



# Economic Sector, Demographic Composition, Educational Attainment, and Earnings in Brazil

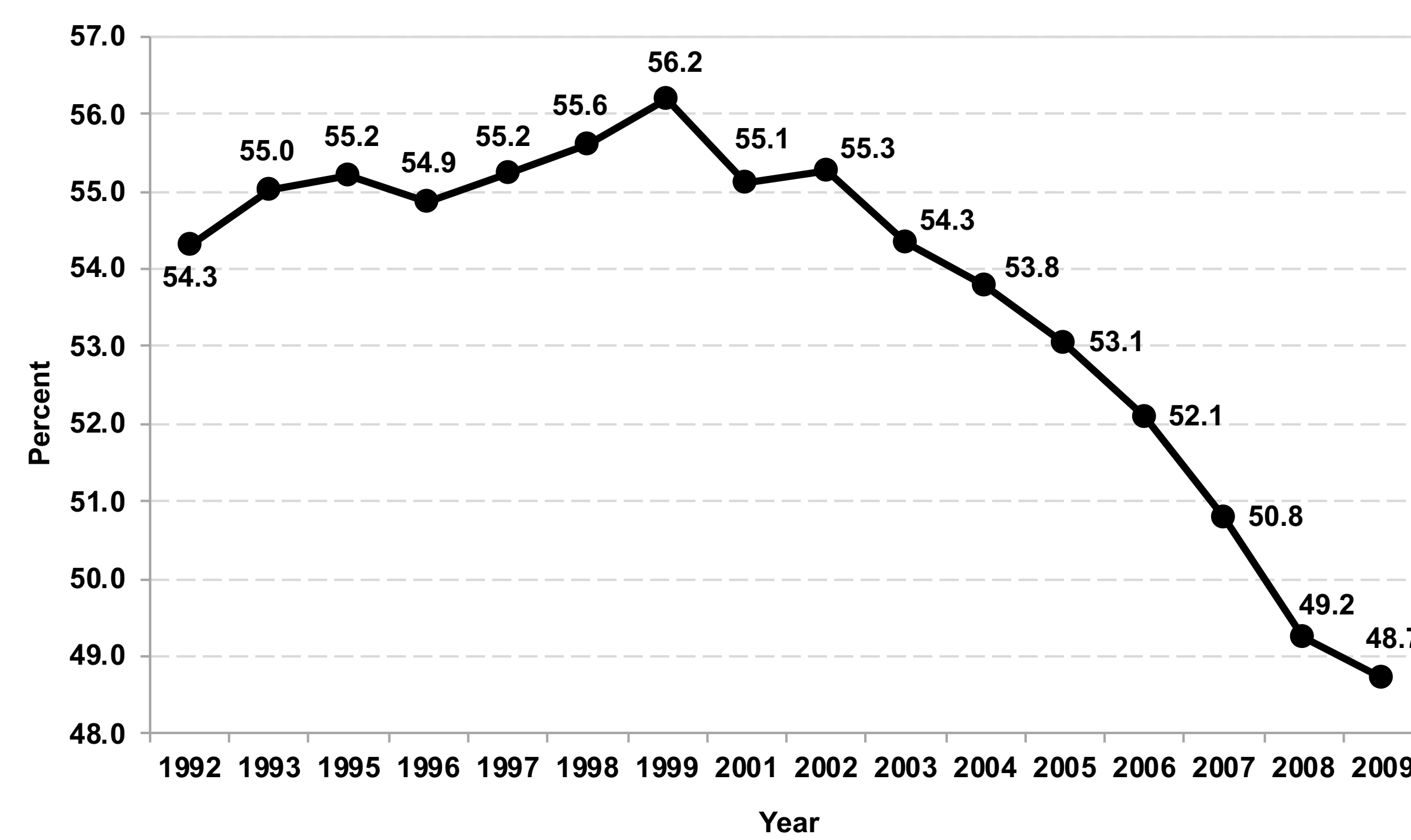
## Objective

- ✓ We estimate associations of individual- and area-level variables with individual earnings of male workers living in urban areas in Brazil
- ✓ We advance beyond the preceding literature by considering changes in the composition of the economic sector (formal and informal jobs)

