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ABSTRACT

The Determinants of Female Labour Supply in Belarus*

Unlike in many other transition countries, where the gender pay gap has remained stable while female employment rates have reduced, in the case of Belarus women' activity rate has been practically unchanged despite an increase in the gender pay gap. This paper investigates why this is the case by looking at the determinants of female labour force participation in 1996 and 2001 (data from the Belarusian Household Survey). The selectivity corrected wage equation is estimated to compute an expected wage offer for women. The latter is included, in the second step, as a regressor in the structural female labour supply equation, estimated by probit. Several measures for the care of children and elderly people, proxies for the opportunity cost of working, affect female participation, but do not generate sample selection mechanisms. The estimated elasticity of female participation to wages is low, at about 0.45 in 1996 and 0.41 in 2001. Moreover the data allows detecting poverty trap mechanisms, whereas women in low-income households have much lower than average participation rates. At the same time the elasticity of female labour supply with respect to the own wage appears to be much higher for the low-paid groups of women.

JEL Classification: J13, J16, J22, P20, P52

Keywords: gender wage gap, female participation, economic transition, Belarus

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Introduction

In their study of female labour market participation during transition, Paci and Reilly (2004, p. 130) notice that much attention has been lent in the literature to women' wages and the gender wage gap (GWG since now), whereas little systematic work has been undertaken on the determinants of female labour supply. However, as well known, these two issues are closely related to each other and should therefore be treated jointly.

Although with some exceptions[1], a general finding of the literature on the gender pay gap during transition is that it is stable or slightly declining as compared to the pre-transition period. In principle, labour supply considerations would suggest that lower gender pay gap be accompanied by increasing female as compared to male labour market participation. However, this was not the case and, in fact, the former has been declining for a long time all over Central and Eastern European Countries (CEECs) as well as in the Commonwealth of Independent States (CIS), though from a high of over 80%, which has rarely been reached in advanced economies. As, among others, Hunt (2002) argues, a general cause of declining gender pay gap in East Germany was indeed the reduction in female participation rates, through sample selection mechanisms. In other words, the causality chain would run in the opposite direction of that commonly hypothesised. It was not the reduced gender pay gap to cause reduced female participation, but rather reduced female participation to yield an *apparent* reduction in the gender pay gap.

Privatisation of state-owned enterprises (Paci and Reilly, 2004) or also the simple process of liberalisation of wage setting mechanisms and a general weakening of employment protection legislation (Munich, Svejnar and Terrell, 2005) would be the *causa causarum*. They would have caused increasingly hard budget constraints for firms (and consequently also for households), forcing hence the least motivated and skilled women from low wage employment into inactivity (or informal economic activities). This would give the fake impression of an increase in female wages and a reduction in the unexplained gender wage gap: in fact, women average wages were declining when considering also those who had become unemployed or inactive. The ensuing literature has confirmed this finding in the case of several transition countries using different types of methods to control for sample selection (Orazem and Vodopivec, 1997, for Slovenia; Oglobin, 1999, for Russia; Paci and Reilly, 2004, for Albania, Bosnia-Herzegovina, Bulgaria, Poland, Serbia, Tajikistan, Uzbekistan).

[1] In fact, as Paci and Reilly (2004) also noted, there is not full consensus on this issue. For instance, Joliffe and Campos (2005) find that the gender pay gap dramatically reduced in Hungary over the period 1986-'98. In a similar vein, Brainerd (2000) finds that the gender pay gap has dramatically reduced in CEECs, but has increased in Russia and Ukraine. The interpretation she provides is that in these latter countries, women have been penalised by the tremendous widening of the wage distribution. Pastore and Verashchagina (2007) also find an increase in the GWG in a neighbouring Belarus over the years 1996-'04, despite there was practically no change in wage inequality over the period considered.

This paper aims to investigate the issue now outlined in more depth for the specific case of Belarus, where female labour force participation has been remarkably high at over 80% and quite stable during transition. The obvious question is why participation did not decline in Belarus? Is this an achievement or a sign of increasing hardship for households? What types of difficulties do women experience? Are such difficulties evenly distributed or do they concentrate in particular categories of women? And in the latter case, which are the weakest segments?

The high participation rate of women in Belarus mirrors the permanence of the two-bread-winner family scheme, which prevailed in all socialist countries. During the course of reform, household income experienced increasingly hard budget constraints due to the contraction, especially at the eve of transition, of real wages, public and firms' expenditure in the care of children and elderly people. Such economic tensions are expected to change the way women reconcile working and reproductive activities. Having children meant for many women to segregate themselves in occupations with a low level of commitment in terms of working time, but often with low pay and low career perspectives. This happened also through the typical pre-market mechanisms of gender differentiation, such as the tendency to choose educational types, which can be spent in low wage sectors only. Here we mention only few of the mechanisms that form the working profiles of women. In what follow we investigate the issue in more detail, aimed at understanding which are the determinants of female labour supply in Belarus.

The paper is structured as follows. Section one intends to reinforce the motivation. Section two illustrates the methodology and the data used. Section three discusses the results. The final section concludes on the main findings of the paper.

1. Motivation and aims of the research

Gender analysis is given little importance in the current policy agenda in Belarus, mainly due to the high degree of protection of female employment inherited from the past. However, as Pastore and Verashchagina (2007) note, the gender pay gap has doubled during the last decade. Neglecting the underlying changes in the role that women play both at the labour market and within households can be detrimental for revitalizing the economy, while more careful investigation of gender related issues can provide additional tools to combat poverty and contributes to forming a stable and socially acceptable long-term growth path.

The case of Belarus, a country known as a gradual reformer, is somehow different from that of its neighbours like Poland. The latter experienced high, sometimes double-digit unemployment rates, accompanied by drastic reduction of female participation since the beginning of transition.

Conversely, the unemployment rate in Belarus has been quite stable over the last decade at about 2-4%[2]. Also the participation rate of women remains high, in the range of 80%, and women represent about 53% of total employment. In addition, as documented in Pastore and Verashchagina (2007), until the mid-1990s, employment shares by gender were even across sectors. In later years, though, there has been a sudden reallocation of women towards such sectors as food, textile and clothing industries, trade and catering, public health, social services, education and culture. The feminisation of low productivity sectors caused an increase in the GWG[3].

Furthermore, the labour market position of women in Belarus might worsen in the future for several reasons. Above all, with time passing, the inherited system of labour market regulation might become unable to continue to grant women the same rights as men. One of the reasons for that is the emergence of a small, but buoyant private sector. The existing benefits that the current labour legislation recognises make female labour more expensive, therefore discouraging firms from employing women. When loosing jobs less motivated women tend to be relegated to their home duties or to be segregated in low-pay industries.

All this is slowly changing also gender roles within the household and, in general, in the society. Figure 1 documents how differently Belarusian people look at the role of men and women in the society as compared to other neighbouring countries (see also Kungurova, 2004). The prevailing idea that women should dedicate their life to the household does not fit with nowadays very high female labour force participation in Belarus.

