2 . ACCESS TO CREDIT AND HEALTH OUTCOMES: EVIDENCE FROM THE BRAZILIAN PAYROLL LENDING EXPERIMENT

Abstract

In 2003, the Brazilian Congress passed a law regulating payroll lending, which had a significant effect on consumer lending (Coelho et al. [2011]). In this chapter, I present evidence that payroll lending had a small but non-negligible effect on health outcomes for elderly citizens. In particular, we find that payroll lending: 1) is negatively associated with death rates for individuals in the age ranges 60–69 and 70–79 years; 2) is associated with fewer physical disabilities, an effect that is stronger for individuals from families with lower incomes; and 3) is associated with more medical consultations per year. Using a diff-diff approach, I also find evidence that one possible mechanism is more health care spending in families with a higher proportion of retirement benefits in their income.

2.1. Introduction

In recent years, numerous studies have established a causal link between financial development and economic performance at the macro level (King and Levine [1993], Levine and Zervos [1998], Levine, Loayza and Beck [2000]). Fewer empirical studies are available on the mechanisms through which financial development affects economic performance. Investment in human capital, such as education, is one such channel (Dehejia and Gatti [2005], Beegle et al. [2003]). Much less explored in the literature is the notion that access to credit markets may affect investment in human capital through another channel: health. In this paper, we document a causal *nexus* from the availability of credit to health outcomes of the elderly.

In 2003, the Brazilian Congress passed legislation regulating the underwriting process of payroll lending to private sector workers and pensioners[8]. Payroll loans are consumer credit with principal and interest payments deducted directly from borrowers' paychecks. Following an initial period of judicial insecurity, payroll lending boomed after 2004, primarily through pensioners and social security beneficiaries (Coelho et al. [2011]). In this context, we assess that payroll lending led to an improvement in the health conditions of the elderly, the main beneficiaries of such lending.

The relationship between economics and health has been a promising field of research. Kochar [2004] established a link between higher perceptions of ill health and a decrease in investments, suggesting that bad health conditions may jeopardize economic development. At the same time, an increase in the proportion of the elderly in populations has challenged health systems given the increasing health care costs related to older populations (Mahal et al. [2002]).

Some government programs in Latin America have affected improving health conditions. Barham [2011] provides evidence of the effect of Progresa (a conditional cash-transfer program) on declining infant mortality rates. Galiani et al. [2005] finds that the privatization of water companies in Argentina led to an improvement in water services that caused a decline in infant mortality. In Brazil, measures such as improvement in sanitation and the provision of piped water are associated with better health indicators and declining death rates (Soares [2007]; Gamper-Rabindran et al. [2010]). Our article contributes to this literature in that it verifies the effect of an exogenous source of variations in credit on health conditions.

We use within-city variations in the availability of payroll lending as a source of identification of variations in the effects of payroll lending on health. We find that payroll lending causes lower death rates for age ranges 60–69 and 70–79 years. Variations in health outcomes and in credit market conditions may be caused by unobservable factors; alternatively, improving health conditions may induce banks to enter or ramp up operations in local markets. Using the staggered nature of the chartering process to underwrite payroll loans as a source of exogenous variations, we find even greater effects of payroll lending on elderly

[8] This type of loan was already available to public servants with lower repayment limits.

health outcomes. Using individual level data, we find that payroll lending improves the health conditions of individuals older than 60 years in the following two dimensions: it increases the number of medical consultations and reduces physical disabilities. We also document the mechanism. Using household budget data from before and after the payroll lending boom, we create a continuous treatment variable equal to pensions as a proportion of household income. We find increased health spending when the treatment is more intensive.

The remainder of the paper is divided as follows. Section 2 describes the background. Section 3 discusses the theory behind the availability of credit, including conditions where health expenditures respond optimally to changes in credit availability. Section 3 describes the data. Section 4 outlines the empirical strategy. The results are presented in section 5 and section 6 concludes.

2.2. Background

Payroll lending in Brazil was restricted to public servants until 2003. Principal and interest payments were restricted to 10% of their salary. In December 2003, Congress passed Law 10,820, which allowed payroll lending to be extended to private-sector workers and social security beneficiaries of the Instituto Nacional do Seguro Social (INSS), the federally run institution that runs the pay-as-you-go pension system in Brazil. The limit of deductions was fixed at 30%[9]. Banks had to be chartered by the INSS to underwrite payroll loans to pensioners. After the chartering process, payroll lending increased, leading to an increase in the volume of personal loans and a decrease in interest rates (Coelho et al. 2011). As Coelho et al. (2011) explain, "the law mandates that the INSS authorize institutions before they can underwrite loans to retirees. Because this process took some time, the law became fully effective in April 2004, when the INSS authorized Caixa Econômica Federal (a federally owned S&L) to underwrite payroll loans. Subsequently, Banco de Minas Gerais became the first authorized private bank. As of December 2005, the INSS had chartered 44 financial institutions." Figure 1 depicts the impressive increase in originations after 2003 [Figure 1].

[9] In 2004, the limit for public servants was also set to 30%.

Employees of private enterprises in Brazil do not enjoy job stability. Payroll lending to private workers may suffer from adverse selection problems because workers who believe that they have a high probability of being fired may use payroll lending as a type of insurance. Because public servants are stable after three years of work and INSS works as a pay-as-you-go system, both public servants and pensioners are preferential clients for payroll lending.

Brazil has had a universal public health system (SUS) since the 1988 constitution. The system coexists with private health care providers, such as HMOs. In 2007, 58% in health spending came from private services, while 26% of the Brazilian population has some kind of private health insurance (Paim et al., 2011). Thus, for at least some services, private medicine provides better quality than public services.

2.3. Theory

Certain theoretical conditions must be satisfied for payroll lending to have an effect on health outcomes. First, the free-of-charge public health system, SUS, must have severe limitations. Private health care must exist and it should provide better quality services at a cost. Finally, payroll lending legislation must call for relaxed credit constraints.

In addition to sovereign risk, beneficiary death is the only remaining risk, which is diversifiable under certain conditions. If pensioners in bad health conditions demand more credit, adverse selection problems may arise, and banks may need to screen loan applicants. However, if applicants with good health conditions demand credit to make a pooling equilibrium possible, then the death risk becomes diversifiable, and obtaining payroll lending to gain access to health services is possible.

Chapter 1 provided a model in which payroll lending was used as a source of collateral to decrease credit restrictions. (Coelho et al. ,2011) documented a significant increase in credit availability at lower interest rates generated by a change in payroll lending regulations and lower *ex-post* delinquency rates. This increase suggests that payroll lending is a valuable instrument for collateral and

has reduced credit constraints and that pooling conditions exist in Brazil, where both healthy and unhealthy costumers obtain loans.

Second, in Brazil, both public health services (provided by SUS and public hospitals) and private health services (including health insurance) coexist, with private services consuming more than 50% of health expenditures (Paim et al. [2010]). Because public health is free of charge, private health services evidently are of higher quality than public services.

Brazil has a unique combination of exogenous shocks in the credit supply for retirees and a health system in which a large number of private services coexist with a universal but lower-quality public system. Our hypothesis is that credit can be used to alleviate credit constraints that previously impeded lower-income retirees from using private health services.

2.4.. Data

2.4.1. – Payroll Lending Data

We use SCR (*Central de Risco*), a unique database from the Brazilian Central Bank with loan-level information on all loans over R$5,000 (approximately US$2,700). The data contain rich information on loan and lender characteristics, including the municipality from which the loan originated. The SCR allows us to construct an annual measure of total payroll lending origination in every city. Our final measure is total payroll lending per capita at the city-year level.

2.4.2.– Population Data

The Brazilian census is decennial, and IBGE projects city populations for every non-census year. These projections contain predictions for the population in different age groups by municipality. We use the DATASUS dataset from the Ministry of Health, which contains hospital level annual data on mortality by age group.

Population projections are available as of each July. Table 18 shows the death rates for different age groups, which have declined over the years. We use death rates for the 60 to 69 age group because focusing on this group mitigates problems related to composition effects of death rates. If we use death rates for all individuals over 60 years of age, cities with a larger number of older people could bias the results because the elderly are more likely to die. We also see that the absolute number of deaths is, on average, increasing but at a slower pace than the increase in the population.

Table 18 - Descriptive Statistics for Death Rates at Each Age Range

	Year					
Variable	2003	2004	2005	2006	2007	2008
Death Rate at Age Range of 20-49 Years Old	1.5984	1.6843	1.6153	1.6213	1.5247	1.5501
	(1.0523)	(1.0838)	(1.0756)	(1.0725)	(1.1328)	(1.0073)
Death Rate at Age Range of 60-69 Years Old	10.9657	11.2647	10.7516	10.7777	9.5996	9.5283
	(7.9328)	(8.2448)	(7.8365)	(8.0145)	(7.2611)	(7.4592)
Death Rate at Age Range of 70-79 Years Old	27.7349	28.0685	26.6574	27.0892	23.1726	22.2452
	(18.7325)	(18.8726)	(18.3945)	(19.3871)	(16.3014)	(16.0363)
Death Rate at Age Range of 0-4 Years Old	1.0755	0.9552	0.8509	0.7408	0.7403	0.6767
	(1.3793)	(1.3131)	(1.2030)	(1.0941)	(1.1401)	(1.0537)
Observations	5,515	5,520	5,534	5,521	5,551	5,508

Source: Datasus

2.4.3. – Data on Health Conditions and Expenditures

We use the PNAD (*Pesquisa Nacional por Amostra de Domicílios*) with supplements containing data on individual's health conditions. Luckily, two such supplements exist, one before and one after the payroll lending boom (2003 and 2008, respectively).

The survey contains several variables that capture the health and physical conditions of individuals, such as displaying difficulty in walking 100 m, in feeding oneself, and in running, among other activities. Information also exists on whether a person was hospitalized and the number of medical consultations during the previous year. Table 19 displays descriptive statistics for these variables. The figures in Table 19 show an increase in disabilities from 2003 to 2008 and more medical consultations in 2008 than in 2003. The proportion of individuals older than 80 years increased, reflecting the ageing of the population.

Table 19 - Descriptive Statistics for Physical Disabilities

Individuals over 60 years of Age	Year	
Variable	2003	2008
Difficulty in Walking 100 m	0.1650	0.2110
	(0.3712)	(0.4080)
Difficulty in Walking 1 km	0.3783	0.3941
	(0.4850)	(0.4701)
Difficulty in Lowering Oneself	0.4530	0.4701
	(0.4978)	(0.4978)
Difficulty to Push a Table	0.3540	0.3540
	(0.4782)	(0.4782)
Difficulty in Feeding Oneself	0.1363	0.1521
	(0.3431)	(0.3591)
Difficulty Going up a Hill	0.4786	0.4736
	(0.4996)	(0.4993)
Number of Medical Consultations During a Year	4.4212	4.6970
	(6.0938)	(6.3987)
Payroll per Capita	90.5273	301.6089
	(76.0932)	(241.833)
Age	69.7942	69.9254
	(7.7151)	(7.9532)
Proportion of Individuals over 80 years of Age	0.1239	0.1342
	(0.3295)	(0.3409)
Observations	28,850	28,850

Sources: IBGE and Banco Central do Brasil

We also use *Pesquisa de Orçamento Familiar* (POF), which contains detailed budget information on households. POF provides information on several items of health expenditures, including health insurance and medicine purchases. We aggregate health expenditures to generate a total health spending variable. Table 20 displays descriptive statistics for health expenditures deflated to 2008 values and shows an increase in spending between the two surveys. Most health expenditures are for medicine purchases and health insurance. We conjecture that recollection may at least partly explain this pattern: the survey was conducted on spending made during the previous 90 days (30 days for medicine). Hospitalization and surgery are relatively rare events, and self-reported information on expenditures may be biased to more frequent expenditures such as medicine and health insurance.

