Economic sector, demographic composition, educational attainment, and earnings in Brazil

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- Brazil has been experiencing major changes
  - Population aging
  - Educational improvement
  - Increase of workers in the formal economic sector
  - Oscillation of earnings by economic sector

- Do changes in demographic, educational, and economic sector compositions affect earnings over time?
  - Estimate associations of individual- and area-level variables with individual earnings of male workers

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1980, 1991, 2000, 2010 Censuses

- Dependent variable
  - Natural logarithm of individual earnings of Brazilian male workers on primary occupation
- Independent variables
  - 16 age-education indicators (G)
    - Age: 15–24, 25–34, 35–49, 50–64
    - Education: less than primary, primary, secondary, university
  - Distribution of the male population in 16 age-education groups for 502 areas (X_{ga})
  - Controls: race/color, marital status, religion, region

OLS models

1. Binary variable for economic sector (*Formal*)

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

2. Proportion of formal workers by area (P_a)

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

3. Interaction of sector and age-education group (*I*)

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

4. Only formal economic sector

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

5. Only informal economic sector

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

Description of sample

Year	Informal economic sector (%)	White (%)	Married (%)	Protestant (%)	Sample size
1980	22.7	61.6	56.3	5.9	4,309,110
1991	30.8	56.2	66.8	7.9	2,775,824
2000	40.9	57.8	48.7	13.5	3,305,805
2010	33.5	51.0	43.2	20.3	3,708,484

