To Work or Not to Work? Labor Supply Decisions of Russia's Disabled

by

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Abstract

By some estimates, almost 6% of Russians are officially disabled. The Russian government has announced the rehabilitation of disabled individuals into the labor force as one of its goals. This paper investigates labor supply decisions of Russia's disabled using data from the cross-sectional NOBUS dataset. Particular emphasis will be made on differences in disability and employment trends across various strata of the Russian population. The paper concludes that Federal disability pension policy does not substantially discourage employment. A key finding is that employment decisions are based primarily on health status, family dynamics, and local opportunities.

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Introduction

In the 1990's, Russia experienced a significant economic downturn, coupled with rising mortality and morbidity rates. One of the most troublesome developments was an increase in disability incidence among Russia's working population. The disability situation in Russia remains a topic of interest for several reasons. First, though the Russian economy has begun to rebound, the direction in which disability rates will move remains unclear. Currently, almost 6% of Russians are estimated to be officially disabled. Second, disability benefits programs remain a large portion of the Russian Federal budget. In recent years, the Federal government has implemented new policies, targeted at rehabilitating disabled individuals into the labor force. The efficacy of such attempts is the subject of this investigation.

Existing studies of the disability situation in post-Soviet countries have been only preliminary, focusing on the characteristics of the disabled population and providing initial estimates of disability rates and risks, using much smaller datasets. This paper seeks to assess the labor supply decisions of Russia's disabled population. About one-third of Russia's disabled are formally employed. Since employed individuals retain their disability pensions, it is interesting to ask why some choose employment while others do not. The paper will be organized as follows: Part I will review extant literature on the topic of disability-employment interaction; Part II will describe the dataset and discuss the patterns of disability and employment; Part III will briefly summarize the disability program policies available under current Russian legislation and their evolution; based on these policies, Part IV will present the economic model; Part V will discuss the econometric results; and a final section will offer conclusions, predictions, and policy recommendations.

Literature Review

In this part, the literature on this topic is divided into two sections. First, the literature dealing specifically with disability in Russia and other countries of the former Soviet Union is presented, followed by more general literature on the topic of disability and labor supply interaction.

Literature on Disability in the USSR, Russia, and other FSU Countries

Much of the work on disability in the USSR and in post-perestroika Russia has focused on changes in various government policies, including the determination of disability groups, the methodology used by the health evaluators, and the pension and benefit schemes for which different categories of disabled individuals become eligible. The literature underlines the sometimes arbitrary nature of Soviet-era policy, the response of disability policy to economic decline and the subsequently strained public budgets, and the rapidly changing dynamics of the post-Soviet labor market, with different incentives for reporting or not reporting disabled status. The Soviet Union officially claimed full employment and low inflation; during the labor market transition and high inflation of the 90s, the non-cash benefits provided by disability pension schemes, including discounted drugs, transportation vouchers, and similar benefits, created a greater incentive to claim disability status. Additionally, disabled individuals in the USSR could not legally work, whereas the emergence of the private sector and self-employment possibilities during the 1990s provided an opportunity to receive disability benefits while earning unofficial income [McCagg and Siegelbaum, 1989, FBEA, 1999].

There have been some attempts to quantify disability and the risk of becoming disabled in Russia and in Kazakhstan. Becker and Merkuryeva provide estimates of transition risk between healthy status and the three disability groups using longitudinal data from the RLMS. They estimate the transition risk using multinomial logit regression and conclude that the primary factors influencing transition are health status and age. They also identify a significant gender gap, to the disadvantage of men, which increases with age [Becker and Merkuryeva, 2007]. Seitenova and Becker look at the disabled population in Kazakhstan, which maintains disability pension policies akin to those in Russia [Seitenova and Becker, 2008]. This literature provides a preliminary assessment of the disabled populations in Russia and Kazakhstan, the factors influencing disabled status, the various government polices and their evolution since the dissolution of the USSR.

General Literature on Disability and Labor Interactions

A number of papers have attempted to study the effect of disability benefit schemes on labor force participation, focusing on the United States, Canada, and the UK. While, admittedly, socio-economic conditions, healthcare services, and public policy in the developed and the transition countries may be markedly different, this literature nonetheless provides valuable insight for my analysis.

Preliminary work on estimating the impact of disability on labor supply decisions is available in Scheffler and Iden (1974). Using data from a 1967 survey, they attempt to measure the significance of health as an input into the labor supply decision. The model is a two-stage regression model. The first stage models the individual's status–employed or unemployed–as a function of health and other variables. The second stage models the choice of work hours as, again, a function of health and other independent variables. These independent variables include family status (the number of children and whether the individual is the "head of household"), income (welfare, family income, and the available wage), human capital (education and disability status), and the demographic dummy "rural." The model is estimated for different age and racial groups; however, the authors only conclude that a model with health has significantly higher predictive power than a model without health [Scheffler and Iden, 1974]. This paper will go beyond assessing predictive power and will attempt to interpret marginal effects.

Fenn and Vlachonikolis (1986) develop a model for a disabled individual's decision to re-enter the labor force following serious illness or injury. They model the individual as having preferences over income and leisure, with variations in preferences coming from observable and unobservable characteristics. Using this model, they derive a decision function for entering the labor force. To estimate their model, they use cross-sectional data from a 1976 survey of disabled individuals in the United Kingdom; the dataset includes household income, age and health, occupation, and household structure variables. The econometric model is a switching regression model, with two equations modeling income and a third equation representing a switch between the two states of the world–unemployed or employed. The results are estimated for males under 65, with a total of 668 observations. The paper concludes that there is some evidence that the British social security system provides incentives to retire prematurely rather than to return to the labor force; these incentives, however, are only significant for individuals with severe health conditions [Fenn and Vlachonikolis, 1986].

In a similar work on the Canadian disability pension system, Maki (1993) studies whether it is the poor health of disabled individuals or the availability of disability benefits that is responsible for the decision to not participate in the labor force. The dataset is a cross-sectional survey conducted in 1985. Maki proceeds as follows. (1) In stage one, in order to correct for selectivity bias, two probit regressions are performed, one using labor-force participation as the dependent variable and the other using disability pension status as the dependent variable. The independent variables are health status and other socioeconomic and demographic characteristics. (2) Then, two Tobit regressions are carried out. The first, on the employed subsample, regresses work income on socioeconomic variables and the inverse Mills' ratios calculated in stage one. The second, for the unemployed subsample, regresses disability benefits on the same socioeconomic variables and Mills' ratios. This is done in order to estimate potential wages for the unemployed individuals and potential benefits for the employed individuals. (3) Finally, a second probit regresses labor-force participation on predicted work income, predicted government benefits, and the socioeconomic variables. Maki concludes that a substantial portion of the reduction in labor force participation rates is cased by government disability pension schemes [Maki, 1993].

Data Description

The data to be used in this study come from the Russian National Survey of Household Welfare and Participation in Social Programs, known by its Russian acronym as NOBUS. Conducted in 2003 by the Russian Federal Statistical Survey (Goskomstat), the "NOBUS is a cross section survey of the Russian households, which was specially designed to measure the efficiency of the national social assistance programs by means of estimating the impact of social benefits and privileges on household welfare" [World Bank Group, 2007]. The NOBUS has important previously unavailable properties: it is a recent study, which is vital in an area of such rapid economic change as Russia; it has a large sample size, surveying over 40,000 households, a total of over 110,000 individuals; it provides data on virtually all members of a household; and it has impressive geographic coverage, surveying all Federal subjects except Chechnya[1]

Some preliminary summary statistics have been calculated and are presented here. Of the sample, 44% are male and 56% female. The mean age is 39, accounting for the presence of individuals under 16 years old, who will be dropped from the analysis, lacking an employment history. More to the point, 0.82% are Group I (most severely) disabled, 3.83% are Group II disabled, and 1.10% are Group III (least severely)

[1]A Federal subject (subject of the Federation) is an administrative unit akin to a US State.

disabled. Thus, 5.65% of the population have a recognized disability.

The dataset provides a variety of various indicators, including eligibility for various non-cash government benefit schemes and cash subsidies, including free telephone installation, exemptions or subsidies for utility payments, and discounted or free medical care. The data also include various health indicators; 17.7% of the population describe themselves as being in poor health and 49.6% have sought medical attention in the past twelve months. Unfortunately, the NOBUS does not have detailed medical history or information on medical conditions, a significant limitation of the present study. There are, however considerable data on employment history and status. 49.5% of the respondents are employed, of whom 83.3% work for an enterprise while 4.77% are self-employed. The mean monthly wage is 3550 roubles (about $120 US). Finally, the data include information on household assets, spending patterns, and income, including rent / own status, government subsidies, or even ownership of a refrigerator.

The Structure of Russia's Disability System

Modern Russia has inherited much of the disability classification and eligibility criteria developed in the Soviet Union. The disability policies and the incentives that individuals face must be understood within the historical context out of which they arose. This section presents a brief synopsis of Soviet and post-perestroika disability policy, compiled and translated from various sources. To my knowledge, this is one of the only such synopses presently available in English.

Disability policies in the Soviet Union

The modern system of social aid for the disabled was born shortly after the October Revolution of 1917. The terrible effects of the First World War and the subsequent

Russian Civil War as well as the new government's social and labor policies required both a systematic approach to a given individual's labor potential and large government expenditures on social security programs. The first medical assessment committees, called Medical Consultative Commissions (VKK)[2] were created in 1917 and the tiered structure of disability classification was born in 1921. The decision of the Sovnarkom, dated 8 December 1921, provided the basis for a six-tiered classification of disabled individuals as follows:

- Group I – the disabled individual has lost all capacity to work and requires outside assistance;
- Group II – the disabled individual has lost all capacity to work but can live without assistance;
- Group III – the disabled individual cannot work regularly but may be able to earn a living with incidental or light labor;
- Group IV – the disabled individual cannot continue at his present job but may find a different job, requiring lower qualifications;
- Group V – the disabled individual cannot continue at his present job but may find a new job in the same field;
- Group VI – the individual can continue at the same job, but with reduced hours or productivity.

The emphasis of this classification scheme on an individual's work potential is largely a reflection of the priorities of the Soviet government. Disability status became inherently tied to the capacity (or, rather, the incapacity) to perform work.

In 1923, the six-tier classification was transformed into the three disability groups, which, with some modification, continue to exist today. The three groups were not

[2] "Vrachebno-Konsul'tativnyye Komissii"

a simple elimination of groups IV – VI above, but rather a redefinition of disabled status:

- Group I – Individuals who have lost all work capacity and require permanent care;
- Group II – Individuals who have lost capacity to professional labor, but could perform unqualified work;
- Group III – Individuals who have lost considerable work capacity, but could work at a different job or under different conditions [FBEA, 1999].

The 1950s and 60s saw both the systematization of the disability screening process and major improvements in the benefits provided to disabled individuals. Part of this should be attributed to the large increase of disabled as a result of the Great Patriotic War (World War Two). Laws enacted in 1956 provided for free medical care and free education for disabled individuals as well as unified pension provisions into one, centrally funded and administered program. In 1964, the same benefits were also extended to workers of collective farms ("kolhozy"). Since, in many ways, many of the structures and policies developed in the 60s remain today, understanding disability in the Soviet Union is useful in assessing how the disabled population has reacted to the transition to market economics.

In the Soviet system, individuals seeking disabled status were first assessed at the polyclinic or hospital in their geographic area by a Medical Consultative Commission (VKK). If the VKK found signs of long-term loss of work ability, it referred the patient to a Medical-Labor Expert Commission (VTEK)[3] in his geographic area. The VTEKs consisted of three medical experts (a surgeon, an internist, and a neurologist), a representative from the Social Services ministry, and a representative from the trade union ("profsoyuz"). The VTEKs were responsible for assessing the degree of

[3] "Vrachebno-Trudovaya Ekspertnaya Komissiya"

disability, establishing the individual's disability group, and making recommendations about the individual's further work potential.

In making their assessment, all VTEKs operated according to guidelines developed at the national level by the Central Scientific Institute for the Study of Labor-ability and Labor Organization among the Disabled (TsIETIN).[4] The TsIETIN's guidelines classified qualifying disabling conditions as one of general illness, work-related injury, occupational illness, or disability from childhood.