Table 20 Descriptive Statistics for Health Spending

Values in terms of 2008	Year	
Variable	2003	2008
Health Expenditures	1203.40	1437.05
	(3030.01)	(3525.75)
Health Insurance	301.79	340.21
	(1201.44)	(1380.26)
Medicine Acquisition	535.19	772.53
	(1088.83)	(2189.25)
Medical Treatment	12.058	2.593
	(246.22)	(173.42)
Hospitalization	19.283	0.1521
	(491.14)	(0.3591)
Exams	48.742	61.847
	(290.672)	(345.547)
Surgery	43.541	42.478
	(1256.79)	(1096.7)
Household Income	7832.39	9943.2
	(15997.6)	(17842.0)
Proportion of Retirement Benefits on Income	0.13151	0.15689
	(0.2443)	(0.2745)
Observations	48,568	56,091

Source: IBGE

The last source of data is ESTBAN, a dataset belonging to *Banco Central do Brasil* that contains the total number of credit operations and demand deposits per bank and per city. Using this dataset in combination with the dates of agreement between banks and INSS, we use information on the total chartered time deposits as an instrument for payroll lending, with variations in the level of chartering at each municipality as instrument for payroll lending.

2.5. Empirical Strategy

Our goal is to measure the causal effect of payroll lending on health outcomes. Pensioners and retirees from INSS are the main recipients of payroll loans. If payroll lending relaxes credit restrictions and induces more investment in health, we expect such lending to improve the health conditions of the elderly.

We first estimate several reduced-form city-level regressions with death rates as the dependent variable. We estimate the following ordinary least squares (OLS) baseline model:

$$DR_{it} = \alpha + \beta.payrollpercap_{it} + \gamma.X_{it} + A_i + D_t + \varepsilon_{it}$$

(4.1)

where DR_{iy} is the death rate among the 60–69 age group in city *i* during year *t*, $payrollpercap_{it}$ is the total amount of payroll lending underwritten per capita, *X* is a vector of controls, A_i and D_t are city and year dummies, respectively, and β is the parameter of interest.

Causal interpretation of the OLS estimate of β may be hindered for several reasons. First, because we use payroll lending per capita, a shock to the death rates lowers the population and, *ceteris paribus*, increases payroll per capita (this problem is worse when we use payroll for populations older than 60 years, as is subsequently shown). Second, the risk associated with payroll lending is the borrower's death, which is the dependent variable. Thus, reverse causality may exist, biasing the OLS model toward zero.

We address both identification problems using two instrumental variables: 1) the proportion of state-owned bank branches in the city and 2) the amount of demand deposits in institutions chartered with the INSS per capita. State-owned banks were able to underwrite payroll loans to public servants and were thus better equipped to take advantage of macro-level improvements that spurred the general credit market after 2003 (see De Mello and Garcia (2011)). Assuming that the presence of state-owned banks does not directly affect elderly death rates, such proportions are a legitimate instrument. As explained at length in the first chapter of this dissertation, the staggered nature of the INSS chartering process may be used as a source to identify variations. The amount of demand deposits at chartered banks affects payroll lending at the city level but does not directly affect death rates.

We go a step further and use individual-level data from PNAD. We estimate the following OLS model:

$$HC_{ijt} = \alpha + \beta.payrollpercap_{it} + \gamma.X_{ijt} + A_i + D_t + \varepsilon_{it}$$

(4.2)

where HC_{ijt} is an indicator of the health condition reported by individual *j* in city *i* during year *t*, and X is a vector of controls of city and individual (or household) characteristics. We again include time and city dummies to capture fixed effects.

Individual-level data present an opportunity. The endogeneity stories outlined above are silent as to whether the effect of payroll lending on health outcomes should be stronger or weaker according to income. We estimate the following OLS model:

$$HC_{ijt} = \alpha + \beta_1.payrollpcap_{it} + \beta_2.payrollpcap.inc_{it} + \gamma.X_{ijt} + A_i + D_t + \varepsilon_{it} \quad (4.3)$$

β_2 measures the heterogeneity of the effect of payroll lending on health conditions according to income. If payroll lending indeed affects health outcomes through a relaxation of credit restrictions, we expect that the effect of payroll lending on health outcomes to be weaker for wealthier individuals or households (β_1 and β_2 have opposite signs).

In practice, payroll lending turns future pensions and retirement benefits into collateral. Thus, we expect the effect of payroll lending on health conditions to be stronger in households with higher pension and retirement benefits income levels after controlling for total income. We estimate the following OLS model:

$$HC_{ijt} = \alpha + \beta_1.prpcap_{it} + \beta_2.prpcap.inc_{it} + \beta_3.prpcap.ret_{it} + \gamma.X_{ijt} + A_i + D_t + \varepsilon_{it} \quad (4.4)$$

We also estimate models (4.2) and (4.3) using the number of medical consultations during the previous 12 months as a dependent variable by fitting Tobit models left-censored in 0. If a person uses payroll lending to improve his or her health, we expect the number of medical consultations to increase with payroll lending but less so for wealthier individuals or households.

We assess whether the mechanism is operative using POF data for 2003 and 2008. If relaxation of credit constraints explains the reduced-form relationship between payroll lending and health outcomes, payroll lending must allow for higher health expenditures. We implement a diff-diff approach using the

proportion of retirement benefits in a household as continuous treatment for health expenses. The estimated model is as follows:

$$Hexp_{ijt} = \alpha + \beta_1 . faminc_{ijt} + \beta_2 y08 + \beta_3 pens_{ijt} + \beta_3 pens_{ijt} . y08 + \gamma . X_{ijt} + \varepsilon_{it} \quad (4.5)$$

where $Hexp_{ijt}$ is total health expenditures for household *j* in state *i* and year *t* (2003 or 2008), $faminc_{jit}$ is total household income, $pens_{ijt}$ is pensions and retirement benefits as a proportion of household income, and y08 is an indicator of the 2008/2009 survey. X_{ijt} is a vector of controls. The main coefficient of interest is β_3, which we expect to be positive.

2.6. Results

2.6.1. Effect of Payroll Lending on Death Rates

2.6.1.1. Simple Fixed-Effects Panel Models

Table 21 presents the estimation results for model (4.1) using death rates for individuals in the age range 60–69 years. The results show a negative relationship between the availability of payroll per capita and the death rates for people in this age range. In our sample, the average death rates are approximately 10.5 per thousand. An increase of one standard deviation in the amount of payroll lending per capita implies a decrease of approximately 0.13–0.15 deaths per thousand, or a decrease from 1.23% to 1.44% in death rates.

Table 21 - Death Rates of People in the 60-69 Age Range (Linear FE Panel)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Death Rate in the 60-69 Age Range (per thousand)					
GDP per Capita		0.0697**	0.0684**		0.0708**	0.0696**
		(0.0319)	(0.0321)		(0.0335)	(0.0336)
Demand Deposits per Capita	-5.45e-05*	-6.26e-05**	-6.03e-05**	-4.40e-05	-5.22e-05*	-4.91e-05*
	(2.84e-05)	(2.91e-05)	(2.92e-05)	(2.82e-05)	(2.88e-05)	(2.87e-05)
Proportion Older than 80 Years			-8.908***			-10.16***
			(3.124)			(3.247)
Child Mortality			0.445***			0.430***
			(0.0505)			(0.0507)
Payroll per Capita	-0.00190**	-0.00201**	-0.00186**	-0.00210**	-0.00222**	-0.00202**
	(0.000893)	(0.000897)	(0.000897)	(0.000917)	(0.000920)	(0.000920)
Death Rate (t-1)				-0.0820***	-0.0821***	-0.0815***
				(0.00673)	(0.00675)	(0.00677)
Constant	9.838***	9.495***	10.46***	10.61***	10.27***	11.41***
	(0.110)	(0.197)	(0.474)	(0.129)	(0.207)	(0.496)
Mean (death rates)	10.48194	10.48194	10.48194	10.48194	10.48194	10.48194
	(7.827036)	(7.827036)	(7.827036)	(7.827036)	(7.827036)	(7.827036)
Impact of 1 std of Payroll per Capita	-0.1290	-0.1365	-0.1263	-0.1426	-0.1508	-0.1372
Observations	33,108	33,108	33,108	33,103	33,103	33,103
R-squared	0.023	0.024	0.028	0.032	0.032	0.036

Note: The panel shows the coefficients for fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old as dependent variable. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Table 22 presents the estimation results for the age range 70–79 years. The coefficient of payroll per capita is important in the sense that an increase of one standard deviation in the amount of payroll per capita means a decrease of 0.338–0.422 deaths per thousand, depending on the specification. Because death rates are higher in this age range than in the 60–69 age range, the relative effect is similar to that shown in Table 21 and decreases by 1.31%–1.63%.

Table 22 - Death Rates of People in the 70-79 Age Range (Linear FE Panel)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Death Rate in the 70-79 age range (per thousand)					
GDP per Capita		0.130	0.126		0.142	0.139
		(0.0892)	(0.0886)		(0.0896)	(0.0892)
Demand Deposits per Capita	-0.000149	-0.000164*	-0.000144	-0.000122	-0.000139	-0.000116
	(9.71e-05)	(9.80e-05)	(9.60e-05)	(9.52e-05)	(9.60e-05)	(9.38e-05)
Proportion Older than 80 Years			-42.92***			-45.50***
			(7.147)			(7.451)
Child Mortality			0.959***			0.914***
			(0.124)			(0.124)
Payroll per Capita	-0.00577***	-0.00598***	-0.00498***	-0.00598***	-0.00621***	-0.00513***
	(0.00192)	(0.00194)	(0.00191)	(0.00196)	(0.00198)	(0.00195)
Death Rate (t-1)				-0.0852***	-0.0855***	-0.0852***
				(0.00649)	(0.00647)	(0.00649)
Constant	23.16***	22.52***	27.92***	25.08***	24.39***	30.17***
	(0.280)	(0.547)	(1.119)	(0.323)	(0.570)	(1.173)
Mean (death rates)	25.83018	25.83018	25.83018	25.83018	25.83018	25.83018
	(18.14281)	(18.14281)	(18.14281)	(18.14281)	(18.14281)	(18.14281)
Impact of 1 std of Payroll per Capita	-0.3918	-0.4061	-0.3382	-0.4061	-0.4217	-0.3484
Observations	33,108	33,108	33,108	33,103	33,103	33,103
R-squared	0.051	0.051	0.056	0.060	0.060	0.065

Note: The panel shows the coefficients for fixed-effects panel models fitted using the death rate in the age range of 70 to 79 years old as dependent variable. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Table 23 shows the results of the estimation for the age range 60–69 years. We separated death rates by different causes: infection or tumors (columns 1–2), cardiac problems (columns 3–4), and external causes (accidents or violence, columns 5–6). The results are negative and significant in all specifications, but the effects are greater for infection/tumors or cardiac problems. An increase of 1 standard deviation of payroll lending is associated with a decrease of roughly 6% in both death rates caused by cardiac problems and caused by infection or tumor, while the decrease in death rates caused by external factors is less than 4%.

