Working Paper

The Impact of Pension Reform on Women's Labor Supply in Mongolia

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Abstract

This paper investigates whether the pension reform—specifically, the shift from a Defined Benefit (DB) scheme to a Notional Defined Contribution (NDC) scheme—affected labor supply decisions in Mongolia, particularly among women far from retirement-claiming age. The Law on Individual Pension Insurance Contribution Accounts, introduced in 1999, mandated that all individuals born after December 31, 1959, be covered by the NDC scheme.

To examine the reform's effect, we employ a sharp regression discontinuity design (RDD) using data from the Labor Force Survey (LFS) conducted in 2002 and 2003. The results show that the transition from the DB to the NDC system led to a significant decline in women's labor supply: the probability of being employed decreased by 13.6 percentage points, while labor force participation fell by 13.1 percentage points. The effects are heterogeneous across individual characteristics, suggesting that the reform's impact on labor market behavior varies among subgroups.

Keywords: social security system; pension reform; labor supply
JEL classification: H55, J22, J26

1.Introduction

Across the globe, population aging continues at a rapid pace, and this trend has motivated many developing countries to introduce pension programs (Nikolov & Hossain, 2023). Public pensions are among the largest government programs in both developed and developing countries. These programs collect contributions from current workers to pay old-age benefits to former workers (Bosch et al., 2025).

Demographic trends are exerting pressure on the fiscal sustainability of public pension systems. According to the latest population projections issued by the National Statistics Office (NSO) of Mongolia, the share of older age groups (65 years or more) in the total population is expected to rise by 7.8 percentage points from 4.2% in 2020 to 12% in 2050.

In 2024, the revenue of Mongolian social insurance fund was MNT 4,399 billion excluding government transfers, while the expenditure was MNT 5,097.5 billion. And, the government transfer was MNT 1,175 billion, representing 4 percent of total government expenditure. The 87% of contributors of the social insurance fund were employees and employers who enrolled in the mandatory scheme. In this article, we examine how a reform in the public pension system affects labor supply behavior of women who are far from retirement.

A large literature has investigated the effects of social security and other government old-age support programs on labor supply close to retirement (Artman et al., 2023). However, there is a few papers have analyzed the relationship between pension reform and labor supply response of people who is far from retirement age. Seminal contributions made by Bovini (2019), French et al. (2022), Artmann et al. (2023), and Johnston et al. (2025).

In this article, we exploit a sharp regression discontinuity design (RDD) to estimate the effect of the pension reform implemented in 1999, which switched the system from a Defined Benefit (DB) pension scheme to a Notional Defined Contribution (NDC) scheme. The new pension system retained the pay-as-you-go nature of the previous DB system and kept the retirement age and other parameters constant but introduced two main differences of Defined Contribution (DC) systems.

First, under the DB system, pensions were calculated based on average earnings over a selected five-year period in an individual's earnings history, whereas the proportionality

embedded in the NDC system means that no particular years are given special weight. Second, the required minimum contribution period was reduced from 20 years in the DB system to 15 years in the NDC system.

We estimate women's employment responses to the pension reform by exploiting the sharp cohort-based discontinuity created by the reform, using Labor Force Survey (LFS) data conducted in 2002 and 2003. The reform applied only to people born after December 31, 1959. This discontinuity implied that two individuals born just a few minutes apart faced radically different pension systems from age 42 in 2002: the older individual continued under the traditional DB system, while the slightly younger counterpart entered the new NDC system.

Our analysis shows that the pension reform led to a decline in women's probability of being employed and participating in the labor force. Moreover, the effects vary across subgroups defined by place of residence, marital status, and education level.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature. Section 3 describes the data and outlines the empirical strategy. Section 4 presents the estimation results, and Section 5 concludes with a discussion of the findings.

2.Related literature

A growing body of research has examined the labor supply effects of pension reforms in different countries. Bovini (2019) and French et al. (2022) examined how the transition from Defined Benefit (DB) to Notional Defined Contribution (NDC) pension systems affects labor supply. The main findings of these studies are summarized in the following paragraphs.

Bovini (2019) studied the labour supply dynamics of a sample of private-sector workers who were aged 35-45 at the time when a pension reform enacted in Italy changed the way in which a portion of their retirement benefits would be calculated. In 1995, the Dini pension reform started the transition to a notional defined-contribution (NDC) public pension scheme, whilst retaining a pay-as-you-go system. The reform was likely to lower the level of retirement benefits at early benefit claiming ages. Furthermore, it tightened the link between contributions paid to Social Security and benefits received, on top of increasing incentives to delay claiming benefits past eligibility. She found over the period of the analysis modest positive effects on labour supply of affected workers, as measured by days covered by (all and work-related only) contributions to Social Security and by labour earnings. The effects tend to grow over time.

