Economic consequences of geographic sorting based on honesty

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Motivation

The frequency of dishonest behaviour differs across localities around the world and migration sorting based on honesty may be a reason.

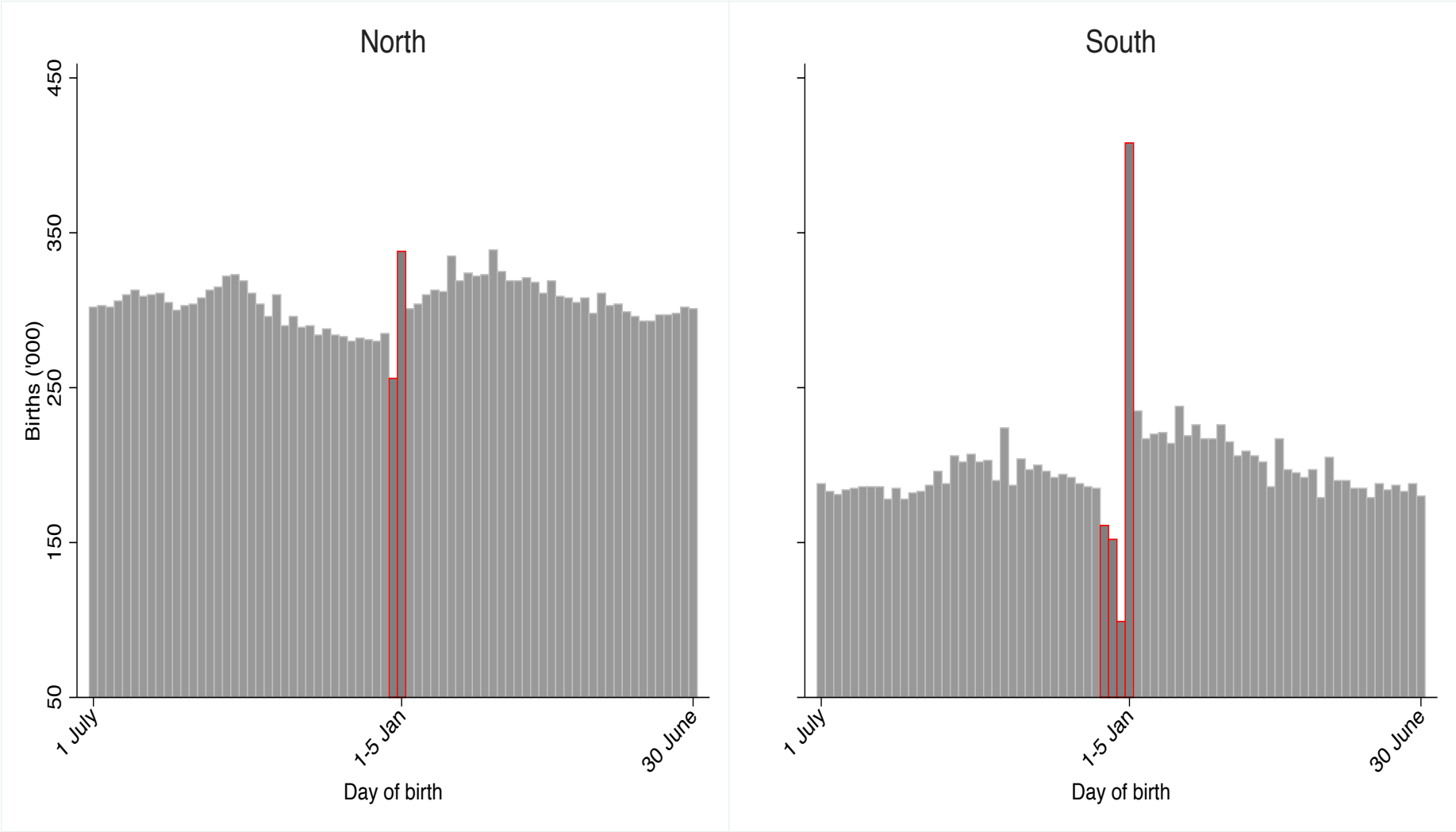
In this paper we show that:

1. Italians sort themselves across localities on the basis of honesty;
2. this geographic sorting has important consequences for economic outcomes in different localities.

To do this, we first need to:

3. describe our indicator of cheating that can be measured for migrants and remainers at the city/time level in Italy;
4. present a theoretical model of honesty and discuss why our indicator captures sorting based on honesty.