Table 23 - Death Rates of People on 60-69 years Age Range by Cause (Linear FE Panel)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Death Rate on 60 to 69 Age Range (per thousand) by death cause					
	Infection/Tumor		Cardio		External Causes	
GDP per Capita		-0.000219		0.0424***		0.0124
		(0.0105)		(0.0151)		(0.0160)
Demand Deposits per Capita	-1.67e-05	-1.39e-05	-5.29e-05**	-4.82e-05*	2.12e-06	1.52e-06
	(1.19e-05)	(1.18e-05)	(2.61e-05)	(2.56e-05)	(5.61e-06)	(6.01e-06)
Proportion Older than 80 Years		-4.435***		-15.62***		-1.614*
		(1.532)		(2.028)		(0.876)
Child Mortality		0.0352		0.111***		0.0221
		(0.0237)		(0.0310)		(0.0139)
Payroll per Capita	-0.00224***	-0.00213***	-0.00407***	-0.00372***	-0.000394**	-0.000373*
	(0.000380)	(0.000379)	(0.000581)	(0.000575)	(0.000198)	(0.000200)
Constant	2.496***	3.091***	4.454***	6.348***	0.658***	0.808***
	(0.0493)	(0.222)	(0.0788)	(0.300)	(0.0259)	(0.141)
Observations	29,753	29,753	29,753	29,753	29,753	29,753
R-squared	0.006	0.006	0.006	0.011	0.002	0.002

Note: The panel shows the coefficients for fixed-effects panel models fitted using the death rate per capita in the age range of 60 to 69 years old by infecction or tumor (columns 1-2), cardio problems (columns 3-4) and external causes (5-6) as dependent variable. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

We conduct a robustness analysis by replacing payroll per capita with payroll per persons over 60 years of age (from now on, payroll per old). Table 24 displays the results for the age range 60–69 years. The results show a positive partial correlation between payroll per old and death rates but with no statistical significance. This result may be explained by the fact that, if there is a shock on death rates of persons in that age range, the amount of payroll per old also increases (and at a faster rate than payroll per capita)[10].

[10] Later in this text, IV analysis will provide evidence that this is indeed the case.

Table 24 - Death Rates of People on 60-69 Age Range (Linear FE Panel)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Death Rate on Age Range of 60 to 69 years old (per thousand)					
GDP per Capita		0.0680**	0.0669**		0.0690**	0.0680**
		(0.0321)	(0.0322)		(0.0336)	(0.0337)
Demand Deposits per Capita	-7.26e-05**	-8.11e-05***	-7.68e-05**	-6.28e-05**	-7.14e-05**	-6.59e-05**
	(3.01e-05)	(3.10e-05)	(3.09e-05)	(2.96e-05)	(3.04e-05)	(3.02e-05)
Proportion Older than 80 years			-9.442***			-10.75***
			(3.111)			(3.233)
Child Mortality			0.444***			0.429***
			(0.0505)			(0.0507)
Payroll per Old	5.19e-05	4.86e-05	4.23e-05	3.92e-05	3.58e-05	2.99e-05
	(6.97e-05)	(6.95e-05)	(6.91e-05)	(7.14e-05)	(7.12e-05)	(7.08e-05)
Death Rate (t-1)				-0.0818***	-0.0819***	-0.0813***
				(0.00673)	(0.00675)	(0.00678)
Constant	9.660***	9.321***	10.38***	10.43***	10.08***	11.33***
	(0.106)	(0.192)	(0.476)	(0.124)	(0.202)	(0.498)
Mean (death rates)	10.48194	10.48194	10.48194	10.48194	10.48194	10.48194
	(7.827036)	(7.827036)	(7.827036)	(7.827036)	(7.827036)	(7.827036)
Observations	33,108	33,108	33,108	33,103	33,103	33,103
R-squared	0.023	0.024	0.028	0.032	0.032	0.036

Note: The panel shows the coefficients for fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old as dependent variable. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

2.6.1.2. Fixed-Effects Panel Models with Instruments

Table 25 presents both first- and second-stage estimations for panel models using chartered assets per capita and proportion of public banks as instruments for the age range 60–69 years. The effect of a one-standard-deviation increase in payroll lending per capita is a decrease in the death rates of people between 60 and 69 years of age by approximately two deaths per thousand habitants. Because the death rates in this range are approximately 10 deaths per 1,000 habitants, the one-standard-deviation increase in payroll lending per capita amounts to a 20% decrease in the outcome.

Table 25 - Death Rates of People on 60-69 Age Range (FE Panel with Instruments)

Panel A: First Stage

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Payroll per Capita					
Demand Deposits per Capita	-0.000234	-0.000726**	-0.000343	-0.000222	-0.000714**	-0.000332
	(0.000358)	(0.000361)	(0.000357)	(0.000358)	(0.000361)	(0.000357)
Chartered Demand Deposits per Capita	0.00535***	0.00558***	0.00526***	0.00535***	0.00558***	0.00526***
	(0.000208)	(0.000209)	(0.000207)	(0.000208)	(0.000209)	(0.000207)
Proportion of Public Banks	6.669***	6.864***	6.262***	6.617***	6.812***	6.221***
	(1.680)	(1.678)	(1.674)	(1.680)	(1.678)	(1.674)
GDP per Capita		1.166***			1.168***	
		(0.128)			(0.128)	
Proportion Older than 80 years			278.2***			276.9***
			(19.37)			(19.37)
Child Mortality			0.445			0.429
			(0.284)			(0.285)
Death Rate (t-1)				-0.0894**	-0.0903**	-0.0723**
				(0.0364)	(0.0364)	(0.0363)
Constant	78.29***	72.68***	38.63***	30.11***	25.13***	-5.749**
	(0.927)	(1.112)	(2.894)	(0.981)	(1.121)	(2.674)
Observations	33,108	33,108	33,108	33,103	33,103	33,103
Overall R-Squared	0.241	0.266	0.202	0.237	0.261	0.199

Note: The panel shows the coefficients for the First Stage fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old as dependent variable. Instrumented variable is the amount of Payroll per Capita conceded in the city. Proportion Older then 80 years is the percentage of individuals with age over 80 years old on the population of individuals with age over 60 years old. Demand deposits per capita is the average amount of demand deposits per capita in each year at each city, as well as Chartered Demand Deposits per Capita is the average amount of demand deposits on institutions chartered with INSS. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old. We used the demand deposits on chartered institutions and the proportion of public banks as instruments.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Second Stage

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Death Rate on 60-69 Age Range (per thousand)					
Payroll per Capita	-0.0356***	-0.0322***	-0.0316***	-0.0359***	-0.0324***	-0.0318***
	(0.00577)	(0.00554)	(0.00562)	(0.00575)	(0.00552)	(0.00560)
GDP per Capita		0.0922***	0.0906***		0.0935***	0.0919***
		(0.0193)	(0.0193)		(0.0192)	(0.0192)
Demand Deposits per Capita	0.000203***	0.000165***	0.000157***	0.000215***	0.000176***	0.000168***
	(5.21e-05)	(5.02e-05)	(4.95e-05)	(5.20e-05)	(5.00e-05)	(4.94e-05)
Proportion Older than 80 years			-0.155			-1.446
			(3.311)			(3.295)
Child Mortality			0.456***			0.440***
			(0.0422)			(0.0420)
Death Rate (t-1)				-0.0852***	-0.0849***	-0.0837***
				(0.00543)	(0.00539)	(0.00537)
Constant	12.30***	11.59***	11.28***	13.12***	12.39***	12.26***
	(0.434)	(0.408)	(0.456)	(0.440)	(0.414)	(0.460)
Mean (death rates)	10.48194	10.48194	10.48194	10.48194	10.48194	10.48194
	(7.827036)	(7.827036)	(7.827036)	(7.827036)	(7.827036)	(7.827036)
Impact of 1 std of Payroll per Capita	-2.4176	-2.1867	-2.1460	-2.4380	-2.2003	-2.1595
Observations	33,108	33,108	33,108	33,103	33,103	33,103
Overall R-Squared	0.027	0.018	0.002	0.093	0.086	0.044

Note: The panel shows the coefficients for fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old as dependent variable. Proportion Older then 80 years is the percentage of individuals with age over 80 years old on the population of individuals with age over 60 years old. Instrumented variable is payroll per capita. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old. We used the demand deposits on chartered institutions and the proportion of public banks as instruments.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

The results for estimations in the age range 70–79 years are shown in Table 26. The coefficients for payroll per capita are larger in absolute terms than those shown in Table 25. However, because death rates are much higher in this age range at approximately 25 deaths per thousand, the relative effect of a payroll change of one standard deviation per capita is smaller, from 11.3% to 13.9%, depending on the specification.

Table 26 - Death Rates of People on 70-79 years Age Range (FE Panel with Instruments)

Panel A: First Stage

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Payroll per Capita					
Demand Deposits per Capita	-0.000234	-0.000726**	-0.000343	-0.000222	-0.000714**	-0.000332
	(0.000358)	(0.000361)	(0.000357)	(0.000358)	(0.000361)	(0.000357)
Chartered Demand Deposits per Capita	0.00535***	0.00558***	0.00526***	0.00535***	0.00558***	0.00526***
	(0.000208)	(0.000209)	(0.000207)	(0.000208)	(0.000209)	(0.000207)
Proportion of Public Banks	6.669***	6.864***	6.262***	6.617***	6.812***	6.221***
	(1.680)	(1.678)	(1.674)	(1.680)	(1.678)	(1.674)
GDP per Capita		1.166***			1.168***	
		(0.128)			(0.128)	
Proportion Older than 80 Years			278.2***			276.9***
			(19.37)			(19.37)
Child Mortality			0.445			0.429
			(0.284)			(0.285)
Death Rate (t-1)				-0.0894**	-0.0903**	-0.0723**
				(0.0364)	(0.0364)	(0.0363)
Constant	78.29***	72.68***	38.63***	30.11***	25.13***	-5.749**
	(0.927)	(1.112)	(2.894)	(0.981)	(1.121)	(2.674)
Observations	33.108	33.108	33.108	33.103	33.103	33.103
Overall R-Squared	0.241	0.266	0.231	0.240	0.264	0.201

Note: The panel shows the coefficients for the First Stage fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old as dependent variable. Instrumented variable is the amount of Payroll per Capita conceded in the city. Proportion Older then 80 years is the percentage of individuals with age over 80 years old on the population of individuals with age over 60 years old. Demand deposits per capita is the average amount of demand deposits per capita in each year at each city. as well as Chartered Demand Deposits per Capita is the average amount of demand deposits on institutions chartered with INSS. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old. We used the demand deposits on chartered institutions and the proportion of public banks as instruments.

*** = significant at the 1% level. ** = significant at the 5%. * = significant at the 10%. All standard errors are robust.