The 1999 pension reform in Poland introduced NDC pensions for those born after 31st December 1948. Those born in 1948 or earlier remained in the DB scheme. Under the DB system, earnings in a small number of years – those in which earnings were at their peak – were particularly important in determining pension benefits. On the other hand, in the NDC system, all years are roughly equally important. French et al. (2022) show that individuals' labor supply is responsive to changes in the link between current social security contributions and future pension benefits, even 10-15 years before the expected retirement age. They found that switching to the NDC scheme increases labor supply at some ages and reduces labor supply at other ages. Furthermore, the effects on labor supply are heterogeneous across regions, depending on the rate of wage growth. On average, the overall impact of the reform was negative.

Several studies have examined the relationship between other types of pension reforms and labor supply. For instance, Artmann et el. (2023) examined how changes in the generosity of public pension systems affect labor supply behavior far from retirement. They exploited the 2014 reform of the Müterrente, which increased the pension wealth of mothers of children born before January 1, 1992 by 4.4% per child on average. They documented significant reductions in labor earnings when affected women are on average 50-55 years old, driven by shifts out of full-time employment.

In response to mounting pension liabilities, every state in the U.S. has implemented pension reforms to reduce costs by cutting benefits. Johnston et al. (2025) examined the effect of a representative reform implemented in Texas on worker retention and output. The reform cut pension annuities and early retirement benefits for public school teachers, projected to save eight percent of pension revenues. Their findings are that the reform maintained or improved both teacher retention and productivity.

The literature review indicates a clear link between pension reforms and labor supply. The effects depend on the nature of the reform, vary across different subgroups, and may change in magnitude over time.

3.Data and Empirical Strategy

3.1 Data Sources

For this analysis, we use data from the Labor Force Survey (LFS) conducted between October 2002 and October 2003. This was the first nationally representative labor force survey carried out in Mongolia by the National Statistics Office, with financial and technical support from the Asian Development Bank (ADB) and the International Labour Organization (ILO). A total of 49,948 individuals aged 5 years and older from 12,787 households were included in the survey sample. For this analysis, we focus on women born in 1959 and 1960 who are not herders.

Table 1. Summary statistics and t-test by cohort

	Born in 1959	Born in 1960	Difference
Labor market status			
Employed	0.65	0.622	0.028
Active	0.791	0.73	0.061**
Location			
Capital city	0.346	0.464	-0.118***
Province center	0.392	0.329	0.063*
Soum center	0.262	0.207	0.055*
Other characteristics			
Single	0.156	0.158	-0.002
Household size	4.787	4.671	0.116
High education	0.192	0.248	-0.056*
Number of observations	263	304	

*Source: Labor Force Survey 2002–2003; authors' calculations. Descriptive statistics and two-sample t-tests by birth year are shown for the estimation sample. Significance levels: * p<0.10 **p<0.05 ***p<0.01.*

The data is well suited for our analysis for two main reasons. First, this is the first nationally representative survey was conducted in Mongolia following the 1999 pension reform, making this dataset particularly valuable. Second, it includes detailed individual-level information such as birth date, geographic location, marital status, household size, and educational attainment.

Table 1 presents descriptive statistics for the outcome variables and key individual characteristics of the estimation sample, which includes women born in 1959 and 1960. In this analysis, a woman is classified as employed if she reported having worked during the previous week, and as active if she either worked or expressed willingness to work.

In the first part of the table, we present the labor market status. The distribution of employment status shows modest variation between the two cohorts. Approximately 65% of women born in 1959 are classified as employed, compared to 62.2% among those born in 1960. The difference in active status is more pronounced and statistically significant at the 10% level, with the 1959 cohort exhibiting a 6.1 percentage point higher share of active individuals.

The rest of the table shows differences in personal characteristics between the two birth cohorts. The variable single is defined as 1 if the individual is never married, divorced, or widowed, and 0 otherwise. Household size refers to the number of household members aged over four years. The dummy variable high education equals 1 if the woman holds a bachelor's degree or higher.

Notable differences are observed in living location and education level. A larger share of individuals born in 1960 live in the capital city and have higher education compared to those born in 1959. These differences are statistically significant.

