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ORIGINAL PAPER

The changing intra-household resource allocation in Russia

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Abstract During the transition period, Russian workers witnessed important changes in their real earnings. In the process, the wage gap between men and women has varied wildly and the family decision-making process may have been significantly altered. To investigate this issue, we estimate a collective labour supply model using data from the RLMS. The specification allows the sharing rule to change in a discrete manner between the *pre-* and *post*-1998 financial crisis. Our results indicate that the parameters of the sharing-rule have shifted to a new equilibrium in the post-1998 period. Indeed, when their relative wage increases, husbands (wives) transfer relatively less (more) to their spouse than was previously the case.

Keywords Collective model · Sharing rule · Russian economic crisis

JEL Classifications D1 · J22 · C5

1 Introduction

The Russian economy has witnessed dramatic changes over the course of the last 15–20 years. During the transition toward a market economy, workers have

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had to face important decreases in their real earnings, as well as widespread unemployment (Thomas and Stillman 2008). Wage arrears became widespread and the absence of safety nets drove many households into poverty (Lokshin and Ravallion 2000; Grogan 2006; Mroz and Popkin 1995). For the majority of Russians, the impact of the 1998 financial crisis was disastrous. The debacle of commercial banks deprived many households of their hard-earned savings during the Soviet period.

Many reckon that women have suffered more than men from the economic collapse (Glinskaya and Mroz 2000).[1] Using data from the Russian Longitudinal Monitoring Survey (RLMS), Lokshin and Yemtsov (2001) have also found that women were more likely than men to reduce expenditures on food and clothing. In recent years, women's behaviour on the labour market has witnessed important changes: on the one hand, a significant proportion of women have withdrawn from the working force to become housewives. On the other hand, young women appear to be more active than older women. They are more inclined to embrace professional careers, are more mobile on the labour market, and tend to delay the birth of their first child.

All these trends inevitably influence intra-household relations and, consequently, the decision process. Thus, behavioural changes on the labour market may reflect not only gender-biased labour market adjustments, but also changing bargaining power within households. The wild fluctuations in the wage rates over much of the 1990s and the important changes in the labour market participation rates offer a unique opportunity to investigate the inner functioning of the Russian households. Yet, assessing the extent to which these adjustments are driven by changing intra-household bargaining power is a difficult task. One way to achieve this is to assume that household outcomes are Pareto-efficient. This way, the so-called sharing rule that supports the observed outcomes can be parametrically identified (see Chiappori 1988, 1992). Because the sharing-rule is directly related to the spouses' relative bargaining power, it can be made time-dependent and the stability of its parameters investigated. We thus estimate a household collective labour supply model that allows the sharing rule to change in a discrete manner between the *pre*- and *post*-1998 periods. Given that the participation status of many individuals fluctuates through the years, the model also allows for corner solutions. For efficiency reasons, the wage rates and the labour supply functions are estimated simultaneously. Finally, we also account for discrete unobserved heterogeneity both in the wage and labour supply equations to avoid confusing preferences with bargaining power.

On the whole, the behaviour of Russian households can be relatively well approximated by the collective model.[2] The parameters of the sharing-rule

[1] Gerry et al. (2004) provide evidence that the wage gap is unevenly distributed, with women at the lower end of the distribution suffering most.

[2] Recently, Vermeulen et al. (2005, 2008) have used consumption data from the RLMS to test the collective model using non-parametric tests. Their results indicate that the collective model is compatible with the data.

indicate that the households have shifted to a new equilibrium in the post-1998 economic crisis. Indeed, when their relative wage increases, husbands (wives) transfer relatively less (more) to their spouse than was previously the case.

The paper is organised as follows. The next section presents the data and discusses the main features of the 1998 financial crisis in Russia and stresses the manner in which it may have impacted intrahousehold bargaining power. In Section 3, we present the household collective labour supply model and the econometric specification. Section 4 discusses the main empirical results and Section 5 concludes the paper.

2 Data and institutional environment

The data we use are drawn from the Russian Longitudinal Monitoring Survey, Phase-II. The RLMS is a household-based representative survey of Russia designed to measure the effects of the reforms implemented through the 1990s on the economic well-being of households and individuals.[3] Data collection under Phase II covers the period from 1994 to 2004. Unfortunately, no data were collected in the years immediately preceding and following the 1998 financial crisis, although the year 1998 was surveyed.

Our sample is composed of intact couples in which wives and husbands are aged between 16 and 55 and 16 and 60, respectively. We exclude full-time students and those who are unable to work for health reasons, women on maternity leave, and, finally, those who are involuntarily unemployed (i.e. unemployed and looking for a job). The latter are excluded to insure that non-employment is a choice rather than a constraint. Our sample thus comprises 1,953 distinct households yielding 4,118 observations. Nearly half of all households are only observed once. Over the course of our panel, 2,545 households are dual earners, 517 are male breadwinners, 476 are female breadwinners, and 580 have no earners. Table 1 provides basic descriptive statistics about the sample. As expected, husbands are slightly older than their spouses, and both have very similar educational attainments. Over the entire period, husbands have enjoyed an unconditional 10% wage advantage over their spouse. The table also provides information about children, region of residence, and the sample distribution across survey years.

2.1 The evolving labour market

The sweeping reforms that were introduced in the 1990s up until the major financial crisis of 1998 have probably triggered changes in the institutional environment and social norms that may be reflected in the labour market behaviour of spouses. Figure 1 provides prima facie evidence on the changing

[3] Information on the RLMS can be found at http://www.cpc.unc.edu/rlms.

Table 1 Descriptive statistics

Variable	Mean	Std-Dev
Individual characteristics		
Wife age	41.046	12.597
Husband age	42.442	11.860
Wife education	12.592	3.384
Husband education	12.658	3.423
Wife hourly wage	2.249	4.139
Husband hourly wage	2.445	4.300
# Children (0–6)	0.118	
# Children (7–18)	0.671	
Region of residence		
Moscow–St. Petersberg	0.103	
North/Northwestern	0.067	
Central/Black Sea	0.177	
Volga/Viask/Volga Basin	0.176	
North Caucus	0.133	
Ural	0.145	
Western Siberia	0.096	
Eastern Siberia	0.103	
Year dummies		
1994	0.146	
1995	0.099	
1996	0.094	
1998	0.123	
2000	0.112	
2001	0.107	
2002	0.108	
2003	0.106	
2004	0.105	

labour market behaviour of Russian spouses. The figure depicts the participation rates and the (log) husbands/wives wage ratios.

Between 1994 and 1996, husbands have suffered a more pronounced decline in their participation rates than their wives (10 vs 3 percentage points, respectively). Yet, by the end of 2004, the participation rates had returned to their 1994 levels in both cases.