[Figure 1 about here]

A possible acceleration of unemployment and inactivity rates might challenge the traditional two-bread-winner household model. It can be the result of the rational choice made by households to switch to a one-bread-winner model if the state will not be able in the future to provide good quality and affordable kindergartens and schools, encourage part-time or temporary employment, sustain a well-functioning pension system able to support the shift of generations of workers.

This paper aims to address these issues by studying the determinants of female labour supply. In particular, we aim to provide an in-depth investigation of the impact of several demand and supply side factors of female participation, which should warrant important information to design a long-sighted policy response.

[2] Here we refer to registered unemployment rates.

[3] In addition, according to the official statistics, in Belarus the share of men having per capita incomes below the minimum standard rose from 39.4 per cent in 1995 to 42.9 per cent in 2000, while the corresponding figures for women rose from 37.4 to 41 per cent. Women generally tend to be overrepresented among the poor. Even though, as Quisumbing et al. (2001) note in their study of 10 developing countries, this might not be so straightforward and needs further investigation in order to understand which are the ways to combat poverty.

2. Methodology and data

In the transition literature, the determinants of female labour supply have been typically studied following two main approaches. The first approach consists of estimating the reduced form selection equation and the selectivity corrected wage equation. As observed in the Introduction, this is the typical exercise that previous studies have mainly carried out to assess the impact of reduced female participation on wages during the process of economic transition.

The second approach consists of using the expected wage that women can obtain, as estimated based on their characteristics, as a proxy for their reservation wage at the second stage of the analysis. The structural female labour force participation equation is used to test for the impact of the reservation wage on female participation. It is estimated by probit and includes as independent variable also the reservation wage as computed based on the selectivity corrected wage equation. The use of a sample selection procedure in the first stage allows us computing the expected wage also for non-employed women. Only few previous studies in the transition literature have adopted this approach, namely Saget (1999) for Hungary and Paci and Reilly (2004) for a group of transition countries[4].

The analysis starts with the Heckman procedure (Heckman, 1979). It is used, first, to verify whether there is sample selection bias in wage equation estimates in the case of Belarus, and, second, to predict the wage offer for each individual, controlling for sample selection into employment. Together with a set of other variables, the reservation wage attained using the Heckman procedure is used then to estimate the probability of female participation in the labour market. The structural participation equation is as follows:

$$Prob[p_i]=f(Z_i,w_i), \qquad i=1,\ldots,N$$

where $p_i=1$ if the woman participates into the labour market;
Z_i is a vector of characteristics that are assumed to affect female participation;
w_i - predicted wages.

Though used more frequently, the correct specification of the Heckman model is subject to several contrasting interpretations. According to Wooldridge (2001), for instance, as a rule, all of, and only, the variables included in the main equation should be also included in the selection equation to identify the model. This rule has been, however, interpreted in different ways. Similar to Paci and Reilly (2004, § 5.17, p.124), this study excludes from the selection equation such variables like sectors and branches of industry that are not defined for unemployed or inactive women.

[4] These include Albania, Bulgaria, Bosnia and Herzegovina, Serbia, Tajikistan, Uzbekistan.

The econometric analysis is based on the Belarusian Household Survey of Incomes and Expenditures (BHSIE), elicited quarterly by the Ministry of Statistics and Analysis. Table A.1 of the Appendix provides the definition of all the variables used in the econometric analysis, while Table A.2 gives descriptive statistics for the dependent and independent variables.

Additional regressors have been introduced as compared to Pastore and Verashchagina (2005). Also the dependent variable is defined in a different way. Two types of information on wages are available. First is the wage declared by the respondents at the fourth quarter interview. Second is an average wage computed by the National Statistical Office, considering answers to the four quarters of the survey. Due to the lack of information on the way this average value is computed, we opted for using the respondent's answer at the end of the year.

The log of hourly wages[5], obtained as usual by dividing the net monthly wage by the declared weekly hours times 4.3, is used as dependent variable, despite the fact that hourly wage rates are not widely used in Belarus. The alternative way to account for differences in hours worked between men and women is by incorporating working hours as an explanatory variable. In fact, the hours of work cannot be used as a regressor in sample selection procedures, because it is in contrast with the Wooldridge's rule.

Taking into account this last, overall, three types of determinants of female participation are considered. First are the individual characteristics, such as the level and type of educational qualification attained, age, marital status and, finally, regional dummies. Apart from using age and age groups, we try different definitions of work experience, starting with values declared by the respondents (actual work experience). However, this last measure has several drawbacks: first, only employed women declare it; second, many observations are missing. Therefore, we prefer potential work experience (PWE), computed in the usual way: age minus years of education minus six, which is the age, when schooling starts in Belarus. In addition, we correct PWE using a non-traditional definition of work experience. Following Munich, Svejnar and Terrell (2005), this is obtained by subtracting the number of children multiplied by three from PWE. This definition aims to account for the child leave as defined in the Labour Code of the Republic of Belarus, which is provided until the child is 3 years old[6]. Note also that sometimes age groups substitute PWE in the selection equation.

The most difficult task to correctly perform the sample selection procedure is to find proper instruments for the participation equation. As well known, given the interrelation between wages

[5] The calculation of hourly wages forces us to loose some information as compared to using monthly wages, since some individuals refuse to give this information. Additionally, since in some cases people declare unusually low wages and unusually high working hours, the variable has been truncated to exclude outliers, defined as those with wages higher or lower than the mean by 3-times the standard deviation of the distribution.

[6] This measure can understate the real values in case of overlapping of three-years periods taken for two children born one after another.

and participation, it is difficult to find variables that affect participation without affecting wages[7]. Data limitations are often impossible to overcome. Also the data set available for this study is unfortunately limited. The focus has been placed, therefore, on two groups of factors, household and region-specific, that should affect the opportunity cost of working.

The former are drawn from the BHSIE itself and have been obtained merging the data relative to individuals and those relative to households. They include "*age when the first child was born"*, which presumably affects the early stages of a woman' carrier. In almost all transition countries, the age of the first marriage, and child, is dramatically increasing as a sign of the increasing importance of maternity as a factor able to affect women participation to the labour market. In Belarus, age at the first birth is increasing very slowly, from 22.9 in 1990 to 23.3 in 2000[8]. One problem with this variable is that it affects wages too: having children early in a woman's life means putting less effort in the development of her human capital and therefore having lower productivity. In addition, the age at first child is itself affected by numerous economic and cultural factors, specific for the period of reforms. Nonetheless, our reasoning is that deciding to have children represents a sufficiently independent factor in a country where the fertility rate remains stable over the recent decade[9], suggesting that social norms play an important role in fertility decisions. Furthermore, we distinguish between those who are under 30 from the rest of the sample, since the effect of birth of the first child may reduce with age.

Second, we test also whether *the number of children* and specifically *the number of dependent children (under the age of 5)* in the family reduces the probability for a woman to be employed, unless there is help provided at the household level. This is a sensitive issue considering its possible impact on fertility.