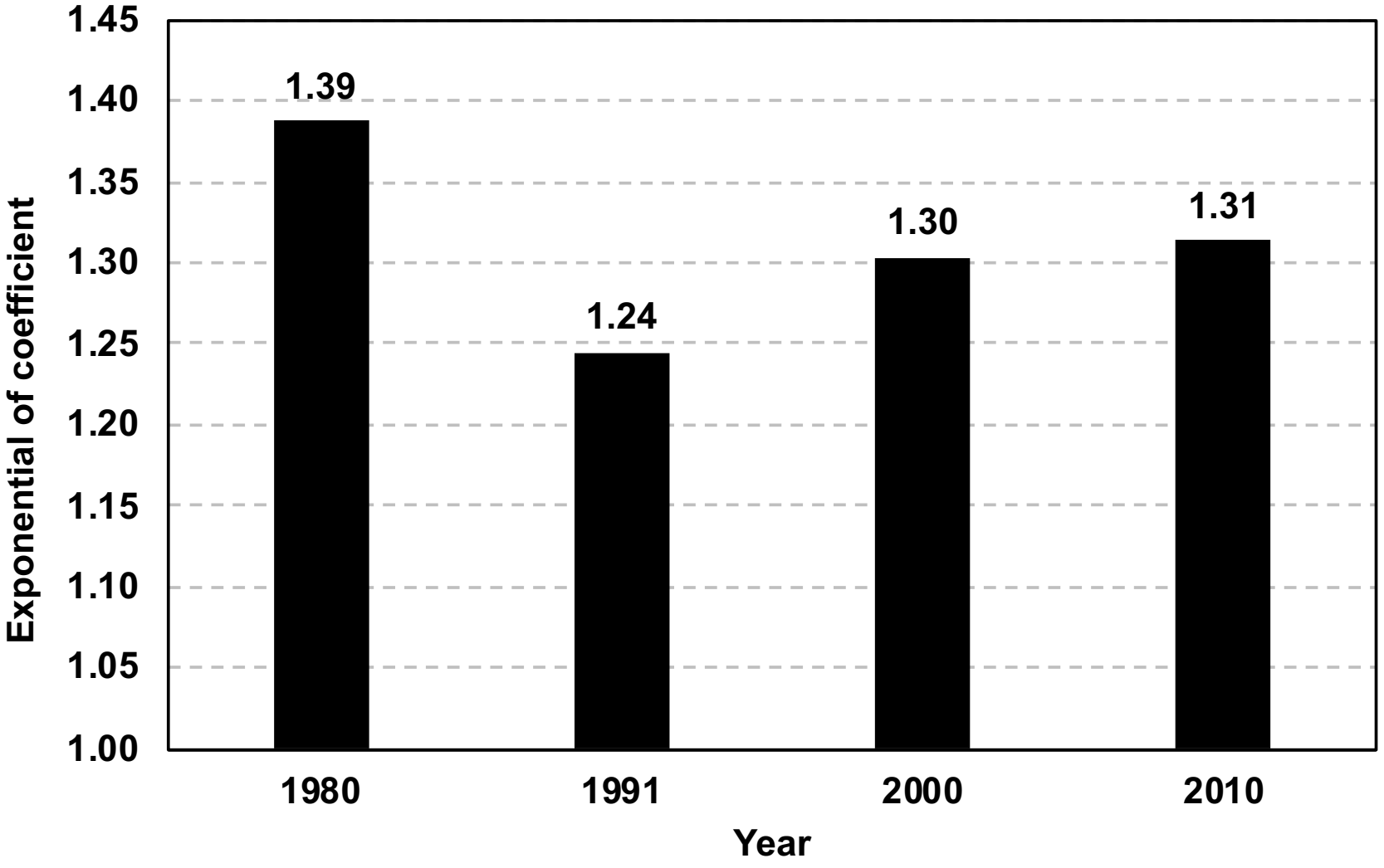
- We analyze only males in urban areas

Source: 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses.

Model results

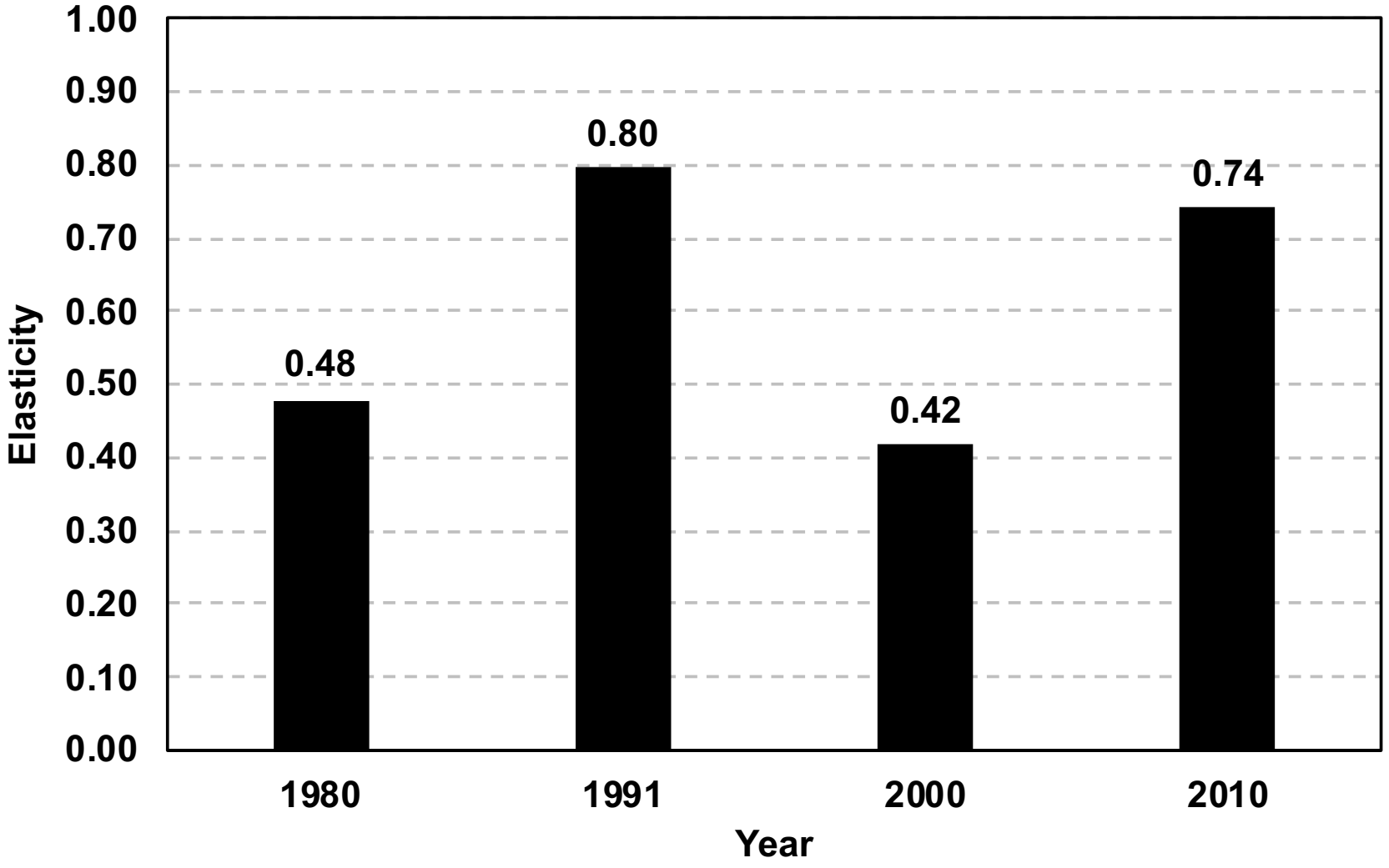
- Higher earnings: older, better educated, white, married, non-Protestant, South, and Center-West regions
- Proportions of people in age-education groups tend to have negative associations with earnings
  - Mostly among older workers and those with secondary education
- Now focus on results about economic sector...