The dotted line in the figure depicts the relative (log) wage ratios.[4] The scale of the dotted line appears on the right-hand side of the figure. Prior to the crisis, wives' wage rates amounted to more or less 90% of their husbands' wage rates, but both were declining slowly. During the crisis, the decrease in men's wages was such that wives' wage rates nearly doubled those of their husbands in 1998. Some have suggested that this was partly due to the collapse of the high-wage sectors that were traditionally reserved for men (see Goskomstat Rossii 1999; Bobyleva 2001).

[4]The period 1994–2004 was plagued by very high inflation. During the transition phase, sellers would post prices in "units" that needed to be translated into roubles using the rouble/US dollar exchange rate. We thus convert the wage rates into US$ using the official exchange rates (see Goskomstat Rossii 2005).

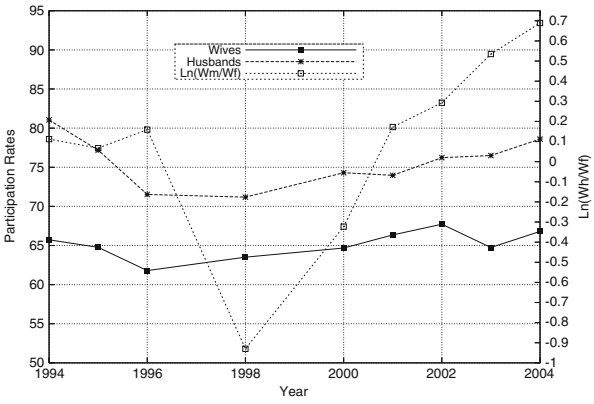

Fig. 1 Participation rates, H/W relative wages, Russia 1994–2004

These trends are also confirmed by simple regression analyses. Table 2 reports the results of a series of regressions that include year dummy variables in addition to standard demographic covariates. The first column focuses on the husband/wife wage ratios. According to the parameter estimates, the wage gap decreases with the husband's age and his wife's schooling level, but increases with his own level of schooling. Households living in the Volga region have larger wage gaps than those living in the Eastern Siberia/Far East region, while the converse holds for those living in Western Siberia. The year dummy variables are consistent with the pattern depicted in Fig. 1. Relative to 1998, the (log) wage gap varies between 23% and 30% in the years 1994–1996, decreases significantly in 1998, and increases steadily between 2000 and 2004.[5]

The next column reports the parameter estimates of pooled probit regressions on participation for each spouse separately. In both cases, age and education are important determinants of labour force participation. Likewise, most regional dummy variables are statistically significant. Once again, the year dummy variables are consistent with the pattern depicted in Fig. 1: Wives' participation rates decline slowly at first, flatten out between 1996 and 2000, and by 2004 are more or less equal to their pre-1998 levels. Husbands' participation rates are also well captured by the year dummy variables. The sharp decline is well captured by the parameter estimates of 1994–2000, and the upward trend is also nicely captured by the 2001–2004 year dummies.

As a last piece of evidence, the last column reports the results of fitting a pooled tobit model on the weekly hours of work using the same specification as in the probit regressions. Once again, age and schooling appear to be important determinants of the weekly hours of work and both exhibit the usual concave shape. According to the parameter estimates, the typical number of weekly hours of work varies significantly between regions. In particular, women in

[5]Glinskaya and Mroz (2000) report very similar wage gaps for the years 1992–1995 using RMLS data. See also Gerry et al. (2004) for a detailed analysis of the gender wage gap for the years 1994–1998.

Table 2 Exploratory regressions

Variable	$\ln(W_m/W_f)$		Probit–Participation				Tobit–Hours			
			Wives		Husbands		Wives		Husbands	
	Para	T-stat	Para	T-stat	Para	T-stat	Para	T-stat	Para	T-stat
Individual characteristics										
Intercept	−0.58	−3.61	−5.33	−24.20	−1.00	−4.82	−24.59	−6.07	29.42	8.50
Age—husband	−0.01	−5.10	0.21	23.11	0.08	9.11	2.20	13.27	0.56	3.99
Age—wife	0.00	0.48	0.00	−20.65	0.00	−10.94	−0.02	−11.24	−0.01	−4.52
Schooling—husband	0.02	2.72								
Schooling—wife	−0.02	−2.26								
Schooling			0.17	7.67	0.04	2.07	1.52	3.88	0.53	1.59
Schooling^2			0.00	−5.25	0.00	−0.51	−0.04	−3.08	−0.01	−0.85
Region of residence										
Moscow - St-Petersberg	−0.03	−0.35	0.01	0.18	0.13	2.54	−2.69	−3.30	−0.17	−0.22
North/Northwestern	0.18	1.65	0.10	1.80	−0.05	−0.83	0.86	0.94	−0.62	−0.71
Central/Black Sea	0.14	1.72	0.10	2.28	−0.02	−0.44	−0.10	−0.14	−1.90	−2.70
Volga/Viask/Volga Basin	0.17	2.05	0.13	2.92	−0.11	−2.57	1.51	2.06	−1.54	−2.18
North Caucus	0.07	0.70	−0.24	−5.20	−0.20	−4.23	−3.93	−4.95	−2.14	−2.82
Ural	0.02	0.21	0.11	2.49	−0.02	−0.43	−0.19	−0.26	−3.76	−5.20
Western Siberia	−0.23	−2.23	0.05	0.96	−0.06	−1.25	−0.97	−1.17	0.98	1.23
Eastern Siberia	Omitted		Omitted				Omitted			
Year dummies										
1994	1.30	14.60	0.14	3.19	0.34	7.72	2.78	3.83	−0.22	−0.31
1995	1.23	11.43	0.10	2.15	0.23	4.84	0.95	1.18	2.70	3.47
1996	1.20	13.14	0.01	0.29	0.05	1.03	0.57	0.69	2.42	3.03
1998	Omitted		Omitted				Omitted			
2000	0.70	8.29	0.02	0.46	0.10	2.26	1.05	1.38	2.10	2.80
2001	1.22	14.09	0.15	3.23	0.09	2.03	1.33	1.73	2.00	2.61
2002	1.36	16.01	0.18	3.76	0.17	3.63	1.41	1.83	2.25	2.97
2003	1.60	19.00	0.11	2.28	0.17	3.67	2.25	2.88	3.03	3.96
2004	1.77	21.09	0.15	3.20	0.26	5.39	1.26	1.61	2.14	2.81
R^2/Log-likelihood	17.7%		−8,534.23		−8,1587.04		−41,126.77		−51,159.15	

the Moscow–St. Petersberg regions work fewer hours than those living in the Eastern Siberia region. According to the year dummy variables, women appear to have had a fairly stable workweek over the 1994–2004 period despite the major economic downturn of 1998. Men, on the other hand, had a shorter workweek during that period but have since returned to their pre-crisis level.