A third factor, which may affect women participation into the labour market, is the *presence of elderly people* (over-60) in the family. The effect may be twofold. On the one hand, old people may need special care, forcing women to provide constant care and therefore possibly reduce participation into paid work. On the other hand, grandparents tend to take care of small children and thus, on the opposite, they make it easier for young mothers to work.

The household consumption, considered as a proxy for family wealth (see Paci and Reilly, 2004) is another potential instrument. The hypothesis to be tested is whether the members of poorer families tend to be more engaged into the working process due to necessity rather than choice. This

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[7] Angrist and Evans (1999) propose to use parental preferences for a mixed sibling-sex composition to construct instrumental variables in estimates of the effect of childbearing on labour supply to control for endogeneity of fertility. In the BHSIE data, there is no way to identify the sex of siblings.

[8] The age of the first birth in Belarus remains one of the lowest in the region. Source: UNECE Gender Statistics Database [http://www.unece.org/stats/gender/].

[9] After a dramatic decline in the first half of the 1990s from 1.9 down to 1.3 the fertility rate in Belarus has remained low and pretty stable at the range of 1.2-1.3.

variable is expected to shed light on the discussed linkage between female participation and poverty. To test for the presence of non-linearity in the effect of this variable on participation we use a set of dummies for the 10^{th}, 25^{th}, 50^{th} 75^{th} and 90^{th} percentile of the log of total household expenditure. We also check for the effect of moving alongside the expenditure distribution by constructing a splined function.

Another instrument used in the estimates is the logged difference between the total household income and the respondents total monthly income, which intends to account for the person's contribution to the household income which would also determine gender roles within the family. Cagatay (1998) and Valenzuela (2003) discuss the determinants of poverty, linking it with the female dominance in the family. The BHSIE data suggests that it may be relevant for our case study, since about half of the households are reported to have a woman as household head.

The second set of variables is based on (scant) official statistics, at the regional level, and was meant to provide exogenous determinants of women participation (see Table A.1 of the Appendix). They include: the percentage of the total population younger than 16; the percentage of the population older than the working age; the percentage of children attending preschool establishments; the number of hospital beds per 1000 of population. All these variables were intended to control for the demand and supply factors of female participation.

3. Results

The Tables from 1 to 3 present the results of different Heckman selection procedures. The maximum likelihood estimator has been preferred to the two-step procedure based on testing of the assumption of normality of residuals and of absence of collinearity between the inverse Mills ratio and the regressors in the main equation (for a discussion of these tests, see, for instance, Vella, 1998; and Puhani, 2000). For the sake of brevity, we report only the results of such tests with reference to the specification using as instrumental variables the household expenditure and the difference between the household and the woman' income[10]. In the case of estimates in Table 2 the normality assumption is not violated (by using normal probability plot of the residuals). Moreover, the mean value for the VIF (*variable inflation factor*) test in an OLS specification of the wage equation including the inverse Mills ratio is 3.12. This is far below the critical value of 10 used to reject the hypothesis of absence of multicollinearity.

The estimates essentially differ in terms of the instruments used, whereas the coefficients of all other variables in the main and selection equation are similar. In Tables 1 and 2 we use household

[10] Similar results of such tests relative to the other specifications are available on request from the authors.

specific effects as instruments. The former uses the number of dependent people in the household, namely children under the age of 5 and the elderly over 60. The estimates in Table 2 are exactly the same as those in Table 1, the only difference being that the former include also measures of household income and expenditure. Table 3 uses indices aiming to catch region specific effects, such as the local supply of childcare and care for elderly people. The instruments in Table 1 and 2 aim to catch demand side factors, whereas the instruments used in Table 3 aim to catch supply side factors.

This sensitivity analysis is informative on such matters as the specific supply and/or demand side factors that might cause sample selection mechanisms as well as the stability of the sample selection procedure itself. In fact, as shown below, the results of the tests for sample selection bias markedly differ from one estimate to the other.

More specifically, the instruments used in Table 1 include: Children under the age of 5 present in the household, the woman's age when the first child was born, the number of dependent children and the presence of elderly people in the household. As expected, the presence of dependent children under the age of 5 and of over-60-year old people in the household reduces female participation in a statistically significant way. This confirms that women' participation to the labour market is influenced by opportunity cost considerations. The impact of elderly people in the household is greater in 2001 than in 1996, which might catch some kind of reduction in the state expenditure in the care of elderly people.

Other household specific instruments are not highly significant. In other words, the fact that a woman has children very early in her life, say between a 15-17 or a 18-22 range of age, does not seem to cause any stigma or problem able to reduce her employment opportunities. In addition, the number of children itself does not seem to matter. Only in 1996, the model seems to detect a statistically significant effect of the number of children, though none with a high significance level. What matters, then, is only the young age of children. Once children have grown up sufficiently, they do not represent any impediment to women' participation to the labour market. This is interesting since it suggests that the Belarusian welfare system does help women to conciliate work and child bearing.

Overall, in neither of the two years was any selection mechanism detected, although σ and λ are both statistically significant. The statistical significance of these variables might explain why the returns to education based on reduced form estimates are different from (lower then) those estimated by (unreported) OLS augmented earnings equations (see also, for comparison, Pastore and Verashchagina, 2006a). This confirms expectations, since, considering also the non-employed, returns to education should be lower if the non-employed have lower human capital endowment and motivation. Also because of this, the predicted hourly wage offers for women have been computed

using the sample selection corrections contained in Table 1. In addition, as already noted, this allows us, in fact, computing expected wages also for non-employed women and those who do not report their wages or hours worked for some reasons.

[Tables 1 about here]

For the sake of comparison, we provide the results of estimates based on a slightly different set of instruments as well. The model presented in Table 2 is similar to that in Table 1, the only difference being that other two instruments were added: household expenditure (taken as a proxy of the household income) and the difference between the individual woman's personal income and the household's income. As noted in the methodological section, these last two instruments have an important drawback, being potentially endogenous: on the one hand, in fact, increasing household income might cause higher female participation, but, on the other hand, a higher female employment might cause higher household income (on this issue see also Paci and Reilly, 2004, p.124). This suggests taking the estimates of Table 2 with the due caveats. Nonetheless, it is interesting to note that the two variables are statistically highly significant and reveal sample selection mechanisms. In turn, this causes a reduction in the returns to education of women by 20% as compared to those obtained by OLS augmented earnings equations. This result is reminiscent of that obtained in Pastore and Verashchagina (2005; and 2006b).

Table 2 reports results of experiments on the hypothesis of non-linearity of the effect of household income on female participation as well. The hypothesis is that female participation is low for women belonging to low income households, but increases with the household income, up to a certain level of income, when it starts declining. In fact, women belonging to poor households would be less prone to work, since they are forced to take care of children. Also women belonging to wealthy households have a lower than average probability to participate in the labour market, since they have a higher opportunity cost of working. Taking care of the household produces a higher income than that obtained by working.

