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SOME SUPPLY-SIDE DETERMINANTS OF RISING FEMALE EMPLOYMENT IN CROATIA

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I. INTRODUCTION

Probably the most important phenomenon in the labor market during the last three or more decades has been a rapid increase in female labor force participation in developed countries[2]. This fact has induced a considerable amount of theoretical and empirical studies of female labor supply behavior. The work obviously gained impetus after the mid-sixties when various authors, first of all Jacob Mincer (1962) in his famous paper, and then others (for early works see for example Becker (1965), Cain (1966) and Lancaster (1966)), revived interest in the family as the basic consumption unit, and pointed out that, in order to understand appropriately the family utility maximization process, the classical dichotomy of market work and leisure should be refuted in analyzing wife's time, because it overlooks the fact that most of the married women's time is devoted to work at home, especially when young children are present.

This early finding, i.e., that female labor force behavior cannot be analyzed solely in terms of demand for leisure determined most of the investigation on female labor supply in the seventies and eighties when the family model of time allocation was further developed and used in various versions (though undoubtedly incomplete, the list of important studies would include Owen (1971), Leibowitz (1974), Gronau (1973a, 1973b, 1977), Wales and Woodland (1976, 1977, 1981), Layard, Barton and Zabalza (1980), Graham and Green (1984), Layard and Mincer (1985), Joshi, Layard and Owen (1985) and Gomulka and Stern (1990).

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2 As shown by Schultz (1989) the female labor force participation rate has not increased in all countries (it has not increased in many developing countries), so that there is no consensus on trends associated with development in women's labor force participation. See also Fallon and Riveros (1989) for some facts on labor force participation rates in developing countries.

The rise of female employment and the change of the male-female ratio in total employment also took place in Croatia. Some domestic studies that are dealing with this labor market phenomenon are Wertheimer-Baletić (1970, 1972, 1976, 1978,), Rašević, Mulina i Macura (1976), and Prpić (1976). The aim of this paper will be to analyze supply-side determinants of rising female employment in Croatia using the time-series data in a period from 1965 to 1988.

As shown in Chart I, female employment rose substantialy and steadily since 1965, with the exception of the first few post-reform years (economic and political reform took place in 1965) when employment growth was influenced by political decisions.

Chart I

Chart II shows how the male-female ratio in total employment changed over the same period in favour of famales.

Chart II

If we attempt to measure the influence of various factors on such a labor market phenomenon, the labor force participation rate is not, in Croatian circumstances, an adequate measure of female labor supply behavior due to two problems. The first one arises from the fact that Croatian unemployment statistics is extremely unreliable[3], and the second one is the result of a strong and atypical exogenous influence on the shape of the LFPR (labor force participation rate) curve which was caused by political decision taken in 1965[4]. The former reason, of course, is valid for another possible measure – female labor supply.

Thus, we shall analyze female labor force behavior by using employment as a third possible measure.

The use of employment rather than the participation rate in Croatia is made easier by the fact that rising female employment has not been caused by a rising number of women of working age. Table I lists the average annual growth rates for the female population in the 15–59 year range and for female employment in the entire analyzed period and in two subperiods, 1965–1976 and 1977–1988.

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[3] Here we cannot explain why is it so but, to illustrate our claim, we shall cite the World Bank (1983) report on Yugoslavia which states that »the Yugoslav authorities estimate that, generally speaking, aproximately 60% of all registered job seekers are actually unemployed« (p. 183–184). The same paper gives some possible explanations why.

[4] Namely, in 1965 the political decision was taken to open the borders for economic emigration from the country. As the borders were previously closed and excess labor demand was present in West European countries, a great number of people (accordingly to official stastistics (SGH–1972) in 1971 224, 722 workers from Croatia were employed abroad) emigrated from the country in the late sixties and early seventies. In the mid-seventies, with the beginning of the first oil shock recession, they started to come back, forming an excess supply in the domestic labor market. We cannot detect the precise number of people that were out of the country in all years (but only in the survey years) and, thus, cannot construct a variable without severe observation errors.