All in all, the patterns depicted in Fig. 1 are fairly robust. These show that the wives' wage rates have decreased significantly relative to their husbands' wage rates starting with the financial crisis of 1998. Yet despite this, their participation rates and their workweek have remained relatively stable.[6] It is thus likely that the wives' share of household income has decreased significantly over that period.

Such important changes may very well impact the distribution of welfare within the households. Each year, the RLMS investigates this issue in a qualitative manner. Spouses are asked to report their subjective "satisfaction level" with their economic conditions. Interestingly, couples in our sample report being very unsatisfied with their economic conditions in the year 2000. Indeed, both spouses consistently report being "less than satisfied" or "not at all satisfied". In 2004, by contrast, the majority of wives still report being unsatisfied while most husbands report being relatively satisfied. Obviously, being satisfied or unsatisfied with one's economic conditions does not imply a gain or a loss of welfare. One may be unsatisfied with one's conditions but still benefit from intrahousehold transfers from one's spouse. The regressions above and the available qualitative information nevertheless do suggest that spouses have had to adapt their behaviour to a changing economic environment. These changes inevitably influence intra-family relations and, consequently, the decision process. The behavioural adjustments may reflect not only gender-biased crisis effects, but also a new equilibrium bargaining power within households. Assuming Russian households behave in a Pareto-efficient manner, it is possible to investigate how the labour market adjustments affect the intra-household allocation of welfare.

3 The collective model with corner solutions

As mentioned previously, changes in intrahousehold bargaining power can be ascertained from examining the labour market behaviour of both spouses, assuming the outcomes are Pareto-efficient.[7] In what follows, we describe a collective model that allows for corner solutions by both spouses (see Donni

[6]The stability of the wage and participation equations has been investigated thoroughly by Radtchenko (2006) based on regressions similar to those reported in Table 2. She finds that the participation equations are stable over the 1994–1996 and 1998–2004 periods, but that the parameter estimates are distinct between the two periods. On the other hand, there does not appear to be any structural break in the wage equations of both husbands and wives.

[7]See the aforementioned papers by Vermeulen et al. (2008), who find the collective model to be consistent with RLMS consumption data.

2003; Bloemen 2009). The model is written so that the parameters of the sharing-rule may vary between the pre- and the post-1998 periods.[8]

3.1 The general model

Consider a household composed of two individuals denoted j, with $j = f$ for female and $j = m$ for male. We assume that there are only two decision makers, although we allow the presence of children and relatives (elderly).[9] Each has his/her own standard utility function[10] that depends on leisure (assignable and observed), L_j, and a Hicksian composite good (unobserved), C_j. Prices are normalised to one. The decision process is assumed to yield Pareto-efficient solutions to the household resource allocation problem. Consumption is decentralised by the appropriate choice of full-income shares, Φ_j, derived from the bargaining process.

The maximisation programme can thus be formulated as:[11]

$$\begin{aligned} &\underset{h_{jt}, C_{jt}}{\text{Max}}\, U_{jt}(h_{jt}, C_{jt}),\ j = f, m \text{ such that} \\ &C_{ft} + w_{ft} L_{ft} \leq \Phi_{ft} \\ &C_{mt} + w_{mt} L_{mt} \leq \Phi_{mt} \\ &L_{jt} + h_{jt} = T, \\ &\Phi_{ft} = \Phi_t(w_{ft}, w_{mt}, y_{ft}, y_{mt}) \\ &\Phi_{mt} = w_{ft} T + w_{mt} T + y_{ft} + y_{mt} - \Phi_{ft}, \end{aligned} \tag{1}$$

where t indexes the year, w_{jt} are the hourly wage rates, h_{jt} are the labour supply functions and y_{ft} and y_{mt} are female and male non-labour incomes.

To avoid addressing the issue of corner solutions, most empirical papers based on the collective model have so far limited their samples to working couples (see, e.g. Chiappori et al. 2002). Donni (2003) proposes an innovative approach for taking corner solutions into account. He assumes that the

[8] We do not allow the sharing-rule to vary yearly to avoid over-parameterising the model. Furthermore, we do not account for home production for two separate reasons. First, time-use data are no longer available as of round IX of the RLMS. Second, as shown by Donni (2008) and Chiappori (1997), if one is willing to assume that the home production is separable in time inputs of spouses, then the collective model is valid even if home production is not explicitly taken into account.

[9] The presence of elderly parents is frequent in Russian households. We acknowledge that elderly parents and grown-up children may influence the decision-making process (see, e.g. Fortin et al. 2008). We omit this possibility to keep the model tractable.

[10] We could alternatively assume that each spouse has "caring" preferences, i.e. $W_j = W_j\left[U(h_j, C_j), U(h_k, C_k)\right]$, $j \neq k$. These preferences allow for interdependence of altruistic utility but impose weak separability between goods consumed by a household member and those consumed by his or her spouse. The assumption of egotistic or "caring" preferences is necessary to identify the collective model in our framework.

[11] We index the variables in the maximisation problem by t to highlight the fact that we use panel data when estimating the model. We remove them in the remainder of the section to ease reading.

household labour supply functions are continuous in the neighbourhood of a so-called participation frontier. Along this frontier, each household member is indifferent to the participation status of his/her spouse. Donni (2003) shows that, under this assumption, both the preferences and the sharing rule are identified up to a constant as in Chiappori (1988, 1992).

To fix ideas, let

$$\omega^j(w_f, w_m, y) \equiv \frac{U_h^j\big(T, C_j(w_f, w_m, y)\big)}{U_C^j\big(T, C_j(w_f, w_m, y)\big)}$$

be the reservation wage of spouse j, where U_h^j and U_C^j are the partial derivatives of the utility function with respect to working hours and consumption, and y is the total household non-labour income. This function describes the marginal rate of substitution between leisure and consumption calculated at $h_j = 0$ ($L_j = T$). Thus, the reservation wage of spouse j is implicitly defined as a function of non-labour income and his or her partner's wage. Donni (2003) has shown that $\omega^j(\cdot)$ is unique under relatively mild conditions. There thus exists a single pair of wages such that both spouses are indifferent between working or not. He has also shown that, for each spouse j, there exists a function $\kappa^j(w_s, y)$ that completely characterises participation:

$$p_j = \begin{cases} 1 & \text{if and only if } w_j > \kappa^j(w_s, y) \\ 0 & \text{if and only if } w_j \leq \kappa^j(w_s, y), \end{cases} \qquad j, s = f, m,\ j \neq s. \tag{2}$$

The intuition behind this result is as follows. In the case where both husband and wife work, the first- and second-order derivatives of the labour supply functions generate a set of partial differential equations that can be solved to identify the sharing-rule up to an additive constant. If only one spouse works, then the set of partial differential equations is also satisfied as $w_j \to \kappa^j(\cdot)$. Thus, the participation frontier, $\kappa^j(\cdot)$, serves as a boundary condition for the system of differential equations.

