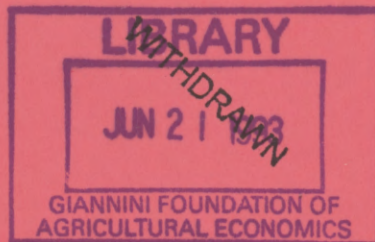


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PREDICTING LONG-TERM CHANGES IN YUGOSLAV
PERSONAL CONSUMPTION WITH A COMPREHENSIVE
REGIONALISED ECONOMIC-DEMOGRAPHIC MODEL

by

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EXECUTIVE SUMMARY

This paper is based on the demographic-economic model built for Yugoslavia, Bachue-Yugoslavia. It describes the household consumption sub-system and presents certain simulations showing the effect of the main explanatory variables on the consumption structure. The paper is divided into three sections. The first section very briefly sketches the structure of Bachue-Yugoslavia and, in greater details, the structure of the personal consumption sub-system, and its place in the whole model and links with the other sub-systems. The second section presents firstly on a theoretical basis, and secondly in practical terms, the functions used to estimate and simulate personal consumption. The equations are derived from a simple consumption model explaining the share of income spent on one commodity as a function of income per capita and a series of socio-demographic variables representing some characteristics of the household, such as the average age of the children, the level of education of the population studied etc.

The third section considers firstly the adjustment of personal consumption provided by the functions estimated, once these functions are no longer used to explain the structure of personal consumption but that they are used to generate the personal final demand in a closed regionalised model of input-output type. In the second part, the evolution of long-term personal consumption structure is discussed, by running the model up to the year 2000. This is followed by the presentation of two long-term simulation runs, one consisting of raising income and keeping all other socio-demographic variables unchanged, and the other the reverse. With respect to the simulations, an interesting outcome of the model is the very important effect on consumption structure of the socio-demographic variables, at least as important as income. Socio-demographic variables are not so important for explaining the allocation of income between consumption and savings, but much more importantly to explain changes in the consumption structure, due to the aging of the population or due to variations in its sociological characteristics, such as education.

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Predicting long-term Changes in Yugoslav Personal
Consumption with a Comprehensive Regionalised
Economic-demographic Model (*)

by

B. Popović and M. Macura,

R. Wéry and P. Cornu

This paper presents some long-term simulations on personal consumption levels and structures by sector (agriculture and non-agriculture) in the eight regions of the Socialist Federal Republic of Yugoslavia (SFRY).

The simulations have been performed with a large economic-demographic model, Bachue-Yugoslavia. Bachue-Yugoslavia is a regionalised, highly endogenous, simulation economic-demographic model for medium- and long-term development and population policy analysis in Yugoslavia (**). It is a yearly recursive model consisting of five inter-linked submodels, which cover the following five areas: economy, population, social services, education and the labour market. Linkages among the submodels represent a number of important inter-relations which in reality exist among the five areas. They make it possible for numerous direct, indirect and feedback effects to operate within the model.

The first section describes very briefly the structure of Bachue-Yugoslavia, particularly the formation of personal consumer demand and its articulation within the whole system. The second section focusses on the specification and estimation of personal consumption functions. The third section presents some simulations for the year 2000.

(*) This paper was originally prepared for the IXth International Conference of Applied Econometrics - Vith International Conference on the Econometric Modelling of Socialist Economies held in Budapest in April 1982. It is based on a version of Bachue-Yugoslavia which has since undergone some changes, the major one being that the model is now completely closed. This does not however, significantly alter the comments on the simulations in this exercise.

(**) For an early, largely non-technical description of the model, see M. Macura, B. Popović and M. Rasević: Bachue-Yugoslavia: Regionalised policy simulation economic-demographic model of Yugoslavia - Conceptual basis, (Geneva, ILO, 1977; mimeographed World Employment Programme research working paper; restricted).

Many thanks are due to Gerry Rodgers for his comments and to Jili Hamilton for typing the paper.

1. MAIN FEATURES, SUBMODELS AND THEIR LINKAGES

1.1 MAIN FEATURES

Broadly speaking, Bache-Yugoslavia focusses on economic development, population change and development-population interactions. It is designed to trace major economic, demographic and related consequences of alternative medium- and long-term development and/or population policies and strategies. They are tracked at the regional level in a way which makes multiple inter- and intra-regional economic-demographic interactions possible. In Yugoslavia, such interactions are too important in the medium- and especially long-term to be ignored in any policy analysis model.

The model is extensively disaggregated. In a large measure this is due to its near-total dissection along two principal dimensions: regional and sectoral. Eight regions and two socio-economic sectors exist in the model. The regions are five republics of Yugoslavia other than Serbia, and three divisions of Serbia - its two autonomous provinces and the rest of the republic. The sectors are agriculture and non-agriculture. The former embraces population and economic activities of traditional, private agriculture. The latter comprises population, economic and other activities largely of the modern "social" economy, which includes social agriculture and social services. Besides the two dimensions, there are several others that are specific to one, two or at most three submodels. The disaggregation along the regional dimension makes it possible for diverse regional development patterns and population changes, as well as for largely regionalised decision-making to be adequately represented in the model. The disaggregation along the sectoral dimension enables the model to capture the modern-traditional dualism existing in the Yugoslav economy and population, and to reflect specifics of both economic and demographic behaviour of the two socio-economic sectors.