[Tables 2 about here]

This was done first by including into the participation equation, instead of logged household expenditure, a set of dummies identifying different percentiles of the consumption distribution[11]. Contrary to *a priori* expectations, the hypothesis of a non-linear effect of household income on female participation is rejected. Female participation is lower for the poorest households and increases steadily when moving to the upper percentiles (see the estimated coefficients for Selection equation 2 in Table 2). This result is confirmed by the coefficients of a splined function of household expenditure with nodes determined by a certain percentile value of the household

[11] We deliberately excluded the 50th percentile in order to see how the border groups tend to behave, anticipating that female participation could be high at the bottom end of household consumption distribution, since in this case they are driven by necessity, instead may be reducing with the rise of family wealth.

expenditure. These coefficients show up as statistically insignificant meaning that simple move among the percentile groups does not change the effect on female participation. The only exception is the borderline of the 10th percentile, which is highly significant (see the estimated coefficients for Selection equation 3 in Table 2). This finding is hardly surprising in the case of Belarus considering that the income distribution is very flat and is suggestive of the existence of poverty trap mechanisms for the poorest households: in fact, belonging to the poor households seems to create strong obstacles for women' labour force participation. In turn, a one-bread-winner model of household is likely to further reduce income and welfare levels. At the same time, once entering the labour force, women generally tend to work more intensively with the increase of the family wealth, also in the case of the wealthiest households (always in relative terms and by Belarusian standards). The interpretation would be that the rising standards of leaving still do not catch up with the expectations of the families, thus sustaining the two-bread-winner family model.

In Table 3, regional characteristics of the demand for and supply of social services are taken into account in place of household characteristics. The regional variables include the number of preschool institutions, the share of young and elderly population, the number of hospital beds. Again, the coefficients of the instrumental variables used suggest that they do not affect female participation, with the only exception of the share of people older than the working age population. The coefficient is positive, suggesting that elderly people help the young generation to cope with the care of dependent people in the household. There appears to be no sample selection at work.

[Table 3 about here]

Overall, the Tables 1 through 3 confirm that the Heckman procedure is very sensitive to the type of instruments used in the selection equation. For this reason, it is difficult to choose the right model on which to compute the expected wages to include in the estimates of the so-called structural female labour force participation model. Two alternative probit estimates are hence presented. Table 4 is based on predicted hourly wage offers for women from the baseline model in Table 1, whereas Table 5 is based on predicted hourly wage offers for women from the baseline model in Table 2. Note that in both cases also the other variables in the reduced form model have been included. The tables present estimated coefficients and marginal effects.

Table 4 confirms the results of Table 1 regarding the significance level of household specific factors, such as having dependent children, the age when the first child was born, the number of children and the presence of over-60-year-old people in the household. The impact of age on labour market participation is non-linear, with younger women working significantly less than older ones. Those aged over 40 are the most active. Disabled women have also a much lower degree of participation. These results are stable across the two specifications.

[Table 4 and 5 about here]

The aim of this exercise is to see the ceteris paribus impact of the individual expected hourly wage on the probability of labour market participation together with the other variables included in the selection equation of the reduced form model. The results confirm that the expected wage does affect female participation. The estimated marginal effects for the predicted hourly wage offer are slightly decreasing between 1996-2001. The higher pseudo-R^2 in Table 4 suggests that the model with individual characteristics only is to be preferred to that including regional characteristics.

Note that the attained coefficients for the expected wages in the estimated labour supply model of both Table 4 and 5 are almost half those Saget (1999) obtains for Hungary. We further calculate the elasticity of female labour force participation with respect to wages, at the sample means[12]. The attained levels of 0.45 for 1996 and of 0.41 for 2001 are based on the estimates reported in Table 4. They suggest that a ten percent increase / decrease in wages would cause less than 5% increase / decrease in female labour supply.

The results for Belarus are again much lower than those Saget (1999, p. 589) finds in the Hungarian case (1.81), but are similar to some of the findings of Paci and Reilly (2004, Table 5.5). They find low elasticity values in the case of Bulgaria (0.275 in 1995 and 0.160 in 2001), Albania (0.522 in 2002) and Tajikistan (0.720 in 1999), but higher than unity in the case of Bosnia and Herzegovina (1.239 in 2001), Serbia (1.904 in 2001) and Uzbekistan (1.941 in 2001).

Table 6 provides wage elasticities of labour supply for different groups of women. The values are quite stable with few exceptions. Confirming previous findings, for instance, the youngest group have higher than average elasticity. The same is true for women having more than three children.

[Table 6 about here]

Interestingly, when calculating the wage elasticity at different deciles of the log hourly wage distribution (Figure 2), although being still lower than unity, the measures are much higher for lower deciles. This suggests that a reduction/increase in wages might have a more important impact on female participation if implemented for jobs with the lowest content in terms of skills. In turn, this finding might be taken as an argument in favour of the aforementioned hypothesis that the least skilled women are the most vulnerable to changes in the economic conditions of the country.

[Figure 2 about here]

Overall, the latter findings are indicative of a low responsiveness of female labour supply to economic incentives in Belarus, which is to be expected considering the high participation rate of women and the two-bread-winner family model prevailing in the country. In addition, the evidence provided here goes in line with the theoretical considerations brought to the fore in Malysheva and

[12] The marginal effects in probit is at the means of other covariates: $ME = \frac{\partial P(y=1|x)}{\partial x'} = \phi(x'\beta)\beta$, where $\phi(.)$ is the density function. The elasticity for each variable is obtained dividing marginal effects by the average probability of participation, which is estimated to be equal to 0.74 in 1996 and 0.77 in 2001.

Verashchagina (2008) and supports the revealed differences in transition path between the CEE and the CIS. It is clear that the documented low elasticity measures of female labour supply found in this paper are related to the current economic situation. It cannot be used as an argument to exclude the possibility of a contraction of female activity rates in the years to come if the state reduces support to women' employment and to female-dominated sectors. This may, in fact, exacerbate the poverty trap mechanisms found in the data: as noted above, female labour supply might respond to increasing disincentives especially for the poorest households.

Concluding remarks

The gender literature on economic transition has asked the question whether women fare better (or worse) in a market economy as compared to a centrally planned economy. Previous studies have observed a reduction in (or sometimes stable) gender pay gap, suggesting that women receive higher wages in a market economy. However, a stream of literature has contended that the reduction in the gender pay gap is not necessarily a consequence of improved welfare: in fact, it was related to a reduction, not to an increase in female participation. Numerous reasons have been raised to explain reduced female participation in studies relative to CEE and CIS countries. First is the increased hardship of finding (or keeping) a job and the increasing uncertainty of the entire economic system due, in turn, to price and wage liberalisation as well as privatisation of state owned enterprises. Second is the increasingly hard budget constraint of (state or private) firms. This has caused a reduction in the state and corporate expenditure for providing childcare facilities and services for elderly people, which has translated into a dramatically increased opportunity cost of supplying labour for many women. The consequent reduction in female labour supply can actually explain also the increased average wages of the most motivated working women.

The question asked in this study is whether the mechanisms at work in other transition countries were also at place in Belarus despite the slow transition process. The main conclusion of our enquiry is that differently from other transition countries, in Belarus female labour force participation remains very high, despite the now documented increase in the GWG (Pastore and Verashchagina, 2007). The latter is still lower than in the neighbouring countries, but if the outlined trend of rising pay gap continues, there is a high probability of women withdrawing from the labour market. It is worth investigating the evolution of the GWG and participation in the future.

