td>
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<tr>
<td>Cotton cloth</td>
<td>693.8</td>
<td>4.21</td>
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<tr>
<td>Other textiles</td>
<td>705.3</td>
<td>6.51</td>
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<tr>
<td>Clothing</td>
<td>763.5</td>
<td>8.45</td>
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<tr>
<td>Shoes, furs, etc.</td>
<td>368.5</td>
<td>7.95</td>
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<tr>
<td>Food</td>
<td>1,683.0</td>
<td>10.58</td>
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<tr>
<td>Sugar</td>
<td>122.4</td>
<td>6.92</td>
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<tr>
<td>Meat</td>
<td>122.0</td>
<td>12.77</td>
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<tr>
<td>Fish</td>
<td>191.8</td>
<td>10.20</td>
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<tr>
<td>Other foods</td>
<td>1,246.8</td>
<td>10.94</td>
</tr>
<tr>
<td>Construction</td>
<td>2,603.0</td>
<td>6.79</td>
</tr>
<tr>
<td>State agriculture</td>
<td>2,425.0</td>
<td>4.12</td>
</tr>
</tbody>
</table>

T.E. = Total employment; n.a. = not available
N(R) = Employment of rabocheye; N(I) = Employment of ITRs. All employment dates are annual averages (full-time equivalents).

Source: TsSu SSSR, Trud v SSSR (Labor in the USSR), Moscow, 1968, pp. 86-89, 121, 126.