Chart 1
Growth of female employment

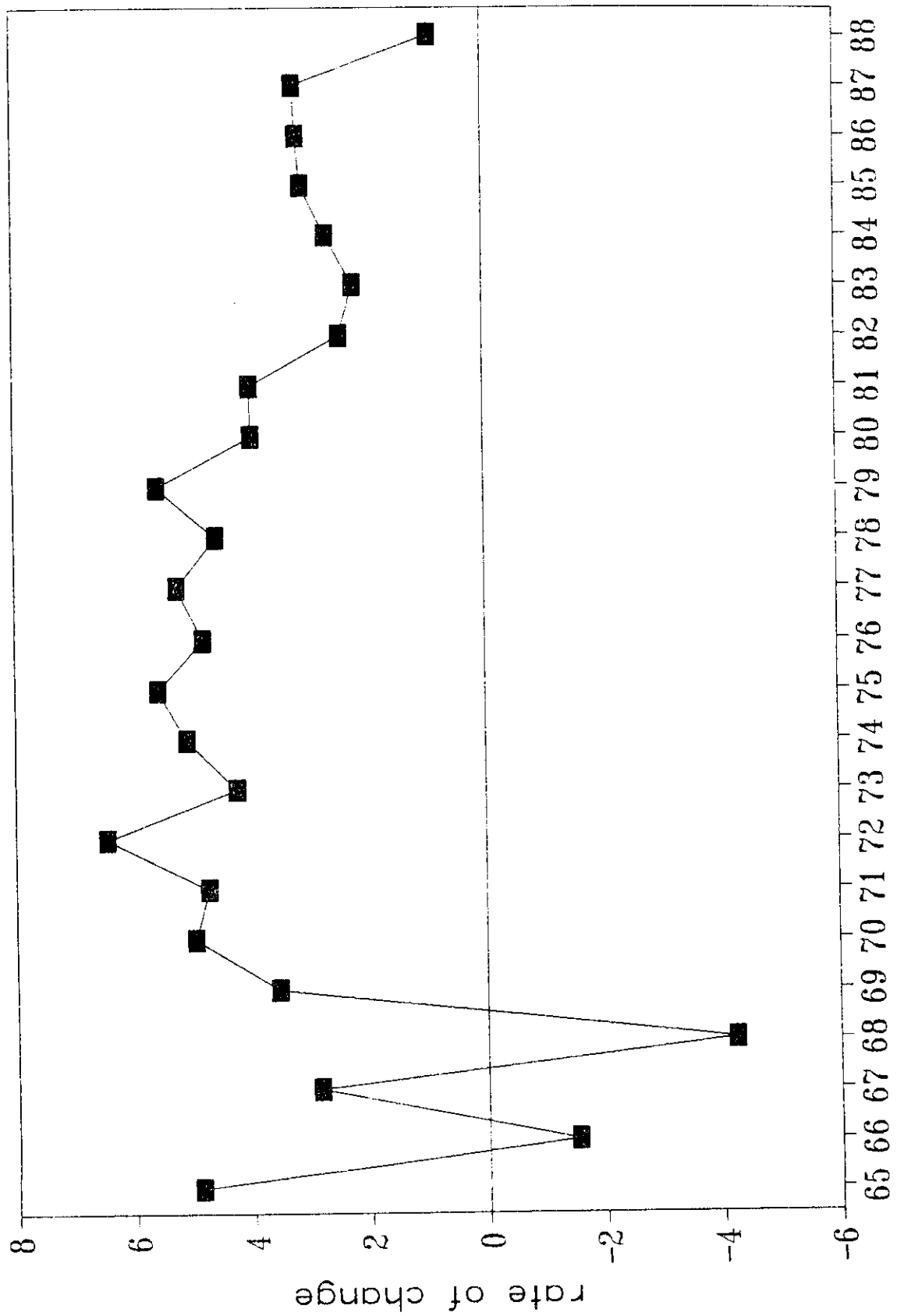

Chart II
Male-female employment ratio

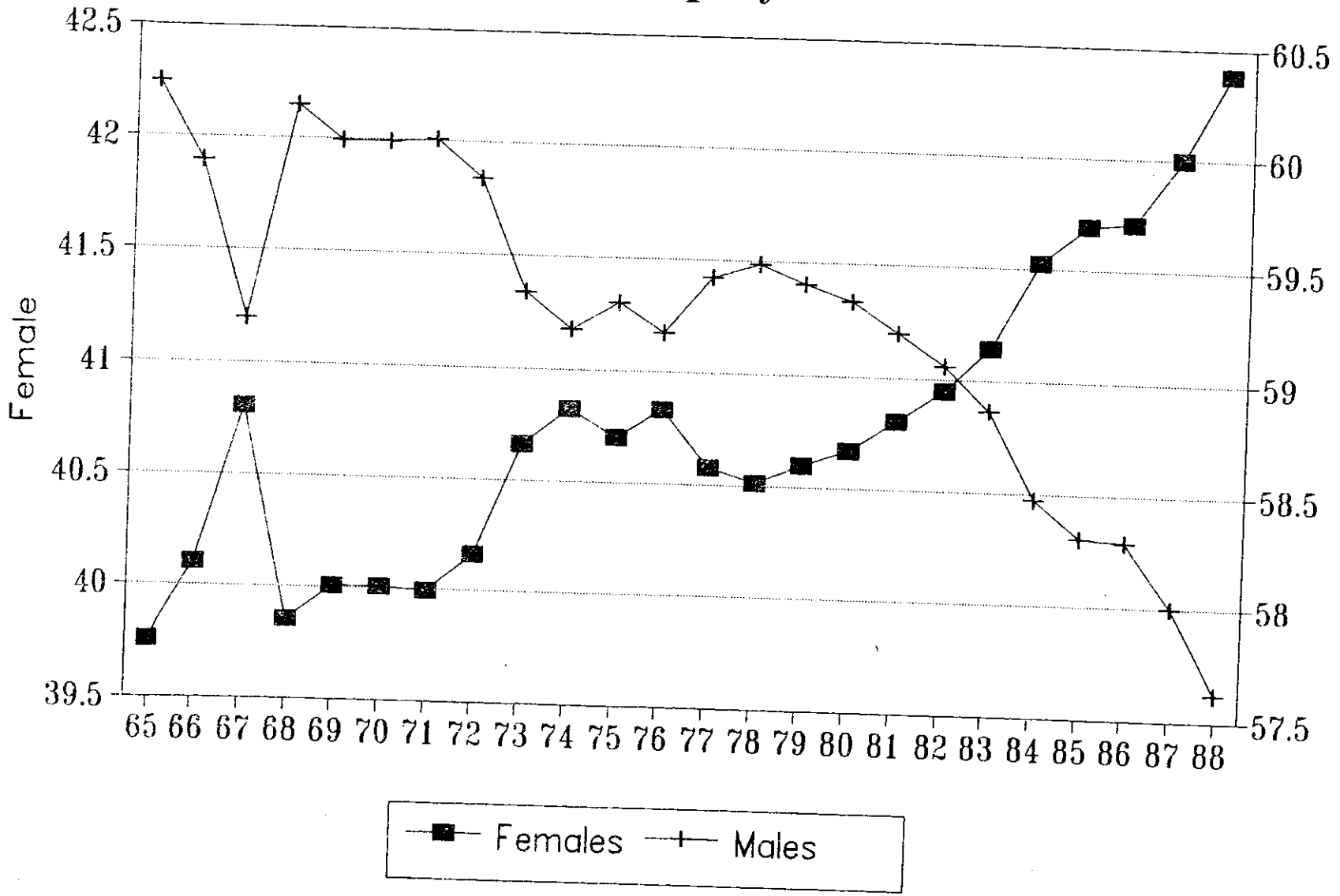

Table I / AVERAGE ANNUAL GROWTH RATES FOR THE FEMALE POPULATION OF WORKING AGE AND FEMALE EMPLOYMENT

	Females 15–59	Employment
1965–1988	0.29	0.70
1965–1976	0.51	0.04
1976–1988	–0.02	1.30

Source: own computations from data in Vujčić (1991).

Although the rate of growth for this category of women is positive (0.29%) for the whole period, in the last thirteen years it became negative (–0.02%), even if the latter turned out to be the period of the most rapid growth of female employment (1.30%). This means that the causes of this labor market phenomenon are other than demographic.

Therefore, we shall look for the determinants of this fast growth of employment through the model of intrafamily allocation of time as it is reasonable to assume that the cause, if it is not the increased number of females of working age, lies in the activation of those wives[5] who were not engaged in market activities before.

II. THE THEORETICAL FRAMEWORK

For the sake of simplicity we will assume that the household consists of two adults, the husband (h) and the wife (w), and that children do not contribute to the household production.

The household maximizes its utility by combining its members leisure time with goods,

$$U = U(X, Lh, Lw) \tag{1}$$

where Lh denotes the husband's leisure time, Lw the wife's leisure time, and X is a Hicksian composite of all consumption goods. X can either be produced at home or purchased in the market, i.e.,

$$X = X_H + X_M \tag{2}$$

where X_H denotes the amount of home goods and X_M the amount of market goods. Home goods are produced by work at home (T_H),

$$X_H = f(T_H) \qquad \begin{matrix} f' > 0 \\ f'' < 0 \end{matrix} \tag{3}$$

where T_H is a time spent in the production of home goods. As stressed by Gronau (1977), the decline in the value of marginal productivity at home is due not only to fatigue or changes in input proportions but also to a change in the composition of X_H. When Th increases more work is done that has a cheaper market substitute.