Panel B: Second Stage

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Death Rate on 70-79 years age range (per thousand)					
Payroll per Capita	-0.0529***	-0.0470***	-0.0438***	-0.0527***	-0.0463***	-0.0430***
	(0.0127)	(0.0122)	(0.0124)	(0.0126)	(0.0122)	(0.0123)
GDP per Capita		0.160***	0.155***		0.172***	0.167***
		(0.0427)	(0.0425)		(0.0424)	(0.0423)
Demand Deposits per Capita	0.000211*	0.000145	0.000139	0.000235**	0.000164	0.000160
	(0.000115)	(0.000111)	(0.000109)	(0.000114)	(0.000110)	(0.000109)
Proportion Older than 80 years			-31.50***			-34.37***
			(7.310)			(7.263)
Child Mortality			0.973***			0.927***
			(0.0931)			(0.0926)
Death Rate (t-1)				-0.0858***	-0.0861***	-0.0855***
				(0.00523)	(0.00522)	(0.00520)
Constant	26.61***	25.37***	28.99***	28.52***	27.19***	31.22***
	(0.956)	(0.902)	(1.006)	(0.961)	(0.907)	(1.010)
Mean (death rates)	25.83018	25.83018	25.83018	25.83018	25.83018	25.83018
	(18.14281)	(18.14281)	(18.14281)	(18.14281)	(18.14281)	(18.14281)
Impact of 1 sd of Payroll per Capita	-3.5924	-3.1918	-2.9745	-3.5789	-3.1442	-2.9201
Observations	33,108	33,108	33,108	33,103	33,103	33,103
Overall R-Squared	0.008	0.003	0.020	0.079	0.070	0.017

Note: The panel shows the coefficients for fixed-effects panel models fitted using the death rate in the age range of 70 to 79 years old as dependent variable. Proportion Older then 80 years is the percentage of individuals with age over 80 years old on the population of individuals with age over 60 years old. Instrumented variable is payroll per capita. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old. We used the demand deposits on chartered institutions and the proportion of public banks as instruments.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Table 27 displays the results for the age range from 60–69 years, separated by the same causes already displayed in Table 23. The effects are now similar for all causes.

Table 27 - Death Rates of People on 60-69 Age Range (FE Panel with Instruments)

Panel A: First Stage

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Payroll per Capita					
Demand Deposits per Capita	-0.000380	-0.000491	-0.000380	-0.000491	-0.000380	-0.000491
	(0.000382)	(0.000380)	(0.000382)	(0.000380)	(0.000382)	(0.000380)
Chartered Demand Deposits per Capita	0.00546***	0.00535***	0.00546***	0.00535***	0.00546***	0.00535***
	(0.000220)	(0.000219)	(0.000220)	(0.000219)	(0.000220)	(0.000219)
Proportion of Public Banks	7.184***	6.738***	7.184***	6.738***	7.184***	6.738***
	(1.759)	(1.752)	(1.759)	(1.752)	(1.759)	(1.752)
Proportion Older than 80 years		306.5***		306.5***		306.5***
		(21.87)		(21.87)		(21.87)
Child Mortality		0.379		0.379		0.379
		(0.308)		(0.308)		(0.308)
Constant	79.53***	35.95***	79.53***	35.95***	79.53***	35.95***
	(1.042)	(3.263)	(1.042)	(3.263)	(1.042)	(3.263)
Observations	29,753	29,753	29,753	29,753	29,753	29,753
R-Squared	0.468	0.473	0.468	0.473	0.468	0.473

Note: The panel shows the coefficients for the First Stage fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old as dependent variable. Instrumented variable is the amount of Payroll per Capita conceded in the city. Proportion Older then 80 years is the percentage of individuals with age over 80 years old on the population of individuals with age over 60 years old. Demand deposits per capita is the average amount of demand deposits per capita in each year at each city, as well as Chartered Demand Deposits per Capita is the average amount of demand deposits on institutions chartered with INSS. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old. We used the demand deposits on chartered institutions and the proportion of public banks as instruments.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Second Stage

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Death Rate on 60-69 Age Range (per thousand)					
	Infection/Tumor		Cardio		External Causes	
Payroll per Capita	-0.0129***	-0.0128***	-0.0273***	-0.0265***	-0.00416***	-0.00410***
	(0.00250)	(0.00256)	(0.00345)	(0.00352)	(0.00145)	(0.00148)
Demand Deposits per Capita	6.61e-05***	6.57e-05***	0.000128***	0.000128***	3.15e-05**	3.11e-05**
	(2.30e-05)	(2.27e-05)	(3.17e-05)	(3.13e-05)	(1.33e-05)	(1.31e-05)
Proportion Older than 80 years		-0.952		-8.175***		-0.401
		(1.603)		(2.206)		(0.928)
Child Mortality		0.0383**		0.118***		0.0234**
		(0.0193)		(0.0266)		(0.0112)
Constant	3.278***	3.379***	6.167***	7.183***	0.936***	0.972***
	(0.190)	(0.210)	(0.262)	(0.289)	(0.110)	(0.122)
Observations	29,753	29,753	29,753	29,753	29,753	29,753
Overall R-Squared	0.0267	0.0210	0.0261	0.0115	0.00111	0.000348

Note: The panel shows the coefficients for fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old caused by infection or tumor (columns 1-2), cardio problems (3-4) and external causes (columns 5-6) as dependent variable. Proportion Older then 80 years is the percentage of individuals with age over 80 years old on the population of individuals with age over 60 years old. Instrumented variable is payroll per capita. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Table 28 presents the results for the regressions fitted in the 60–69 age range using payroll per old instead of payroll per capita as an explanatory variable. In contrast to the results of Table 24, the coefficients are negative and significant. A payroll increase of one standard deviation per old also causes an approximate 2.18 to 2.40 decrease on deaths per 1,000 habitants, very similar to that of payroll per capita specification.

Table 28 - Death Rates of People on 60-69 years Age Range (FE Panel with Instruments)
Panel A: First Stage

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Payroll per Old					
Demand Deposits per Capita	-0.0323***	-0.0360***	-0.0322***	-0.0322***	-0.0359***	-0.0321***
	(0.00451)	(0.00456)	(0.00451)	(0.00451)	(0.00456)	(0.00451)
Chartered Demand Deposits per Capita	0.0683***	0.0700***	0.0685***	0.0682***	0.0700***	0.0684***
	(0.00262)	(0.00263)	(0.00262)	(0.00262)	(0.00263)	(0.00262)
Proportion of Public Banks	123.8***	125.2***	124.4***	123.4***	124.9***	124.1***
	(21.18)	(21.17)	(21.18)	(21.18)	(21.17)	(21.18)
GDP per Capita		8.775***			8.794***	
		(1.617)			(1.617)	
Proportion Older than 80 Years			-495.7**			-514.9**
			(245.0)			(245.1)
Child Mortality			5.043			4.549
			(3.596)			(3.599)
Death Rate (t-1)				-0.802*	-0.809*	-0.819*
				(0.459)	(0.459)	(0.459)
Constant	787.4***	745.1***	854.3***	360.2***	322.7***	421.0***
	(11.68)	(14.03)	(36.61)	(12.36)	(14.14)	(33.82)
Observations	33,108	33,108	33,108	33,103	33,103	33,103
Overall R-Squared	0.110	0.130	0.119	0.107	0.126	0.116

Note: The panel shows the coefficients for the First Stage fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old as dependent variable. Instrumented variable is the amount of Payroll conceded in the city at each year divided by population over 60 years old. Proportion Older then 80 years is the percentage of individuals with age over 80 years old on the population of individuals with age over 60 years old. Demand deposits per capita is the average amount of demand deposits per capita in each year at each city, as well as Chartered Demand Deposits per Capita is the average amount of demand deposits on institutions chartered with INSS. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old. We used the demand deposits on chartered institutions and the proportion of public banks as instruments.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Second Stage

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Death Rate on Age Range of 60 to 69 years old (per thousand)					
Payroll per Old	-0.00275***	-0.00253***	-0.00265***	-0.00278***	-0.00255***	-0.00267***
	(0.000451)	(0.000441)	(0.000448)	(0.000449)	(0.000439)	(0.000446)
GDP per Capita		0.0770***			0.0782***	
		(0.0190)			(0.0189)	
Demand Deposits per Capita	0.000119***	9.44e-05**	0.000117***	0.000131***	0.000105***	0.000129***
	(4.16e-05)	(4.09e-05)	(4.15e-05)	(4.15e-05)	(4.08e-05)	(4.14e-05)
Proportion Older than 80 Years			-10.20***			-11.56***
			(2.890)			(2.881)
Child Mortality			0.456***			0.439***
			(0.0424)			(0.0423)
Death Rate (t-1)				-0.0842***	-0.0841***	-0.0836***
				(0.00543)	(0.00540)	(0.00541)
Constant	11.72***	11.17***	12.80***	12.53***	11.97***	13.79***
	(0.346)	(0.345)	(0.545)	(0.352)	(0.351)	(0.550)
Mean (death rates)	10.48194	10.48194	10.48194	10.48194	10.48194	10.48194
	(7.827036)	(7.827036)	(7.827036)	(7.827036)	(7.827036)	(7.827036)
Impact of 1 sd of Payroll per Capita	-2.3765	-2.1864	-2.2901	-2.4024	-2.2036	-2.3073
Observations	33,108	33,108	33,108	33,103	33,103	33,103
Overall R-Squared	0.0302	0.0233	0.002	0.095	0.090	0.041

Note: The panel shows the Coefficients for fixed-effects panel models fitted using the death rate in the age range of 60 to 69 years old as dependent variable. Proportion Older then 80 years is the percentage of individuals with age over 80 years old on the population of individuals with age over 60 years old. Instrumented variable is payroll per old, which is defined as the ratio of total amount of payroll lending to population older than 60 years in each city in each year. All models have also time dummies. Proportion Older than 80 years is the proportion of individuals over 80 years old in the population over 60 years old. We used the demand deposits on chartered institutions and the proportion of public banks as instruments.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

2.6.2. Effect of Payroll Lending on Health Conditions

Table 29 presents the results for the regressions that fit physical difficulties on payroll per capita and that control for individuals over 60 years of age. Table 30 presents the results for the same specifications but using the weights in PNAD. Years of study has a negative sign, indicating that individuals with lower levels of education are more prone to physical difficulties, and the indicator of being a female has positive signs, indicating that women have a higher probability of

having physical problems. As expected, age has positive coefficients because the older the person, the higher the possibility of having one or more of these disabilities. The coefficients are negative in all outcomes except for difficulty to feed oneself, providing evidence that an increase in payroll lending is associated with better physical conditions. However, the statistical significance of the coefficient depends on the outcome. In general, the results are more statistically significant in non-weighted regressions or when the sample is restricted to individuals who sought medical assistance during the previous two weeks before the interview. However, the difference in significance between the weighted and non-weighted regressions tends to be the result of an increase in standard deviation instead of a decrease in the magnitude of the coefficients.