As noted above, patients were divided into three groups, based on the severity of disability. Once disability had been established, individuals were reexamined every two years (for Group I) or every year (for Groups II and III), except for those that had reached retirement age and the veterans of the Great Patriotic War (World War Two), who were exempt from reexamination.

The primary function of Soviet social security was compensation for lost wages. Individuals who had become disabled and had work history were entitled to disability pensions. Group I and Group II individuals received a pension calculated as a percentage of the old-age pension, the exact percentage depending on the reason for disability. Since Group III individuals were expected to work, their pensions were lower and were based on a percentage of their average monthly earnings, with a typical pension at around 30% of monthly earnings. To get an idea of the size of these pensions, consider a disability pension for a Group II individual. In 1974, these pensions ranged from 45 to 120 rubles a month. The poverty line during that period was estimated at 65 rubles a month. Additionally, those without an employment history were eligible for benefits ("posobiya") paid to disabled individuals of Groups I and II.

[4] "Tsentral'nyi nauchno-issledovatel'skii Institut Ekspertizy Trudosposobnosti i organizatsii Truda Invalidov"

On top of pensions or benefits, disabled individuals in the Soviet Union qualified for a number of real benefits. These included free medical care as well as discounts on public transportation. Group III individuals, who retained some work capacity, were eligible for special programs of training, retraining or job placement [McCagg and Siegelbaum, 1989, Seitenova and Becker, 2008].

Present-day disability policies in Russia

Most of the Soviet structure has remained in place, with some notable exceptions, which will be significant for this analysis. Disability in present-day Russia is governed by the 24 November 1995 Federal law "On the Social Protection of Disabled Individuals in the Russian Federation." The most significant change in disability determination has been the change in the definition of disability away from work potential. In principle, because disability status is no longer defined as a loss of ability to work, disabled individuals of any group can enter the labor force. Additionally, the expansion of the definition of disability has resulted in an increase in disability numbers as those outside of the labor force, mainly the retired, have filed for disabled status.

Disability status is still assigned as one of three groups for individuals over the age of 16 or as "disabled child" for those under the age of 16. Medical evaluation and status assignments are made by the Bureau of Medical and Social Evaluation (BMSE)[5], which has replaced the VTEK. Status is reviewed every two years for Group I individuals and every year for Groups II and III, except for the retired and those with certain permanent disabilities, such as blindness or anatomical defects. Hence, in this study an individual is defined as "disabled" *if she has an assigned disability group from the BMSE.* Such individuals can be classified as one of three categories:

[5] "Byuro medetsinskoi i sotsial'noi ekspertizy"

pensioners who have disabled status but receive a retirement pension, unemployed disabled individuals, and working individuals [FBEA, 1999, Seitenova and Becker, 2008, Russian Federation, 1995, Virtual Center, 2007]. The latter two groups receive disability pensions.

The first category, that of individuals above retirement age, has primarily come into existence because of the eligibility for additional benefits on top of the retirement pension, such as discounted transportation, discounted medical care, and discounts on utility payments. Since these individuals do not make labor-leisure decisions (at least in the formal sector), they are not included in this analysis.

Thus, the second and third categories will be the focus of this study because these individuals make labor-leisure decisions. In principle, disabled individuals are eligible to enter the labor force and have been legally encouraged to do so with the development of individual-oriented rehabilitation plans designed by BMSEs and the introduction of workplace quotas. In practice, disabled individuals attempting to procure a job may face a number of complications.

The incentive structure for a disabled individual choosing to work is threefold. On the one hand, prior to 2003, working disabled individuals are ineligible for certain non-cash benefits such as free medical care and utility discounts. On the other hand, companies are increasingly hesitant to hire disabled individuals because of the potential for reduced productivity, minimum pay requirements and other legal and systemic problems. Finally, in areas of weak economic development, individuals may turn to disability benefits as an alternative to employment because disability pensions are more attractive than other social security programs, such as unemployment benefits.

The non-cash benefits of the pension package were discontinued in Russia during the pension reform legislation of 2003. The NOBUS was carried out in 2003, and data on non-cash benefits are available. However, calculating their cash equivalency is a non-trivial problem. Thus, the impact of non-cash benefits on labor decisions, as well as the impact of the reform legislation, remains the subject of a future study.

The Structure of the Benefits System

The Russian disability benefits system is fairly complicated, and includes a number of different programs, of which the most significant is "labor-related disability pensions"[6], or simply "disability pensions". Other payments include pensions for civil servants ("civil pension"), pensions for those without an employment history, and pensions to disabled children, the latter two classified as "social pensions". The Russian Pension Fund administers multiple other pension programs, including old-age pensions.

Soviet pensions were funded on a pay-as-you-go basis similar to American Social Security. The Russian government has recently begun a transition to a partially privatized system. Starting in 2004, pensions consist of three parts: the minimum "base" equal for all recipients, the "insurance" component dependent on an individual's work history, and a "growth component" that can be invested in the private sector. The minimum "base" is set at 50%, 100%, and 200% of the retirement pension for Groups III, II, and I, respectively [Merkuryeva, 2007]. Table 1 summarizes the contribution of disability and other pensions to the individual budget.

Eligibility for disability pensions does not exclude eligibility for other benefits programs, including unemployment benefits. However, unemployment benefits are tied to the individual's previous wages, and, to encourage job hunting, decrease significantly with time, require frequent visits to the unemployment office and participation in government employment and training programs [Russian Federation, 1991].

Estimates of disability incidence in Russia range between 4 and 6 percent. According to the NOBUS dataset, 5.65% of the population is disabled. Over three quarters

[6] "trudovye pensii po invalidnosti"

Table 1: Amounts of various pensions in 2003 (in rubles). Source: NOBUS.

	Mean	St Dev	Share of Mean HH Income
Old-age pension	1675.25	482.21	28.7%
Disability pension (Group I)	1709.48	668.83	29.3%
Disability pension (Group II)	1591.65	552.02	27.3%
Disability pension (Group III)	1280.86	646.39	22.0%
Social pensions	1043.27	391.79	17.9%
Monthly before-tax salary	3550.75	3466.79	60.9%
Unemployment benefits	848.64	732.62	14.6%

of these are over the legal retirement age, and thus are classified as retired (though many engage in informal economic activity). Table 2 summarizes disability incidence among individuals of working age; here, of working age are individuals above the age of 16 and below the legal retirement age–60 for men and 55 for women. Table 3 reveals the employment incidence among disabled of working age. The most striking characteristic of this data is the high incidence of unemployment among Group II individuals.

Table 2: Disability incidence among working-age population in 2003. Source: NOBUS.

	Percent of working-age population
Not disabled	96.0%
Group I (permanently) disabled	0.60%
Group II (severely) disabled	2.20%
Group III (partially) disabled	1.22%
Individuals of working age (71,005 observations).	

Figure 1 presents disability incidence for the working-age population in the NOBUS sample in 84 of the 85 Federal subjects of the Russian Federation (data for the Chechen Republic are not available). The lowest disability rates are in Russia's Far East and extreme North. The highest are in St Petersburg City, areas of the Central federal district (especially Belgorod Oblast) and parts of the South (especially Dagestan). While the results in Dagestan are probably a reflection of the recent conflict in neighboring Chechnya, the other results appear counter-intuitive at first. Undoubtedly, age dynamics and self-selection are at play, as disabled individuals move to areas of both greater economic and healthcare opportunities and milder living conditions. On the other hand, since distances in the remote regions are vast and travel conditions are often onerous, the data may be indicative of a reporting bias.

Table 3: Employment incidence among Russia's disabled. Source: NOBUS.

	Employed (income-earning activity)	
	Yes	No
Not disabled	65.6%	34.4%
Group I	26.2%	73.8%
Group II	11.8%	88.2%
Group III	43.0%	57.0%
Total	63.9%	36.1%
Individuals of working age (71,004 observations).		

Methodology

The proposed model is based on the one developed in Fenn and Vlachonikolis (1986) and Maki (1993), with the main difference that individual labor hours are not fixed at 40 hours a week. Instead, individuals face a trade-off between leisure and income. Assume that individual utility can be modeled by the Cobb-Douglas utility function

$$U_i = Y_i^{\alpha} l_i^{\vec{\beta}\cdot\vec{x}_i+\epsilon_i} \tag{1}$$

Here Y_i represents the ith individual's income and l_i represents the ith individual's leisure. Preferences are affected by both observable and unobservable characteristics. The vector of observable characteristics $\vec{x}_i$ includes the individual's age, sex, education

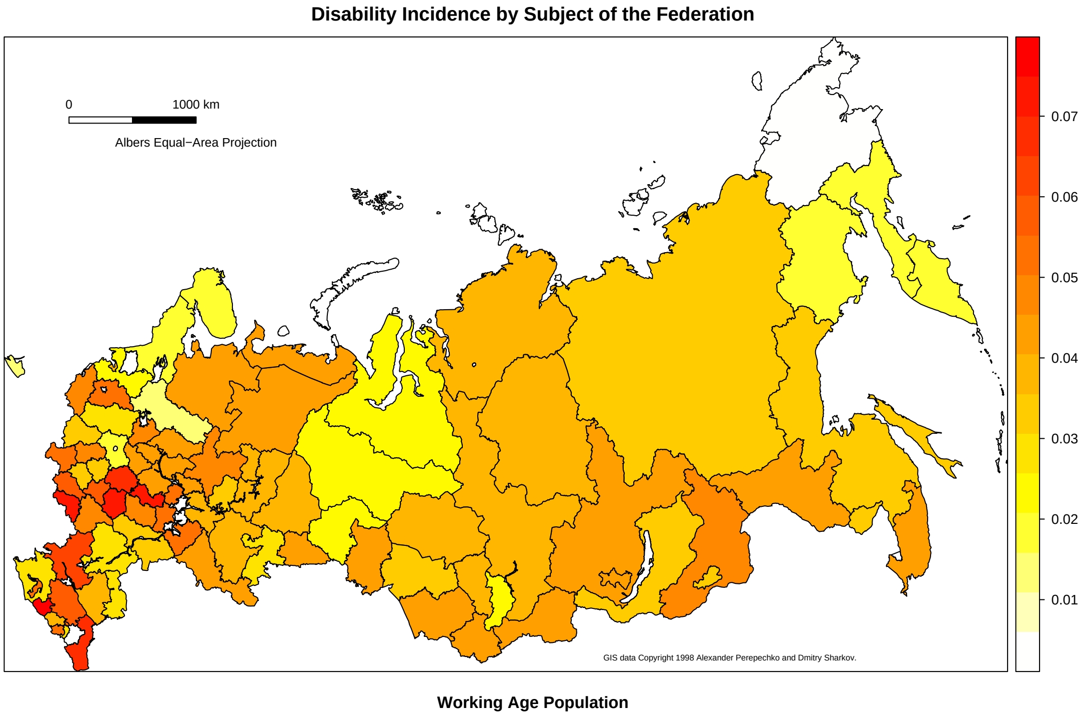


Figure 1: Disability incidence by Federal Subject of residency as percentage of the working-age population.

attainment, health, and household characteristics. The ϵ_i is a stochastic disturbance, assumed to be normally distributed with mean zero and variance σ_ϵ^2. It is more convenient to work with the logarithm of the utility. Thus, I write:

$$\log U_i = \alpha \log Y_i + (\vec{\beta} \cdot \vec{x}_i) \log l_i + \epsilon_i \log l_i \qquad (2)$$

The basic properties of this model do not change under monotonic transformations.

As Figure 2 illustrates, a given individual faces a trade-off between l^{retire} units of leisure and Y_i^{retire} units of income if she chooses to be unemployed and l_i^{work} units of leisure and Y_i^{work} units of income if she chooses to be employed. Here, l^{retire} is the maximum amount of leisure available and Y_i^{retire} is the ith individual's disability benefits package; l_i^{work} is the amount of leisure the ith individual has if she chooses to work and $Y_i^{work} = w_i(l^{retire} - l_i^{work}) + Y_i^{retire}$ is the ith individual's work income.