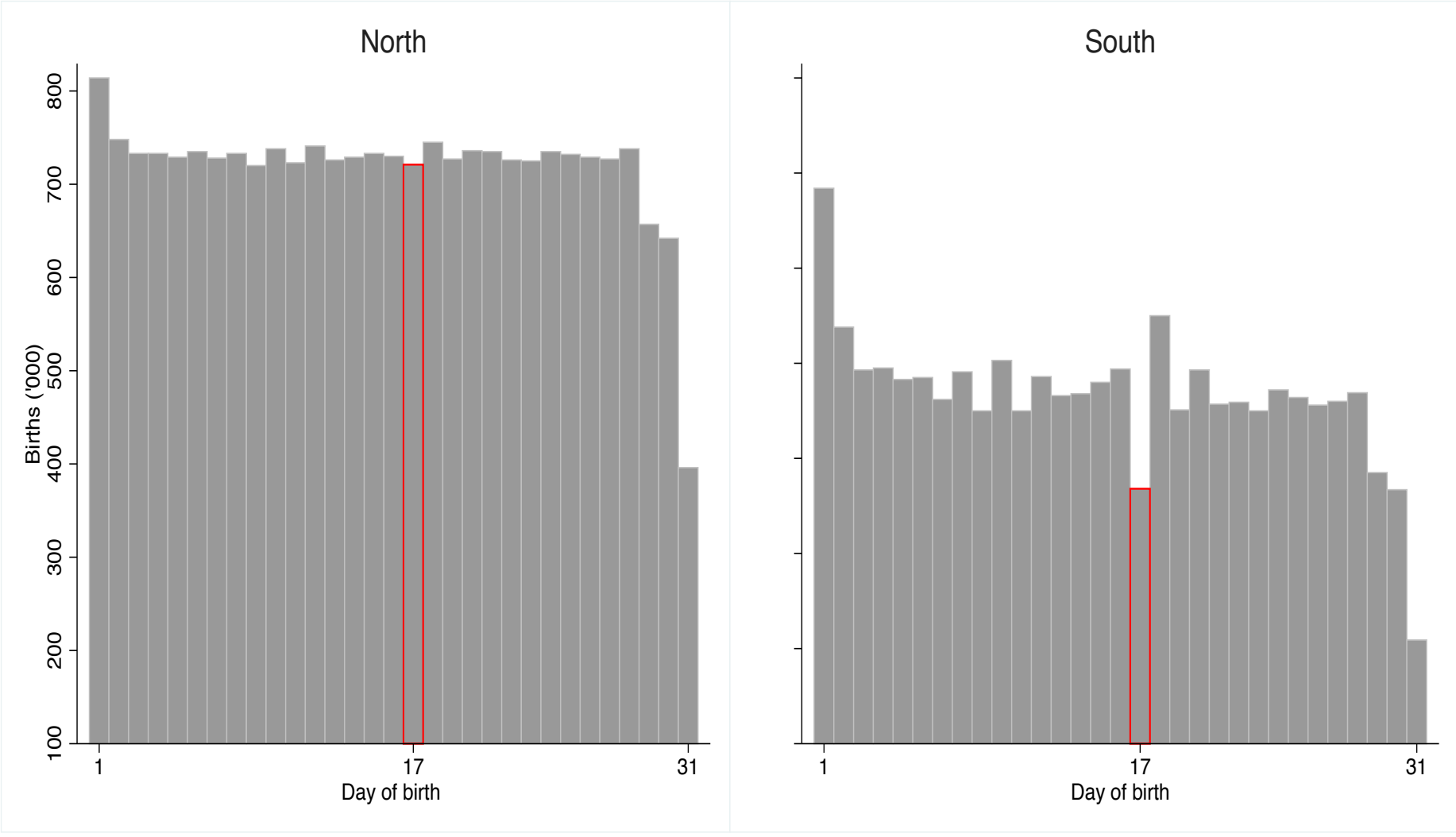
"January Birthdate" (JBD) cheating: North and South



Note: restricted Census 1991 data with precise birth date on 1920-1970 cohorts.