Table 29 - Physical Difficulties for persons older than 60 years as a Function of Payroll per Capita and Family Income

Panel A: All Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	5.80e-08	4.88e-07	-4.47e-08	4.14e-07	-4.71e-07	5.71e-07
	(7.71e-07)	(5.53e-07)	(5.89e-07)	(7.80e-07)	(5.88e-07)	(5.78e-07)
Years of Study	-0.0110***	-0.0158***	-0.0148***	-0.0141***	-0.0101***	-0.0172***
	(0.000457)	(0.000558)	(0.000519)	(0.000623)	(0.000409)	(0.000673)
Female	0.0802***	0.141***	0.133***	0.137***	0.0324***	0.145***
	(0.00312)	(0.00395)	(0.00418)	(0.00412)	(0.00294)	(0.00374)
Age	0.000396***	0.000316***	6.15e-05	0.000347***	0.000662***	0.000123
	(9.49e-05)	(0.000107)	(8.54e-05)	(0.000107)	(0.000118)	(9.63e-05)
Payroll per Capita	-5.63e-05*	-8.17e-05*	-8.21e-05**	-4.76e-05	2.31e-05	-6.06e-05*
	(3.29e-05)	(4.54e-05)	(3.54e-05)	(4.08e-05)	(3.81e-05)	(3.34e-05)
Constant	0.151***	0.363***	0.446***	0.329***	0.121***	0.480***
	(0.00882)	(0.0110)	(0.00826)	(0.0102)	(0.0106)	(0.00912)
Mean (Difficulty)	0,18915	0,3864	0,46164	0,3775	0,1446	0,4756
	(0,39163)	(0,48692)	(0,49853)	(0,48476)	(0,3517)	(0,49941)
Effect of 1 sd increase of Payroll per Capita	-0.01183	-0.01716	-0.01725	-0.01000	0.004853	-0.01273
Observations	56,945	56,945	56,945	56,945	56,945	56,945
R-squared	0.056	0.067	0.060	0.070	0.047	0.072

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used all individuals older than 60 years old in the sample. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Only Individuals that Looked for Health Services

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	3.49e-06***	1.98e-06	9.17e-07	2.59e-06*	1.58e-06	1.63e-06
	(1.12e-06)	(1.43e-06)	(1.21e-06)	(1.54e-06)	(1.24e-06)	(1.19e-06)
Years of Study	-0.0114***	-0.0144***	-0.0133***	-0.0127***	-0.0118***	-0.0149***
	(0.000951)	(0.000916)	(0.00112)	(0.000899)	(0.000879)	(0.00103)
Female	0.0661***	0.116***	0.112***	0.108***	0.000357	0.115***
	(0.00701)	(0.00836)	(0.00877)	(0.00951)	(0.00721)	(0.00798)
Age	0.000334*	-0.000130	-0.000464***	-1.99e-05	0.00119***	-0.000367***
	(0.000180)	(0.000144)	(8.78e-05)	(0.000160)	(0.000313)	(0.000126)
Payroll per Capita	-0.000202***	-0.000154***	-0.000144***	-0.000128**	-2.55e-05	-8.75e-05*
	(5.80e-05)	(5.72e-05)	(5.55e-05)	(5.88e-05)	(8.73e-05)	(5.03e-05)
Constant	0.240***	0.500***	0.590***	0.461***	0.180***	0.608***
	(0.0155)	(0.0137)	(0.0135)	(0.0161)	(0.0254)	(0.0118)
Mean (Difficulty)	0,18915	0,3864	0,46164	0,3775	0,1446	0,4756
	(0,39163)	(0,48692)	(0,49853)	(0,48476)	(0,3517)	(0,49941)
Effect of 1 sd increase of Payroll per Capita	-0.04244	-0.03235	-0.03025	-0.02689	0.005357	0.01838
Observations	13,651	13,651	13,651	13,651	13,651	13,651
R-squared	0.087	0.094	0.090	0.093	0.096	0.096

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used individuals older than 60 years old in the sample that had looked for medical services in the previous two weeks before the interview. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Table 30 - Physical Difficulties for persons older than 60 years as a Function of Payroll per Capita

Panel A: All Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	2.98e-07	4.67e-07	-2.28e-07	4.11e-07	-2.35e-07	5.14e-07
	(6.22e-07)	(4.67e-07)	(4.95e-07)	(6.49e-07)	(4.63e-07)	(4.84e-07)
Years of Study	-0.0112***	-0.0158***	-0.0152***	-0.0144***	-0.0100***	-0.0172***
	(0.000455)	(0.000616)	(0.000554)	(0.000701)	(0.000475)	(0.000795)
Female	0.0786***	0.139***	0.129***	0.134***	0.0313***	0.141***
	(0.00338)	(0.00446)	(0.00517)	(0.00490)	(0.00307)	(0.00442)
Age	0.000465***	0.000410***	0.000157*	0.000451***	0.000683***	0.000205**
	(9.49e-05)	(0.000111)	(9.35e-05)	(0.000112)	(0.000122)	(9.95e-05)
Payroll per Capita	-6.33e-05	-8.13e-05*	-7.65e-05*	-5.95e-05	7.40e-06	-6.26e-05
	(4.26e-05)	(4.63e-05)	(4.15e-05)	(4.77e-05)	(3.44e-05)	(4.32e-05)
Constant	0.146***	0.352***	0.446***	0.321***	0.118***	0.472***
	(0.00960)	(0.0106)	(0.00826)	(0.0101)	(0.0104)	(0.00936)
Mean (Difficulty)	0,18915	0,3864	0,46164	0,3775	0,1446	0,4756
	(0,39163)	(0,48692)	(0,49853)	(0,48476)	(0,3517)	(0,49941)
Effect of 1 sd increase of Payroll per Capita	-0.01330	-0.01708	-0.01607	-0.01250	0.001555	-0.01315
Observations	56,945	56,945	56,945	56,945	56,945	56,945
R-squared	0.059	0.069	0.062	0.072	0.048	0.072

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used all individuals older than 60 years old in the sample. Looked for Health Service is a dummy that has value 1 if the individual had looked for health services in the previous two weeks before the interview. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust. Estimation are weighted by observation relevance.

Panel B: Only Individuals that Looked for Health Services

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	4.12e-06***	2.50e-06**	1.11e-06	2.98e-06**	2.03e-06**	1.59e-06
	(9.27e-07)	(1.09e-06)	(1.03e-06)	(1.17e-06)	(9.92e-07)	(1.03e-06)
Years of Study	-0.0123***	-0.0149***	-0.0137***	-0.0134***	-0.0118***	-0.0151***
	(0.000889)	(0.000995)	(0.00122)	(0.00104)	(0.000901)	(0.00118)
Female	0.0618***	0.110***	0.103***	0.104***	-0.000431	0.108***
	(0.00738)	(0.00960)	(0.00942)	(0.0108)	(0.00711)	(0.00864)
Age	0.000435*	-3.16e-05	-0.000395***	0.000121	0.00128***	-0.000345**
	(0.000257)	(0.000208)	(0.000127)	(0.000227)	(0.000420)	(0.000161)
Payroll per Capita	-0.000210***	-0.000144**	-0.000135*	-0.000142*	-6.43e-05	-7.27e-05
	(6.89e-05)	(7.19e-05)	(8.06e-05)	(7.57e-05)	(6.84e-05)	(7.50e-05)
Constant	0.236***	0.493***	0.590***	0.449***	0.177***	0.606***
	(0.0200)	(0.0175)	(0.0135)	(0.0192)	(0.0317)	(0.0144)
Mean (Difficulty)	0,18915	0,3864	0,46164	0,3775	0,1446	0,4756
	(0,39163)	(0,48692)	(0,49853)	(0,48476)	(0,3517)	(0,49941)
Effect of 1 sd increase of Payroll per Capita	-0.04412	-0.03025	-0.02836	-0.02983	0.01351	-0.01527
Observations	13,651	13,651	13,651	13,651	13,651	13,651
R-squared	0.092	0.095	0.091	0.098	0.099	0.096

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used all individuals older than 60 years old in the sample. Looked for Health Service is a dummy that has value 1 if the individual had looked for health services in the previous two weeks before the interview. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust. Estimation are weighted by observation relevance.

Tables 31 and 32 present the results for the regressions in the form of (4.3). Table 31 corresponds to non-weighted regressions, whereas Table 32 uses the weights suggested in PNAD. The results are similar in magnitude in both tables, and they are statistically significant in more regressions represented by Table 31 than by Table 32. In all variables except for difficulty in feeding oneself, the coefficients show the stronger effects of payroll lending on individuals with lower incomes. The results are consistent with the situation in which payroll lending is used as a source to fund health expenses.

Table 31 - Physical Difficulties for persons older than 60 years as a Function of Payroll per Capita and Family Income

Panel A: All Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	1.91e-07	7.42e-07	1.62e-07	7.58e-07	-6.33e-07	8.44e-07
	(8.00e-07)	(6.16e-07)	(6.03e-07)	(7.98e-07)	(5.67e-07)	(5.75e-07)
Years of Study	-0.0103***	-0.0145***	-0.0134***	-0.0131***	-0.0105***	-0.0152***
	(0.000512)	(0.000543)	(0.000612)	(0.000631)	(0.000449)	(0.000656)
Female	0.0809***	0.140***	0.132***	0.136***	0.0327***	0.145***
	(0.00309)	(0.00400)	(0.00433)	(0.00420)	(0.00305)	(0.00390)
Age	0.000395***	0.000317***	5.72e-05	0.000342***	0.000666***	0.000122
	(9.60e-05)	(0.000109)	(8.63e-05)	(0.000108)	(0.000120)	(9.79e-05)
Income	-3.32e-06***	-6.90e-06***	-7.40e-06***	-5.95e-06***	3.39e-07	-9.27e-06***
	(7.90e-07)	(1.48e-06)	(1.14e-06)	(1.13e-06)	(9.27e-07)	(1.38e-06)
Payroll per Capita	-6.47e-05*	-9.90e-05**	-9.46e-05***	-6.20e-05	2.61e-05	-8.34e-05**
	(3.48e-05)	(4.58e-05)	(3.42e-05)	(4.20e-05)	(4.07e-05)	(3.33e-05)
Payroll per Capita * Income	2.40e-09**	5.53e-09***	4.97e-09***	4.53e-09***	1.36e-09	6.41e-09***
	(1.03e-09)	(1.84e-09)	(1.36e-09)	(1.25e-09)	(1.08e-09)	(1.54e-09)
Constant	0.153***	0.369***	0.463***	0.334***	0.122***	0.487***
	(0.00915)	(0.0111)	(0.00783)	(0.0104)	(0.0111)	(0.00915)
Mean (Difficulty)	0,18915	0,3864	0,46164	0,3775	0,1446	0,4756
	(0,39163)	(0,48692)	(0,49853)	(0,48476)	(0,3517)	(0,49941)
Effect of 1 sd on 25th percentile of income	-0.01331	-0.02017	-0.01498	-0.01251	0.005638	-0.01679
Effect of 1 sd on 50th percentile of income	-0.01308	-0.01961	-0.01448	-0.01206	0.005775	-0.01615
Effect of 1 sd on 75th percentile of income	-0.01258	-0.01848	-0.01346	-0.01112	0.006055	-0.01483
Observations	54,694	54,694	54,694	54,694	54,694	54,694
R-squared	0.057	0.068	0.062	0.071	0.047	0.073

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used all individuals older than 60 years old in the sample. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty, for the 25th, 50th and 75th percentiles of income.
*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust. Estimation are weighted by observation relevance.