The dataset includes information on unemployed and inactive individuals. Respondents were asked whether they had ever been employed and, if so, when they left their last job. A total of 174 women in the dataset reported having worked before.

3.2 Empirical strategy

To estimate the labor market effects of the change in the social security system, we follow the methodology of Lee and Lemieux (2010), applying a regression discontinuity design. The empirical strategy is implemented using the following model:

$$y_i=\alpha+\beta D_i+\gamma f(z_i-c)+X_i'\delta+\epsilon_i \qquad (1)$$

Where β captures the effect of the pension reform and indicator $D_i=1$, if the individual was born on or after January 1, 1960. The age z_i, calculated based on the individual's date

Figure 1. Regression discontinuity plots

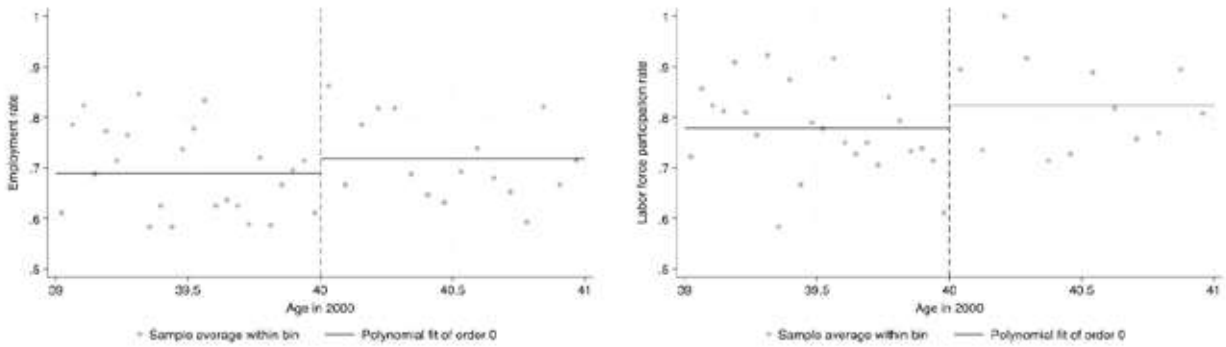

Table 2. Main results

	Employed		Active	
	I	II	I	II
Treatment	-0.149*	-0.136*	-0.146**	-0.131*
	(0.073)	(0.073)	(0.068)	(0.068)
Running variable	-0.124*	-0.092	-0.088	-0.017
	(0.066)	(0.067)	(0.059)	(0.011)
Capital city		0.062		-0.074
		(0.050)		(0.049)
Province center		0.011		-0.013
		(0.051)		(0.051)
Single		-0.227***		-0.083*
		(0.057)		(0.053)
Household size		-0.036***		-0.017
		(0.011)		(0.011)
High education		0.095*		0.015
		(0.049)		(0.043)
Quarter 2		0.008		0.045
		(0.056)		(0.050)
Quarter 3		0.037		0.004
		(0.057)		(0.053)
Quarter 4		0.006		0.023
		(0.056)		(0.051)
X variables	No	Yes	No	Yes
Number of observations	567	562	567	562

*Source: Labor Force Survey 2002–2003; authors' calculations. Average marginal effects are reported. Significance levels: * p<0.10 **p<0.05 ***p<0.01.*

of birth, enters the empirical model in difference to the reform cut off c, which is 42 by 2002. In our baseline specifications, we include a linear trend in the running variable, $f(z_i\text{-}c)=z_i\text{-}c$. Additional control variables (summarized in X_i') include location, marital status, household size, educational information and the survey quarter.

4.Results

The main results estimated from the logit regression are displayed in Table 3. We show the results for the two labor market outcomes in two different specifications. Specification I only includes the treatment indicator and a linear trend in the running variable. In Specification II we additionally control for individual characteristics. Figure 1 presents the regression discontinuity plots for women's employment rate and labor force participation rate.