## Background

- ✓ Proportion of workers in the formal economic sector increased between 2000 and 2010
- ✓ Earnings decreased from 1980 to 1991 and increased in 2000
- ✓ Earnings in the formal economic sector decreased again in 2010

## Workers in the informal economic sector



Source: Neto and Zylberstajn (1999) for 1992–1999; Brazilian Ministry of Labor and Employment (MTE) for 2001–2009.

## Data and methods

- ✓ 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses
- ✓ Ordinary least squares (OLS) models for log monthly earnings of male workers

## Individual-level independent variables

- ✓ Indicators of age-education groups (G)
- ✓ Economic sector (*Formal*): formal vs informal
- ✓ Interactions (*I*) combining binary variable of formal workers with age-education groups
- ✓ Race/color: non-white, white
- ✓ Marital status: non-married, married
- ✓ Religion: non-Protestant, Protestant
- ✓ Region: North, Northeast, South, Southeast, Central-West

## Contextual-level independent variables

- ✓ Variables by 502 comparable areas of residence (micro-regions) through time
- ✓ Male population distributed (*X*) into age-education groups (*g*) by area (*a*) and time (*θ*)
- ✓ Proportion of workers in formal economic sector (*P*) by area (*a*)

## Economic sector as proportion

$$\log(Y_{ij}) = \beta_0 + \beta_1 G_i + \beta_2 X_{ga} + \beta_3 P_a + \varepsilon_i$$

Independent variables	1980	1991	2000	2010
<b>Economic sector</b>				
Proportion of workers in the formal sector	0.618*** (0.007)	1.146*** (0.010)	0.704*** (0.012)	1.112*** (0.010)

Note for all models: Robust standard errors are reported in parentheses. \*Significant at p<0.1, \*\*Significant at p<0.05, \*\*\*Significant at p<0.01. Source: 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses (Brazilian Institute of Geography and Statistics – IBGE).

## Economic sector as binary variable

$$\log(Y_{ij}) = \beta_0 + \beta_1 G_i + \beta_2 X_{ga} + \beta_3 Formal_i + \varepsilon_i$$

Independent variables	1980	1991	2000	2010
<b>Economic sector</b>				
Informal economic sector	ref.	ref.	ref.	ref.
Formal economic sector	0.328*** (0.001)	0.219*** (0.001)	0.265*** (0.001)	0.273*** (0.001)

## Interaction (*I*) of age-education (*G*) with economic sector (*Formal*)

$$\log(Y_{ij}) = \beta_0 + \beta_1 G_i + \beta_2 X_{ga} + \beta_3 Formal_i + \beta_4 I_i + \varepsilon_i$$