The solution of the programme Eq. 1, with due allowance for corner solutions, yields:

$$\begin{aligned} h_f &= h^f\big[w_f, \Phi_f(w_f, w_m, y_f, y_m, p_f, p_m)\big] \\ h_m &= h^m\big[w_m, \Phi_m(w_f, w_m, y_f, y_m, p_f, p_m)\big]. \end{aligned} \tag{3}$$

3.2 The labour supply model

The labour supply functions are assumed to be log-linear, i.e.

$$h_m^* = \alpha_{mD} \ln\left(w_m\right) + \beta_{mD} \ln\left(w_m\right)^2 + \gamma_{mD} \ln\left(\Phi_m\right) + \delta_{mD} \tag{4}$$

$$h_f^* = \alpha_{fD} \ln\left(w_f\right) + \beta_{fD} \ln\left(w_f\right)^2 + \gamma_{fD} \ln\left(\Phi_f\right) + \delta_{fD}. \tag{5}$$

The structural parameters are indexed by D so that they may vary between the pre- and the post-1998 periods, i.e. $\alpha_{jD} = \alpha_{j0} + \alpha_{j1} D$, $\beta_{jD} = \beta_{j0} + \beta_{j1} D$,

$\gamma_{jD} = \gamma_{j0} + \gamma_{j1} D$, $\delta_{jD} = \delta_{j0} + \delta_{j1} D$, $j = m,\ f$. The last terms on the right-hand side capture male, female and household characteristics, i.e.

$$\delta_{mD} = X^m \delta_{m0} + X^m \delta_{m1} D$$
$$\delta_{fD} = X^f \delta_{f0} + X^f \delta_{f1} D,$$

with $X^m = (X_m,\ X_{fm})$, $X^f = (X_f,\ X_{fm})$.

Let $\Delta = \Phi_m - \Phi_f$. Given the budget constraint, $\Phi = \Phi_f + \Phi_m$, the individual shares can be written as:

$$\Phi_m = \frac{\Phi + \Delta}{2} \quad \Phi_f = \frac{\Phi - \Delta}{2}.$$

Thus, in log form,

$$\ln(\Phi_m) = \ln\left(\frac{\Phi + \Delta}{2}\right) = \ln\left(\Phi\left(1 + \frac{\Delta}{\Phi}\right)\Big/ 2\right) \tag{6}$$

$$\ln(\Phi_f) = \ln\left(\frac{\Phi - \Delta}{2}\right) = \ln\left(\Phi\left(1 - \frac{\Delta}{\Phi}\right)\Big/ 2\right). \tag{7}$$

Let $d = \frac{\Delta}{\Phi}$. Kalugina et al. (2009) and Radtchenko (2009) have found, using RLMS data, that the shares of two household members are usually of the same order. Consequently, d is likely relatively small, and by Taylor expansion, we get

$$\begin{aligned} \ln(\Phi_m) &= \ln(\Phi) + \ln(1+d) - \ln(0.5) \approx \ln(\Phi) + d - \ln(0.5) \\ \ln(\Phi_f) &= \ln(\Phi) + \ln(1-d) - \ln(0.5) \approx \ln(\Phi) - d - \ln(0.5). \end{aligned} \tag{8}$$

The individual shares Φ_m and Φ_f are defined by Eqs. 6 and 7 in terms of $\Phi = (w_m + w_f)T + y$ and d, which we specify below. Substituting Eq. 8 into Eqs. 6 and 7, the labour supply functions become

$$h_m^* = \alpha_{mD} \ln\left(w_m\right) + \beta_{mD} \ln\left(w_m\right)^2 + \gamma_{mD}\left(\ln\left(\Phi\right) + d\right) + \tilde{\delta}_{mD}$$
$$h_f^* = \alpha_{fD} \ln\left(w_f\right) + \beta_{fD} \ln\left(w_f\right)^2 + \gamma_{fD}\left(\ln\left(\Phi\right) - d\right) + \tilde{\delta}_{fD},$$

where $\tilde{\delta}_{jD} = \delta_{jD} - \ln(0.5)$, $j = m,\ f$.

3.3 Introducing non-participation

The continuity condition on the participation frontier applies to the labour supply functions, as well as to the sharing rule. Thus, given our specification of the sharing rule, the continuity condition hinges upon d being continuous as each spouse's labour supply tends to zero. The following transformation of d insures continuity along the participation frontier:

$$d^* = \begin{cases} d + r_{mD} h_f^*, & \text{if } p_m = 1 \text{ and } p_f = 0 \\ d + r_{fD} h_m^*, & \text{if } p_f = 1 \text{ and } p_m = 0, \end{cases} \tag{9}$$

where r_{mD} and r_{fD} are the parameters describing the continuity of the sharing rule derivatives on the participation frontier. When one's spouse is not

working, the labour supply functions become (upon substituting d^* and re-grouping terms):

$$h_m = \alpha_{mD} \ln(w_{mt}) + \beta_{mD} \ln(w_m)^2 + \gamma_{mD} \left[\ln(\Phi) + d\right] + s_m h_f^* + \tilde{\delta}_{mD}$$

$$h_f = \alpha_{fD} \ln(w_{ft}) + \beta_{fD} \ln(w_f)^2 + \gamma_{fD} \left[\ln(\Phi) - d\right] + s_f h_m^* + \tilde{\delta}_{fD}, \quad (10)$$

where s_m and s_f are the parameters that insure the continuity of the labour supply functions. The parameters r_{mD} and r_{fD} are related to s_m and s_f through the following constraints: $r_{mD} = s_m/\gamma_{m_D}$, $r_{fD} = -s_f/\gamma_{fD}$.

As with any endogenous tobit model, the issue of coherency must be addressed (see Gourieroux et al. 1980; Lacroix and Fortin 1992; Fortin et al. 2007). It can easily be shown that our specification is coherent if $|s_m \cdot s_f| < 1$ (see also Bloemen 2009). This condition is not imposed beforehand and needs to be verified once the model is estimated.