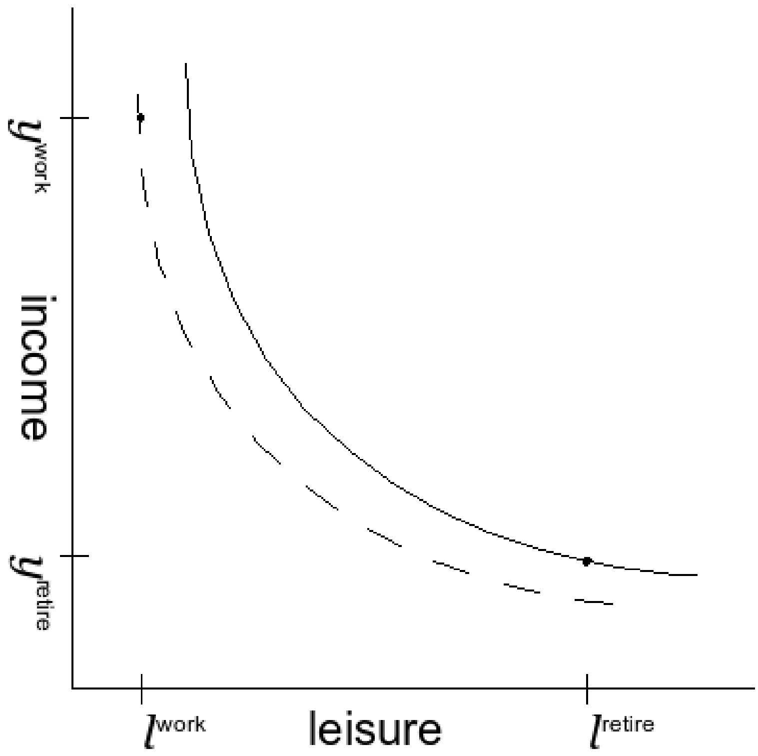


Figure 2: A disabled individual's choice set.

Clearly, $l_i^{work} < l^{retire}$ and $Y_i^{work} > Y^{retire}$.

The probability that the ith individual works given his disability group is simply $Pr(U_i^{work} > U_i^{retire} \mid disabgroup_i)$. With a bit of algebra, this can be rewritten as:

$$Pr(U_i^{work} > U_i^{retire} \mid disabgroup_i) = Pr\left(\alpha \frac{\log Y_i^{work} - \log Y_i^{retire}}{\log l^{retire} - \log l_i^{work}} - \vec{\beta} \cdot \vec{x}_i > \epsilon_i\right) \quad (3)$$

This leads to the probit decision function where the individual chooses to work if $works_i > 0$ where $works_i$ is defined as:

$$works_i = \gamma_0 + \gamma_1 \left(\frac{\log Y_i^{work} - \log Y_i^{retire}}{\log l^{retire} - \log l_i^{work}}\right) + \vec{\gamma}_2 \cdot \vec{x}_i + \epsilon_i \quad (4)$$

In general, Equation 4 cannot be estimated by probit analysis because the values of Y^{work} and l^{work} are not known for individuals who are not working and must be imputed. In addition, individuals self-select into the employed and unemployed groups, requiring correction for selectivity bias.

The estimation proceeds in three steps. In the first stage, a reduced form of Equation 4 is estimated in order to provide the inverse Mills' Ratios to correct for selectivity bias in the subsequent stage. The reduced form equation is:

$$works_i = \gamma_0^1 + \vec{\gamma}_1^1 \cdot \vec{x}_i + \epsilon_i^1 \tag{5}$$

Here, $works_i$ is defined as a dichotomous variable equal to 1 if the ith individual is working. The vector $\vec{x}_i$ contains the following explanatory variables: Male = 1 if the respondent is male; Age and Age^2, the respondent's age; residency dummies (with "village" the omitted category); a categorical variable for the Federal Subject of residency; family status dummies (with "single" the omitted category); NumKids, the number of children under the age of 16 in the respondent's household; Assets, a measure of the value of the household's fixed asset holdings (including consumer durables and vehicles); HealthGood = 1 if the respondent's self-reported health status is "very good", "good", or "satisfactory"; YearsSmoked, the number of years the respondent self-reported smoking (even if she has quit); and categorical variables for the consumption of vodka and other liquor, wine, and beer.

From this regression, the inverse Mills' ratios are obtained, defined as

$$Mill_i = \frac{\phi\left(\gamma_0^1 + \vec{\gamma}_1^1 \cdot \vec{x}_i\right)}{\Phi\left(\gamma_0^1 + \vec{\gamma}_1^1 \cdot \vec{x}_i\right)} \tag{6}$$

Here, $\phi(\cdot)$ is the standard normal probability density function and $\Phi(\cdot)$ is the standard normal cumulative distribution function.

Regressions for the labor hours and the hourly wages are then estimated for those individuals who are working. The equations are specified as follows:

$$\log l_i^{work} \mid disabgroup_i = \delta_0^l + \vec{\delta}_1^l \cdot \vec{z}_i^l + \eta_i^l \quad (7)$$

$$\log w_i \mid disabgroup_i = \delta_0^w + \vec{\delta}_1^w \cdot \vec{z}_i^w + \eta_i^w \quad (8)$$

The vector of characteristics $\vec{z}^l$ contains the determinants of labor hours: Male; Age and Age^2; education dummies (with "no schooling" the omitted category); residency dummies; Federal Subject; LogOthersIncome, the income of other members of the household (used as a proxy for the joint labor decisions of husband and wife); family status dummies; NumKids; and the Mills' ratios generated in the first stage. The theory of selectivity bias correction requires that at least one variable used in Regression 5 be omitted; the omitted variable is HealthGood. Since labor hours are sandwiched, a Tobit regression model is appropriate.

The vector of characteristics $\vec{z}^w$ contains the determinants of pre-tax hourly wage: Male; Age and Age^2; the education dummies; the residency dummies; Federal Subject; LogFoodPerPerson, a measure of weekly food expenditures per household member used as a proxy for the cost of living; the imputed weekly work hours; and the Mills' ratios. Again, HealthGood has been omitted to correct for self-selection.

Clearly, the error terms η^w and η^l are not independent. In order to be able to impute values for individuals not currently working, assume that one of hours or wages is exogenously determined. It is reasonable to assume that hours are set by the individual while wages depend on hours worked. Unreported regressions confirm that this hypothesis is reasonable. Thus, I report two regression results for the hourly wage estimation: an OLS result and an instrumental variables result using the Two-Stage Least Squares technique. In Equation 7, the imputed income variable is instrumented by the categorical variable Smoking, a measure of how much the respondent smokes.

The results of the two regressions, Equations 7 and 8, are used to impute the labor hours and hourly wage for unemployed individuals. In the final stage, Equation 4 is estimated using the imputed values and socio-demographic characteristics. In Equation 4, the vector of characteristics $\vec{x}_i$ contains: Male; Age and Age^2; the family status dummies; NumKids; the residency dummies; Federal Subject; HealthGood; YearsSmoked; the alcohol variables; LogAssets; and the leisure / income variable $\zeta = \frac{\log Y_i^{work} - \log Y_i^{retire}}{\log l^{retire} - \log l_i^{work}}$, the measurement of the respondent's leisure-income opportunity basket. The coefficient γ_1 on ζ captures the income-leisure incentive structure on the work decision. This regression is estimated for the entire working-age population and then for eight subsamples: healthy, and Groups I, II, and III disabled with separate regressions for men and women.

Regression Results

The results of the first stage of the estimation are reported in Table 14, in the Appendix. They are used to compute the inverse Mills' ratios for the selectivity bias correction in the subsequent stage. The first result is the notably large gender differences in the coefficients, justifying running separate regressions for men and women.

Table 4 reports the results of the weekly work hours regression. Note that, as a consequence of the clustering of most observations around 38-40 hours, this regression has fairly low predictive power. While this regression is intended to impute potential work hours for currently unemployed individuals, it can also be interpreted to make marginal observations about the characteristics of the Russian labor force.

Observe, particularly, that males, on average, work 6.5% more than females. Curiously, men on average work less in cities while women, on average, work more in cities. Work hours decline for married women; marriage here is possibly endogenous as, on the one hand, married women often work less because of their family obligations, while, on the other, work opportunities often influence marriage decisions.

Labor hours increase for men as the number of children increases, which is also expected. The coefficient on the Mills' ratios is statistically significant only for women, indicating that women are more likely to self-select out of the labor force.

The results of the wage estimation regression are reported in Table 5. These results were used to impute potential hourly wage earnings for individuals not currently in the labor force. However, taken by itself, too, the regression offers several insights into the dynamics of the Russian labor market.

Note that the results of the 2SLS procedure change significantly. Age becomes statistically significant for women, while the effect of education on hourly wage becomes unclear, a somewhat counter-intuitive result. According to the 2SLS result, males earn 27% more than females, even controlling for education. Wages increase with higher cost of living, as expected. Also, men earn more in cities than in the village, which is to be expected, but the opposite result for women is also counter-intuitive. The Mills' ratios are statistically significant, indicating that self-selection is at play in the labor market.

Finally, the results of the probit regressions on the *works* dichotomous variable are reported in Tables 6, 7, 8, and 9.

The most significant finding is that healthy individuals and Group III men are sensitive to income-leisure changes in making their work decisions (the coefficients on the Leisure / Income term are statistically significant). Group I and Group II disabled individuals and Group III women, however, are not sensitive to such changes. Additionally, self-reported health status is strongly associated with working in most cases. In regression after regression, the coefficient on health status comes up consistently as significant and large. This result indicates that the most severely disabled individuals work when health permits them to do so, while the partially disabled and healthy individuals work in order to receive income. The fact that the coefficients on health status are the largest for Group I individuals probably reflect a self-reporting measurement bias. For the most disabled individuals, the definition of good health may very well be linked to being able to carry out normal tasks, including work.

Other notable results are also evident. Observe that healthy men are almost 9% more likely to work than healthy women but, on the other hand, there are no significant gender effects in the disabled population. Marriage is positively associated with working for men, increasing their probability of working by almost 22%, though the causality here is unclear. While surely married men are under more pressure to work, working men may also be more likely to marry. On the other hand, divorce is positively associated with working for women. Clearly, in the average Russian household, the man continues to be the primary breadwinner. Also, the effect of children, where significant, appears to be negative for both genders, though it is more so for women than men. Unfortunately, the regression does not capture the age of children, which may have an important impact on the decisions of women. Since data on age are avialble in the NOBUS, this could be an area of further inquiry.

The probability of working is larger in large cities and declines as city size gets smaller. However, this effect is not necessarily true for disabled individuals. In the cities, a more competitive labor market may be forcing disabled individuals out of the formal sector. Additionally, the increased work opportunities available in cities may be offset by a larger social safety net, which discourages employment. Recall that the regression only contains federal disability benefits; some cities maintain a sizeable social services budget, paying out pensions on top of the federal benefits.

Finally, smoking appears to be negatively associated with working, especially for women, while the effect of alcohol is unclear. For healthy men, vodka consumption enters negatively while beer enters positively. This finding makes intuitive sense: beer, to a large extent, is a social beverage, often consumed with coworkers or friends. On the flip side, vodka is often consumed for the purpose of getting drunk. The fact that vodka enters positively for Group III individuals (in Table 9) may be picking up reverse causality: working disabled individuals may feel healthy enough to indulge in the occasional drink.

Figure 3 illustrates the gender-interacted age effects on the probability of working for the eight subsets of the population. Observe, in the upper-left-hand corner, that the probability of working for healthy men first increases, then attains a maximum around the age of 35, and then decreases after about the age of 50. The probability of working for healthy women almost duplicates this pattern, except at about five percentage points lower. At the margin, the probabilities grow at the same rate for men and women during the ages of 18 to 25, capturing workforce entry following completion of education. Then, the rate of change is lower for women than for men, capturing, undoubtedly, family dynamics. Female workforce participation then peaks around the age of 45 and declines thereafter.