▸ cohorts 2005-10

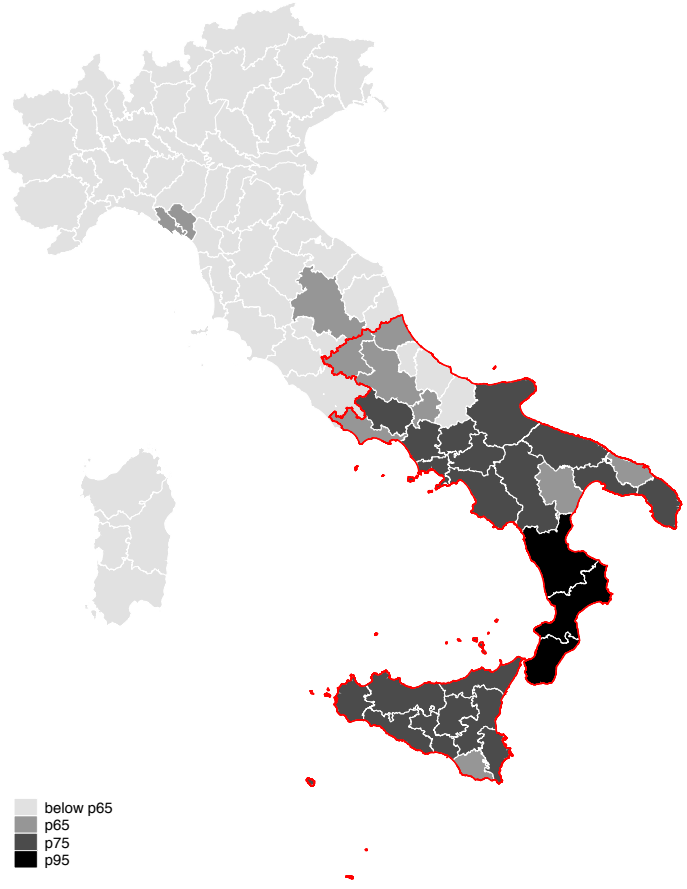
"17 Birthdate" (17BD) cheating: North and South



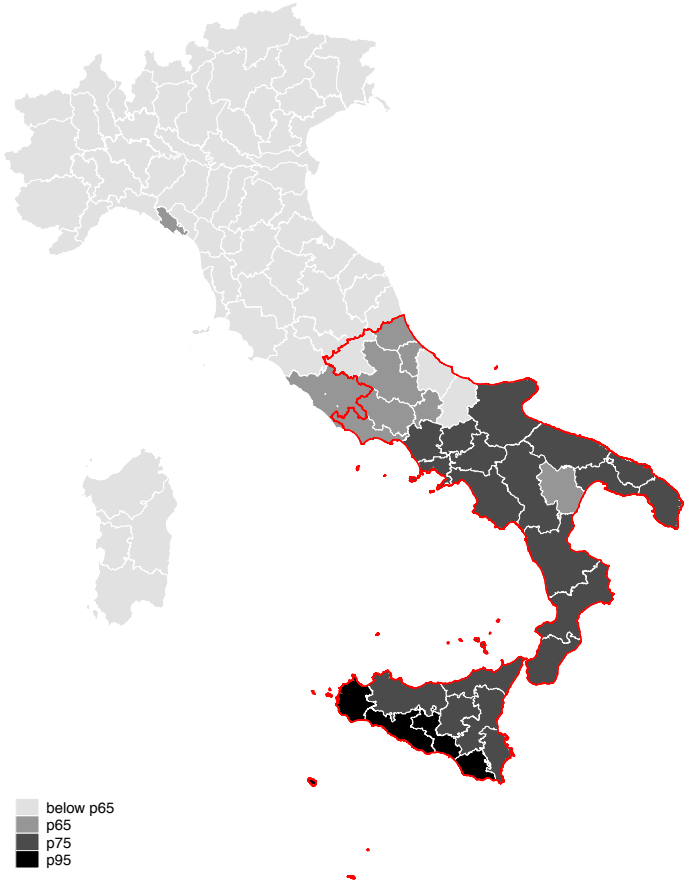
Note: restricted Census 1991 data with precise birth date on 1920-1970 cohorts

Definition of North and South

JBD cheating



17BD cheating



We define South as the provinces ruled by the "Regno delle due Sicilie" until 1861.

Reasons for BD cheating that we can exclude

In principle, BD cheating could have nothing to do with honesty.

However, we can exclude many of the "irrelevant" interpretations.

Specifically, BD cheating is not related to:

- Office closures around Xmas time. ▸ Easter holidays
- Who in the household respond to the Census questionnaire.
- The urban or rural location of the household.
- Observables of the child like gender and education. ▸ Link
- The census year. ▸ JBD 2001 ▸ JBD 2011 ▸ 17 - 2001 ▸ 17 - 2011
- We do not yet have admin vital statistics, but we expect to observe the same BD cheating there as well.