3.4 Sharing rule specification and reduced-form model

Individual income shares are not observed in the data. Consequently, the sharing rule in Eq. 8 must be specified explicitly. Let d be a function of the log-wages $[\ln(w_m), \ln(w_f), \ln(w_m)^2, \ln(w_f)^2]$, and individual and household characteristics, X_m, X_f, X_{fm}:

$$d = \bar{X}\theta_D,$$

where $\bar{X} = [\ln(w_m), \ln(w_f), \ln(w_m)^2, \ln(w_f)^2, X_m, X_f, X_{fm}]$ and $\theta = (\theta_{wmD}, \theta_{wfD}, \theta_{w_2mD}, \theta_{w_2mD}, \theta_{mD}, \theta_{fD}, \theta_{fmD})$ is the vector of corresponding coefficients.[12] By substituting d in Eq. 10, we get:

$$h_m^* = \alpha_{mD} \ln(w_m) + \beta_{mD} \ln(w_m)^2 + \gamma_{mD} \left[\ln(\Phi) + \bar{X}\theta_D\right] + \tilde{\delta}_{mD} \quad (11)$$

$$h_f^* = \alpha_{fD} \ln(w_f) + \beta_{fD} \ln(w_f)^2 + \gamma_{fD} \left[\ln(\Phi) - \bar{X}\theta_D\right] + \tilde{\delta}_{fD} \quad (12)$$

$$h_m = \begin{cases} h_m^*, & \text{if } p_f = 1 \\ h_m^* + s_m \cdot h_f*, & \text{if } p_f = 0 \end{cases}$$

$$h_f = \begin{cases} h_f^*, & \text{if } p_m = 1 \\ h_f^* + s_f \cdot h_m*, & \text{if } p_m = 0. \end{cases}$$

The structural parameters corresponding to the wage rates and the sharing rule are all uniquely identified (see Eqs. 4 and 5). From these, we can compute the elasticities of the sharing rule with respect to the wage rates:

$$\frac{\partial \ln \Phi_m}{\partial \ln w_j} = \frac{\partial \ln \Phi}{\partial \ln w_j} + \frac{\partial d}{\partial \ln w_j} = T\frac{w_j}{\Phi} + \theta_{w_{jD}} + \theta_{w_{2jD}} \quad (13)$$

$$\frac{\partial \ln \Phi_f}{\partial \ln w_j} = \frac{\partial \ln \Phi}{\partial \ln w_j} - \frac{\partial d}{\partial \ln w_j} = T\frac{w_j}{\Phi} - \theta_{w_{jD}} - \theta_{w_{2jD}}. \quad (14)$$

[12] The specification does not include constants for the time being. They will be introduced later on through fixed effects.

Because the individual shares, Φ_m and Φ_f, are neither observed nor measured, the marginal effects can only be calculated for arbitrary values of household income sharing, for example, at half of the total income:

$$\begin{aligned}\frac{\partial \Phi_m}{\partial w_j}_{|\Phi_m=\Phi_f} &= T\frac{\Phi_m}{\Phi} + \left(\theta_{wjD} + \theta_{2wjD}\right)\frac{\Phi_m}{w_j} \\ &= \frac{1}{2}\left(T + \left(\theta_{wjD} + \theta_{2wjD}\right)\frac{\Phi}{w_j}\right) \qquad (15)\\ \frac{\partial \Phi_f}{\partial w_j}_{|\Phi_m=\Phi_f} &= T\frac{\Phi_f}{\Phi} - \left(\theta_{wjD} + \theta_{2wjD}\right)\frac{\Phi_f}{w_j} \\ &= \frac{1}{2}\left(T - \left(\theta_{wjD} + \theta_{2wjD}\right)\frac{\Phi}{w_j}\right). \qquad (16)\end{aligned}$$

3.5 The statistical model

The model of the previous section focused entirely on the labour supply. In particular, it implicitly assumes that wage rates are observed even when a spouse is not working. We must thus specify a wage function for spouse j at time t:[13]

$$\ln w_{jt} = z_{jt}\eta_j + \delta_j D + \pi_j + u_{jt}, \qquad (17)$$

where

$$D = \begin{cases} 1, & \text{if } t \geq 1998 \\ 0, & \text{if } t < 1998. \end{cases} \qquad (18)$$

The equation states that the wage rates depend upon observed characteristics, z_{jt}, as well as time-invariant unobserved characteristics, π_j, and a contemporaneous shock, u_{jt}. We also allow the wage function to shift in a discrete manner between the pre- and post-1998 periods through the parameter δ_j.

Let X_{jt} be the vector of individual characteristics of the household member j that proxies his/her preferences and which may also affect the sharing rule. Furthermore, let ν_{jt} and λ_j represent unobserved heterogeneity variables that are time-dependent and time-independent, respectively. The reduced-form labour supply model can then be written as:

$$\begin{aligned} p_{jt} &= \mathbb{1}(h^*_{jt} > 0) \\ h^*_{mt} &= a_D x_{mt} + \nu_{mt} + \lambda_m + (1 - p_{ft}) s_m \cdot (b_D x_{ft} + \nu_{ft} + \lambda_f) \\ h^*_{ft} &= b_D x_{ft} + \nu_{ft} + \lambda_f + (1 - p_{mt}) s_f \cdot (a_D x_{mt} + \nu_{mt} + \lambda_m) \qquad (19)\\ h_{jt} &= \begin{cases} h^*_{jt} \text{ if } h^*_{jt} \geq 0, \; j = f, m \\ 0 \qquad\quad \text{otherwise,} \end{cases} \end{aligned}$$

[13] We index the variables with t to underline the fact that the model is estimated with panel data.

where a_D and b_D are the parameter vectors of the reduced forms of Eqs. 11 and 12, respectively, and x_{mt} and x_{ft} are the corresponding vectors of explanatory variables.[14]

The contemporaneous error terms $(u_{mt}, u_{ft}, v_{mt}, v_{ft})$ of the wage and labour supply equations are assumed to have a joint normal distribution with mean 0 and covariance matrix:

$$\Sigma_{uv} = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{13} & 0 \\ \sigma_{12} & \sigma_2^2 & 0 & \sigma_{24} \\ \sigma_{13} & 0 & \sigma_3^2 & \sigma_{34} \\ 0 & \sigma_{24} & \sigma_{34} & \sigma_4^2 \end{pmatrix} \tag{20}$$

The error terms are thus assumed to be independent across households. As in Bloemen (2009), we allow nonzero correlations between spouses' labour supply and wage equations. Each spouse's labour supply function is further assumed to be correlated to his/her wage function. The zeros on the diagonal reflect the fact that we do not allow the wage rate and the hours of work to be correlated across spouses.

The contemporaneous error terms $(u_{mt}, u_{ft}, v_{mt}, v_{ft})$ are assumed to be independent of the individual random effects $(\pi_f,\pi_m,\lambda_f,\lambda_m)$. Following Hoynes (1996), and in the spirit of Heckman and Singer (1984), we assume that the individual random effects follow a discrete distribution with a finite number of realisations.[15] More precisely, we assume that the terms $(\pi_m^k, \lambda_m^k, \pi_f^{k'}, \lambda_f^{k'})$ occur with probability $p^{k,k'}, k, k' = 1, \ldots, K$. There are thus $K \times K$ possible types of household configuration in the model.

4 Results

4.1 Reduced-form model

The parameter estimates of the reduced-form model are presented in Table 3.[16] The first four columns focus on the labour supply functions, whereas

[14] Additive heterogeneity can be shown not to affect the identification of the sharing rule since additive constants are not identified.