The remaining three graphs illustrate the age effects on the probability of working for disabled individuals. The dynamics are similar except for Group II individuals, which show almost no age variation. Note that at its apex, the probability of working is about 50% for Group III men, about 40% for Group I men, and only about 15% for Group II men. This confirms the initial observation that it is Group II individuals that are most significantly work-impaired. As we will see below, diversity of medical conditions leading to disability is probably at play.

Figure 4 captures the effect of residency on the probability of working for 32 subsets of the population. Again, the healthy population is plotted in the upper-left-hand corner. Observe four sets – for residents of villages, urban-type towns (PGT), cities of 20,000 to 1 million inhabitants, and large cities of 1 million inhabitants and more – of two box plots each, one for men and one for women. The figure illustrates that the median probability of working for both healthy men and women increases going from village to large city. Additionally, the inter-quartile range of the predicted probabilities decreases going from village to large city. Thus, more individuals work in large cities and the probability of getting a job is higher.

The remaining three graphs in the figure illustrate the residency dynamics for the disabled population. The trend in general appears to be the same, though the increase in probability from village to large city is smaller, except, perhaps, for the Group III individuals. Two interesting dynamics, however, may be observed from this graph. First, observe that, in large cities, the probability of working for Group III men is significantly lower than for Group III women. Also, observe the skewness of the Group I distributions: the low median reflects that, on average, Group I individuals do not work but the large upward skewness reflects many individuals who do, in fact, find employment. These results demonstrate that, while Group I individuals may well be classified as "permanently disabled", many of them (e.g. the blind) can in fact maintain normal, productive lives. In fact, for some Group I individuals, the probability of working is comparable to their healthy counterparts. Absent detailed medical information, we cannot assert confidently who is and is not working, but we certainly see that Group II individuals as a whole are less likely to work, perhaps because Group II is more narrowly defined in terms of disabling conditions.

Finally, Figure 5 reflects the family status effects on the probability of employment. It is arranged in the same format already familiar to the reader. Here, perhaps the most striking feature is that the probability of employment more than doubles with marriage both for healthy men and women. At the same time, the disparities between male and female employment also almost double with marriage. Finally, divorced and widowed women are more likely to work than their male counterparts.

Turning our attention to the disabled section of the population, we observe a similar effect of marriage. The effects of divorce are even more pronounced for Group II and Group III individuals. Thus, as one implication for disability policy, married disabled individuals are more likely to work than their single counterparts (for both genders), while divorced disabled men are more likely to leave the labor force.

The regression results did not pick up significant regional differences, but some of the variation may be captured in the income term. Thus, Tables 10, 11 and 12 summarize the mean predicted probabilities of working for our eight groups (male/female, healthy and three disability groups, with Group I men and women merge to increase sample size) conditional on being a resident in one of 84 Federal subjects of the Russian Federation[7]. For the reader's convenience, the subjects are grouped by their Federal District. Within each district, subjects are arranged by type and then alphabetically (using the Latin alphabet). Additionally, GIS maps in Figure 6 plot the same spatial variation presented in the tables. These may be easier to follow for the reader familiar with Russian geography.

For the healthy population, the highest probabilities of employment are in Russia's two federal cities, Moscow and St Petersburg. The lowest are in the Ingush Republic (undoubtedly a reflection of the recent conflict in neighboring Chechnya) and the Tuva Republic along Russia's border with Mongolia. In fact, the probability of working for healthy individuals in Tuva is lower than the probability of working for Group III individuals in other parts of the country!

How vast are the differences in employment between Moscow and Tuva and are those differences statistically significant? Figure 7 contrasts the mean employment probabilities for four groups of healthy individuals: men in Moscow, women in Moscow, men in Tuva and women in Tuva. The probability of employment for men is 30 percentage points higher in Moscow than in Tuva, and significant at the 95% level. The same is true for women in Moscow and in Tuva. Interestingly, the difference in mean employment probabilities between Tuvan men and women is insignificant at the 95% level.

[7] Russia's complex federal system has changed repeatedly in recent years. The data here are presented for the federal system as of 2003. For statistical purposes, the autonomous okrugi have been included in their parent oblasti or krai, as the table indicates. Data for the Chechen Republic are unavailable. Additionally, probabilities could not be calculated for some groups in some areas because of small sample size. These are indicated as "N/A".

While the large dataset permits us to look closely at variation on the subject level for healthy individuals, the results for disabled individuals should be treated with caution, since the small sample size is much smaller. The most striking feature here is the diversity of employment probabilities for Group III men. The highest probabilities of employment seem to be grouped in the Ural regions of Sverdlovsk, Chelyabinsk, and Orenburg Oblasti and the Bashkir and Komi Republics. Group III male employment reaches its nadir again in Tuva. Finally, while in most instances probabilities for women are lower than probabilities for men, this is not the case for Group III individuals in highly urban areas. Observe, for example, that Group III females almost double their male counterparts in employment probability in Moscow and St Petersburg. At the same time, close to the opposite is true for almost all subjects of the highly rural Southern Federal District.

To summarize, we observed the following results in this section. Among healthy individuals, employment probabilities are higher for men than women. There are significant age variations for both sexes and the probabilities increase unambiguously as we move from villages into the cities. Marriage raises the employment probability for men but divorce – for women. Finally, there is significant regional variation, as presented by comparing Russia's richest region–Moscow–to one of its poorest–Tuva Republic.

Among the disabled, Group II individuals tend to be unemployed. Group I individuals are divided between those who do and do not seek employment. Group III individuals demonstrate many of the dynamics of the healthy population, except that Group III men tend to not work in urban areas. Finally, regional variations for disabled employment are even more pronounced than for the healthy population, with Group III individuals most likely to work in the middle-income Federal subjects.

Policy Implications

To assess the implications of this study for Russian disability policy, imagine the following thought experiment. Suppose that the Russian government cuts disability benefits exactly in half. What will be the corresponding change in the probability of employment for disabled individuals? The predicted change in probability of employment is reported in Table 13.

Observe that while the change in predicted probability of employment is statistically significant at any level, it is not of practical economic importance. For Group I men, the probability of employment increases by one-tenth of one percent. For Group III men, the probability actually decreases by almost one percent. Perhaps this reflects reduced employment opportunities for the disabled. Assuming disabled individuals have some reservation wage, they are more likely to work if they receive a disability pension as a wage subsidy. If that subsidy is removed, it may be more rewarding to leave the labor force and to engage in unreported economic activity such as self-employment or petty trade.

Figure 8 presents a more detailed, but preliminary, examination of the change in probability. (A more rigorous analysis would require additional regressions). Observe, in the top row, that individuals generally become less sensitive to changes in disability pensions with age. In the second row of the same figure, observe the effects of residency on the change in probability. As we move from the villages into the cities, where employment opportunities are more abundant, the sensitivity to a change in pensions generally declines, except for Group III men. Finally, the lower row of the figure plots the sex and family status interaction effects on the change in probability. Here, too, we observe the expected result: married men and divorced women in general have the smallest changes in their employment decisions. The most significant, and negative, change in probability is for Group III single men. These observations bolster the hypothesis that disability pensions act as a wage subsidy for Group III individuals since single men tend to be the most economically flexible group and since opportunities for informal economic activity are the highest in the cities.

Conclusion

In conclusion, labor supply decisions of Russia's disabled are primarily determined by factors exogenous to government policy: age, health, residency, and family status. While significant differences among Federal subjects exist, these are undoubtedly due to employment opportunities.

Government disability pension policy does not appear to discourage individuals from working, and the decision to continue paying a pension to employed individuals can only be lauded since it appears to actually promote employment for some groups. More efficient classification would make it easier for the government to allocate disability pension payments.

It seems evident that disability group determination in modern Russia is largely impractical. If under the Soviet system disability was inherently tied to reduced work capacity, the current government's decision to amend determination in order to encourage employment has actually resulted in an unplanned result: disabled individuals self-select in and out of the labor force regardless of disability group. We observed that Group II individuals tend to be unemployed. While many Group I individuals are also unemployed, for some the probability of employment is as high as for their healthy counterparts. While detailed medical data are not available (a limitation of this study), it is safe to say, as we have seen above, that some individuals classified as "permanently disabled" may in fact live normal, productive lives. It only makes sense to reclassify such individuals as having substantial work capacity.

Finally, we have seen that disabled employment is inherently tied to family dynamics, health status, and local prosperity. Higher economic prosperity, which has bloomed in cities and the richer regions of the country, means improved healthcare services, and a more diversified labor market both in the type of work and number of jobs. All of this, at the end of the day, translates to rehabilitation for the disabled population. Previous literature had concluded that disability was largely tied to the economic slump, which started in the late 1980s and proceeded into the 1990s. This paper asserts that rehabilitation will be inherently tied to an economic boom. Thus, the Federal and regional governments ought to cooperate in promoting more employment opportunities for the disabled, providing greater access to healthcare, and expanding current family stimulus programs. These policies will encourage disabled individuals, especially men, to return to the labor force when health allows them to do so. At the same time, it will allow the government to focus its budget on those disabled individuals most in need of monetary assistance.

Table 4: Regression to predict weekly wage hours.

Tobit estimation results: log of weekly work hours.			
	Entire Sample	Male	Female
Constant	3.603 ***	3.529 ***	3.701 ***
Male	0.0652 ***		
Age	0.00009	-0.00102	-0.00055
Age Squared	-0.000007	0.000001	0.000004
EDPrimary	0.0796	0.251	-0.0203
EDMiddle	0.104	0.280	-0.00623
EDHSchool	0.0918	0.261	-0.00619
EDPtuFzu	0.0923	0.265	-0.00978
EDProf	0.0914	0.270	-0.0154
EDSomeCollege	0.0585	0.243	-0.0527 **
EDCollegeGrad	0.0705	0.255	-0.0433 ***
EDPostGrad	0.112	0.341	-0.0969
LargeCity	0.00270	-0.0264 **	0.0547 ***
City	0.0127 *	-0.0298 ***	0.0326 ***
PGT	-0.00250	-0.0365 ***	0.0311 ***
FedSubject	0.000121	0.000155	0.000097
LogOtherIncome	0.00039	-0.00035	0.00271
Married	-0.00735	0.0164 *	-0.0310 ***
Divorced	0.00541 *	0.0123	-0.00819
Widowed	0.00012	-0.0161	-0.0128
NumKids	0.00431	0.00976 **	-0.00225
Mill	-0.0712 *	-0.0643	-0.0832 **
Group I	-0.0284	-0.0176	-0.0485
Group II	-0.0211	-0.0142	-0.0600
Group III	-0.0534 *	-0.0472	-0.0619
Num. obs.	40765	20107	20658
Subpop Size	51.9 Million	25.7 Million	26.2 Million
F on 24 and 4511 df	23.07 ***	6.04 ***	7.17 ***
σ	0.238 ***	0.228 ***	0.245 ***
Censoring values: log(1) = 0 and log(168) = 5.12			
Significance codes: *** = 1%, ** = 5%, * = 10%			

Table 5: Regressions to predict hourly wages.