The household maximizes its utility under two kinds of constraints. The budget constraint,

$$PX_M = WhT_Mh + WwT_Mw + V = Y \tag{4}$$

[5] And in some cases daughters who usually stay, in Yugoslavia, in the same household with their parents for a relatively long time.

where P denotes prices, Wh the husband's wage, Tmh the husband's time spent in market work, Ww the wife's wage, Tmw the wife's time spent in market work, V other sources of income besides earnings, while Y stands for family income; and the two separate time constraints

$$T_i = T_{Mi} + T_{Hi} + T_{Li} \qquad i = w,h \tag{5}$$

where T is a total amount of time available and T_L is leisure time.

If the wife does not work in the market we are faced with the corner solution Tmw = 0, when she divides her time exclusively between work at home and leisure.

In this case the shadow price of her time (W*w) is determined by the value of the marginal product of her labor inputs in the production of home goods what comes from the familiar rule that the input price should equal its value of marginal product

$$W^*_w = \frac{P\,\partial XH}{\partial THw} \tag{6}$$

where P is the commodity (X_H) price. Therefore, if

$$TMw = 0, \text{ then clearly } W^*_w > W_w \tag{7}$$

In this case the household faces a somewhat different budget constraint,

$$PX_M = W_h T_{Mh} + V = Y \tag{8}$$

or, when the husband does not work at home, we may rewrite equation(8) as

$$PX_M = Wh\,(T - T_{Lh}) + V = Y. \tag{9}$$

The wife's time constraint is also somewhat different because the total available amount of time is divided between home work and leisure exclusively,

$$Tw = T_{Hw} + T_{Lw}. \tag{10}$$

A change in the parameters Wh and V changes the shadow price of wife's time. Increases of both Wh and V increase income and, thus, increase the demand for all components of the utility function. Due to the time constraint the wife cannot respond simultaneously to the demand for her leisure time and home goods and, thus, her shadow price W^*_w rises.