Panel B: Only Individuals that Looked for Health Services

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	3.63e-06***	2.43e-06*	1.09e-06	2.68e-06	1.40e-06	1.79e-06
	(1.19e-06)	(1.43e-06)	(1.18e-06)	(1.65e-06)	(1.16e-06)	(1.21e-06)
Years of Study	-0.0105***	-0.0122***	-0.0109***	-0.0105***	-0.0119***	-0.0121***
	(0.00103)	(0.00104)	(0.00118)	(0.00110)	(0.00102)	(0.00112)
Female	0.0675***	0.114***	0.112***	0.111***	0.000221	0.116***
	(0.00715)	(0.00892)	(0.00902)	(0.00940)	(0.00762)	(0.00860)
Age	0.000353*	-0.000108	-0.000463***	2.40e-05	0.00130***	-0.000336**
	(0.000193)	(0.000157)	(9.20e-05)	(0.000175)	(0.000338)	(0.000137)
Income	-6.21e-06***	-1.21e-05***	-1.15e-05***	-1.13e-05***	-2.38e-06	-1.40e-05***
	(1.59e-06)	(2.50e-06)	(2.42e-06)	(2.14e-06)	(2.14e-06)	(2.30e-06)
Payroll per Capita	-0.000223***	-0.000187***	-0.000152***	-0.000153**	-2.17e-05	-0.000115**
	(6.73e-05)	(6.07e-05)	(5.90e-05)	(6.37e-05)	(9.12e-05)	(5.71e-05)
Payroll per Capita * Income	6.01e-09***	9.01e-09***	5.88e-09**	7.64e-09***	4.48e-09*	7.51e-09***
	(2.30e-09)	(2.90e-09)	(2.68e-09)	(2.60e-09)	(2.51e-09)	(2.88e-09)
Constant	0.244***	0.510***	0.602***	0.464***	0.177***	0.614***
	(0.0172)	(0.0153)	(0.0123)	(0.0174)	(0.0278)	(0.0128)
Mean (Difficulty)	0,18915	0,3864	0,46164	0,3775	0,1446	0,4756
	(0,39163)	(0,48692)	(0,49853)	(0,48476)	(0,3517)	(0,49941)
Effect of 1 sd on 25th percentile of income	-0.04617	-0.03827	-0.03127	-0.03128	-0.004051	-0.02331
Effect of 1 sd on 50th percentile of income	-0.04556	-0.03736	-0.03067	-0.03051	-0.003599	-0.02255
Effect of 1 sd on 75th percentile of income	-0.04433	-0.03550	-0.02946	-0.02893	-0.002677	-0.02101
Observations	13,128	13,128	13,128	13,128	13,128	13,128
R-squared	0.090	0.098	0.095	0.098	0.098	0.102

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used individuals older than 60 years old in the sample that had looked for medical services in the previous two weeks before the interview. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty, for the 25th, 50th and 75th percentiles of income.
*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust. Estimation are weighted by observation relevance.

Table 32 - Physical Difficulties for persons older than 60 years as a Function of Payroll per Capita and Family Income

Panel A: All Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	3.87e-07	7.39e-07	-9.25e-08	6.93e-07	-3.95e-07	7.29e-07
	(6.85e-07)	(5.27e-07)	(5.27e-07)	(7.06e-07)	(4.32e-07)	(4.82e-07)
Years of Study	-0.0105***	-0.0146***	-0.0137***	-0.0134***	-0.0104***	-0.0153***
	(0.000556)	(0.000554)	(0.000654)	(0.000693)	(0.000517)	(0.000721)
Female	0.0792***	0.138***	0.127***	0.134***	0.0315***	0.141***
	(0.00334)	(0.00452)	(0.00543)	(0.00503)	(0.00326)	(0.00474)
Age	0.000454***	0.000401***	0.000145	0.000436***	0.000677***	0.000194*
	(9.56e-05)	(0.000112)	(9.28e-05)	(0.000112)	(0.000123)	(0.000100)
Income	-2.97e-06***	-6.22e-06***	-7.47e-06***	-6.11e-06***	2.10e-07	-9.10e-06***
	(8.73e-07)	(1.91e-06)	(1.29e-06)	(1.39e-06)	(9.70e-07)	(1.71e-06)
Payroll per Capita	-6.20e-05	-9.92e-05**	-9.15e-05**	-7.14e-05	1.66e-05	-8.49e-05*
	(4.40e-05)	(4.79e-05)	(4.19e-05)	(4.80e-05)	(3.48e-05)	(4.44e-05)
Payroll per Capita * Income	1.10e-09	5.67e-09**	6.05e-09***	5.13e-09***	7.84e-10	7.24e-09***
	(1.81e-09)	(2.33e-09)	(2.02e-09)	(1.84e-09)	(1.43e-09)	(2.29e-09)
Constant	0.153***	0.369***	0.463***	0.334***	0.122***	0.487***
	(0.00915)	(0.0111)	(0.00783)	(0.0104)	(0.0111)	(0.00915)
Mean (Difficulty)	0,18915	0,3864	0,46164	0,3775	0,1446	0,4756
	(0,39163)	(0,48692)	(0,49853)	(0,48476)	(0,3517)	(0,49941)
Effect of 1 sd on 25th percentile of income	-0.01291	-0.02020	-0.01501	-0.01225	0.003576	-0.01702
Effect of 1 sd on 50th percentile of income	-0.01279	-0.01963	-0.01440	-0.01174	0.003656	-0.01629
Effect of 1 sd on 75th percentile of income	-0.01256	-0.01846	-0.01315	-0.01068	0.003817	-0.01479
Observations	54,694	54,694	54,694	54,694	54,694	54,694
R-squared	0.059	0.069	0.063	0.074	0.048	0.073

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used all individuals older than 60 years old in the sample. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty, for the 25th, 50th and 75th percentiles of income.
*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Only Individuals that Looked for Health Services

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	4.24e-06***	2.94e-06***	1.15e-06	3.00e-06**	1.72e-06**	1.60e-06
	(1.01e-06)	(1.10e-06)	(1.05e-06)	(1.31e-06)	(8.72e-07)	(1.00e-06)
Years of Study	-0.0114***	-0.0130***	-0.0115***	-0.0112***	-0.0123***	-0.0122***
	(0.000958)	(0.00104)	(0.00132)	(0.00121)	(0.00100)	(0.00133)
Female	0.0632***	0.107***	0.104***	0.107***	-0.000764	0.110***
	(0.00751)	(0.0102)	(0.00972)	(0.0109)	(0.00740)	(0.00917)
Age	0.000433	-2.43e-05	-0.000400***	0.000136	0.00133***	-0.000330*
	(0.000265)	(0.000216)	(0.000128)	(0.000241)	(0.000447)	(0.000173)
Income	-4.91e-06***	-9.92e-06***	-1.02e-05***	-1.06e-05***	-1.23e-06	-1.39e-05***
	(1.78e-06)	(2.81e-06)	(2.65e-06)	(2.36e-06)	(2.61e-06)	(2.36e-06)
Payroll per Capita	-0.000213***	-0.000163**	-0.000129	-0.000154*	-4.73e-05	-8.85e-05
	(7.46e-05)	(7.61e-05)	(7.91e-05)	(8.01e-05)	(7.10e-05)	(7.95e-05)
Payroll per Capita * Income	2.90e-09	6.55e-09*	4.94e-09	6.28e-09*	3.36e-09	7.23e-09**
	(3.71e-09)	(3.51e-09)	(3.19e-09)	(3.26e-09)	(3.61e-09)	(3.39e-09)
Constant	0.238***	0.502***	0.594***	0.451***	0.178***	0.611***
	(0.0218)	(0.0191)	(0.0144)	(0.0207)	(0.0339)	(0.0159)
Mean (Difficulty)	0,18915	0,3864	0,46164	0,3775	0,1446	0,4756
	(0,39163)	(0,48692)	(0,49853)	(0,48476)	(0,3517)	(0,49941)
Effect of 1 sd on 25th percentile of income	-0.04442	-0.03350	-0.02654	-0.03164	-0.009556	-0.01777
Effect of 1 sd on 50th percentile of income	-0.04413	-0.03284	-0.02604	-0.03101	-0.009217	-0.01704
Effect of 1 sd on 75th percentile of income	-0.04353	-0.03149	-0.02503	-0.02972	-0.008526	-0.01556
Observations	13,128	13,128	13,128	13,128	13,128	13,128
R-squared	0.094	0.098	0.096	0.103	0.102	0.102

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used individuals older than 60 years old in the sample that had looked for medical services in the previous two weeks before the interview. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty, for the 25th, 50th and 75th percentiles of income.
*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Table 33 presents the results for age range 20–49 years for non-weighted regressions. The coefficients for payroll per capita and its interaction with family income are much smaller in absolute size than those in Table 31. However, in relative terms, the effects are even greater because the percentage of physical limitations is much smaller than those for the 60–69 age range.

Table 33 - Physical Difficulties for persons in 20-49 Age Range as a Function of Payroll per Capita and Family Income

Panel A: All Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	-7.89e-08	1.43e-07	-2.59e-08	6.88e-08	3.57e-09	3.15e-07
	(1.00e-07)	(1.69e-07)	(2.21e-07)	(1.55e-07)	(1.04e-07)	(1.96e-07)
Years of Study	-0.00214***	-0.00512***	-0.00566***	-0.00414***	-0.00270***	-0.00623***
	(9.25e-05)	(0.000209)	(0.000216)	(0.000163)	(0.000102)	(0.000231)
Female	0.0110***	0.0453***	0.0419***	0.0386***	0.00638***	0.0600***
	(0.000475)	(0.00119)	(0.00154)	(0.00118)	(0.000634)	(0.00187)
Age	0.00126***	0.00372***	0.00551***	0.00359***	0.000698***	0.00515***
	(4.20e-05)	(7.60e-05)	(0.000104)	(7.79e-05)	(3.97e-05)	(0.000113)
Income	-9.07e-07***	-3.33e-06***	-4.42e-06***	-2.59e-06***	4.25e-08	-4.48e-06***
	(1.39e-07)	(3.34e-07)	(3.55e-07)	(2.94e-07)	(1.42e-07)	(3.66e-07)
Payroll per Capita	-1.04e-05*	-3.48e-05**	-3.85e-05***	-1.71e-05*	-5.93e-06	-3.92e-05***
	(5.37e-06)	(1.44e-05)	(1.16e-05)	(8.74e-06)	(6.42e-06)	(1.36e-05)
Payroll per Capita * Income	2.05e-10	2.17e-09***	3.38e-09***	9.14e-10**	-3.85e-10	2.74e-09***
	(3.37e-10)	(6.32e-10)	(5.45e-10)	(4.30e-10)	(3.72e-10)	(6.23e-10)
Constant	-0.0105***	-0.0328***	-0.0647***	-0.0452***	0.0170***	-0.0546***
	(0.00194)	(0.00402)	(0.00471)	(0.00336)	(0.00177)	(0.00517)
Mean (Difficulty)	.0207741	.0685427	.0876058	.0598393	.0210786	.0874536
	(.0002716)	(.0004811)	(.0005383)	(.0004516)	(.0002735)	(.0005379)
Effect of 1 sd on 25th percentile of income	-0.002162	-0.007065	-0.007705	-0.003489	-0.001290	-0.007925
Effect of 1 sd on 50th percentile of income	-0.002141	-0.006846	-0.007364	-0.003397	-0.001328	-0.007648
Effect of 1 sd on 75th percentile of income	-0.002099	-0.006399	-0.006668	-0.003209	-0.0014076	-0.007084
Observations	267,141	267,141	267,141	267,141	267,141	267,141
R-squared	0.020	0.045	0.057	0.042	0.027	0.060