Dependent variable: log of hourly wage.						
	OLS Results			2SLS Results		
	Entire Sample	Male	Female	Entire Sample	Male	Female
Constant	-12.21 ***	-6.982	-18.25 ***			-103.2 ***
Male	0.0511			0.273 ***		
Age	-0.0163	0.0258 **	-0.0197	-0.0101	-0.0321	0.185 ***
Age Squared	-0.00022 *	0.00032 **	0.00012	-0.000652	0.00217	-0.00062 ***
EDPrimary	-0.528 ***	-0.198	-0.818 ***	-0.252	0.0605	0.0365
EDMiddle	-0.645 ***	-0.321	-0.947 ***	-0.284	-0.154	-0.412 ***
EDHSchool	-0.477 **	-0.157	-0.801 ***	-0.157	-0.0169	-0.298 ***
EDPtuFzu	-0.397 **	-0.0782	-0.724 ***	-0.0755	0.0580	-0.128
EDProf	-0.336 **	-0.0289	-0.647 ***	-0.0173	0.104	-0.112
EDSomeCollege	-0.117	-0.0472	-0.294 **	0.0887	0.128	1.285 ***
EDCollegeGrad	-0.0508	-0.177	-0.282 **	0.196	0.269	1.111 ***
EDPostGrad	0.00152	0.258	-0.247	0.465	0.418	2.813 ***
LargeCity	0.410 ***	0.521 ***	0.277 ***	0.474 ***	0.553 ***	-1.189 ***
City	0.265 ***	0.393 ***	0.122 ***	0.280 ***	0.401 **	-0.768 ***
PGT	0.189 ***	0.307 ***	0.0563 *	0.185 ***	0.314	0.755 ***
FedSubject	-0.00083 ***	-0.00089 **	-0.00041 **	-0.00066	-0.00062	-0.00259 ***
LogFoodPerPerson	0.376 ***	0.386 ***	0.362 ***	0.390 ***	0.393 ***	0.347 ***
LogWorkHoursWeek (imputed)	3.552	2.127	5.317 ***	0.132 **	0.265 ***	27.18 ***
Mill	-0.153	-0.421 ***	0.0490	-0.361 ***	-0.592 ***	2.479 ***
Group I	0.163	0.155	0.317	0.0430	0.132	1.106 ***
Group II	0.243	0.450 ***	0.143	0.132	0.446 **	0.956 ***
Group III	0.0108	-0.0512	0.150	-0.183	-0.136	1.257 ***
Num obs	39750	19506	20244	39749	19506	20243
F on 21 and 4504 df	198.19 ***	134.50 ***	124.89 ***	227.26 ***	115.76 ***	125.56 ***
R^2	0.34	0.35	0.31	0.34	0.35	0.27
Significance codes: *** = 1%, ** = 5%, * = 10%						

Table 6: Probability of working for working-age healthy individuals.

Marginal effects after probit: works = 1 if respondent works				
	Entire Sample	Not Disabled		
		Entire Sample	Male	Female
Income / Leisure	0.0144 ***	0.0110 ***	0.0108 ***	0.0105 ***
Log Assets	0.0217 ***	0.0199 ***	0.0234 ***	0.0156 ***
Male	0.0799 ***	0.0878 ***		
Age	0.0946 ***	0.0994 ***	0.0818 ***	0.119 ***
Age Squared	-0.00114 ***	-0.00120 ***	-0.00101 ***	-0.00146 ***
Married	0.104 ***	0.0849 ***	0.218 ***	-0.0150
Divorced	0.0941 ***	0.0807 ***	0.0174	0.0898 ***
Widowed	0.130 ***	0.109 ***	0.101 ***	0.0621 **
NumKids	-0.0433 ***	-0.0509 ***	-0.0356 ***	-0.0822 ***
LargeCity	0.107 ***	0.109 ***	0.105 ***	0.106 ***
City	0.0711 ***	0.0710 ***	0.0571 ***	0.0766 ***
PGT	0.0641 ***	0.0609 ***	0.0373 **	0.0784 ***
FedSubject	0.00017	0.00016	0.00005	0.00030 *
HealthGood	0.249 ***	0.177 ***	0.188 ***	0.152 ***
YearsSmoked	-0.00139 ***	-0.00136 ***	-0.00074 *	-0.00388 ***
Vodka	-0.0138 ***	-0.0211 ***	-0.0257 ***	0.00845
Wine	0.00787	0.00488	-0.00563	0.0292 ***
Beer	0.0250 ***	0.0248 ***	0.0311 ***	0.0116 **
Num. obs.	61134	58342	27763	30579
Subpop size	75.2 Million	72.1 Million	34.3 Million	37.7 Million
F on 18 and 4548 df	336.60 ***	320.14 ***	207.42 ***	180.46 ***
Significance codes: *** = 1%, ** = 5%, * = 10%				

Table 7: Probability of working for working-age permanently disabled individuals.

Marginal effects after probit: works = 1 if respondent works				
	Entire Sample	Group I Disabled		
		Entire Sample	Male	Female
Income / Leisure	0.0144 ***	0.00082	0.00123	0.00300
Log Assets	0.0217 ***	0.0360	0.0948 *	-0.0186
Male	0.0799 ***	-0.0463		
Age	0.0946 ***	0.0670 ***	0.0769 ***	0.339
Age Squared	-0.00114 ***	-0.00097 ***	-0.00107 ***	-0.00053
Married	0.104 ***	0.259 **	0.269 *	0.352 **
Divorced	0.0941 ***	0.216 *	0.331 **	0.216
Widowed	0.130 ***	0.213	0.0792	0.329 **
NumKids	-0.0433 ***	0.0510	0.107	-0.0429
LargeCity	0.107 ***	0.199 *	-0.0168	0.438 ***
City	0.0711 ***	0.158 **	-0.00165	0.486 ***
PGT	0.0641 ***	0.299 **	0.286 *	0.297 **
FedSubject	0.00017	0.00003	0.00071	0.00089
HealthGood	0.249 ***	0.380 ***	0.352 ***	0.529 ***
YearsSmoked	-0.00139 ***	-0.00335	-0.00198	-0.00274
Vodka	-0.0138 ***	-0.0822	0.0698	0.220
Wine	0.00787	0.0660	0.0579	0.146
Beer	0.0250 ***	-0.0313	-0.0237	-0.116
Num. obs.	61134	413	247	166
Subpop size	75.2 Million	0.5 Million	0.3 Million	0.2 Million
F on 18 and 4548 df	336.60 ***	4.43 ***	3.40 ***	3.09 ***
Significance codes: *** = 1%, ** = 5%, * = 10%				

Table 8: Probability of working for working-age severely disabled individuals.

Marginal effects after probit: works = 1 if respondent works				
	Entire Sample	Group II Disabled		
		Entire Sample	Male	Female
Income / Leisure	0.0144 ***	0.00153	-0.00051	0.00191
Log Assets	0.0217 ***	0.00874	0.00023	0.00293
Male	0.0799 ***	0.0311		
Age	0.0946 ***	0.00733	0.00637	0.00387
Age Squared	-0.00114 ***	-0.00008	-0.00012	-0.000012
Married	0.104 ***	0.0988	0.215 ***	-0.0224
Divorced	0.0941 ***	0.162	0.0462	0.170
Widowed	0.130 ***	0.0713	0.278	-0.0304
NumKids	-0.0433 ***	0.0613 **	0.0746 **	-0.0238
LargeCity	0.107 ***	0.191 **	0.280 ***	0.119
City	0.0711 ***	0.101 **	0.0749	0.147 **
PGT	0.0641 ***	0.0984	0.122	0.0720
FedSubject	0.00017	-0.00061	-0.00144	0.00007
HealthGood	0.249 ***	0.143 ***	0.185 ***	0.0768 *
YearsSmoked	-0.00139 ***	-0.00281 *	-0.00187	-0.00613
Vodka	-0.0138 ***	-0.0266	-0.0564 **	0.0405
Wine	0.00787	0.0749 **	0.0879 ***	0.0870
Beer	0.0250 ***	0.0108	0.0318	-0.0138
Num. obs.	61134	1533	857	676
Subpop size	75.2 Million	1.7 Million	0.9 Million	0.8 Million
F on 18 and 4548 df	336.60 ***	3.80 ***	4.00 ***	2.64 ***
Significance codes: *** = 1%, ** = 5%, * = 10%				

Table 9: Probability of working for working-age partially disabled individuals.

Marginal effects after probit: works = 1 if respondent works				
	Entire Sample	Group III Disabled		
		Entire Sample	Male	Female
Income / Leisure	0.0144 ***	-0.00468	-0.00782 **	-0.00128
Log Assets	0.0217 ***	0.0680 **	0.0825 ***	0.0745 *
Male	0.0799 ***	0.0834		
Age	0.0946 ***	0.0242	0.0307	0.302
Age Squared	-0.00114 ***	-0.00030	-0.00041	-0.00038
Married	0.104 ***	0.140	0.136	0.192
Divorced	0.0941 ***	0.135	-0.0749	0.318 ***
Widowed	0.130 ***	0.318 ***	0.165	0.449 ***
NumKids	-0.0433 ***	0.0393	-0.00055	0.0463
LargeCity	0.107 ***	0.315 ***	0.169	0.537 ***
City	0.0711 ***	0.231 ***	0.192 ***	0.290 ***
PGT	0.0641 ***	0.272 ***	0.222 **	0.361 **
FedSubject	0.00017	0.00127	0.00161	0.00098
HealthGood	0.249 ***	0.148 ***	0.151 **	0.114
YearsSmoked	-0.00139 ***	-0.00423 *	-0.00249	-0.0136 ***
Vodka	-0.0138 ***	0.0857 ***	0.0845 ***	0.176 **
Wine	0.00787	-0.0450	-0.0913 **	0.188 **
Beer	0.0250 ***	-0.0242	-0.0128	-0.137 **
Num. obs.	61134	846	493	353
Subpop size	75.2 Million	1.0 Million	0.5 Million	0.4 Million
F on 18 and 4548 df	336.60 ***	3.80 ***	2.81 ***	3.90 ***
Significance codes: *** = 1%, ** = 5%, * = 10%				

Figure 3: Effect of age on predicted probability of employment.

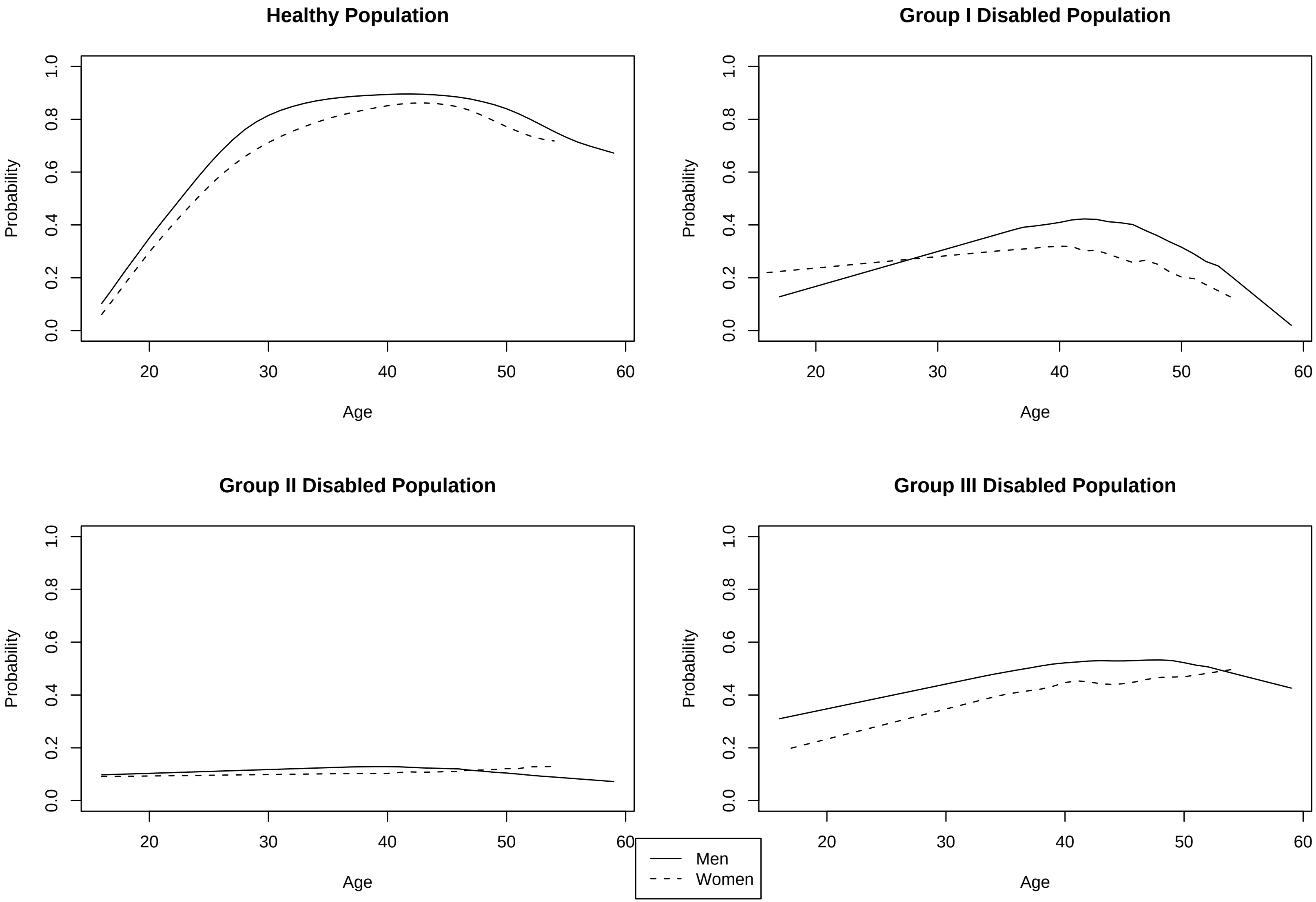


Figure 4: Effect of residency on predicted probability of employment.