[15] In earlier work, we estimated the model using a standard random effects model. Because over half of our sample is only observed once (1,040 out of 1,953 households), we deem it preferable to use a parsimonious discrete specification, thus avoiding turning to specific parametric distributions. Michaud and Vermeulen (2006) have recently estimated a discrete-choice collective household labour supply model in which unobserved heterogeneity is modelled in a similar fashion.

[16] The likelihood function is relatively involved. It is omitted from the paper for the sake of brevity. The interested reader may consult Lacroix and Radtchenko (2008).

Table 3 Parameter estimates—reduced form model

	Labour supply functions				Wage equations	
	Husbands		Wives		Husbands	Wives
	$D=0$	$D=1$	$D=0$	$D=1$		
Wages and income variables						
$\ln \Phi$	0.021	−0.059	−0.027	−0.022		
	(0.025)	(0.033)	(0.024)	(0.031)		
$\ln w_m$	−0.041	0.060	0.006	0.025		
	(0.016)	(0.021)	(0.015)	(0.019)		
$\ln w_f$	−0.009	0.019	0.007	0.009		
	(0.014)	(0.018)	(0.015)	(0.018)		
$(\ln w_m)^2$	−0.004	0.010	0.002	0.005		
	(0.003)	(0.004)	(0.003)	(0.004)		
$(\ln w_f)^2$	0.000	0.001	0.002	−0.001		
	(0.003)	(0.003)	(0.003)	(0.003)		
Observable characteristics						
Age/10	0.033	−0.010	0.075	−0.050	−1.204	−4.516
	(0.028)	(0.036)	(0.037)	(0.045)	(1.613)	(0.672)
Age^2/100					1.527	5.249
					(2.117)	(0.827)
Schooling/10	0.020	−0.021	0.021	−0.020	0.372	0.319
	(0.008)	(0.011)	(0.009)	(0.012)	(0.061)	(0.057)
# Children (0–6)	−0.030	0.034	−0.019	−0.011		
	(0.011)	(0.014)	(0.015)	(0.017)		
# Children (7–18)	−0.004	−0.003	−0.002	−0.007		
	(0.005)	(0.007)	(0.005)	(0.006)		
Region of residence						
Moscow–St. Petersberg					0.353	0.641
					(0.078)	(0.076)
North/Northwestern					0.197	0.317
					(0.084)	(0.081)
Central/Black Sea					−0.114	−0.073
					(0.074)	(0.068)
Volga/Viask/Bolga Basin					−0.365	−0.234
					(0.074)	(0.072)
North Caucus					−0.384	−0.324
					(0.082)	(0.078)
Ural					−0.117	−0.097
					(0.081)	(0.073)
Western Siberia					0.087	0.248
					(0.086)	(0.076)
Eastern Siberia (omitted)		–		–		–
Post-1998 ($D=1$)		0.113		0.094	0.112	0.045
		(0.049)		(0.049)	(0.040)	(0.038)
Unob. Het. Type I		0.728		0.163	−1.169	−0.345
		(0.040)		(0.040)	(0.314)	(0.171)
Unob. Het. Type II		0.327		0.368	−1.038	−0.500
		(0.039)		(0.038)	(0.311)	(0.152)

Standard errors in parentheses

the last two concern the wage equations. For each spouse, the parameter estimates of the labour supply functions are divided into two columns according to whether $D=0$ or $D=1$ (pre or post 1998).

In general, the full-income variable has a negative impact on labour supply, but is statistically significant only in the husbands' equation in the post-1998 period. An increase in the husbands' wage rate has a negative impact on their own labour supply in the pre-1998 period, but a positive one in the post-1998 period, and no effect on the wives' labour supply. The wives' wage rates, on the other hand, have no effect on either labour supplies in both periods.[17] The second panel of the table reports the parameters estimates associated with X_m, X_f, X_{fm}, respectively. According to the table, schooling has a positive effect on weekly hours of work of both husbands and wives, and pre-schoolers exert a negative impact on husbands' hours of work. There are no statistical differences between the pre- and the post-1998 periods.

The dummy variable post-1998 indicates that both husbands and wives have increased their labour supply following the financial crisis of 1998. The parameter estimate does not distinguish between the intensive and extensive margins but is nevertheless consistent with the results of Table 2 and the evidence presented in Fig. 1. In addition to this discrete change in labour supply, we can investigate whether the parameter estimates change in a significant manner between the two periods. We may wish to test two different assumptions. The first relates to variables that implicitly determine the bargaining power, and include non-labour income and wages. The null assumption of temporal stability yields $\chi^2(5) = 24.82$ and $\chi^2(5) = 4.71$ for husbands and wives, respectively. When considered together, we get $\chi^2(10) = 45.34$, again rejecting temporal stability. The second assumption includes variables that proxy individual preferences (age, schooling and children). The null assumption is once again rejected for husbands ($\chi^2(4) = 14.22$) and for wives at the 10% level ($\chi^2(4) = 8.17$). When combined, the null assumption is also rejected ($\chi^2(8) = 23.03$). These results are only suggestive but stress that both the preferences and the determinants of the relative bargaining power of the spouses may have changed between pre and post 1998.

The parameter estimates of the wage equations show that the wage rates decrease slightly with age and increase by approximately 4% with an additional year of schooling.[18] Such a rate of return is certainly low by Western standards.

[17]The P values of the null assumption that the wages ($\ln w_j$, $(\ln w_j)^2$) have no effect on labour supply are the following:

	Husbands		Wives	
	$D = 0$	$D = 1$	$D = 0$	$D = 1$
Husbands	0.022	0.011	0.792	0.444
Wives	0.537	0.300	0.738	0.656

[18]The wage equations include regional dummy variables that are absent from the hours equations. This exclusion restriction is motivated by the fact that auxiliary regressions have shown that, once we condition on wages, there is little regional variation in weekly hours of work. On the other hand, children variables are included in the hours regressions but not in the wage regressions.

Yet it coincides perfectly with those reported in Cheidvaaser and Benitez-Silva (2007).[19] The table also shows that wages vary considerably across regions for both husbands and wives. Not surprisingly, wages are highest in the Moscow–St. Petersberg regions and lowest in the Volga and North Caucus regions. The dummy variable D captures any shift that may have occurred in the wage functions in the post-1998 period above and beyond those that are already controlled for in the regression. It shows that both husbands and wives have benefited from increases of 11% and 5%, respectively. This is consistent with the results reported in Table 2 that indicated that the husbands/wives wage ratios increased in the years that followed the financial crisis. Recall that the results presented in Table 2 were based on households in which both spouses are working. In Table 3, on the other hand, the estimation includes husbands and wives whose spouses do not work. It is thus conceivable that wives whose husbands do not work are a self-selected group whose earning are larger than average.[20]