This paper adds to the literature by providing a systematic study of the determinants of female labour supply in 1996 and 2001 (data from the Belarusian Household Survey). A selectivity corrected wage equation is estimated to compute the expected wage offer for women. The latter

enters as regressor in the structural female labour force participation equation, estimated by probit. The results provide interesting insights into several aspects of the link between female participation and their wages in Belarus. The opportunity cost of working – as measured by demand and supply side measures of facilities for the care of children and elderly people – does affect female participation, but without generating sample selection mechanisms. In other words, having dependent children, under the age of 5, or elderly people, aged more than 60, reduces the probability for a woman to participate on the labour market, but this reduction seems to be randomly distributed across the sample of women. This suggests that welfare state answers to women' needs do not generate discrimination against specific groups of women. However, sample selection procedures prove to be very sensitive to the type if instruments used in the selectivity equation. In fact, sample selection is detected when a measure of household income, as proxied by the household expenditure, is used as a determinant of female participation. Female participation is found to be lower for the poorest households, which might generate poverty trap mechanisms. The low estimated elasticity (about 0.45 in 1996 and 0.41 in 2001) of female labour supply to wages confirms that for a woman, rather than being a choice, working is a need consistent with the prevailing two-bread-winner strategy of Belarusian households.

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Table 1. Maximum likelihood estimates for the selectivity corrected female wage equation. The role of household characteristics

Regressors[a]	1996		2001	
	Selection equation	Wage equation	Selection equation	Wage equation
Constant	0.477***	1.534***	0.22	6.059***
	0.143	0.103	0.134	0.098
University	0.856***	0.606***	0.998***	0.670***
	0.101	0.057	0.109	0.063
Technical school	0.673***	0.248***	0.834***	0.315***
	0.09	0.051	0.097	0.058
Vocational school	0.529***	0.057	0.694***	0.114
	0.089	0.05	0.104	0.059
General secondary school	0.509***	0.074	0.713***	0.101
	0.089	0.049	0.097	0.057
PWE	-	0.016**	-	0.026***
		0.005		0.005
PWE2	-	-0.000**	-	-0.001***
		0		0
16≤Age≤20	-1.497***	-	-1.445***	-
	0.144		0.119	
21≤Age≤30	-0.650***	-	-0.553***	-
	0.11		0.093	
31≤Age≤40	0.007	-	0.051	-
	0.09		0.084	
41≤Age≤50	0.288**	-	0.342***	-
	0.093		0.086	
Married	-0.054	-0.018	0.021	-0.039
	0.097	0.036	0.066	0.026
Divorced/Widowed	0.047	-0.013	0.15	-0.047
	0.116	0.044	0.086	0.033
Disabled	-1.965***	-0.216	-2.077***	-0.700**
	0.261	0.237	0.278	0.264
Chernobyl affected	-0.036	0.071	-0.072	-0.054
	0.1	0.039	0.097	0.036
Children under 5 present in the HH	-0.530***	-	-0.680***	-
	0.06		0.063	
15≤Age the first child was born≤17	-0.234	-	0.515*	-
	0.293		0.255	
18≤Age the first child was born≤22	0.224*	-	0.207*	-
	0.094		0.092	
More than 3 dependent children	-0.202*	-	0.004	-
	0.079		0.087	
Presence of old persons over 60	-0.151*	-	-0.285***	-
	0.073		0.071	
rho	-0.1481		0.0020	
	0.1287		0.1126	
sigma	0.4978		0.4964	
	0.0078		0.0066	
lambda	-0.0737		0.0010	
	0.0647		0.0010	
Sample size	3818		3878	
Log likelihood	-3764.336		-3729.716	
LR test of indep. eqns. (rho=0):	chi2(1)=1.33 Prob>chi2=0.2489		chi2(1) = 0.00 Prob>chi2=0.9859	

Note: *significant at 10%; **significant at5%; *** significant at 1%. The figures under the coefficients represent standard errors.

[a] The list of variables incorporated into both wage and selectivity equations includes as well 18 regional dummies as described in Table A1 of the Appendix I, not reported for lack of space.

Source: Own elaboration on the BHSIE.

Table 2[†]. Maximum likelihood estimates for the selectivity corrected female wage equation. The role of the household's income

	1996			2001		
Additional instruments	**Selection equation [1]**	**Selection equation [2]**	**Selection equation [3]**	**Selection equation [1]**	**Selection equation [2]**	**Selection equation [3]**
Difference between personal and household income	-0.249***	-0.2122***	-0.2340***	-0.208***	-0.2046***	-0.2018***
	0.03	0.0288	0.0298	0.027	0.0270	0.0271
Household expenditure	0.596***	-	-	0.630***	-	-
	0.044			0.041		
p10	-	-0.6455***	1.0666***	-	-0.9123***	1.3851***
		0.1024	0.2524		0.0927	0.2333
P25	-	-0.4302***	-0.0602	-	-0.4039***	-0.9209*
		0.0762	0.4185		0.0727	0.4038
P50	-	-	-0.5778	-	-	0.2098
		-	0.3960			0.3936
P75	-	0.3514***	-0.3822	-	0.1970***	0.0753
		0.0628	0.4849		0.0590	0.4511
P90	-	0.3531***	0.3857	-	0.4102***	-0.6355
		0.0726	0.3975		0.0686	0.3780
P100	-	0.5750***	-	-	0.6753***	-
		0.0879			0.0815	
rho	-0.7156	-0.6867	-0.7027	-0.8504	-0.8502	-0.8404
	0.0358	0.0403	0.0379	0.0201	0.0202	0.0215
sigma	0.5492	0.5439	0.5464	0.5657	0.5645	0.5629
	0.0106	0.0107	0.0106	0.0095	0.0095	0.0096
lambda	-0.3930	-0.3735	-0.3840	-0.4811	-0.4800	-0.4730
	0.0256	0.0277	0.026492	0.0175	0.0175	0.0181
Sample size	3818	3818	3818	3858	3858	3858
Log likelihood	-3681.478	-3680.5190	-3674.347	-3577.585	-3567.541	-3575.748
LR test of indep. eqns. (rho=0):	chi2(1)= 87.2 Prob>chi2= 0.0	chi2(1)= 73.57 Prob>chi2=0.0	chi2(1)= 81.58 Prob>chi2=0.0	chi2(1) =138.36 Prob>chi2= 0.0	chi2(1)=140.27 Prob>chi2=0.0	chi2(1)=128.87 Prob>chi2= 0.0

Note: * significant at 10%; ** significant at5%; *** significant at 1%. The figures under the coefficients represent standard errors.

[†] The estimates include all the variables in Table 1, plus the two extra instruments reported here. Both household expenditure as well as the difference between household and personal income enter the specification in logged form in the **Selection equation [1]**. The household income enters **Selection equation [2]** in the form of dummies representing different percentiles of the personal income distribution and **Selection equation [3]** in the form of a spline function.