The model is highly endogenous. This endogeneity derives from a multiplicity of inter- and intra-submodel linkages which are essentially of two types. The first enables any particular variable, generated in any given submodel, to be used directly in the same submodel and/or elsewhere, either alone or in combination with some other variable(s). The second ensures that any specific variable exerts influence via behavioural and/or technological functions on some other variable(s) in the same submodel and/or elsewhere. The functions represent major economic and economic-demographic relationships operating in reality. As a rule, they are estimated by ordinary least squares from a large body of Yugoslav economic, demographic, educational, employment and related data. The data come exclusively from official statistical sources, are mostly of the macro type and include time-series spanning the period from the mid-1960s to the mid-1970s and cross-sections centred around 1971.

1.2 SUBMODELS AND THEIR LINKAGES

The economic submodel depicts growth and structural change of eight regional economies, each of which consists of up to 21 so-called industries. One of the industries is private agriculture which largely overlaps with agriculture in the sectoral classification. For every region, the submodel generates final demand components and social product by industry. The final demand depends

mainly on economic and demographic variables, the social product on economic and employment variables. Built around regional input-output tables, the submodel further yields over-all domestic demand and supply by industry, which are inputs into the internal market clearing process. Within each industry, the process occurs according to common, pre-determined conditions and as a rule leads to inter-regional trade. The proceeds resulting from the trade are used to compute the gross value-added, which is then distributed. This distribution, affected to a considerable measure by appropriate policy variables, yields: depreciation and industrial savings, personal incomes and contributions to social services. These items financed respectively investment in the economy, personal consumption and social expenditures.

The demographic submodel treats vital and migratory processes and resultant changes in population size and structure at the regional level. Each regional population is dissected along sectoral and national boundaries and thus consists of internal as well as external non-agricultural and agricultural populations.¹ These populations are all disaggregated by age, sex and educational level; the disaggregation is finer for the internal populations. The submodel generates fertility survival and external migration rates for all populations and internal migration rates for the internal populations. In a large measure the rates are derived endogenously. They depend directly or indirectly on variables generated in all five submodels and to some extent on demographic quasi-policy variables. The rates are used to track the size and structure of each population. The educational dimension of the structure is shaped by the educational process, modelled in the educational submodel.

The social services submodel treats social services at the regional level. Eight social service activities exist in every region and mainly comprise education, health, old-age security, social housing, regional and federal administration. The submodel determines demand for and supply of resources for financing social services by activity. The demand depends on economic, demographic and educational variables. The supply is a function of GVA and gross wages by industry and gross wages by activity, as well as of relevant policy variables. The submodel further determines consumption of services as well as the distribution of social expenditures by activity. Consumption of services derived from demand and supply through an adjustment process, allows for intra- and inter-regional transfers of resources that lead to complete or partial removal of demand-supply imbalances. The distribution of social expenditures net of material costs (equal to social consumption) is in principle similar to the distribution of GVA in the economic submodel and generates social services investment funds.

The educational submodel treats formal education among internal populations. Education is divided among five-year levels of schooling; which include general and technical/vocational secondary schooling. For each internal population, the submodel generates first-grade enrolment rates and single-grade dropout rates, all by level (as well as type of schooling at the secondary level), and sex. Lower primary level enrolment rates in all populations, which are as a rule close to unity in reality, and tertiary level enrolment rates in agricultural populations are exogenous. All dropout rates are exogenous too. The remaining enrolment rates are obtained by behavioural functions and depend on variables generated in various submodels and/or exogenous education

¹ The external non-agricultural (agricultural) population of a given region consists of migrant workers and their dependents abroad who belonged to the internal non-agricultural (agricultural) population of the region before moving abroad.

policies. Enrolment and dropout rates are used to track size and structure of student and non-student school-age populations, by age, grade completed and sex.

The labour allocation submodel deals with non-agricultural and agricultural labour markets at the regional level. The two are treated differently. In the former, labour demand and supply, as well as employment and unemployment, all by three educational levels, are treated. In the latter, only labour supply of the lower educational level exists and, by assumption, is all employed at an undetermined degree of utilisation. In all labour markets, the labour supply is obtained from the population structure and labour force participation rates, by age, sex and educational level. Male rates are exogenous since in reality they vary only to a limited extent. Female rates are endogenous; they depend on variables produced in demographic and educational submodels as well as in the present submodel. In non-agricultural labour markets, the labour demand, which originates in economic and social services submodels, is obtained endogenously by labour demand functions by industry and activity, and by educational level. Employment by industry and activity and unemployment are determined through a labour allocation process.