Equation 19 shows that both labour supply equations and both the wage equations contain random effects and correlated error terms. The parameters of the unobserved heterogeneity are presented in the last two lines of the table.[21] According to the parameter estimates, type-1 husbands have a stronger preference for work than type 2, while the converse holds for wives. For the wage regressions, the parameter estimates are all statistically significant but the null assumptions $H_0 : \pi_m^1 = \pi_m^2$ and $H_0 : \pi_f^1 = \pi_f^2$ cannot be rejected. Thus, contrary to the labour supply functions, unobserved heterogeneity appears not to be an important factor in determining the wage rates of husbands and wives. There are potentially four types of households in the data. While not reported, by far the most common type corresponds to $(\lambda_m^2, \lambda_f^2)$ and (π_m^2, π_f^2). This configuration arises with a probability of 87.6%. Other configurations occur with much smaller probabilities (1.4%, 4.2% and 6.8%). One can thus conjecture that the control variables are capturing a sizeable amount of individual heterogeneity so that there is little room for unobserved heterogeneity parameters.[22]

[19]The low rate of return was traditionally attributed to government "wage-squeezing" policies. It was conjectured that the rate of return would increase as Russia moved towards market democracy (see Brainerd 1998). Cheidvaaser and Benitez-Silva (2007) attribute the low rate of return to education in post-communist Russia to an excess supply of well-educated workers.

[20]One could also argue the opposite: wives with inactive husbands are willing to work at lower-than-average wage rates. While plausible, this situation is more likely when husbands are involuntarily unemployed. In principle, there are no involuntarily unemployed individuals in our sample.

[21]The model is estimated for only two pairs (π_j^k, λ_j^k). The data support up to three pairs of parameters. Unfortunately, one of the pairs always has a very small probability of realisation. To avoid over-parameterising the model, we focus on the more parsimonious specification.

[22]For the sake of brevity, we do not report the parameter estimates of Σ_{uv}. A more detailed discussion can be found in Lacroix and Radtchenko (2008). It suffices to mention that we find little correlation between own wages and own labour supply but that the labour supply functions of both spouses are relatively strongly correlated.

4.2 Structural parameters

The parameters of the structural model (Eqs. 11 and 12) are reported in Table 4. As is customarily found in the literature, we find a negative relationship between own wage and labour supply for men and a positive one for women ($\alpha_{fD} > 0, \alpha_{mD} < 0$). The parameter estimates of γ_{fD} and γ_{mD} are negative and statistically significant in the post-1998 period, which suggests leisure is a normal good. The table also reports the parameters associated with the wage rates in the sharing rule. Finally, the labour supply continuity parameters s_m and s_f easily verify the coherency condition of the model (i.e. $|s_m \cdot s_f| < 1$). We comment below on the interpretation of the labour supply and sharing-rule continuity parameters.[23]

A number of interesting statistics can be computed from the parameters of Table 4.[24] First, recall from Eqs. 13 and 14 that the elasticity of each spouse's share of income can be computed with respect to both wages rates. These are reported in the top panel of Table 5. Bearing in mind that not all are statistically significant, the table nevertheless reveals interesting changes between the pre- and post-1998 periods. To start with, a ten-percentage-point increase in husbands' wage rates increases their relative income share way more in the aftermath of the financial crisis. According to the table, such a change would have translated into a 5.2% increase before 1998 and by as much as 9.2% after 1998. The same wage increase would have increased the wives' share by 3.3% and 0.9%, respectively. This means that, as the husbands' wage rates increased in the years that followed the economic downfall, they have kept a greater share of the additional full income to themselves. Wives, on the other hand, have behaved differently. The table shows that a ten-percentage-point increase in their wages translated into a 7.8% increase of their share prior to 1998 and approximately 6.6% after 1998. Thus, while both husbands and wives do behave altruistically, or behave in a manner which is consistent with "caring" preferences, wives in the post-crisis period seem to transfer a greater share of family full income than husbands do, contrary to what prevailed in the pre-crisis period.

The next panel of the table presents the impact of a unit increase in each spouse's wage rate on their relative full income, assuming it is initially divided into equal shares. The calculations are based upon Eqs. 15 and 16. These results are central to the paper, but their validity depends on the assumption

[23] Just as we did with the reduced-form parameters, we could test whether the structural parameters change between pre- and post-1998. The structural parameters all depend upon the parameter estimates of $\Phi(\cdot)$. Unfortunately, because this parameter is only statistically significant for men in the post-1998 period, the tests are of little quantitative value.

[24] Most of these are highly non-linear functions of the structural parameters. So while few of these are individually statistically significant, it may be he case that these non-linear functions turn out to be significant once the covariance between the parameter estimates are taken into account. Furthermore, the elasticities in Table 5 are intimately related to the parameters of the sharing-rule, i.e. γ_{mD} and γ_{fD}.

Table 4 Parameters of the structural model

	Parameters	Husbands		Wives	
		$D=0$	$D=1$	$D=0$	$D=1$
Variables					
ln(own-wage)	α_m, α_f	−3.863	−3.483	1.718	4.353
		(2.137)	(2.348)	(2.332)	(3.114)
ln(own-wage)^2	β_m, β_f	−0.498	0.729	0.238	0.433
		(0.360)	(0.641)	(0.293)	(0.497)
ln(own-share)	γ_m, γ_f	2.068	−3.862	−2.718	−4.889
		(2.536)	(2.122)	(2.420)	(1.944)
		$D=0$		$D=1$	
Sharing-rule(d)					
ln(w_m)	θ_{wm}	0.220		0.628	
		(0.392)		(0.107)	
ln(w_f)	θ_{wf}	−0.417		−0.263	
		(0.316)		(0.192)	
ln(w_m)^2	θ_{w2m}	0.073		0.143	
		(0.129)		(0.063)	
ln(w_f)^2	θ_{w2f}	−0.014		−0.024	
		(0.120)		(0.046)	
Labour supply					
Continuity parameters					
s_m			0.018		
			(0.014)		
s_f			0.019		
			(0.011)		
Sharing-rule					
Continuity parameters					
r_m		0.009	−0.005		
		(0.013)	(0.003)		
r_f				0.007	0.004
				(0.006)	(0.002)

Standard errors in parentheses

of equal sharing holding true. A unit increase in the hourly wage rate of a spouse automatically increases full-income by \$168 ($T = 168$ hours per week). The table indicates that, prior to 1998, an increase in the husbands' wage rates would have increased their share of the full-income by \$102.73 and that of their wives by \$65.27. In the post-1998 period, an identical change in their wage rates would have increased their share by \$152.12 and that of the wives by only \$15.87. The marginal impact of an increase in the wives' hourly wage rates is completely different. Indeed, prior to 1998, they would have kept nearly all the increase in the family full income to themselves (\$167.49). In the post-1998 period, they would have kept \$125.98 to themselves and transferred \$42.02 to their husbands. What these estimates suggest is that spouses do not behave in an egotistic manner. An increase in their wage rates does increase their share of the household income but not at the expense of their spouses. Both benefit from the additional income. The estimates do suggest, however, that, in the