Equation 1: Formal vs. Informal



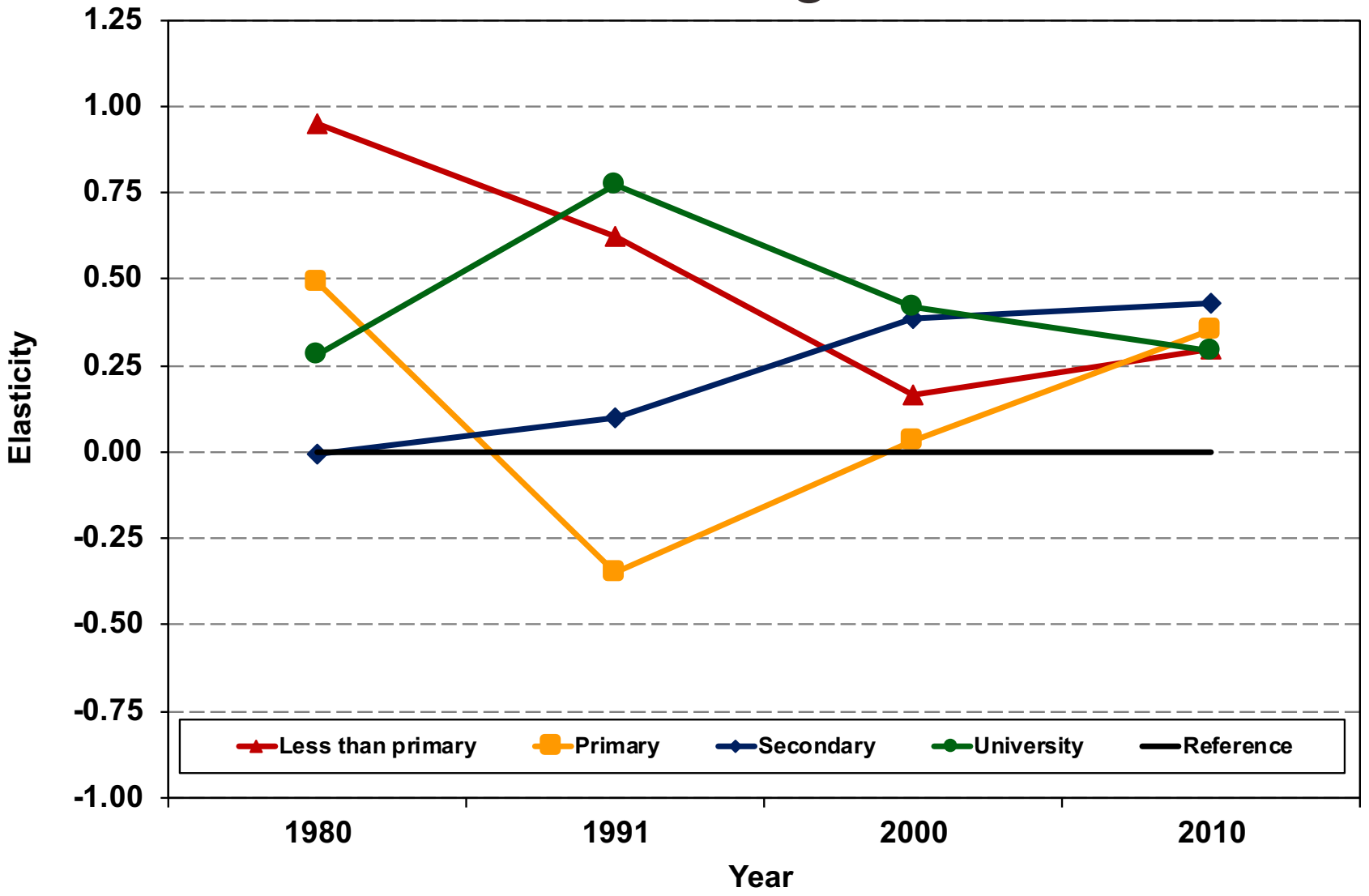
Source: 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses.