Our results indicate that the pension reform had a negative average effect on women's employment of approximately 14.9 percentage points. In other words, the probability of being employed in the treatment group is 14.9 percentage points lower than in the control group. This effect is slightly smaller—13.6

Table 3. Heterogeneous effects on labor market status

Sample	Singles	Couples	High education	Low education	Capital city	Province center	Soum center
Employed							
Treatment	0.013	-0.168**	-0.153	-0.139	-0.197*	-0.091	-0.206
	(0.204)	(0.075)	(0.140)	(0.085)	(0.105)	(0.133)	-0.131
Running variable	0.042	-0.143	-0.028	-0.133*	-0.092	-0.049	-0.332**
	(0.190)	(0.070)	(0.121)	(0.079)	(0.098)	(0.112)	(0.144)
Active							
Treatment	-0.200	-0.129*	-0.044	-0.177**	-0.207*	-0.103	-0.114
	(0.179)	(0.073)	(0.142)	(0.077)	(0.096)	(0.123)	(0.142)
Running variable	-0.082	-0.082	0.064	-0.131	-0.079	-0.027	-0.237*
	(0.173)	(0.063)	(0.115)	(0.069)	(0.092)	(0.098)	(0.128)
X variables	No	No	No	No	No	No	No
Number of observations	89	478	125	437	232	203	132

*Source: Labor Force Survey 2002–2003; authors' calculations. Average marginal effects are reported. Significance levels: * p<0.10 **p<0.05 ***p<0.01.*

Table 4. Placebo reform

	Employed	Active
Treatment	0.056	0.067
	(0.084)	(0.073)
Running variable	0.003	0.012
	(0.073)	(0.063)
Number of observations	516	516

*Source: Labor Force Survey 2002–2003; authors' calculations. In the placebo sample, women born in 1959 are assigned to the treatment group, whereas women born in 1958 are assigned to the control group. Average marginal effects are reported. Significance levels: * p<0.10 **p<0.05 ***p<0.01.*

percentage points—when control variables are included in the specification. We also find a negative effect on labor market participation, with a decrease of 14.6 percentage points in activity.

The signs of the estimated coefficients for the control variables align with expectations. Employment rates tend to decrease with age, and larger household size is associated with lower employment probability. Moreover, women with higher levels of education are more likely to be employed.

To examine effect heterogeneity, we estimate Equation 1 separately for subgroups. Table 4 presents the average marginal effects by marital status, education level, and living area. The results reveal statistically significant negative effects for specific groups: women who are married, those with education below a bachelor's degree, and those residing in Ulaanbaatar, the capital city of Mongolia.

We provide supporting evidence of the identification assumptions using placebo test. More specifically, we estimate the main specification, but we impose the reform cutoff artificially to January 1959. Since the pension reform affected cohorts from January 1960, we should not see any significant treatment effect in these placebo tests. The results of this exercise are displayed in Table 4. As expected, the estimated placebo effects are all insignificant.

5.Conclusion

In this paper, we use Mongolian Labor Force Survey data to provide new evidence on how public pension reform affects early labor market outcomes. Specifically, we examine how the transition from a Defined Benefit (DB) to a Notional Defined Contribution (NDC) pension system influences women's labor supply. To estimate the effect of the reform, we exploit a sharp regression discontinuity design (RDD) based on the cohort-specific nature of the reform.

Our results indicate a negative impact of the reform on women's employment and labor force participation. The magnitude of the effects on both outcomes is similar, suggesting that women born after December 31, 1959, were likely to leave the labor force as a result of the reform. If women decide to leave the labor force, this leads to a reduction in potential social security revenues. Moreover, the effects vary across subgroups defined by characteristics such as marital status, education, and place of residence.

A limitation of our study is the relatively small sample size, and future research should aim to replicate these results using larger datasets to confirm the robustness of the findings.

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モンゴル国における年金改革が女性の労働力供給に与える影響（要旨）

モンゴル国立大学経済学部　**ウルズィーフィシグ・ドゥラムスレン**
モンゴル国立大学経済学部　**ドブチンスレン・ハリオン**
モンゴル国立大学経済学部　**ヒャルガス・ツェウェルマー**

本研究は、モンゴル国における確定給付型（DB）制度から確定拠出型（NDC）制度への年金改革が、女性の労働供給にどのような影響を与えたか検証している。1999年に施行された年金制度の法改正により、1959年12月31日以降に生まれたすべての人がNDC制度の適用対象となった。検証には2002年と2003年の労働力調査データ（LFS）を使用した。改革の特質に伴い、シャープ不連続回帰（RDD）を用いた結果、DB制度からNDC制度への移行は、女性の労働力供給を減少させていることが判明した。雇用される確率が13.6パーセントポイント低下し、労働力参加率は13.1パーセントポイント減少している。更に、改革が労働市場に及ぼす影響は均一ではなく、サブグループ間で異質であることが示唆されている。

キーワード：社会保障制度、年金改革、労働供給
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