Independent variables	1980	1991	2000	2010
<b>Economic sector</b>				
Informal economic sector	ref.	ref.	ref.	ref.
Formal economic sector	0.329*** (0.001)	0.174*** (0.002)	0.316*** (0.002)	0.445*** (0.003)
<b>Interactions of age-education and economic sector</b>				
15-24 years; Less than primary completed	ref.	ref.	ref.	ref.
15-24 years; Primary completed	0.044*** (0.004)	-0.029*** (0.005)	-0.045*** (0.003)	-0.083*** (0.004)
15-24 years; Secondary completed	0.066*** (0.007)	0.066*** (0.008)	-0.078*** (0.004)	-0.176*** (0.004)
15-24 years; University completed	0.407*** (0.025)	0.288*** (0.032)	0.124*** (0.020)	-0.201*** (0.019)
25-34 years; Less than primary completed	-0.084*** (0.002)	-0.016*** (0.003)	-0.143*** (0.003)	-0.173*** (0.004)
25-34 years; Primary completed	-0.162*** (0.006)	-0.068*** (0.006)	-0.203*** (0.004)	-0.284*** (0.004)
25-34 years; Secondary completed	-0.096*** (0.007)	0.015*** (0.007)	-0.126*** (0.004)	-0.265*** (0.004)
25-34 years; University completed	0.148*** (0.013)	0.105*** (0.016)	0.040*** (0.010)	-0.208*** (0.009)
35-49 years; Less than primary completed	0.027*** (0.002)	0.106*** (0.003)	-0.051*** (0.003)	-0.182*** (0.004)
35-49 years; Primary completed	-0.177*** (0.009)	0.077*** (0.009)	-0.078*** (0.005)	-0.279*** (0.005)
35-49 years; Secondary completed	-0.189*** (0.010)	0.127*** (0.010)	0.018*** (0.005)	-0.231*** (0.005)
35-49 years; University completed	-0.142*** (0.013)	0.086*** (0.017)	0.094*** (0.009)	-0.142*** (0.010)
50-64 years; Less than primary completed	0.115*** (0.003)	0.161*** (0.004)	0.054*** (0.004)	-0.101*** (0.004)
50-64 years; Primary completed	-0.015 (0.017)	0.135*** (0.019)	0.051*** (0.010)	-0.177*** (0.007)
50-64 years; Secondary completed	-0.025 (0.021)	0.204*** (0.022)	0.129*** (0.010)	-0.107*** (0.007)
50-64 years; University completed	-0.020 (0.023)	0.182*** (0.027)	0.126*** (0.012)	-0.005 (0.012)

## Only workers in formal sector

$$\log(Y_i^f) = \beta_0^f + \beta_1^f G_i^f + \beta_2^f X_{ga}^f + \varepsilon_i^f$$

Independent variables	1980	1991	2000	2010
<b>Proportions in age-education groups</b>				
15-24 years; Less than primary completed	ref.	ref.	ref.	ref.
15-24 years; Primary completed	-1.977*** (0.050)	6.648*** (0.133)	-1.276*** (0.087)	0.288*** (0.103)
15-24 years; Secondary completed	0.592*** (0.107)	0.018 (0.225)	2.538*** (0.125)	0.756*** (0.089)
15-24 years; University completed	17.237*** (0.919)	50.036*** (1.021)	-5.843*** (1.053)	-3.780*** (0.530)
25-34 years; Less than primary completed	4.722*** (0.046)	4.156*** (0.093)	1.426*** (0.091)	4.499*** (0.124)
25-34 years; Primary completed	10.550*** (0.153)	-5.364*** (0.168)	0.528*** (0.159)	6.135*** (0.136)
25-34 years; Secondary completed	-0.075 (0.163)	1.177*** (0.194)	3.854*** (0.160)	2.994*** (0.103)
25-34 years; University completed	11.267*** (0.221)	26.230*** (0.319)	14.573*** (0.368)	6.892*** (0.200)
35-49 years; Less than primary completed	2.135*** (0.052)	4.683*** (0.087)	1.494*** (0.076)	1.894*** (0.081)
35-49 years; Primary completed	6.601*** (0.266)	19.156*** (0.263)	1.014*** (0.176)	1.710*** (0.134)
35-49 years; Secondary completed	1.771*** (0.266)	0.702*** (0.243)	-3.368*** (0.142)	3.787*** (0.117)
35-49 years; University completed	0.476* (0.266)	-4.315*** (0.296)	7.957*** (0.260)	4.705*** (0.228)
50-64 years; Less than primary completed	0.009 (0.051)	-2.277*** (0.064)	-3.269*** (0.061)	0.104 (0.073)
50-64 years; Primary completed	-17.248*** (0.400)	-16.632*** (0.546)	14.421*** (0.357)	4.458*** (0.195)
50-64 years; Secondary completed	23.355*** (0.409)	-1.512*** (0.515)	-1.156*** (0.332)	-2.156*** (0.152)
50-64 years; University completed	-15.609*** (0.517)	-5.551*** (0.530)	-18.699*** (0.369)	-0.010 (0.199)