Equation 2: Effects of proportion in the formal sector (P_a)



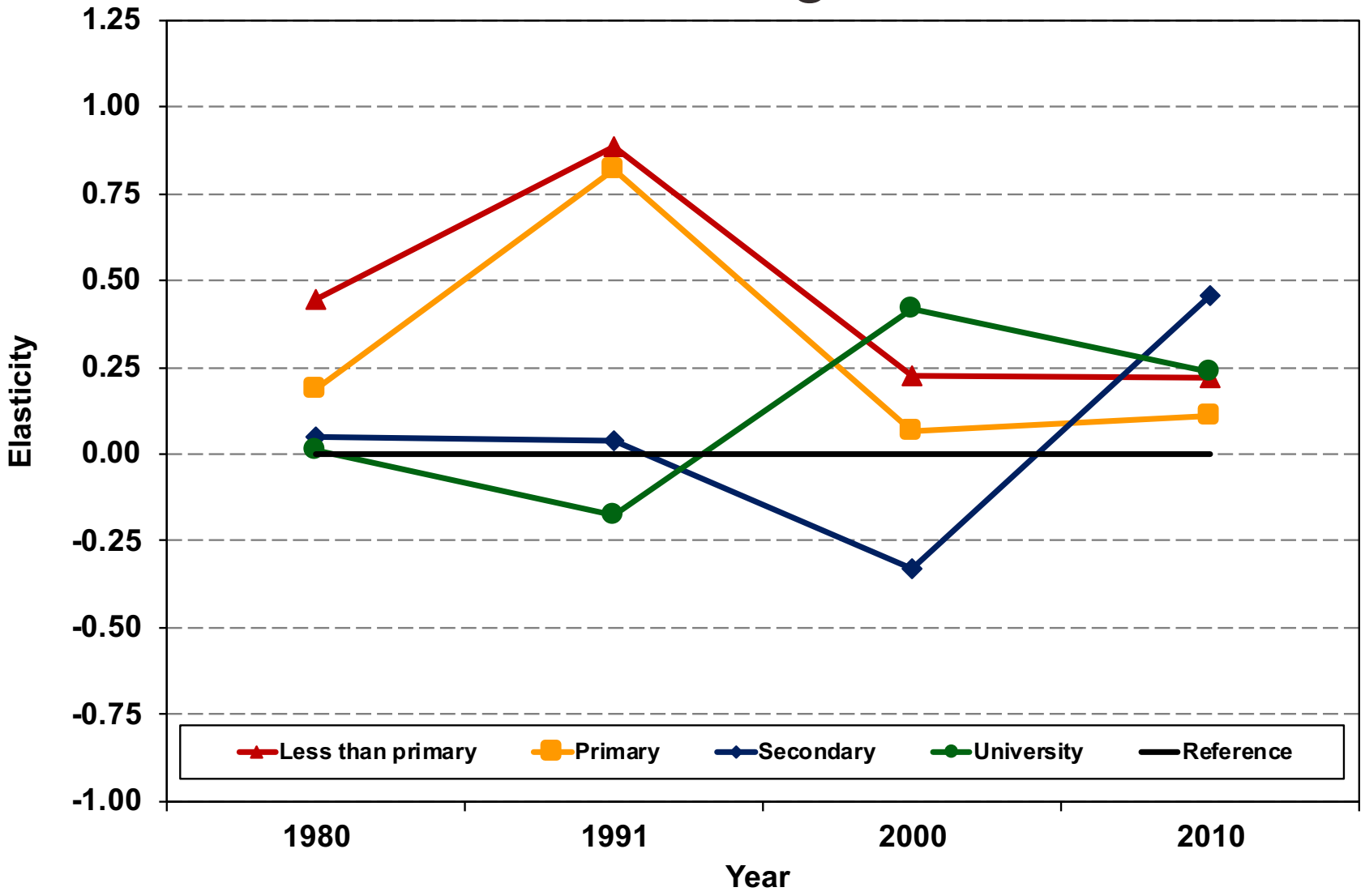
Source: 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses.