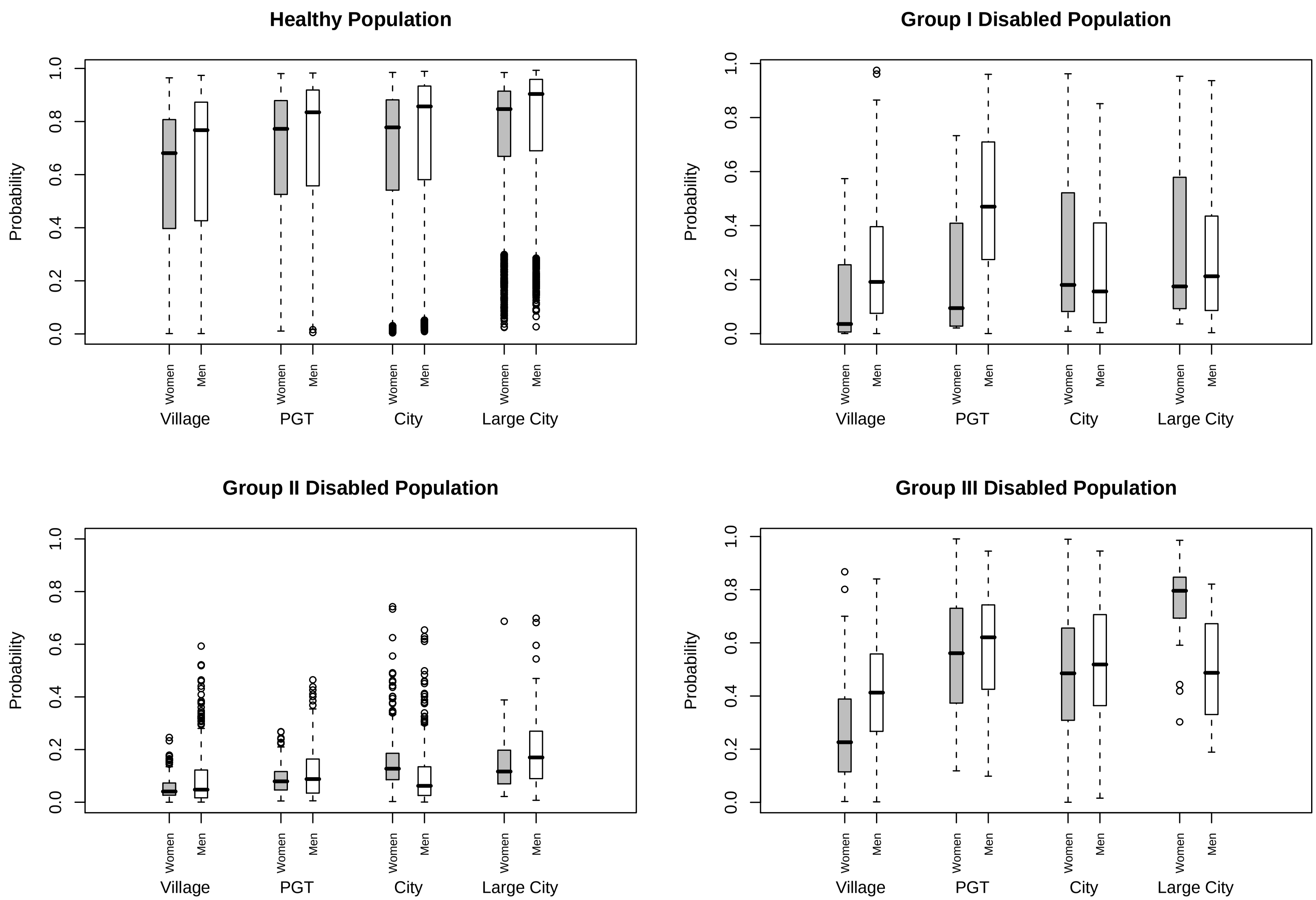


Figure 5: Effect of family status on predicted probability of employment.

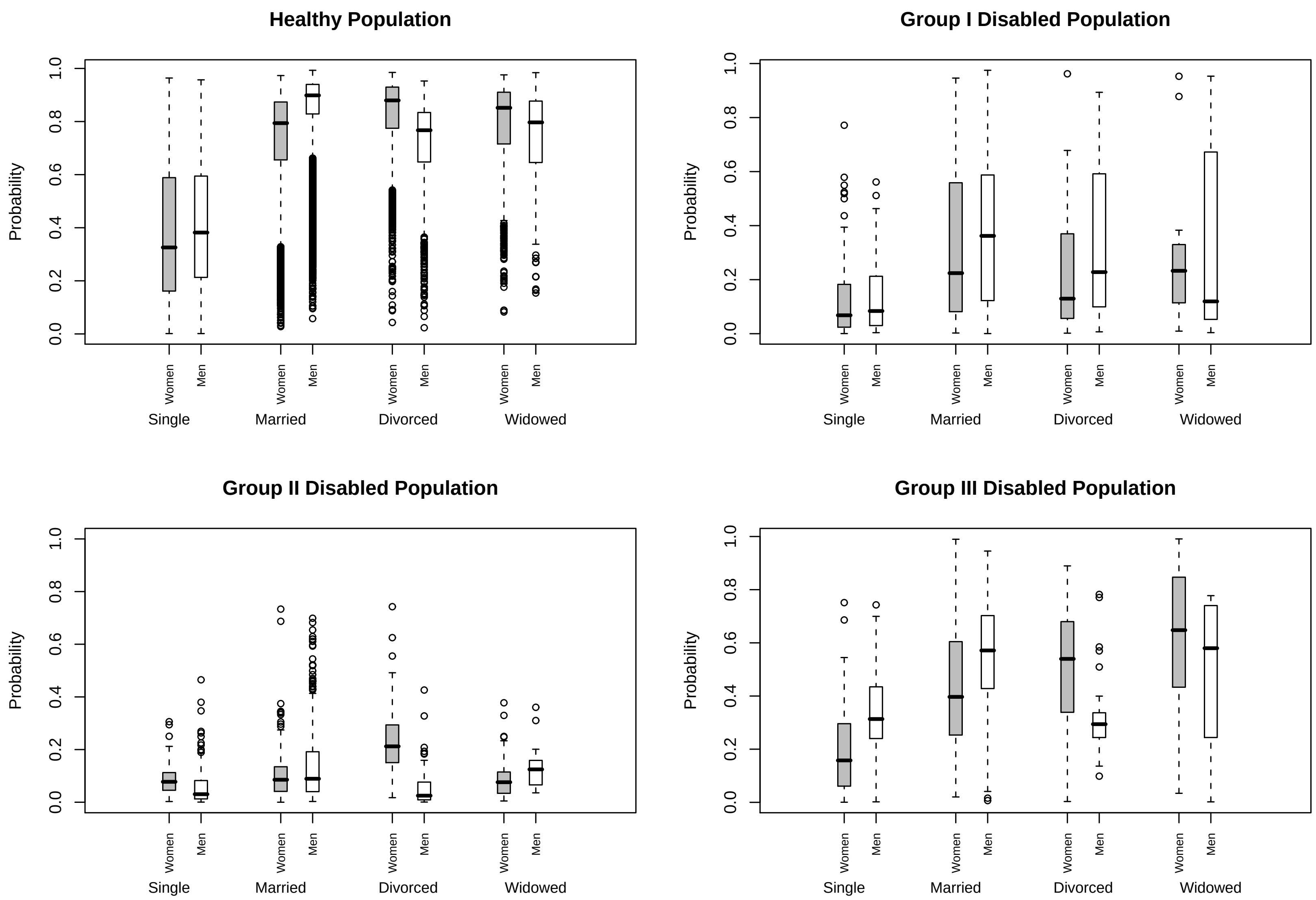


Table 10: Mean predicted probability of working by subject of the Russian Federation.

	Healthy		Group I	Group II		Group III	
	Men	Women		Men	Women	Men	Women
Central Federal District							
Moscow City	0.839	0.791	N/A	0.117	0.083	0.401	0.778
Belgorod Oblast	0.761	0.661	0.100	0.037	0.151	0.566	0.226
Bryansk Oblast	0.706	0.646	0.246	0.086	0.079	0.402	0.357
Ivanovo Oblast	0.729	0.682	0.223	0.102	0.100	0.445	0.382
Kaluga Oblast	0.748	0.712	0.017	0.071	0.047	0.492	0.609
Kostroma Oblast	0.720	0.672	0.155	0.070	0.115	0.396	0.453
Kursk Oblast	0.717	0.692	N/A	0.229	0.125	0.288	0.486
Lipetsk Oblast	0.726	0.685	0.066	0.099	0.155	0.497	0.390
Moscow Oblast	0.751	0.696	0.092	0.138	0.067	0.550	0.806
Orel Oblast	0.699	0.682	0.577	0.070	0.174	0.424	0.422
Ryazan Oblast	0.748	0.728	0.230	0.040	0.137	N/A	N/A
Smolensk Oblast	0.737	0.653	N/A	0.017	0.025	0.599	0.277
Tambov Oblast	0.695	0.645	0.195	0.085	0.099	0.468	0.383
Tver Oblast	0.728	0.677	0.140	0.070	0.095	0.390	0.347
Tula Oblast	0.769	0.706	N/A	0.157	0.093	N/A	0.552
Vladimir Oblast	0.775	0.693	N/A	0.134	0.093	0.301	N/A
Voronezh Oblast	0.711	0.671	0.099	0.129	0.099	0.325	0.455
Yaroslavl Oblast	0.738	0.679	0.280	0.080	0.189	0.605	0.506
Southern Federal District							
Krasnodar Krai	0.723	0.654	0.304	0.082	0.105	0.282	0.277
Stavropol Krai	0.688	0.648	0.126	0.041	0.057	0.747	0.570
Adyg Republic	0.692	0.653	0.402	0.073	0.094	0.306	0.289
Dagestan Republic	0.610	0.584	0.441	0.130	0.088	0.425	0.387
Ingush Republic	0.536	0.508	0.096	0.119	N/A	N/A	0.170
Kabardino-Balkar Rep.	0.656	0.608	0.347	0.071	0.139	0.538	0.331
Kalmyk Republic	0.656	0.574	0.159	0.077	N/A	0.398	0.384
Karachay-Cherkess Rep.	0.590	0.649	0.076	0.114	0.085	0.585	0.153
North Ossetin Rep.	0.707	0.683	0.403	0.067	0.127	N/A	N/A
Astrakhan Oblast	0.688	0.650	0.223	0.157	0.067	0.445	0.229
Rostov Oblast	0.699	0.661	0.350	0.120	0.116	0.525	0.345
Volgograd Oblast	0.717	0.676	0.083	0.067	0.086	0.499	0.626

Table 11: Mean predicted probability of working by subject of the Russian Federation.