Source: Own elaboration on the BHSIE.

Table 3[†]. Maximum likelihood estimates for the selectivity corrected female wage equation. The role of regional characteristics

Regressors	1996		2001	
	Selection equation	Wage equation	Selection equation	Wage equation
Constant	4.644	0.983***	0.299	5.553***
	4.532	0.111	2.786	0.079
University	0.927***	0.833***	1.043***	0.916***
	0.101	0.062	0.107	0.058
Technical school	0.766***	0.424***	0.881***	0.497***
	0.09	0.055	0.095	0.055
Vocational school	0.597***	0.228***	0.753***	0.315***
	0.09	0.052	0.102	0.057
General secondary school	0.556***	0.219***	0.772***	0.266***
	0.088	0.051	0.095	0.055
PWE	-	0.030***	-	0.031***
		0.006		0.005
PWE2	-	-0.001***	-	-0.001***
		0		0
16≤Age≤20	-1.554***	-	-1.378***	-
	0.134		0.114	
21≤Age≤30	-0.786***	-	-0.676***	-
	0.091		0.079	
31≤Age≤40	-0.056	-	0.006	-
	0.088		0.081	
41≤Age≤50	0.255**	-	0.355***	-
	0.093		0.084	
Married	-0.199*	-0.05	0.018	-0.085**
	0.086	0.038	0.064	0.026
Divorced/Widowed	-0.07	-0.026	0.146	-0.044
	0.107	0.045	0.083	0.034
Disabled	-1.918***	-0.37	-2.094***	-1.038***
	0.26	0.249	0.281	0.264
Chernobyl affected	-0.004	0.092*	-0.052	-0.019
	0.098	0.04	0.094	0.038
Preschool institutions[a]	-0.041	-	-0.173	-
	0.092		0.113	
Younger WAP[a]	-0.334	-	-0.919	-
	0.966		0.633	
Older WAP[a]	0.022	-	0.677**	-
	0.183		0.257	
Hospital beds[a]	-0.632	-	0.248	-
	0.394		0.346	
rho	0.2232		0.2676	
	0.1419		0.0752	
sigma	0.5217		0.5257	
	0.0099		0.0082	
lambda	0.1165		0.1407	
	0.0756		0.0407	
Sample size	3818		3878	
Log likelihood value	-3931.606		-3925.177	
LR test of indep. eqns. (rho=0):	chi2(1)=1.65 Prob>chi2=0.1996		chi2(1)=8.06 Prob>chi2=0.0045	

Note: * significant at 10%; ** significant at5%; *** significant at 1%. The figures under the coefficients represent standard errors. [†] Different from Table 1, instead of household level variables, the instruments in the selection equation here are built on the basis of the regional level data. The set of regional dummies has been dropped.

[a] For the definition of these instruments see Table A1 of Appendix I, as well as the section on data and methodology. WAP stands for the working age population (16 through 60 for men, and 16 through 55 for women)

Source: Own elaboration on the BHSIE.

Table 4. Structural female labour force participation model as based on Table 1

Regressors[a]	1996		2001	
	Probit estimates	**Marginal effects**	**Probit estimates**	**Marginal effects**
Constant	-0.883**	-	-5.815***	-
	0.2770		0.857	
16≤Age≤20	-1.531***	-0.5560***	-1.530***	-0.5534***
	0.1510	0.0448	0.118	0.0373
21≤Age≤30	-0.572***	-0.2004***	-0.525***	-0.1746***
	0.1100	0.0404	0.093	0.0331
31≤Age≤40	0.0820	0.0265	0.063	0.0190
	0.0890	0.0282	0.082	0.0246
41≤Age≤50	0.304**	0.0938**	0.318***	0.0917***
	0.0930	0.0271	0.086	0.0233
Married	-0.0560	-0.0181	0.067	0.0205
	0.0990	0.0317	0.066	0.0204
Divorced/Widowed	0.0350	0.0113	0.214*	0.0617*
	0.1180	0.0376	0.088	0.0239
Disabled	-1.786***	-0.6155***	-1.386***	-0.5110***
	0.2650	0.0565	0.323	0.1052
Chernobyl affected	-0.0870	-0.0289	-0.007	-0.0023
	0.1060	0.0361	0.096	0.0294
Children under 5 present in the HH	-0.507***	-0.1766***	-0.671***	-0.2300***
	0.0610	0.0222	0.065	0.0239
15≤Age the first child was born≤17	-0.2530	-0.0883	0.668*	0.1518
	0.3100	0.1144	0.29	0.0441
18≤Age the first child was born≤22	0.285**	0.0856**	0.340***	0.0929***
	0.0940	0.0261	0.092	0.0224
More than 3 dependent children	-0.193**	-0.0653**	0.006	0.0019
	0.0750	0.0263	0.083	0.0251
Presence of old persons over 60	-0.161*	-0.0541*	-0.308***	-0.1010***
	0.0740	0.0256	0.073	0.0257
Predicted log hourly wage offer[b]	1.023***	0.3323***	1.042***	0.3174***
	0.1390	0.0445	0.131	0.0391
Sample size	3818		3878	
Log likelihood value	-1834.9583		-1708.7396	
Pseudo R2	0.2036		0.2449	

Note: * significant at 10%; ** significant at5%; *** significant at 1%. The figures under the coefficients represent standard errors.

[a] Both the wage and the selectivity equations include 18 regional dummies as described in Table A.1 of the Appendix. The coefficients of these variables are omitted.

[b] The predicted hourly wage is calculated on the basis of specification as reported in Table 1.

Source: Own elaboration on the BHSIE.

Table 5. Structural female labour force participation model as based on Table 2

	1996		2001	
Regressors	**Probit estimates**	**Marginal effects**	**Probit estimates**	**Marginal effects**
Constant	2.466	-	-2.966	-
	4.513		2.878	
16≤Age≤20	-1.295***	-0.4812***	-1.301***	-0.4785***
	0.142	0.0479	0.119	0.0419
21≤Age≤30	-0.521***	-0.1825***	-0.497***	-0.1671***
	0.087	0.0320	0.08	0.0285
31≤Age≤40	0.058	0.0189	0.06	0.0185
	0.086	0.0278	0.081	0.0246
41≤Age≤50	0.289**	0.0902***	0.353***	0.1035***
	0.092	0.0272	0.084	0.0229
Married	-0.112	-0.0359	0.106	0.0332
	0.088	0.0277	0.065	0.0207
Divorced/Widowed	-0.022	-0.0073	0.190*	0.0561
	0.108	0.0357	0.085	0.0239
Disabled	-1.521***	-0.5501***	-1.100***	-0.4122***
	0.263	0.0716	0.32	0.1188
Chernobyl affected	-0.094	-0.0317	-0.052	-0.0165
	0.103	0.0354	0.095	0.0303
Preschool institutions [a]	0.049	0.0159	0.007	0.0023
	0.072	0.0237	0.102	0.0316
Younger WAP [a]	-0.253	-0.0828	-1.191	-0.3697
	0.965	0.3161	0.633	0.1965
Older WAP [a]	-0.014	-0.0044	0.564*	0.1753*
	0.178	0.0583	0.257	0.0798
Hospital beds [a]	-0.542	-0.1776	-0.101	-0.0315
	0.389	0.1273	0.345	0.1073
Predicted log hourly wage offer [b]	1.092***	0.3576***	0.976***	0.3031***
	0.116	0.0370	0.108	0.0327
Sample size	3818		3878	
Log likelihood value	-1877.2529		-1775.7394	
Pseudo R2	0.1853		0.2153	

Note: * significant at 10%; ** significant at5%; *** significant at 1%. The figures under the coefficients represent standard errors.