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used all individuals in age range from 20 to 49 years old in the sample. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty, for the 25th, 50th and 75th percentiles of
*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Only Individuals that Looked for Health Services

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	-1.35e-07	3.23e-07	1.13e-07	3.14e-08	3.55e-07	-1.33e-07
	(2.47e-07)	(4.28e-07)	(4.53e-07)	(4.80e-07)	(2.78e-07)	(5.81e-07)
Years of Study	-0.00544***	-0.0104***	-0.0101***	-0.00815***	-0.00494***	-0.0119***
	(0.000362)	(0.000549)	(0.000668)	(0.000558)	(0.000402)	(0.000612)
Female	0.0107***	0.0490***	0.0409***	0.0439***	-0.00381	0.0655***
	(0.00209)	(0.00372)	(0.00388)	(0.00370)	(0.00256)	(0.00475)
Age	0.00260***	0.00658***	0.00941***	0.00690***	0.00153***	0.00890***
	(0.000140)	(0.000241)	(0.000270)	(0.000217)	(0.000131)	(0.000298)
Income	-2.05e-06***	-7.79e-06***	-1.01e-05***	-7.04e-06***	-2.30e-06***	-1.02e-05***
	(6.53e-07)	(1.07e-06)	(1.11e-06)	(9.80e-07)	(6.54e-07)	(1.15e-06)
Payroll per Capita	-2.48e-05	-5.73e-05	-0.000109***	-4.91e-05	-5.69e-05***	-5.84e-05*
	(1.80e-05)	(4.31e-05)	(3.28e-05)	(3.26e-05)	(1.73e-05)	(2.99e-05)
Payroll per Capita * Income	-1.53e-09	2.34e-09	4.88e-09**	1.09e-09	1.57e-09	2.80e-09*
	(1.98e-09)	(2.57e-09)	(2.30e-09)	(2.04e-09)	(1.53e-09)	(1.64e-09)
Constant	0.00105	-0.00715	-0.0639***	-0.0521***	0.0487***	-0.0416***
	(0.00725)	(0.0123)	(0.0143)	(0.0109)	(0.00592)	(0.0146)
Mean (Difficulty)	.0207741	.0685427	.0876058	.0598393	.0210786	.0874536
	(.0002716)	(.0004811)	(.0005383)	(.0004516)	(.0002735)	(.0005379)
Effect of 1 sd on 25th percentile of income	-0.005384	-0.01177	-0.02235	-0.01019	-0.01178	-0.01195
Effect of 1 sd on 50th percentile of income	-0.005538	-0.01154	-0.02185	-0.01008	-0.01162	-0.01167
Effect of 1 sd on 75th percentile of income	-0.005853	-0.01106	-0.02085	-0.00986	-0.01129	-0.01109
Observations	36,471	36,471	36,471	36,471	36,471	36,471
R-squared	0.057	0.085	0.104	0.083	0.050	0.107

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used individuals in age range from 20 to 49 years old in the sample that had looked for medical services in the previous two weeks before the interview. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty, for the 25th, 50th and 75th percentiles of income.
*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

To verify why the effects are also present in the 20–49 age range, we conduct the regression in equation (4.4). The results are displayed in Table 34. The coefficients for the interaction of payroll per capita and pension are negative and statistically significant, and they are greater in magnitude than the coefficient for interaction between payroll per capita and income (except for the difficulty of lowering oneself, which is not statistically significant and not greater in

magnitude than the interaction between payroll per capita and family income), which means that pension benefits in the household amplify the effects of payroll lending on health outcomes.

Table 34 - Physical Difficulties for persons in age range of 20-59 years old as a Function of Payroll per Capita and

Panel A: All Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	-7.28e-08	1.52e-07	-1.58e-08	7.95e-08	1.24e-08	3.26e-07*
	(1.01e-07)	(1.70e-07)	(2.21e-07)	(1.56e-07)	(1.01e-07)	(1.97e-07)
Years of Study	-0.00213***	-0.00511***	-0.00565***	-0.00413***	-0.00268***	-0.00621***
	(9.19e-05)	(0.000208)	(0.000215)	(0.000163)	(0.000102)	(0.000230)
Female	0.0109***	0.0452***	0.0418***	0.0385***	0.00630***	0.0599***
	(0.000473)	(0.00120)	(0.00154)	(0.00118)	(0.000632)	(0.00187)
Age	0.00128***	0.00374***	0.00553***	0.00361***	0.000716***	0.00517***
	(4.20e-05)	(7.61e-05)	(0.000104)	(7.80e-05)	(3.95e-05)	(0.000113)
Income	-1.50e-06***	-4.20e-06***	-5.11e-06***	-3.63e-06***	-8.29e-07***	-5.48e-06***
	(1.55e-07)	(3.66e-07)	(3.95e-07)	(3.52e-07)	(1.49e-07)	(3.82e-07)
Pension	5.80e-06***	8.49e-06***	6.96e-06***	1.02e-05***	8.49e-06***	9.73e-06***
	(7.20e-07)	(1.01e-06)	(1.19e-06)	(1.17e-06)	(7.95e-07)	(1.43e-06)
Payroll per Capita	-1.02e-05*	-3.44e-05**	-3.80e-05***	-1.67e-05*	-5.55e-06	-3.88e-05***
	(5.41e-06)	(1.45e-05)	(1.15e-05)	(8.83e-06)	(6.49e-06)	(1.36e-05)
Payroll per Capita * Income	6.77e-10***	2.77e-09***	3.57e-09***	1.73e-09***	3.38e-10	3.46e-09***
	(2.50e-10)	(5.86e-10)	(5.69e-10)	(4.79e-10)	(3.19e-10)	(5.92e-10)
Payroll per Capita * Pension	-4.97e-09***	-6.68e-09***	-3.52e-09	-8.64e-09***	-7.50e-09***	-7.87e-09***
	(1.36e-09)	(1.51e-09)	(2.32e-09)	(2.20e-09)	(1.35e-09)	(3.00e-09)
Constant	-0.0111***	-0.0337***	-0.0656***	-0.0463***	0.0161***	-0.0557***
	(0.00194)	(0.00402)	(0.00466)	(0.00337)	(0.00179)	(0.00512)
Observations	267,125	267,125	267,125	267,125	267,125	267,125
R-squared	0.020	0.045	0.057	0.042	0.028	0.060

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used all individuals in age range of 20 to 49 years old in the sample. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. Pension is the monthly amount of pension and retirement benefits of the household in the year.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Only Individuals that Looked for Health Services

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: difficulty in:	Walking 100m	Walking 1 km	Lowering Oneself	Pushing a Table	Feeding Oneself	Going up a Hill
Demand Deposits per Capita	-1.37e-07	3.26e-07	1.16e-07	3.00e-08	3.55e-07	-1.36e-07
	(2.46e-07)	(4.28e-07)	(4.52e-07)	(4.77e-07)	(2.73e-07)	(5.76e-07)
Years of Study	-0.00539***	-0.0104***	-0.0100***	-0.00806***	-0.00488***	-0.0119***
	(0.000357)	(0.000539)	(0.000660)	(0.000541)	(0.000397)	(0.000603)
Female	0.0107***	0.0490***	0.0409***	0.0440***	-0.00381	0.0655***
	(0.00209)	(0.00373)	(0.00389)	(0.00370)	(0.00256)	(0.00472)
Age	0.00261***	0.00661***	0.00943***	0.00693***	0.00154***	0.00892***
	(0.000139)	(0.000241)	(0.000269)	(0.000217)	(0.000130)	(0.000296)
Income	-3.11e-06***	-9.16e-06***	-1.13e-05***	-8.92e-06***	-3.53e-06***	-1.19e-05***
	(7.00e-07)	(1.16e-06)	(1.23e-06)	(1.03e-06)	(6.03e-07)	(1.19e-06)
Pension	1.01e-05***	1.35e-05***	1.18e-05***	1.83e-05***	1.23e-05***	1.62e-05***
	(2.02e-06)	(3.12e-06)	(3.32e-06)	(3.34e-06)	(2.52e-06)	(3.32e-06)
Payroll per Capita	-2.38e-05	-5.49e-05	-0.000107***	-4.66e-05	-5.50e-05***	-5.67e-05*
	(1.83e-05)	(4.32e-05)	(3.25e-05)	(3.27e-05)	(1.73e-05)	(2.97e-05)
Payroll per Capita * Income	-6.53e-10	2.60e-09	4.72e-09**	2.11e-09	2.07e-09	4.09e-09**
	(2.03e-09)	(2.73e-09)	(2.33e-09)	(1.93e-09)	(1.28e-09)	(1.59e-09)
Payroll per Capita * Pension	-9.36e-09***	-7.33e-09*	-4.21e-09	-1.38e-08***	-8.25e-09**	-1.42e-08**
	(2.66e-09)	(3.81e-09)	(4.05e-09)	(4.56e-09)	(3.91e-09)	(5.83e-09)
Constant	-7.33e-05	-0.00906	-0.0657***	-0.0543***	0.0471***	-0.0434***
	(0.00728)	(0.0123)	(0.0142)	(0.0108)	(0.00587)	(0.0144)
Observations	36,468	36,468	36,468	36,468	36,468	36,468
R-squared	0.058	0.086	0.105	0.084	0.051	0.107

Note: This panel shows the coefficients of linear probability models fitted in physical difficulties as function of regressors. We used individuals in age range of 20 to 49 years old in the sample that had looked for medical services in the previous two weeks before the interview. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. Pension is the monthly amount of pension and retirement benefits of the household in the year.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

2.6.3. Effect on Health Care

Table 35 presents the results of models (4.1) and (4.2) using the number of medical consultations in the 12 months before the interview as dependent variable. All results are from Tobit models left-censored on 0. Panel A uses a sample of people over the age of 60 years, whereas panel B uses a sample of people in the age range 20–49 years. The coefficients for payroll per capita in Panel A are positive in all specifications, whereas their interactions with income are negative. A standard deviation change in payroll per capita means an increase of approximately 0.18 (non-weighted estimation) or 0.26 (weighted) on the number of medical consultations. Because the mean at this age range is approximately 4.6 consultations per year, this change means an increase of 3.9% to 5.7% from that number. The coefficient of the interaction term is negative in both weighted and non-weighted specifications but significant only in the non-weighted one, indicating that the effect is stronger on families with lower incomes. The results in Panel B display non-significant coefficients for payroll per capita and positive and significant coefficients for the interaction. These coefficients indicate that no effect of payroll lending on medical consultation appears in this age range.