Table 5 Structural elasticities

	Husbands		Wives	
	$D=0$	$D=1$	$D=0$	$D=1$
Sharing-rule (on the participation frontier)				
$\partial \ln \Phi_j / \partial \ln w_m$	0.521	0.927	0.331	0.097
	(0.492)	(0.102)	(0.491)	(0.101)
$\partial \ln \Phi_j / \partial \ln w_f$	0.002	0.220	0.783	0.659
	(0.289)	(0.159)	(0.288)	(0.160)
$\partial \Phi_j / \partial w_m$	102.730	152.125	65.270	15.875
	(96.981)	(16.558)	(96.981)	(16.558)
$\partial \Phi_j / \partial w_f$	0.511	42.023	167.489	125.977
	(61.723)	(30.498)	(61.723)	(30.498)
Labour supply				
Constant sharing-rule				
$\partial \ln h_m / \partial \ln w_{m\|_{\bar{\Phi}}}$	−0.079	−0.114		
	(0.044)	(0.049)		
$\partial \ln h_f / \partial \ln w_{f\|_{\bar{\Phi}}}$			0.030	0.085
			(0.051)	(0.066)
Variable sharing-rule				
$\partial \ln h_j / \partial \ln w_m$	−0.051	−0.204	−0.021	−0.011
	(0.049)	(0.076)	(0.017)	(0.010)
$\partial \ln h_j / \partial \ln w_f$	0.000	−0.090	−0.020	0.008
	(0.016)	(0.053)	(0.018)	(0.056)

Standard errors in parentheses

post-1998 period, as the economic environment got better, husbands became somewhat more egotistic and wives somewhat more altruistic.

The behavioural changes relative to the full-income sharing is bound to impact the labour supply elasticities. To investigate this, we report two different types of elasticities in the bottom half of Table 5. The first panel reports the own-wage elasticities computed under the assumption that the sharing-rule in unaffected by the increase in the wage rate.[25] The elasticities reported in the bottom panel account for the additional income effects accruing from changes in the sharing of the full income. The results of the first panel indicate that the elasticities are relatively constant across periods for both husbands and wives. Once again, the results relative to the husbands are relatively more precise. The bottom panel tells a different story. First, the impact of a marginal increase in the husbands' wage rates on their labour supply increases from −0.05 to −0.20 between the pre- and post-crisis periods. This is essentially due to the fact that husbands transfer less income to their spouse in the post-1998 period. Likewise, an increase in the wives' wage rates has a negative impact on their husbands' labour supply in the post-1998 period. This is a consequence of transferring them more income than was previously the case. As a matter of fact, the estimates suggest that, in the pre-1998 period (bottom line), wives' wage rates had no impact on their husbands' labour supply precisely because

[25] Recall that the spouse's wage rate intervenes only through the sharing rule.

they essentially kept the additional full-income to themselves. Finally, the table shows that the wives' labour supply elasticities are generally negative (although not statistically significant) once the sharing-rule is accounted for. This follows from the fact that an increase in their own wage rate, or that of their husbands, translates into an increase in their full income.

The above elasticities are derived under the assumption that both spouses work. Recall from Eqs. 9, 11 and 12 that the labour supply functions and the sharing rule change according to the participation status of each spouse. The continuity parameters are presented in Table 4. The labour supply continuity parameters s_m and s_f insure the statistical coherency of the model with four participation regimes but also underline the importance of taking into account the participation status of each spouse on the own-wage elasticity of their labour supply. For example, given that husbands have a negative own-wage elasticity and wives have a negative own-share elasticity, a positive value of s_m implies that if wives stop working then the elasticity of husbands' labour supply with respect to their wage will increase. This effect occurs via income transfers from the husbands to their wives. The same reasoning applies, mutatis mutandis, to wives through the parameter s_f. Furthermore, a change in the participation status of one of the spouses in the post-1998 crisis influences the manner in which the household full income is distributed. For example, given that husbands have a negative own-wage elasticity, a positive value of r_f implies that if they were to stop working then the elasticity of their income share with respect to their own wage would decrease (see Eq. 9). Likewise, because $r_m < 0$, if wives were to stop working, their elasticity would also decrease. These results highlight the importance of taking into account the participation status of each spouse because the intra-household income distribution is intimately related to it.

5 Conclusion

This paper investigates the evolution of the intra-household income allocation among Russian households over a period of significant economic turmoil. The main thrust behind the paper is the recognition that the important changes in the economic and institutional environments that have occurred in Russia over the 1994–2004 period may have triggered important behavioural changes. Adaptation to the major economic downturn of 1994–1998 and to the eventual recovery of 2000–2004 may indeed have brought spouses to a new economic equilibrium. We first document these changes by looking at the evolution of the participation rates and the spouses' relative wages using data from the Russian Longitudinal Monitoring Survey. Surely, the most impressive change relates to the dramatic decline in the wage rates, and primarily that of male workers in the year 1998. In the years that followed, male workers have managed to regain some of the loss more rapidly than their spouses. Thus, not only did the gender wage gap increase during the 2000–2004 period, but so did the intra-household wage gap.

It is thus important to assess how such changes may have impacted the intra-household distribution of welfare within Russian households. Fortunately, if one is willing to assume that the households behave in a Pareto-efficient manner, then it is possible to focus on labour market outcomes to indirectly infer the impact of the changing economic environment on individual welfare. We propose a model that is inspired from the works of Bloemen (2009) and Donni (2003). The model assumes Pareto-efficient outcomes and admits both interior and corner solutions on working hours. Wage rates and labour supply functions are estimated simultaneously. The main novelty of the empirical model is to allow the parameters of the sharing-rule to change in a discrete manner between the pre- and post-1998 periods.

The main empirical result of the paper suggests that spouses behave in a cooperative manner. An increase in the husband's or wife's wage rate benefits both spouses. On the other hand, we find that, in the 2000–2004 period, as the economy got better, husbands' and wives' behaviours changed somewhat: An increase in their relative wage translates into a smaller/larger transfer to their spouse.

This paper attempts to investigate the impact of the enormous shocks the Russian economy has gone through on individual welfare. Given the nature of our results, further research is certainly warranted. We acknowledge that the empirical and theoretical analyses rest on relatively strong assumptions. Chief among those is the implicit assumption that households are only composed of two decision makers. The recent literature suggests that adult children and elderly parents may also have a say on the decision process. Because Russian households typically include elderly parents, this issue should be accounted for in future research. Furthermore, the empirical model could be refined to allow greater intertemporal interdependence of intra-household decisions. Dynamic collective models are still in their inception but are surely pertinent for the type of problem we investigate in this paper. The important changes that have occurred on the Russian labour market over the last 15 years and the availability of quality data offer an excellent basis to develop and validate the collective models in numerous directions.

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