[a] For the definition of these instruments see Table A1 of Appendix I, as well as the section on data and methodology. WAP stand for the working age population (under 60 for men, and under 55 for women)

[b] The predicted hourly wage is calculated on the basis of specification as reported in Table 3.

Source: Own elaboration on the BHSIE.

Table 6. Wage elasticity of labour supply for different groups of women

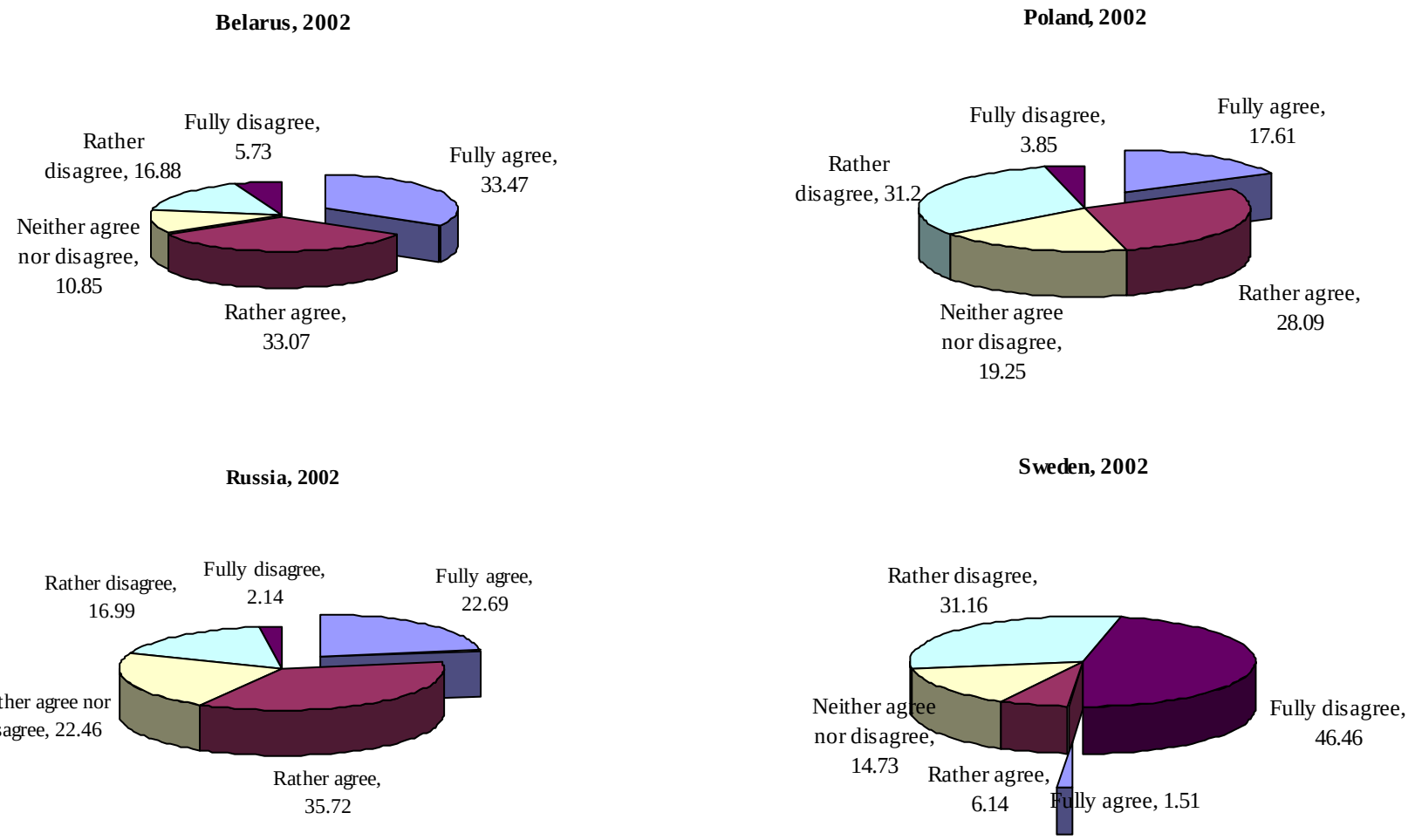
Target population	1996		2001	
	Nobs.	**Wage elasticity**	**Nobs.**	**Wage elasticity**
All women	3818	0.449(0.060)	3878	0.413 (0.051)
Specific groups of women:				
21≤Age≤30	903	0.688 (0.581)	882	0.626 (0.086)
31≤Age≤40	1233	0.423 (0.067)	1052	0.392 (0.058)
41≤Age≤50	981	0.347 (0.059)	1101	0.315 (0.048)
Single	541	0.449 (0.060)	725	0.413 (0.051)
Married	2763	0.457 (0.063)	2555	0.403 (0.050)
Divorced/Widowed	514	0.435(0.077)	598	0.333 (0.050)
18≤Age the first child was born≤22	461	0.337 (0.053)	419	0.286 (0.045)
More than 3 dependent children	468	0.536 (0.076)	437	0.410 (0.057)

Note: all coefficients reported in the table are significant at 1%. The estimates are based on the marginal effects reported in Table 4.

Source: Own elaboration on the BHSIE.

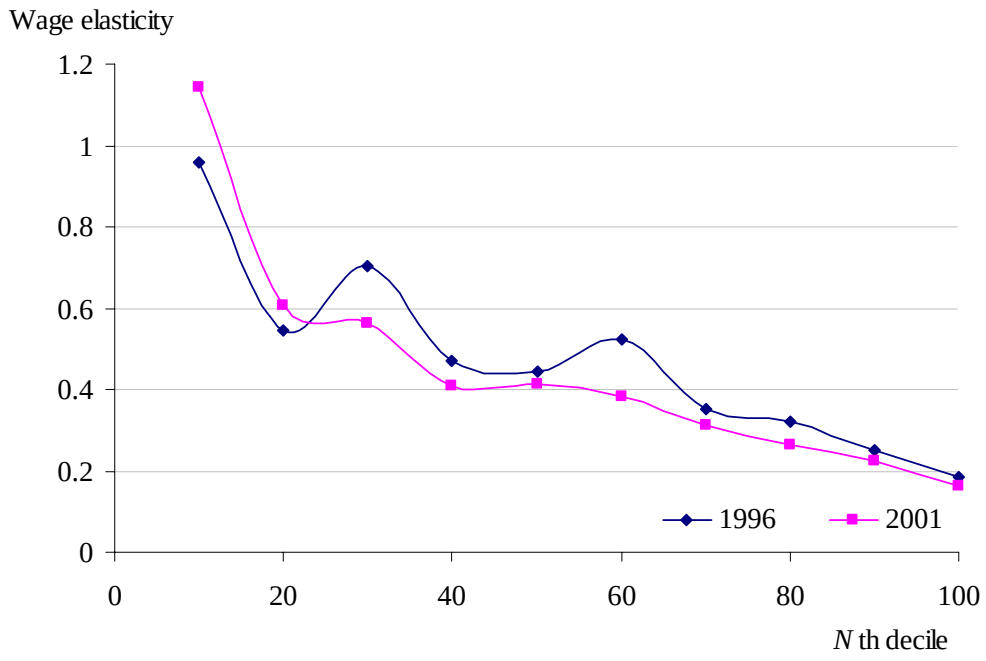
Figure 1. Cross-country differences in attitudes towards the role of men and women