Equation 4: Effects of group proportions (X_{ga}) Formal sector, age 25–34



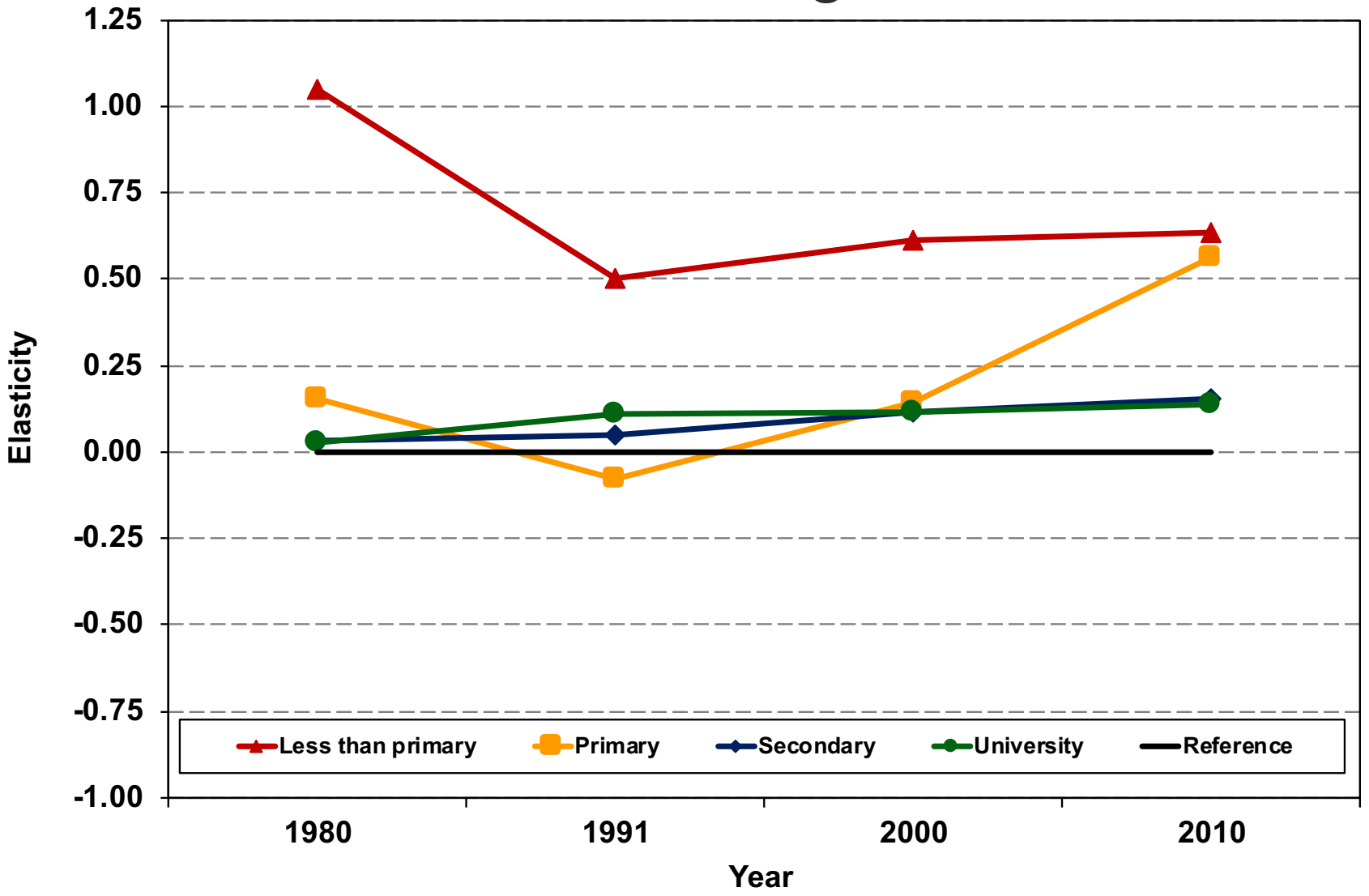
Source: 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses.