## Summary of results

- ✓ Individual-level variables
  - Older and better educated workers have higher earnings
  - Workers in the formal economic sector have higher earnings than those in the informal sector
  - White, married, non-Protestant men have higher earnings than other groups, as well as those living in the South and Central-West
- ✓ Area-level variables
  - Proportions of people in age-education groups have negative associations with earnings mostly among older workers
  - Higher proportions of people working in the formal economic sector have positive associations with earnings
- ✓ Models by economic sector
  - Proportions in age-education groups have higher positive coefficients in the informal sector, compared to the formal sector

## Only workers in informal sector

$$\log(Y_i^{if}) = \beta_0^{if} + \beta_1^{if} G_i^{if} + \beta_2^{if} X_{ga}^{if} + \varepsilon_i^{if}$$

Independent variables	1980	1991	2000	2010
<b>Proportions in age-education groups</b>				
15-24 years; Less than primary completed	ref.	ref.	ref.	ref.
15-24 years; Primary completed	-1.239*** (0.101)	4.170*** (0.165)	-2.288*** (0.106)	-1.630*** (0.145)
15-24 years; Secondary completed	2.515*** (0.180)	0.077 (0.283)	3.339*** (0.164)	3.506*** (0.139)
15-24 years; University completed	8.284*** (1.501)	55.753*** (1.509)	4.879*** (1.403)	3.288*** (0.912)
25-34 years; Less than primary completed	5.616*** (0.071)	2.432*** (0.105)	3.561*** (0.095)	5.702*** (0.177)
25-34 years; Primary completed	9.499*** (0.259)	-1.939*** (0.224)	2.938*** (0.195)	10.428*** (0.218)
25-34 years; Secondary completed	2.558*** (0.237)	1.658*** (0.235)	2.639*** (0.203)	2.043*** (0.164)
25-34 years; University completed	5.965*** (0.380)	21.064*** (0.463)	14.759*** (0.502)	9.256*** (0.336)
35-49 years; Less than primary completed	3.492*** (0.074)	2.343*** (0.103)	2.532*** (0.089)	2.191*** (0.115)
35-49 years; Primary completed	2.437*** (0.410)	11.185*** (0.362)	2.813*** (0.226)	8.845*** (0.220)
35-49 years; Secondary completed	4.228*** (0.401)	-3.216*** (0.311)	-2.169*** (0.182)	3.879*** (0.184)
35-49 years; University completed	1.493*** (0.466)	-5.305*** (0.415)	8.121*** (0.344)	-0.795** (0.387)
50-64 years; Less than primary completed	-0.557*** (0.073)	-3.121*** (0.083)	-3.839*** (0.072)	-0.668*** (0.111)
50-64 years; Primary completed	-3.323*** (0.638)	-11.267*** (0.722)	8.702*** (0.477)	-0.121 (0.325)
50-64 years; Secondary completed	23.339*** (0.724)	3.173*** (0.705)	4.443*** (0.437)	-0.580** (0.254)
50-64 years; University completed	-10.435*** (0.935)	-2.723*** (0.790)	-16.025*** (0.515)	4.008*** (0.362)

## Final considerations

- ✓ The stronger positive coefficients in the informal sector are an indication of higher levels of economic inequality among their workers, compared to workers in the formal sector
- ✓ We could expect that the increase in proportion of workers in the formal economic sector could generate competition for jobs and negatively affect earnings of workers in this economic sector
  - This expectation has not happened according to our models
- ✓ Our results suggest that the Brazilian labor market is relatively integrated, instead of presenting two segmented sectors
  - However, there is a higher concentration of younger and less educated workers in the informal sector, compared to the formal sector