	Healthy		Group I	Group II		Group III	
	Men	Women		Men	Women	Men	Women
Northwestern Federal District							
St Petersburg	0.814	0.788	0.426	0.301	0.144	0.362	0.718
Karelia Republic	0.754	0.695	N/A	0.089	0.140	N/A	0.737
Komi Republic	0.682	0.647	0.276	0.107	0.147	0.638	0.703
Arkhangelsk Oblast[a]	0.701	0.638	0.282	0.123	0.102	0.509	0.357
Kaliningrad Oblast	0.703	0.708	N/A	N/A	N/A	0.463	N/A
Leningrad Oblast	0.732	0.673	0.569	0.121	0.061	N/A	0.557
Murmansk Oblast	0.726	0.679	0.222	0.077	0.112	0.524	0.470
Novgorod Oblast	0.711	0.673	0.352	0.141	0.140	0.375	0.390
Pskov Oblast	0.702	0.669	0.273	0.101	0.105	0.557	0.343
Vologda Oblast	0.691	0.635	N/A	0.042	0.050	N/A	N/A
Far Eastern Federal District							
Khabarovsk Krai	0.723	0.661	0.328	0.137	0.090	0.523	0.189
Primorskiy Krai	0.710	0.647	0.408	0.118	0.107	0.433	0.457
Saha (Yakutia) Rep.	0.652	0.614	0.359	0.147	0.067	0.524	0.446
Amur Oblast	0.719	0.636	0.136	0.140	0.078	0.435	0.215
Kamchatka Oblast[b]	0.732	0.653	0.066	0.034	0.107	0.526	0.087
Magadan Oblast	0.700	0.639	N/A	0.005	0.184	N/A	N/A
Sakhalin Oblast	0.711	0.655	0.188	0.144	0.107	0.338	0.376
Chukotka AO	0.700	0.615	N/A	0.048	N/A	N/A	N/A
Jewish AO	0.637	0.558	0.146	0.030	N/A	N/A	0.637

[a]Includes Nenets Autonomous Okrug.
[b]Includes Koryak Autonomous Okrug.

Table 12: Mean predicted probability of working by subject of the Russian Federation.

	Healthy		Group I	Group II		Group III	
	Men	Women		Men	Women	Men	Women
Siberian Federal District							
Altai Krai	0.712	0.616	0.088	0.146	0.053	N/A	N/A
Krasnoyarsk Krai[a]	0.704	0.664	0.200	0.124	0.120	0.455	0.361
Altai Republic	0.617	0.661	0.078	0.017	0.042	0.320	0.217
Buryat Republic	0.688	0.621	0.274	0.077	0.092	0.462	0.563
Khakassiya Republic	0.662	0.644	N/A	0.106	0.062	N/A	N/A
Tyva Republic	0.578	0.505	N/A	0.158	0.093	0.158	0.349
Chita Oblast[b]	0.664	0.611	0.239	0.094	0.100	0.468	0.362
Irkutsk Oblast[c]	0.719	0.664	0.404	0.194	0.042	0.570	N/A
Kemerovo Oblast	0.698	0.678	0.299	0.087	0.128	0.382	0.426
Novosibirsk Oblast	0.750	0.677	0.307	0.142	0.161	0.505	0.631
Omsk Oblast	0.703	0.674	0.360	0.148	0.124	0.552	0.526
Tomsk Oblast	0.736	0.682	N/A	0.030	0.165	N/A	N/A
Urals Federal District							
Kurgan Oblast	0.706	0.664	0.434	0.153	0.159	0.428	0.392
Sverdlovsk Oblast	0.751	0.689	0.299	0.094	0.150	0.702	0.506
Tyumen Oblast[d]	0.747	0.664	0.219	0.122	0.106	0.488	0.531
Chelyabinsk Oblast	0.752	0.675	0.216	0.071	0.157	0.699	0.462
Volga Federal District							
Bashkir Republic	0.728	0.665	0.198	0.079	0.063	0.692	0.585
Chuvash Republic	0.727	0.694	N/A	0.053	0.106	0.664	0.555
Mari El Republic	0.690	0.647	0.277	0.047	0.064	0.338	N/A
Mordva Republic	0.712	0.685	0.230	0.082	0.110	0.617	0.487
Tatar Republic	0.716	0.666	0.182	0.130	0.156	0.643	0.664
Udmurt Republic	0.711	0.675	0.242	0.048	0.095	0.489	0.367
Kirov Oblast	0.712	0.671	0.338	0.147	0.214	0.517	0.440
Nizhniy Novgorod Obl.	0.734	0.693	0.297	0.125	0.152	0.364	0.534
Orenburg Oblast	0.682	0.647	0.745	N/A	0.327	N/A	0.317
Penza Oblast	0.694	0.622	N/A	0.101	0.095	0.632	0.382
Perm Oblast[e]	0.699	0.682	N/A	0.399	0.201	0.518	0.619
Samara Oblast	0.753	0.718	0.324	0.172	0.123	0.465	0.591
Saratov Oblast	0.705	0.646	N/A	0.055	0.056	N/A	0.644
Ulianovsk Obl.	0.688	0.674	0.160	0.041	0.091	0.582	0.667

[a]Includes Taimyr (Dolgano-Nenets) and Evenki Autonomous Okrugi.
[b]Includes Agin-Buryat Autonomous Okrug.
[c]Includes Ust-Orda Buryat Autnomous Okrug.
[d]Includes Yamal-Nenets and Khanty-Mansi Autonomous Okrugi.
[e]Now Perm Krai, includes Komi-Permyak Autonomous Okrug.

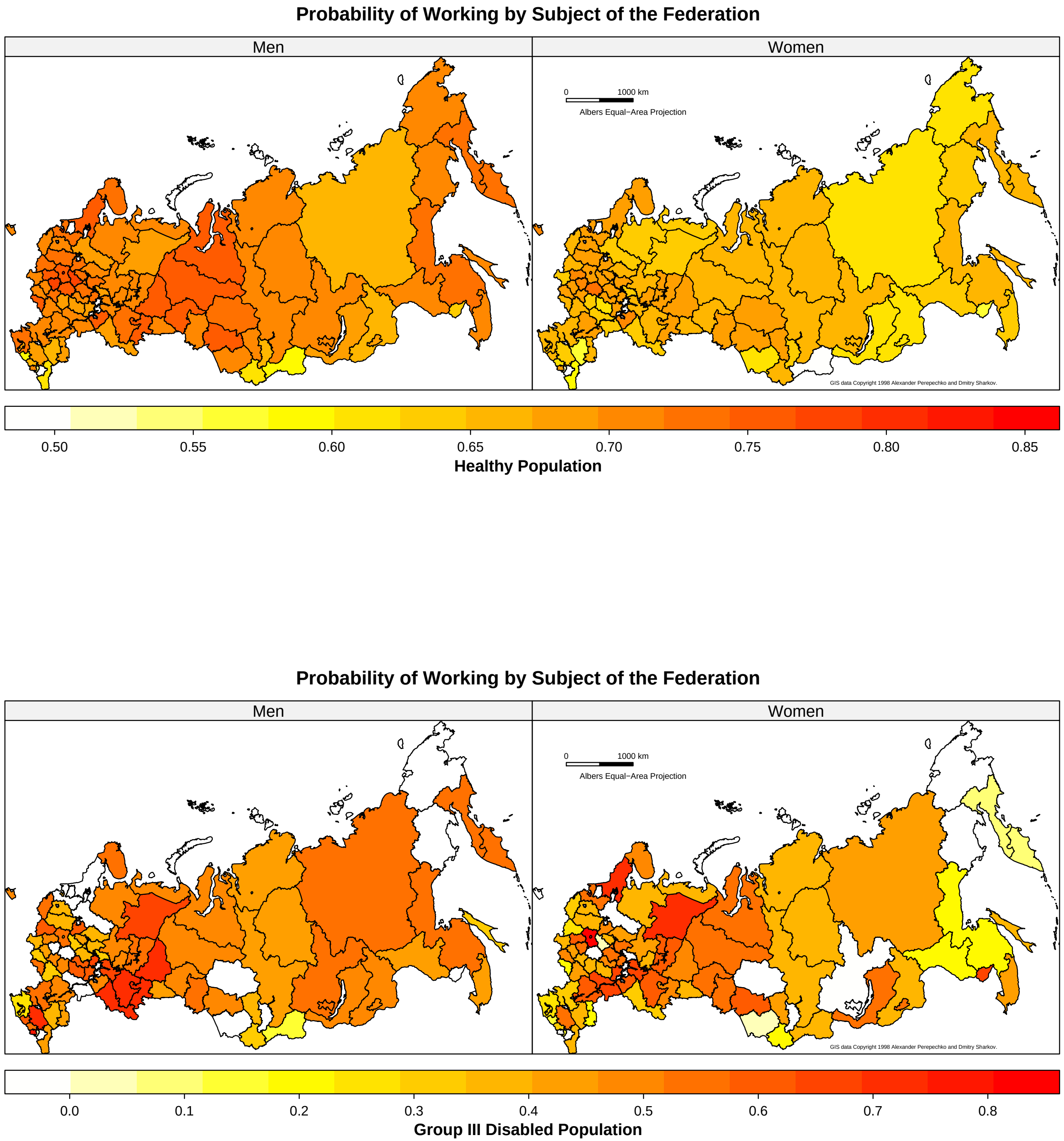


Figure 6: Predicted probability of working for the working-age population

Figure 7: Mean-Mean Comparison of predicted probability of employment for healthy individuals.