Equation 4: Effects of group proportions (X_{ga}) Formal sector, age 35–49



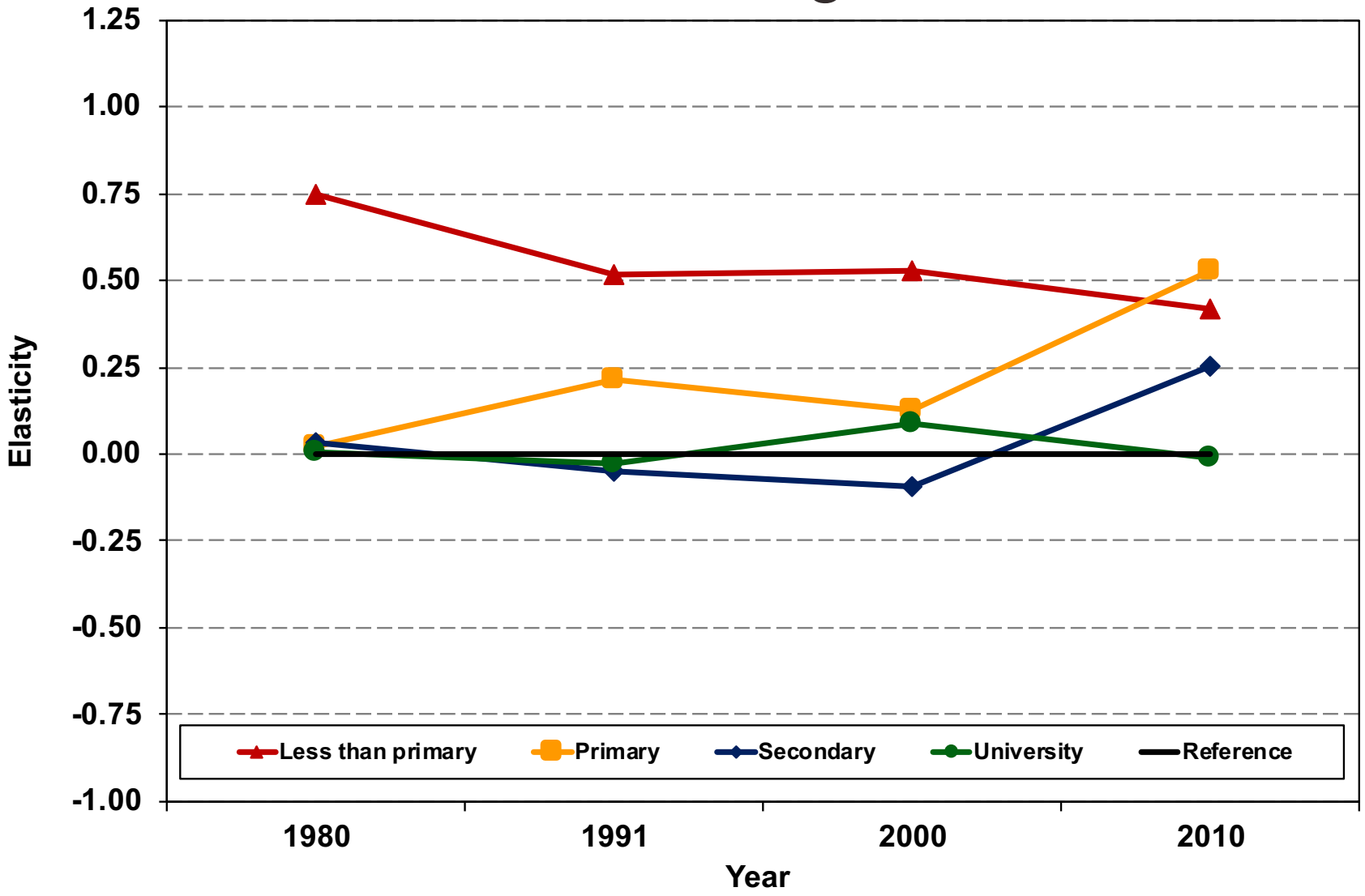
Source: 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses.

Equation 5: Effects of group proportions (X_{ga}) Informal sector, age 25–34



Source: 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses.

Equation 5: Effects of group proportions (X_{ga}) Informal sector, age 35–49



Source: 1980, 1991, 2000, and 2010 Brazilian Demographic Censuses.

Discussion

- Informal sector tends to have younger and less educated workers with lower earnings
- Increase in proportion of workers in the formal economic sector had positive effects on earnings
  - Indication of relatively integrated labor market, instead of presenting two segmented sectors
- Effects of proportions in age-education groups vary more among workers in the informal sector
  - Indication of higher levels of economic inequality among these workers in recent years