Since TMw = Tw – (THw + TLw) is the labor supply of the wife we would, thus, expect

$$\frac{\partial T_{MW}}{\partial Y} < 0. \tag{12}$$

The increase of the husband's wage rate, holding V constant (which will be the assumption in our later empirical estimation because of unobservable V), gives rise to a substitution of the husband's time for the wife's leisure and home goods. An increase in the demand for the wife's time is enhanced by an income effect and, possibly, by a substitution between commodities.

Generally, husbands are offered higher wages than wives and wives are more productive in work at home. Although this may sound like a male chauvinist model of the world, it is still a fact. The ratio of male to female wages in Croatia is shown in Table II for two survey years, 1967 and 1986.

Table II / NET MONTHLY WAGES (PER WORKER IN DINARS) IN THE SOCIALIST SECTOR IN CROATIA

Year	Males	Females	Female net wages as % of male net wages
1976	4105	3366	82%
1986	100086	82027	87%

Source: Jugoslavija 1918 – 1988., SZS, 1989. Beograd, pp. 79–81, last column own calculation.

The fact that wives are more productive in the production of home goods can be explained by their job experience or on-the-job-training in home production. Because home goods and market purchased goods are not perfect substitutes the household places more value on the wife's housework time and on the husband's time spent in market work.

Specialization in market and home activities should provide more welfare to both members of the household. When there is no perfect substitution between two kinds of goods (or when $Xm < 0$ for all goods) two kinds of cross subsidies take place in the household. Because the wife does not earn income she pools money from the mutual (household) fund and, in turn, provides more home goods and, thus, implicitly more leisure time for the husband. These cross-subsidy effects do not necessarily equal zero[6] because both wife's or husband's time may be more valuable.

The introduction of children into the household additionally increases the wife's shadow price of time. At very young ages there is almost no substitute for the wife's child-caring activity but the price of substitutes (maids, kindergarten, school) falls as the child grows older making the demand for wife's time and, thus, her shadow price of time (W_w^*) negatively correlated with the child's age.

Due to substitutability between the wife and other factors of production at home, the falling prices of other home work substitutes (e.g., laundry machines, dish-washing machines, vacuum cleaners etc.) also decrease the value of the wife's time. The degree of substitutability in home production activities other then child care is likely to be dependent on the level of technology employed in the household. The lower the level of technology employed, the greater is the degree of substitutability and vice versa.

One more important factor which influences the value of the wife's time is education. More education raises the opportunity cost of being out of market work because the potential wage rate for more educated persons is higher. Therefore, other things being equal, higher education should lead to higher labor force participation (though it may be considered as a factor of rising productivity in the nonmarket sector as well).

[6] In fact, as a rule, they do not because optimal time allocation is restricted by institutionally given hours of market work, so that both members cannot vary the number of their hours in market work according to their relative wage rates and their efficiency in the production of home goods.

III. AN ESTIMABLE EQUATION

A woman's price of time in the absence of market opportunities is in fact her reservation wage – the wage at which she is ready to supply the first unit of labor. In order to identify the relevant determinants of rising female employment in Croatia we should, therefore, measure the impact of various factors on the female reservation wage.

A woman will engage in a market activity when the actual market wage rate W exceeds or becomes equal to her reservation wage $W_w(W \geq W_w^*)$

The woman's price of time may be expressed as

$$Wi = v + \varepsilon i \tag{11}$$

where v is the mean value of time for all women and εi the i-th random deviation from this mean. The woman will therefore participate if

$$W - v \geq \varepsilon i \tag{12}$$

and will remain a full-time homemaker otherwise.

The number of working hours is fixed institutionally, so that one cannot vary its number in market work.

By using the assumption stated in the first part of the paper, i.e., that the cause for increasing participation of females in market work lies in the activation of those wives (and/or daughters) who were not engaged in market work before (namely, a fast rise in female employment is clearly not attributable to demographic factors) we may estimate the impact of various variables which, according to theoretical assumptions, affect the wife's value of time in order to identify the relevant determinants of this labor market phenomenon.

As participation in market work is negatively correlated with the shadow price of time v, it is clear that the same factors which affect v necessarily affect the participation decision but with an a priori expected opposite parameter sign.

Within our theoretical framework we may write that v is affected by:

$$v = \beta_0 + \beta_1 Y - \beta_2 HOMPRO + \beta_3 CHDEP - \beta_4 EDUC \tag{13}$$

where the shadow price of the woman's time is associated positively with the family income (Y) and the dependency on young children (CHDEP), and negatively with home-work productivity (HOMPRO), and formal education (EDUC) variables.