Table 35 - Number of Medical Consultations as a Function of Payroll per Capita and Family Income

Panel A: Age over 60 years old

	(1)	(2)	(3)	(4)
Dependent Variable:	Number of Medical Consultations			
Demand Deposits per Capita	-2.71e-05***	-3.25e-05***	-2.92e-05**	-3.61e-05***
	(1.03e-05)	(9.65e-06)	(1.19e-05)	(1.09e-05)
Years of Study	-0.00346	-0.0147	-0.0306***	-0.0408***
	(0.0117)	(0.0129)	(0.0109)	(0.0110)
Female	1.599***	1.575***	1.610***	1.582***
	(0.0568)	(0.0645)	(0.0581)	(0.0659)
Age	-5.72e-05	-0.000110	-0.000139	-0.000205
	(0.00108)	(0.00114)	(0.00111)	(0.00118)
Income			0.000123***	0.000113***
			(2.46e-05)	(3.00e-05)
Payroll per Capita	0.000855*	0.00125**	0.000975*	0.00141**
	(0.000487)	(0.000516)	(0.000513)	(0.000548)
Payroll per Capita * Income			-7.08e-08***	-5.61e-08
			(2.38e-08)	(3.56e-08)
Constant	2.716***	2.595***	2.616***	2.457***
	(0.320)	(0.321)	(0.322)	(0.346)
Mean (Medical Consultations)	4.564723	4.564723	4.564723	4.564723
	(6.256322)	(6.256322)	(6.256322)	(6.256322)
Effect of 1 sd on 25th percentile of income	0.17963	0.26262	0.19681	0.28987
Effect of 1 sd on 50th percentile of income	0.17963	0.26262	0.18967	0.28421
Effect of 1 sd on 75th percentile of income	0.17963	0.26262	0.17509	0.27266
Weighted	No	Yes	No	Yes
Observations	56,929	56,929	54,679	54,679
Pseudo R-squared	0.00878	0.00958	0.00909	0.00992

Note: This panel shows the coefficients of OLS regressions with number of medical consultations in the previous 360 days before the interview as outcome. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita. We also express the predicted effect of one standard error of increase in the amount of payroll per capita on the probability of each difficulty, for the 25th, 50th and 75th percentiles of income.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Age range 20-50 Years Old

	(1)	(2)	(3)	(4)
VARIABLES	Number of Medical Consultations			
Demand Deposits per Capita	-6.82e-06	-1.54e-05*	-7.01e-06	-1.46e-05*
	(1.14e-05)	(8.84e-06)	(1.01e-05)	(7.71e-06)
Years of Study	0.0888***	0.0732***	0.0746***	0.0632***
	(0.00931)	(0.00792)	(0.00781)	(0.00738)
Female	3.075***	3.088***	3.097***	3.109***
	(0.0399)	(0.0422)	(0.0399)	(0.0426)
Age	0.0678***	0.0677***	0.0656***	0.0662***
	(0.00205)	(0.00197)	(0.00192)	(0.00195)
Income			4.44e-05***	2.68e-05***
			(1.08e-05)	(8.82e-06)
Payroll per Capita	0.000133	0.000412	-0.000161	2.30e-05
	(0.000334)	(0.000379)	(0.000312)	(0.000349)
Payroll per Capita * Income			5.02e-08***	6.59e-08***
			(1.58e-08)	(1.72e-08)
Constant	-4.004***	-3.982***	-3.864***	-3.841***
	(0.223)	(0.294)	(0.204)	(0.267)
Mean (Difficulty)	2.71323	2.71323	2.71323	2.71323
	(4.592579)	(4.592579)	(4.592579)	(4.592579)
Weighted	No	Yes	No	Yes
Observations	275,820	275,820	267,095	267,095
Pseudo R-squared	0.0207	0.0209	0.0209	0.0211

Note: This panel shows the coefficients of OLS regressions with number of medical consultations in the previous 360 days before the interview as outcome. Income is the monthly imcome of household. Payroll per capita is the amount of payroll lending conceded in the city in the year per capita.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Using data on households' budget contained in POF, we conducted the regression in (4.5), where the percentage of pensions in household income is used as continuous treatment. Table 36 shows the results using data for income and expenditures in the regression, and Table 37 shows the results using the logarithms of the variables (we added 1 to the variables to avoid losing the values

of zero). The results in Table 36 show that the coefficients for the interaction between an indicator of the 2008/2009 survey and the proportion of pension benefits in the household are positive, with values from 270.7 to 391.60. Therefore, for the years after the change in legislation, the spending of a family with full funds from a pension, *ceteris paribus*, was increased by that amount. The values are statistically significant in Panel A (for non-weighted values) and marginally significant for specification in Panel B without fixed effects for states. Despite the loss of significance, the coefficients in Panel B are close than those of Panel A. Another point is that, when using the proportion of individuals older than 60 years of age as a control, the coefficient for the proportion of income from retirement decreases by approximately two-thirds in magnitude, whereas the interaction's coefficient decreases by only approximately 10%.

The coefficients for the interaction term between proportion of pension benefits and the indicator of the 2008/2009 survey in logarithm form (as displayed in Table 37) are positive and in the range 0.215 to 0.288. These coefficients are all significant at the 5% level, except for one specification, which is significant at the 10% level. When the proportion of persons older than 60 years is introduced into the regressions, the coefficients for the proportion of health benefits decrease more than 50%, whereas the interaction coefficients remain almost the same.

Table 36 -Health Expenditures as a Function of Income and Retirement Benefits

Panel A: Non-Weighted

	(1)	(2)	(3)	(4)
Dependent Variable	Health Expenditures			
Family Income	0.0314***	0.0312***	0.0303***	0.0302***
	(0.00522)	(0.00520)	(0.00517)	(0.00515)
Number of members	57.66***	100.7***	88.52***	129.8***
	(6.212)	(7.311)	(8.223)	(9.249)
Year 2008	249.3***	253.7***	226.1***	231.5***
	(37.22)	(37.24)	(35.04)	(35.07)
Proportion of income from retirement	1101***	281.6***	1165***	364.9***
	(69.74)	(88.57)	(66.65)	(81.84)
Proportion of income from retirement * Year2008	391.6***	356.8***	327.7***	295.7***
	(82.26)	(82.25)	(81.87)	(81.92)
Proportion of Individuals with Age over 60 years old		1268***		1231***
		(90.15)		(87.03)
Constant	-465.4***	-673.5***	-419.8***	-614.0***
	(131.7)	(133.2)	(151.1)	(153.0)
Fixed effects of State	no	no	yes	yes
Observations	104,537	104,537	104,537	104,537

Note: This panel shows the coefficients of OLS regressions with annualized heath expenditures as outcome. Income is the anual income of household. Data on income and expenditures are deflated to 2008 values.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Weighted

	(1)	(2)	(3)	(4)
Dependent Variable	Health Expenditures			
Family Income	0.0409***	0.0406***	0.0396***	0.0394***
	(0.00607)	(0.00593)	(0.00603)	(0.00592)
Number of members	57.10***	124.4***	90.75***	154.9***
	(11.43)	(22.42)	(8.796)	(19.87)
Year 2008	299.5***	310.1***	338.7***	347.5***
	(67.59)	(69.14)	(66.96)	(67.98)
Proportion of income from retirement	1,505***	247.1	1,603***	375.3
	(267.5)	(296.2)	(272.5)	(262.1)
Proportion of income from retirement * Year2008	343.8*	335.3*	275.3	270.7
	(199.8)	(203.0)	(190.6)	(194.9)
Proportion of Individuals with Age over 60 years old		1,820***		1,765***
		(389.4)		(379.1)
Constant	-757.6***	-1,075***	-1,039***	-1,338***
	(262.6)	(334.1)	(345.6)	(409.6)
Fixed effects of State	no	no	yes	yes
Observations	104,537	104,537	104,537	104,537

Note: This panel shows the coefficients of OLS regressions with annualized heath expenditures as outcome. Income is the anual income of household. Data on income and expenditures are deflated to 2008 values.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Table 37 -Health Expenditures (in log) as a Function of Income and Retirement Benefits

Panel A: Non-Weighted

	(1)	(2)	(3)	(4)
Dependent Variable		log(Health Expenditures)		
log(Family Income)	1.400***	1.389***	1.371***	1.360***
	(0.0406)	(0.0404)	(0.0411)	(0.0416)
log(Number of members)	0.477***	0.626***	0.516***	0.662***
	(0.0402)	(0.0404)	(0.0392)	(0.0409)
Year 2008	0.275***	0.282***	0.257***	0.265***
	(0.0821)	(0.0815)	(0.0791)	(0.0785)
Proportion of income from retirement	1.211***	0.544***	1.181***	0.518***
	(0.136)	(0.118)	(0.125)	(0.101)
Proportion of income from retirement * Year2008	0.288**	0.262**	0.278**	0.253*
	(0.134)	(0.128)	(0.135)	(0.129)
Proportion of Individuals with Age over 60 years old		1.065***		1.055***
		(0.0579)		(0.0599)
Constant	-9.325***	-9.434***	-8.897***	-9.010***
	(0.420)	(0.419)	(0.387)	(0.389)
Fixed effects of State	no	no	yes	yes
Observations	104,537	104,537	104,537	104,537

Note: This panel shows the coefficients of OLS regressions with log of annualized heath expenditures as outcome. Log (family income) is the logarithm for the anual income of household. Data on income and expenditures are deflated to 2008 values.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

Panel B: Weighted

	(1)	(2)	(3)	(4)
Dependent Variable		log(Health Expenditures)		
log(Family Income)	1.385***	1.374***	1.350***	1.341***
	(0.0309)	(0.0306)	(0.0309)	(0.0311)
log(Number of members)	0.441***	0.592***	0.476***	0.624***
	(0.0387)	(0.0438)	(0.0378)	(0.0429)
Year 2008	0.280***	0.288***	0.298***	0.305***
	(0.0453)	(0.0442)	(0.0477)	(0.0465)
Proportion of income from retirement	1.276***	0.573***	1.283***	0.584***
	(0.115)	(0.137)	(0.114)	(0.138)
Proportion of income from retirement * Year2008	0.231**	0.227**	0.218**	0.215**
	(0.102)	(0.101)	(0.101)	(0.100)
Proportion of Individuals with Age over 60 years old		1.051***		1.041***
		(0.0902)		(0.0929)
Constant	-9.009***	-9.128***	-8.666***	-8.803***
	(0.296)	(0.295)	(0.274)	(0.277)
Fixed effects of State	no	no	yes	yes
Observations	104,537	104,537	104,537	104,537

Note: This panel shows the coefficients of OLS regressions with log of annualized heath expenditures as outcome. Log (family income) is the logarithm for the anual income of household. Data on income and expenditures are deflated to 2008 values.

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%. All standard errors are robust.

2.7. Conclusion

The change in legislation on payroll lending in Brazil has shifted the supply of credit (Coelho, Funchal and de Mello, 2011). For institutional reasons, pensioners and retirees from INSS were targets for such loans. We take a step further in this analysis, verifying whether this type of loan is associated with better health conditions. Our results show that, first, more payroll lending is

associated with lower death rates, especially at ages above 60 years. Second, this effect is stronger when the proportion of public banks and the number of chartered bank assets per capita are used as instruments. Third, individuals in cities with more payroll lending are more likely to have better physical conditions. The effect is stronger for individuals with lower incomes and, for the 20–50 age range, the effect is stronger for families with more retirement benefits. Fourth, more payroll lending is associated with a larger number of medical consultations. Fifth, if the proportion of retirement benefits is used as the treatment variable, a positive effect on spending occurs during the years after the change in legislation.

The results provide evidence that an increase in payroll lending resulted in an improvement in health conditions associated with an increase in health spending. Therefore, payroll lending helps to circumvent credit restrictions that worsen health conditions and is evidence of the limitations of the Brazilian public health system.

This article is important in terms of documenting a method for increasing welfare related to better access to credit markets. We see the analysis of payroll lending as a very promising source of evidence on the relationship between credit markets and development because it can be seen as a creative exogenous measure that addresses credit restrictions and a relatively poor institutional framework.