*Men should do a living and women should take care of the household**



Source: Own elaboration on the basis of ISSP data* (http://www.issp.org/).

Figure 2. Wage elasticity of labour supply by deciles of the log hourly wage distribution



Source: Own elaboration on the BHSIE.

Appendix I.

Table A.1. Definition of variables

Variable name	Definition
lhwage	natural log of hourly wage from the main job
university	= 1, if university degree; = 0, otherwise (including those with PhD)
technical school	= 1, if diploma of technical secondary school; = 0, otherwise
vocational school	= 1, if diploma of vocational secondary school; = 0, otherwise
general secondary school	= 1, if diploma of general secondary school; = 0, otherwise
compulsory education (low secondary school, baseline)	= 1, if diploma of basic school; = 0, otherwise
age	age of a person
age groups: 16≤Age≤20, 21≤Age≤30, 31≤Age≤40, 41≤Age≤50, 51≤Age≤60, Age>60	age groups divide the sample into 6 categories: aged 16 to 20, 21 to 30, 31 to 40, 41 to 50, 51 to 60 and over 60
awe	actual (declared) work experience (in years)
pwe	potential work experience =(age – education – 6) – no.children*3
pwe2	potential work experience squared
marital	marital status is represented by three dummy variables: married, single and divorced/widowed
disabled	dummy for disabled persons
chernob	dummy for persons who report to be Chernobyl influenced
Brest_ru, Brest_sm, Brest_lar, Gomel_ru, Gomel_sm, Gomel_lar, Grodno_ru, Grodno_sm, Grodno_lar, Minsk_ru, Minsk_sm, Minsk_lar, Minsk_city, Vitebsk_ru, Vitebsk_sm, Vitebsk_lar, Mogilev_ru, Mogilev_sm, Mogilev_lar	nineteen regional dummies are constructed by dividing each of the six existing oblasts/regions (Brest, Gomel, Grodno, Minsk, Vitebsk, Mogilev) into three sub-regions, relative to areas with large cities, small cities and rural areas. Minsk city is kept separately and represents a baseline
Instruments	
Household level data	
15/18/23≤Age the first child was born≤17/22/28	Dummy for the age when the first child was born, three groups are considered: 15-17, 18-22, 23-28 (only for women with age≤30 at the time of the interview)
children under 5 in the HH	=1 if there are children in the household under 5 years old
more than 3 children	=1 if the number of dependent is greater than 3
old60 in the HH	=1, if in the household there are elderly over 60
ltotalexp	total household expenditures, in natural log terms
ldifer	difference between the total household income and the respondent's total monthly income
Aggregate level data (by regions)	
preschool	% of children attending pre-school establishments, in log terms
younger_wap	percentage of the population younger than the working age (<16), in log terms
older_wap	percentage of the population older than the working age (>55 for women, >60 for men), in log terms
hospital beds	number of hospital beds per 10000 of population, in log terms

Table A.2. Descriptive statistics

Variable	1996					2001				
	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
lhwage	2705	1.631	0.571	0.006	3.606	2830	6.276	0.579	3.57	7.906
university	3818	0.167	0.373	0	1	3878	0.186	0.389	0	1
technical	3818	0.258	0.437	0	1	3878	0.312	0.463	0	1
vocational	3818	0.235	0.424	0	1	3878	0.163	0.370	0	1
gen. secondary	3818	0.212	0.409	0	1	3878	0.225	0.417	0	1
pwe	3818	13.840	9.511	0	50	3878	14.576	9.635	0	50
pwe2	3818	281.991	329.329	0	2500	3878	305.278	325.252	0	2500
single	3818	0.142	0.349	0	1	3878	0.189	0.390	0	1
married	3818	0.724	0.447	0	1	3878	0.659	0.474	0	1
div/widow	3818	0.135	0.341	0	1	3878	0.154	0.361	0	1
disabled	3818	0.012	0.107	0	1	3878	0.011	0.102	0	1
chernob	3818	0.065	0.247	0	1	3878	0.073	0.261	0	1
student	3818	0.000	0.000	0	0	3878	0.000	0.000	0	0
pensioner	3818	0.000	0.000	0	0	3878	0.000	0.000	0	0
self-employed	3818	0.000	0.000	0	0	3878	0.000	0.000	0	0
age	3818	36.271	10.760	16	60	3878	37.049	11.212	16	60
16≤Age≤20	3818	0.081	0.273	0	1	3878	0.086	0.280	0	1
21≤Age≤30	3818	0.237	0.425	0	1	3878	0.227	0.419	0	1
31≤Age≤40	3818	0.323	0.468	0	1	3878	0.271	0.445	0	1
41≤Age≤50	3818	0.257	0.437	0	1	3878	0.284	0.451	0	1
51≤Age≤60	3818	0.102	0.303	0	1	3878	0.132	0.338	0	1
15≤Age first child ≤17	3818	0.007	0.084	0	1	3878	0.008	0.078	0	1
18≤Age first child ≤22	3818	0.121	0.326	0	1	3878	0.108	0.310	0	1
children under 5 in the HH	3818	0.235	0.424	0	1	3878	0.191	0.393	0	1
more than 3 children	3818	0.123	0.328	0	1	3878	0.113	0.316	0	1
old60 in the HH	3818	0.120	0.325	0	1	3878	0.130	0.337	0	1
ltotalexp	3818	7.712	0.623	4.605	11.044	3878	12.211	0.607	9.507	15.805
ldifer	3818	7.425	1.097	0	11.049	3858	11.912	1.452	0	15.694
pre-school	3818	4.054	0.337	3.578	4.292	3878	4.209	0.250	3.842	4.378
younger_wap	3818	3.139	0.031	3.086	3.19	3878	2.993	0.052	2.901	3.068
older_wap	3818	3.045	0.147	2.708	3.14	3878	3.055	0.122	2.779	3.144
hospital beds	3818	4.827	0.079	4.665	4.903	3878	4.840	0.079	4.672	4.922

Note: We exclude respondents over 60 years old, students, pensioners, self-employed and outliers on the basis of declared wages.