Therefore, an estimable equation reads

$$EMPf = \beta_0 - \beta_1 Y + \beta_2 HOMPRO - \beta_3 CHDEP + \beta_4 EDUC \tag{14}$$

where EMPf is female employment and parameter signs are opposite than in (13).

IV. DATA AND RESULTS

Official statistics do not provide time-series data on family income (they do not separate male from female wage rates either) so that we shall, instead, use real wages (W72) as a proxy variable for Y. Data on both home-work

productivity and formal education are not available from official statistics either. Therefore, we were forced to skip the education variable[7], and for home-productivity (HOMPRO) we use data on electrical energy spending in households expressed as the number of kwh per inhabitant. It is intuitively obvious that such a variable should be a good proxy for changing technology in home production (i.e., the number of electrical substitutes)[8] When plotted (see Chart III), it shows a constant and fast rise of productivity in the households over the analyzed period.

Chart III

The child dependency ratio (CHDEP) was constructed as the ratio of children aged 5 years or less to the female population aged 20–34 years (dependency ratio). Why these age limits? First, 20–34 year old females are in the most fertile period of life, and, second, various studies have shown that the value of the mother's time is most affected by having children five years old or less[9]. Beenstock and Warburton (1988) also used such a variable with time-series data for the UK labor market to measure the impact of children on female participation. They did not obtain a significant estimate but nevertheless stressed that childbearing is clearly important to female labor supply and warned that the increasing degree of provision of child care activities, both privately and by the state, may help to explain the inconclusive results obtained.

For information sake we have plotted the child dependency ratio for Croatia during the analyzed period in Chart IV.

Chart IV

An additional, already mentioned factor which has strongly affected labor market fluctuations of both females and males in Croatia, and represents a specific feature of this labor market, is emigration which took place after 1965. In order to estimate our equation one should therefore account for this phenomena. We have taken the ratio of workers who came back from work

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[7] Data on the overall education level are available only for the survey years.

[8] Another important substitute is the possibility of the household to hire a housekeeper and thus save the wife's home work time. Although the model could be extended to include outside help as an endogenous variable, our empirical analysis excludes this case due to lack of suitable data.

[9] See, for example, Arleen Leibowitz (1974) and Reuben Gronau (1973). Gronau also gives four possible explanations for a decline in the value of the mother's time with the age of the child. »a) The technology of production of child services may be such that the marginal product of C of a given input unit (time and goods) increases with the child's age. Since it may be difficult to change the output per child of child services (the child's »quality«) as he grows older, this technology should lead to a decline in inputs with the child's age. b) An increase in the elasticity of substitution between the mother's time and market goods and services as the child grows, and a greater incentive to substitute goods for time if mother's age has a positive effect on her price of time, may lead to replacing mother's time by market goods. c) An increase in the mother's productivity in the production of child services due to on-the-job training and formal schooling ... may allow her to produce the same level f services with ever-decreasing time inputs. d) The utility derived from a child may be directly related to the amount of time spent in the production of child services. If the psychic income associated with the production of child services declines as the child grows older, so would his mother's value of time.« (p.188)