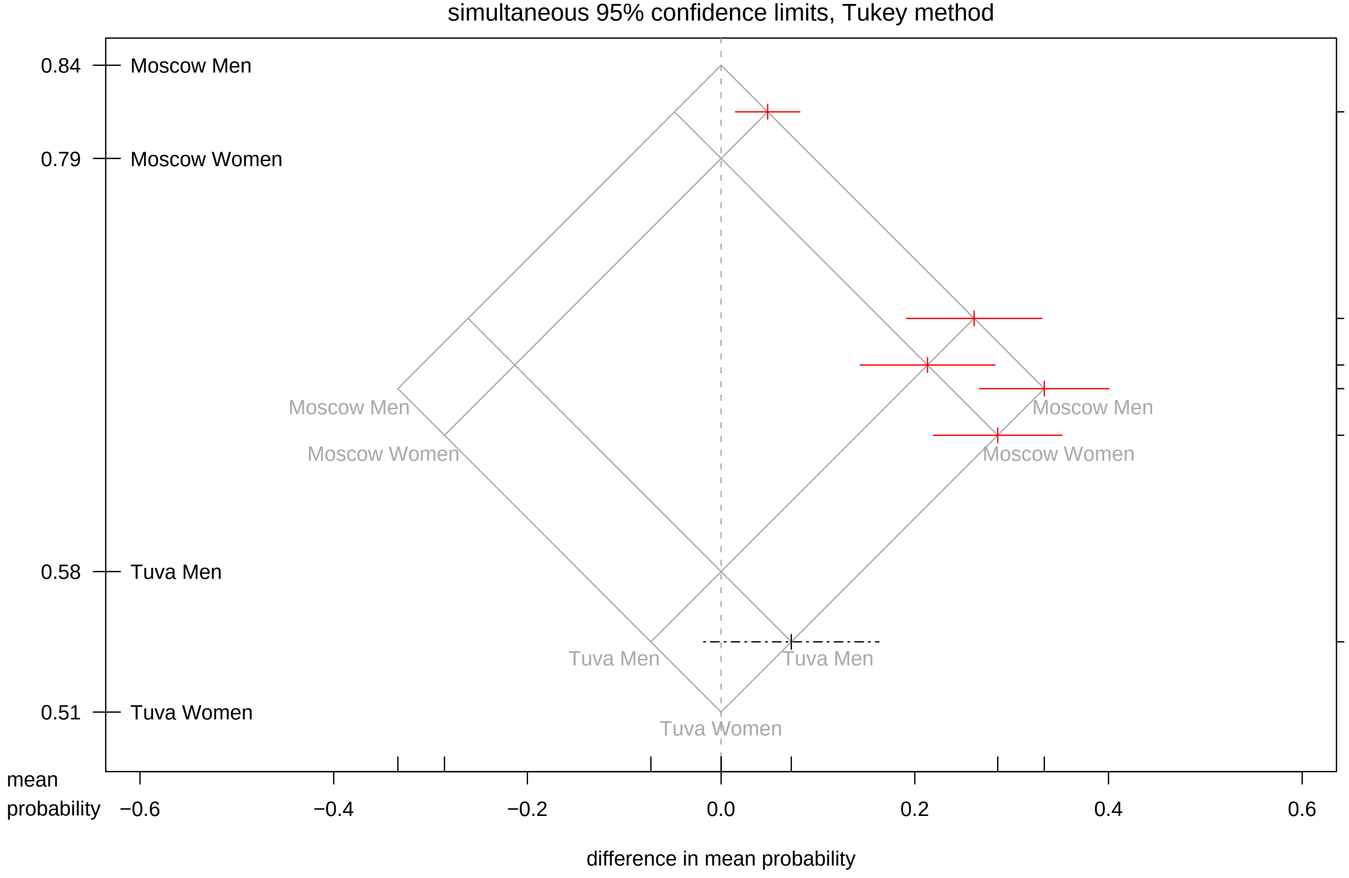
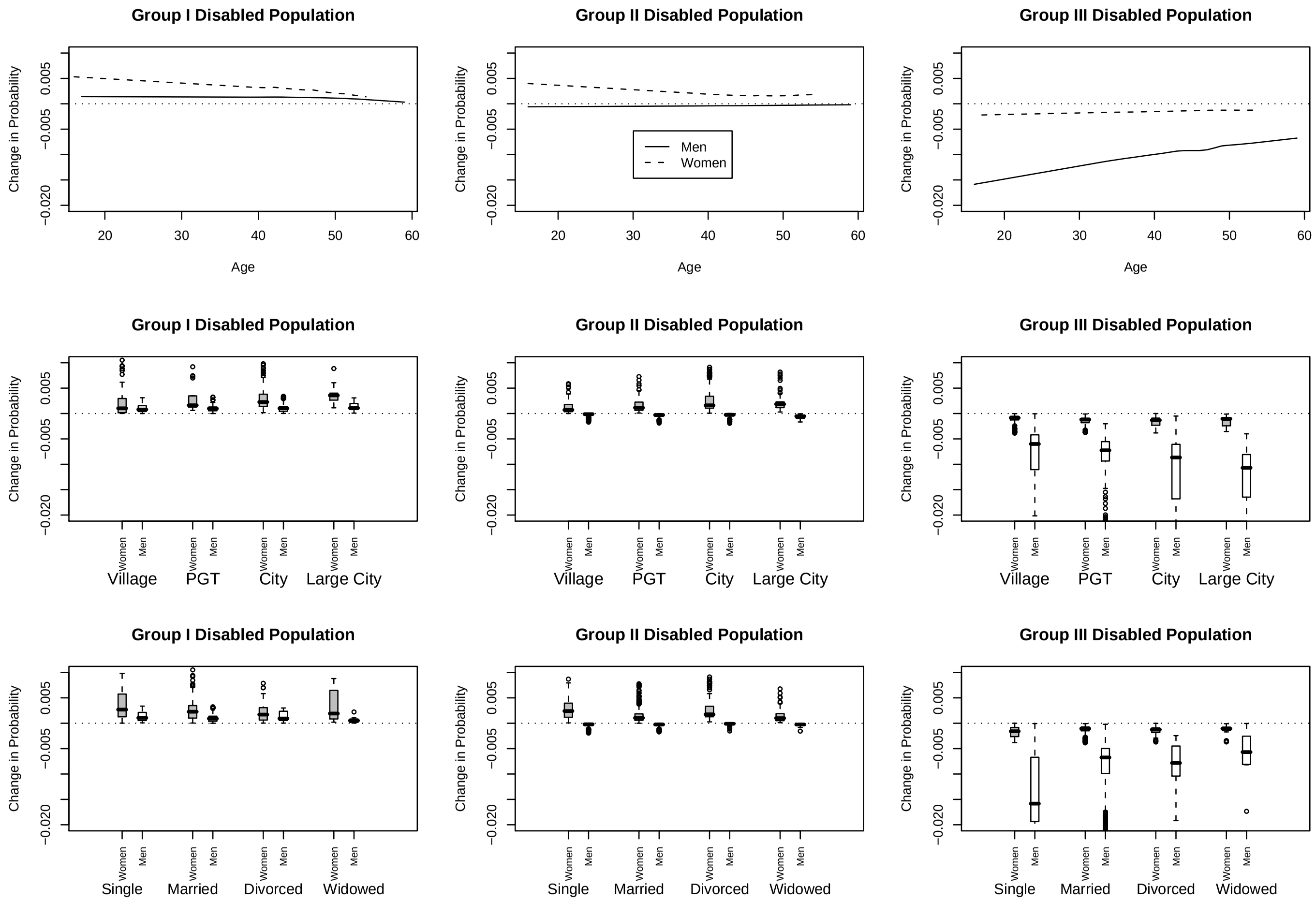


Table 13: Mean change in employment probability given a 50% cut in disability benefits.

	Men	Women
Group I	0.0011 ***	0.0030 ***
Group II	-0.0003 ***	0.0019 ***
Group III	-0.0096 ***	-0.0015 ***
Significance codes: *** = 1%, ** = 5%, * = 10%		

Figure 8: Change in employment probability given a 50% cut in disability benefits.



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Appendix

Initial-stage Regression Results

Table 14 reports the initial-stage regression results used to compute the Mills' ratios for the selectivity bias correction procedure.

Table 14: Initial stage regressions used to correct for selectivity bias.

Probit estimation. Dependent variable: works.			
	Entire Sample	Male	Female
Constant	-6.826 ***	-6.246 ***	-7.301 ***
Male	0.272 ***		
Age	0.319 ***	0.285 ***	0.367 ***
Age Squared	-0.00390 ***	-0.00353 ***	-0.00453 ***
LargeCity	0.483 ***	0.542 ***	0.404 ***
City	0.309 ***	0.312 ***	0.272 ***
PGT	0.269 ***	0.239 ***	0.273 ***
FedSubject	0.00014	-0.00003	0.00037
Married	0.238 ***	0.631 ***	-0.0921 **
Divorced	0.288 ***	0.137 **	0.273 ***
Widowed	0.286 ***	0.408 ***	0.0923
NumKids	-0.149 ***	-0.105 ***	-0.227 ***
Log Assets	0.0645 ***	0.0711 ***	0.0551 ***
HealthGood	0.502 ***	0.564 ***	0.424 ***
Years Smoked	-0.00433 ***	-0.00345 ***	-0.00907 ***
Vodka	-0.0691 ***	-0.0783 ***	-0.00923
Wine	0.0263 **	-0.0121	0.0873 ***
Beer	0.0700 ***	0.100 ***	0.0279 **
Group I	-1.182 ***	-1.178 ***	-1.135 ***
Group II	-1.848 ***	-1.825 ***	-1.869 ***
Group III	-0.669 ***	-0.631 ***	-0.716 ***
Num. obs.	69611	33546	36065
Subpop size	85.4 Million	41.1 Million	44.2 Million
F on 20 and 4561 df	319.18 ***	209.89 ***	187.74
Significance codes: *** = 1%, ** = 5%, * = 10%			

Survey Stratification Specifications

The NOBUS is a stratified survey design. In regressions and other analyses, STATA's survey commands were used to properly weigh observations. The full specification of the survey design is indicated in the NOBUS documentation files, available online. The following command was used to set up survey functionality in STATA:

```
svyset psu [pweight = kvzv], strata( strata )
```

Here, `psu` identifies the primary sampling units, `strata` specifies the survey design strata and `kvzv` contains the probability weights for the individual observations.

Technical Comments

Due to certain liminations in the data, several assumptions had to be made, and certain quantities had to be backed out. The following describes in detail the procedures used.

The NOBUS reports the weekly work hours but records the monthly salary. To convert from monthly salary to weekly salary, the following formula was used:

$$wageweek = wagemon * 12 * \frac{7}{365.25} \tag{9}$$

The hourly wage was then obtained by dividing the weekly wage by the weekly work hours.

The NOBUS reports salary income only for individuals working for a company or for an individual (responses 1 and 2 to question Ve5). Salary is not reported for those responding 3 (Owner of an enterprise), 4 (Entrepreneur), 5 (Farmer), 6 (Self-employed) and 7 (Member of a production cooperative). Weekly salary values for these individuals, however, could be backed out based on household data. First, the household income values were considered (question 5 of section 5). For households that responded -7 (difficult to answer) or -8 (refuse to answer), values for question

5 were assumed from responses to question 6, if available. The categorical values of question 6 were changed to quantitative responses as follows: for households responding 1 (below 500 rubles), the value 250 rubles was assumed; for households responding 14 (above 50,000 rubles), the value 60,000 rubles was assumed; for households responding in any other group between x and y rubles, the value $\frac{x+y}{2}$ was assumed. This variable was called *incmon* (monthly [self-reported household] income).

Once *incmon* was known, the incomes of all members of a household, converted to monthly values, were summed. Total individual income was defined as the sum of individual wage (question Ve 13), labor pension income (question Ge 4), state pension income (question Ge 11), social pension income (question Ge 16), private pension income (question Ge 21), radiation exposure benefits (question De 4), child support benefits (questions De 8, De 12, and De 16), and pregnancy and maternity benefits (questions De 19 and De 20). This value was called *totalincmon* (total monthly [implicit individual] income). The total monthly implicit household income was then generated using the STATA command:

```
by idhh, sort: egen totalincmonHH = sum(totalincmon)
```

where *totalincmonHH* is the implicit total monthly household income and *idhh* is a unique household identifier. The unrecorded individual salary was then assumed to be $wagemon = incmon - (totalincmonHH - totalincmon)$.[8]

The dichotomous variable `workingage` was defined as one for males aged 17 to 60, inclusive, as one for females aged 17 to 55, inclusive, and as zero otherwise.

Regression Specifications

The work hours regression was run using the command:

```
svy, subpop(workingage): tobit logworkhoursweek male age
```

[8] In theory, if more than one member of a household had unrecorded salary income, this calculation would not be accurate. In practice, this did not turn out to be a problem.

```
agesq edprimary edmiddle edhschool edptufzu edprof edsomecollege
edcollegegrad edpostgrad largecity city PGT a001ter
logotherincome married divorced widowed numkids
 mill group1 group2 group3, ll(0) ul(5.12)
```

Here, $\log 1 = 0$ and $\log 24 * 7 = \log 168 = 5.12$. The work hours could then be imputed using the command:

`predict implogworkhoursweek if workingage`.

The wage regression was run using the command:

```
 svy, subpop(workingage): ivregress 2sls logwage male age
 agesq edprimary edmiddle edhschool edptufzu edprof edsomecollege
 edcollegegrad edpostgrad largecity city PGT a001ter
 logfoodperperson mill group1 group2 group3
 (implogworkhoursweek = a6j22)
```

The wages for the entire sample were then imputed using the command:

`predict implogwage if workingage`

The measure of leisure-income opportunity $\zeta = \frac{\log Y_i^{work} - \log Y_i^{retire}}{\log l^{retire} - \log l_i^{work}}$ was generated from the imputed values using the command:

```
gen zeta = (log(exp(implogwage) * exp(implogworkhoursweek) + laborpensionmon)
 - log(laborpensionmon)) / (log(168) - log(168 - exp(implogworkhoursweek)))
 if workingage
```

Here, the amount of disability pension `laborpensionmon` was defined as the total monthly labor pension plus one ruble for disabled individuals and as one ruble for non-disabled individuals. Finally, the probit regression was run using the command:

```
svy, subpop(workingage): probit works zeta logassets male age agesq
 married divorced widowed numkids largecity city PGT a001ter
 healthgood yearssmoked a6j25 a6j26 a6j27
```

The probability of employment can be predicted using the command:

```
predict probworking if workingage, pr
```

To run the policy experiment, the quantity `laborpensionmon` was divided by two, and `zeta` was recomputed.

The graphics were generated using the software package R. The code, as well as links to GIS map data for the Russian Federation, is available on the author's website at `http://www.ponomar.net/papers.html`. The author would like to thank Alexander Perepechko, Dmitry Sharkov, and the University of Washington for providing the GIS data and Roger Bivand for help on importing the data into R.