1.3 CONSUMER DEMAND

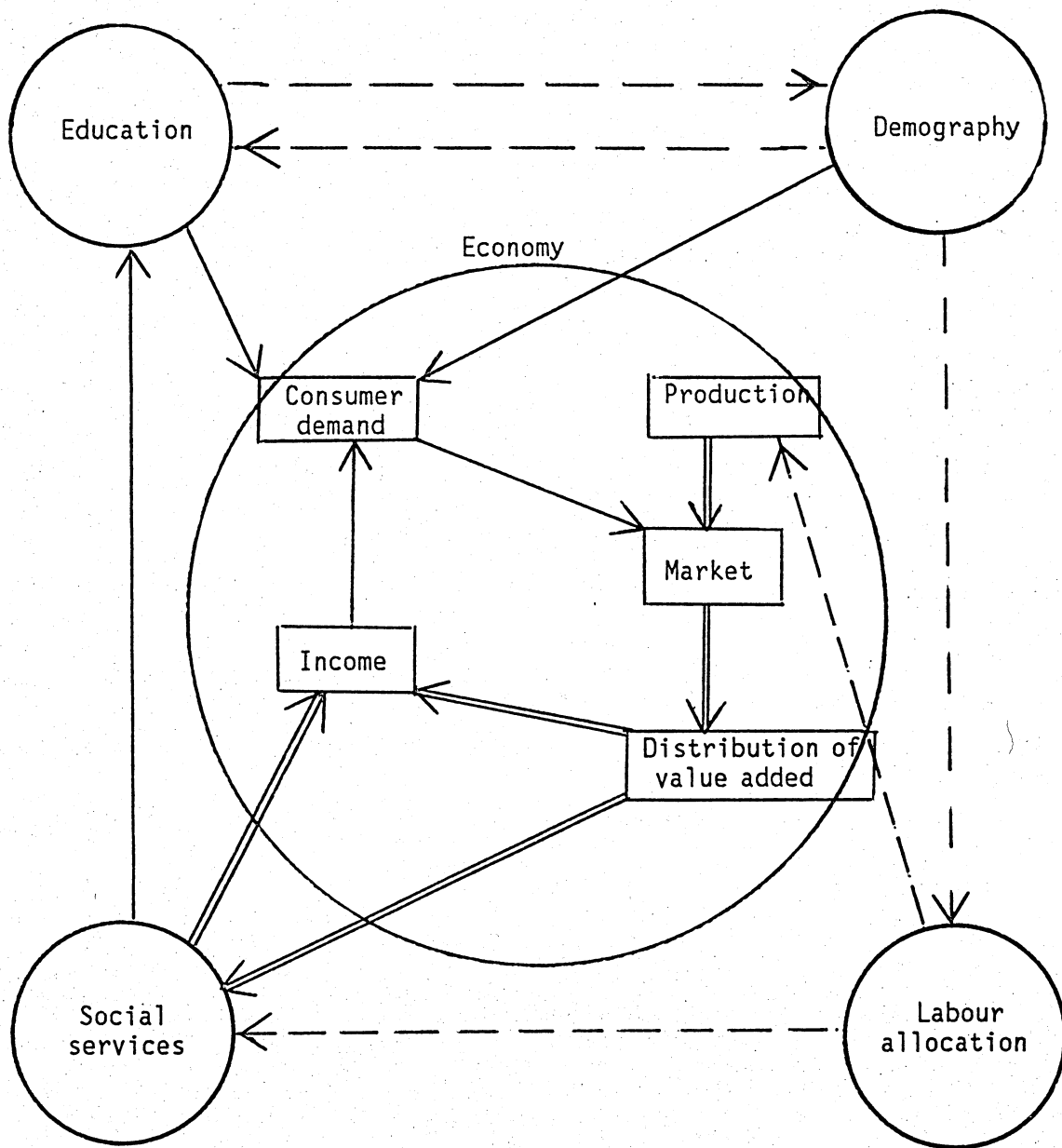
In each of the eight regional economies, the demand block of the economic submodel generates three domestic final demand components for 21 industries: personal consumer demand of the agricultural and non-agricultural populations, social services consumption and investment demand and the economy's investment demand. The position of consumer demand in the model is represented in Figure 1.

Thirty-six personal consumption functions and two transition matrices are used to determine the levels of industrial-regional demands (ex ante personal consumption) of the population. The behavioural functions are used first to generate the levels of demand; then the matrices are used to convert the levels of demand for particular categories of goods and services into levels of consumer demand for outputs of 21 industries in each region.

Savings of the population constitute one of the components of the accumulation in the economy and one of the items stemming from the distribution of the disposable income by the population. This form of savings is generated by the personal savings function for the non-agricultural as well as the agricultural population of each region. For reasons of simplicity, personal savings are treated as an item in the classification of personal consumption of goods and services, a kind of delayed consumption.

There are four more personal income consumer expenditure functions for social services and taxes. They are used only when the structure of household expenditures is determined since their demand does not involve consumption of economic outputs.

Figure 1: Simplified formation of consumer demand in Bachue-Yugoslavia



- ====> flows of financial and material resources
- - -> flows of people
- - -> influences and effects