Chart III
Electrical energy spending in household

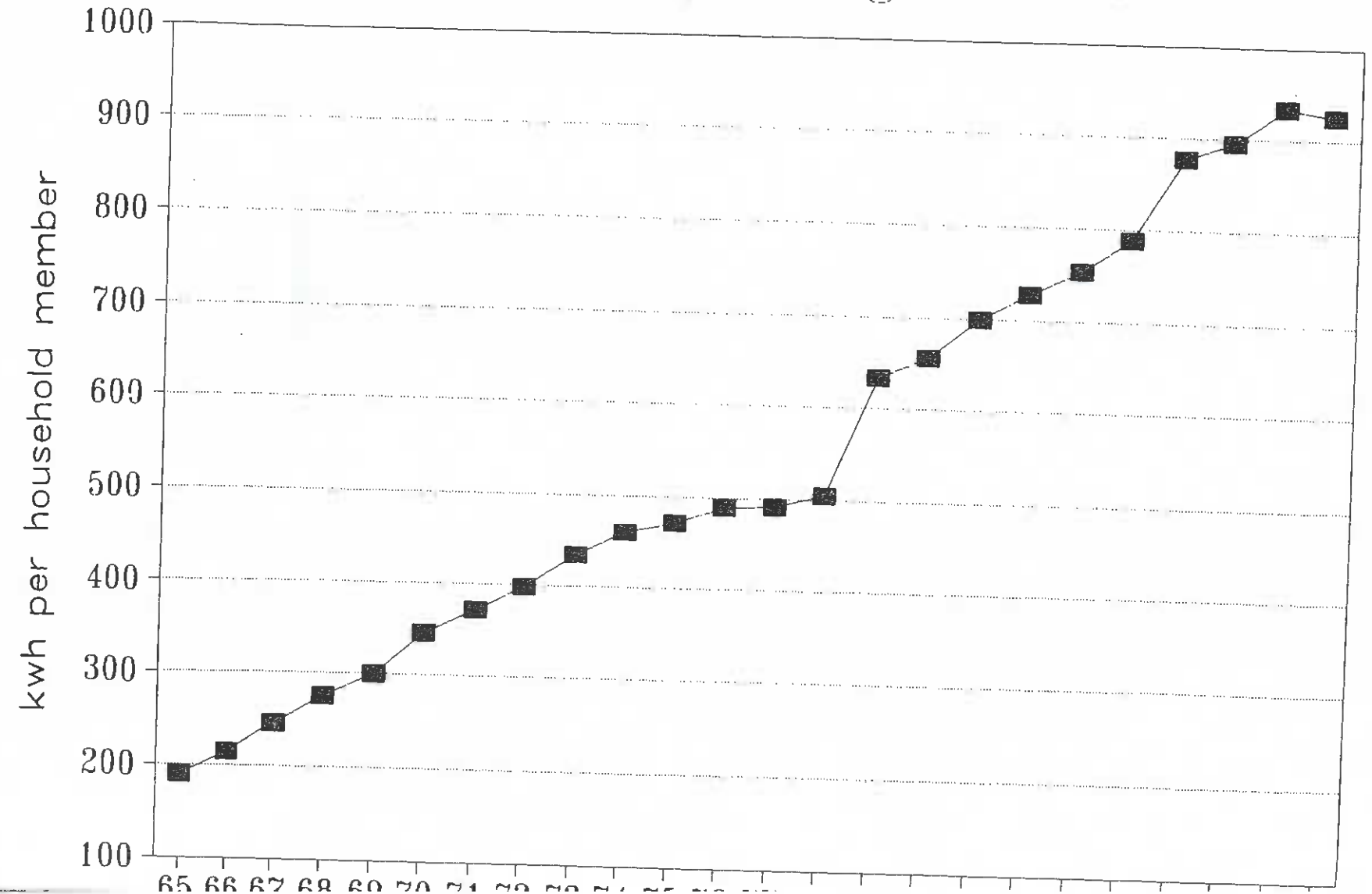
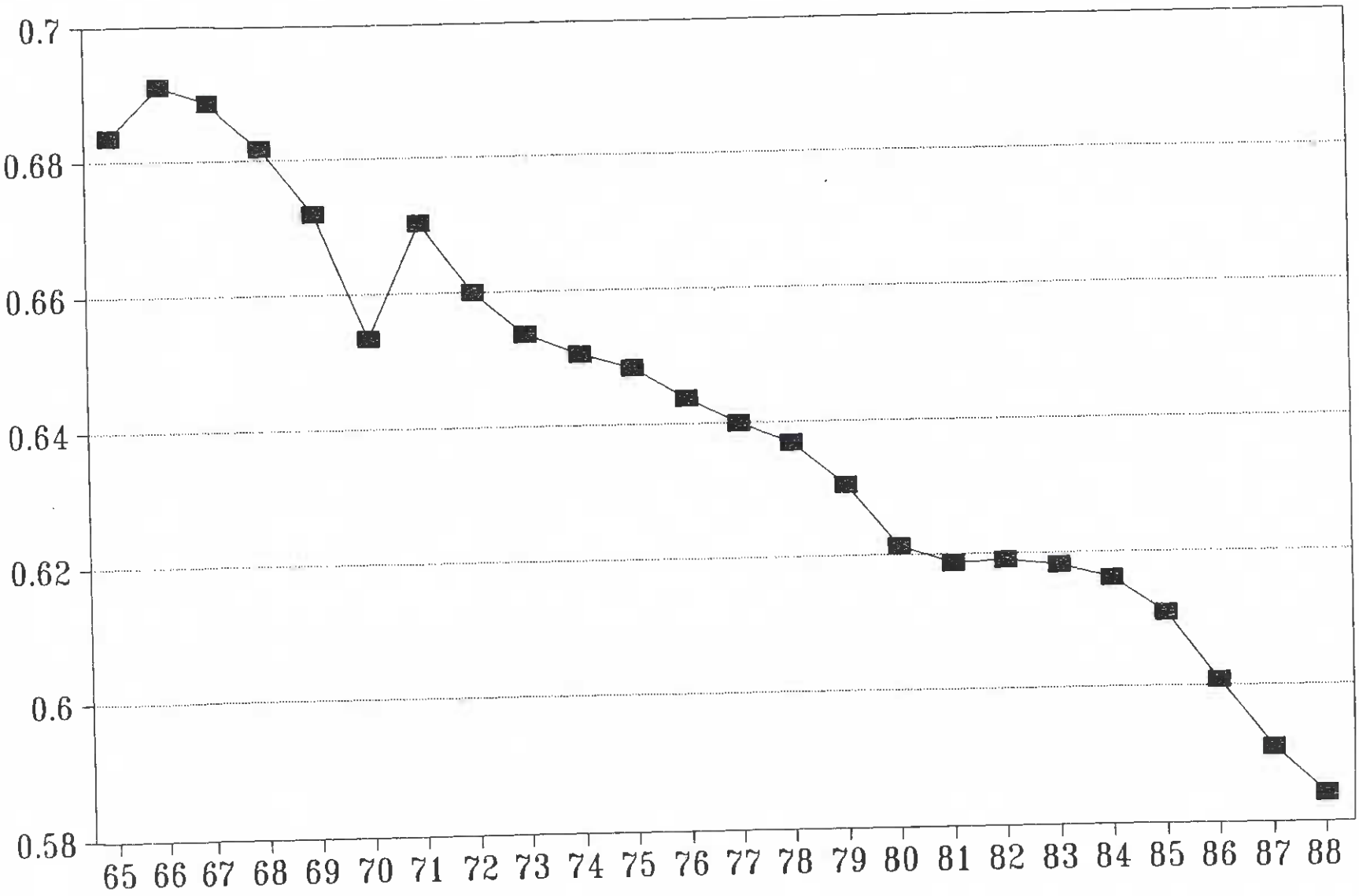


Chart IV
Child dependency ratio



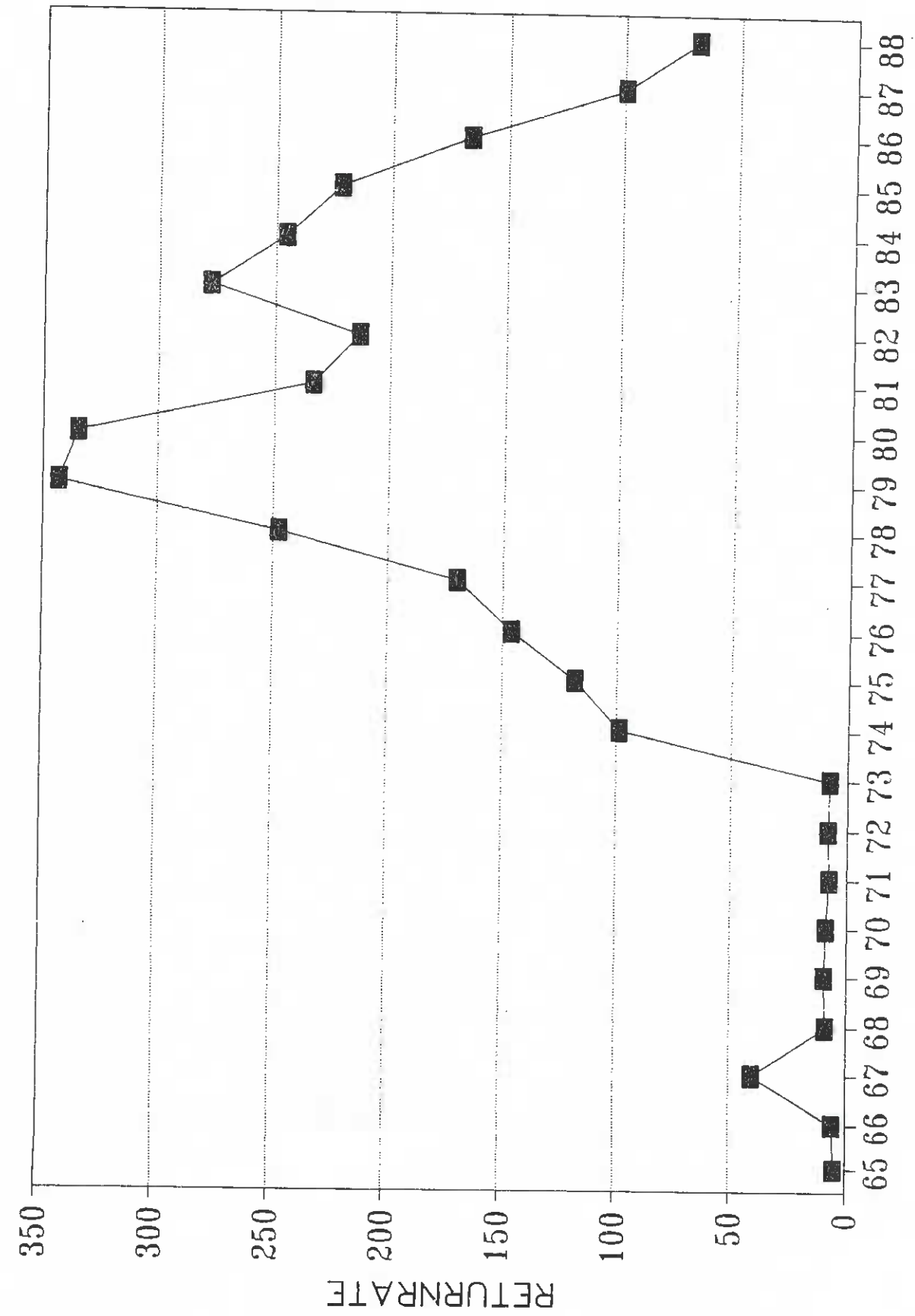


Chart V
Rate of return of workers from abroad
RETURNRATE
350
300
250
200
150
100
50
0
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88

abroad to those who were employed abroad in a particular year and thus constructed the RETURNRATE as a good proxy for a strong »exogenous« impact on labor supply. We have plotted the RETURNRATE in Chart V to show how sharply it has changed between two subperiods, 1965 – 1974 and 1975 – 1988.

Chart V

Finally, the theory suggests that during a recession some unemployed workers or nonparticipants (such as, in our case, the wife who is a full-time homemaker) become pessimistic about finding a job with an acceptable wage so that they do not, for some time, participate at all. This phenomenon is called the discouraged worker effect[10] and we may look for it by means of changes in the expected unemployment rate. In our equation the lagged change in the unemployment rate (DIFURt-1) is used to represent the discouraged worker effect. Beenstock and Warburton (1988), for example, also used this variable with time-series data for the UK labor market and obtained a significant parameter estimate with a theoretically expected negative sign.

The closest representation of the explained model is detailed below:

Sample period: 1965–1988

$$EMPft = 1.0940 - 49.9258\ W72_{t-1} + 144.3432\ HOMPRO_{t-1} -$$
$$(-3.9331) \qquad (4.3865)$$

$$-6.6404\ CHDEPt + 94.4341\ RETURNRATE -$$
$$(-2.5335) \qquad (3.9148)$$

$$-4398.6459\ DIFUR_{t-1} + 18270.691\ REFORMA^{10\ 11} \qquad (15)$$

$$R^2 = 0.9899,\ R^{-2} = 0.9864,\ DW = 2.319.$$

The equation is satisfactory in respect of both parameter stability properties and autocorrelation. The variation of the dependent variable explained by the equation is very high, almost 99%, and all parameter estimates are of the theoretically expected sign.

Apart from the usual association with the income effect on the backward-bending labor supply curve, in this case negative wage elasticity should be rather attributed to the added-worker effect – the notion that a decrease in nonlabor (intrahousehold transfer) income tends to cause one (in our case the female household member) to become a labor force participant. This clearly arises from the fact that both a rise in employment and a sharp fall in real wages were present during the entire period from 1979 until 1988. It is interesting to note that this tendency is captured with female employment being a dependent

[10] For an extensive empirical work on this subject see for example Finegan (1981).

[11] Dummy variable for the first post-reform years, 1965–1967, when employment was influenced by political decisions and, thus, react in unusual amplitudes (which could be seen from Chart I).

variable. This is a consequence of the following phenomenon: two kinds of different budget constraints were present simultaneously, the hard budget constraint on the family side and the soft budget constraint on the firm's side, and, in addition, Duessenbery's relative income effects and in some cases minimum living requirements were also present. The family's hard budget constraint and the ratchet effect in family consumption (with some influence of minimum living requirements, and »keep up with the Joneses« effect) have caused more female household members to become labor market participants. On the other side, the enterprise's soft budget constraint, a known feature of socialist economies, allowed that portion of labor supply to lead to increased female employment rather then unemployment. It is a fact that, normally, during a recession (and a recession took place during the whole period from 1979 to 1988.) firms are, generally, not willing to employ new workers. Fortunately for us (although unfortunately for the socialist economies) we were able to capture this phenomenon due to the soft budget constraint behavior of Yugoslav enterprises.

It is also interesting that analogously with the added-worker effect there is also indication of the discouraged-worker effect presence (which is not, of course, theoretically impossible when one uses the time-series data).

The return rate of workers from abroad turned out to be a very important factor, warning that it is impossible to explain the labor market behavior in Croatia without including it.

Both the child dependency ratio and rising productivity in the households proved our theoretical expectations, the latter being the most significant variable which indicates that the level of household production technology was low, so that the substitutability between the wife and other factors of home production (electrical) has been high.

V. CONCLUDING REMARKS

Economic circumstances in Yugoslavia and particularly in Croatia appear to represent an interesting framework for research in labor market behaviour. Like many other countries Croatia has experienced a fast increase both in the female employment, and in women's part in overall employment. Demographic factors did not appear to be the cause of this labor market transformation, so we looked for them through the model of intrafamily allocation of time.

Using the time-series data for the period from 1965 to 1988 we have found out that the relevant factors in explaining the fast rise of female employment in Croatia were: 1)rising productivity in the households; 2) declining child dependency of females; 3) large-scale economic emigration during the years of the excess labor demand in West European countries and return of these emigrants after the first oil shock recession in the mid-seventies; and 4) the added-worker effect during the recession that took place in the eighties in Yugoslavia. We have also found the presence of the discouraged-worker effect.

Finally, we have to point out that, although indicating some answers, this work leaves many questions on female labor supply behavior in Croatia still open. The fact that we were restricted to official statistical sources and, there-

fore, forced to treat the aggregate time-series data on the average wage rate as a »representative individual« without distinguishing between male and female earnings still leaves one of the most important questions – how the woman's labor supply decision answers to her own wage rate and how to her husband's wage – unanswered. It has likewise been impossible to distinguish between married and other women, to analyze the behavior of supply by age cohorts and by education, and to include data on exogenous income because they are not sufficiently reliable.

It is obvious that some cross-sectional data will be necessary to warrant stronger conclusions about labor market behavior of females in Croatia. Until then we may only cite Gronau and say »Handle (the estimates) with care! Fragile.«

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