Plausible reasons for BD cheating

For 17BD cheating:

- superstition
- number 17 in the "Tombola napoletana" ▸ La disgrazia

For JBD cheating:

- Allows child to be physically more developed than mates;
  - analogy with "red shirting";
  - relevant in school, sports, army.
- Makes the child available to help at home for a longer time:
  - If child is male, military service starts one year later;
  - if child is female, there is more time to find a husband.

Census information does not allow us to nail down the specific reasons for BD cheating (in particular for JBD cheating), but ...

Why BD cheating is informative about honesty based sorting?

Irrespective of the motive, BD cheating is a lie that can be:

1. computed for small groups in the population at different points in time during the 20th century ("generations"), and specifically for:
   - migrants out of a given locality and
   - remainers in the same locality;
2. it correlates closely across cities with more traditional indicators of honesty and social capital; ▸ Correlations
3. traditional indicators cannot be typically observed for migrants and remainers within the same locality at different points in time.
4. Theory, which will come next, suggests a test of informativeness.

A caveat that may turn in an advantage: BD cheating is by parents, while migration may be of children;

- some degree of intergenerational transmission of honesty is needed

(Tabellini, 2008; Algan and Cahuc, 2010 Zilibotti et al. 2017)

Road map

- Preliminary evidence on BD cheating indicators.
- A model of honesty, probability of cheating and deterrence.
- Geographic sorting on the basis of honesty.
- The 1926 Fascist reforms: a shock to deterrence for BD cheating.
- The economic consequences of geographic sorting based on honesty.

Summary of the model

Definition of intrinsic honesty:

- Honest agents never cheat;
- Dishonest agents cheat if the benefit is higher than deterrence

Absence of cheating in a group does not imply honesty of the group.

If two groups are similar in terms of

- starting level of deterrence,
- distribution of cheating benefits,

the fraction of honest agents is larger in the group reacting less to an increase of deterrence.

▸ skip model

A definition of honesty

An agent can decide to cheat ($C = 1$) or not ($C = 0$).

$B \in (-\infty, +\infty)$ is the utility benefit of cheating and $f(.)$ is its distribution.

$D \in (-\infty, +\infty)$ is deterrence = disutility of the expected cost of cheating.

An agent is *honest* if she never cheats no matter how high is the benefit of cheating or how low is deterrence:

$$H = 1 \quad \iff \quad \forall B, D \quad C = 0$$

An agent is *dishonest* if she cheats when the benefit is larger than deterrence and does not cheat otherwise:

$$H = 0 \quad \iff \quad \begin{cases} C = 1, & \text{when } B > D \\ C = 0, & \text{when } B \leq D \end{cases}$$

Probability of cheating and reaction to deterrence

Let Π_H denote the probability of cheating for an agent of type H.

The probability of cheating is positive for a dishonest agent and zero for a honest agent:

$$\Pi_H = \begin{cases} \Pi_1 = 0 & \text{if } H = 1; \\ \Pi_0 = 1 - F(D) & \text{if } H = 0. \end{cases}$$

Only dishonest agents react to deterrence, by reducing cheating if deterrence increases (and viceversa):

$$\frac{\partial \Pi_H}{\partial D} = \begin{cases} \frac{\partial \Pi_1}{\partial D} = 0 & \text{if } H = 1; \\ \frac{\partial \Pi_0}{\partial D} = -f(D) & \text{if } H = 0. \end{cases}$$

From individuals to groups

Consider two groups of agents $g = \{m, r\}$ in a locality facing:

- the same deterrence D^*,
- the same distribution of cheating benefits $F(B)$.

Agents i are distributed on the $[0, 1]$ interval in each group.

Let H_{ig} denote their honesty:

$$\forall g, \quad H_{ig} \in \{0, 1\}.$$

The proportion of honest agents in group g is:

$$h_g = \mathbb{P}(H_{ig} = 1).$$

The share of cheaters in group g is given by:

$$\pi_g = \Pi_1 h_g + \Pi_0 (1 - h_g) = (1 - F(D^*))(1 - h_g).$$

Hp 1: Observed share of cheaters and honesty

The proportion of honest agents is larger in group m

$$h_m > h_r$$

if and only if the share of cheaters is lower in m:

$$\pi_m = (1 - F(D^*))(1 - h_m) < (1 - F(D^*))(1 - h_r) = \pi_r$$

This proposition and the next hold only if one can claim that D^* and $F(B)$ are the same for both groups.

If D^* is very high so that $F(D^*) \to 1$, the share of cheaters approaches zero in both groups, which become indistinguishable in this respect.

Hp 2: Observed reaction to deterrence and honesty

The proportion of agents with high honesty is larger in group m

$$h_m > h_r$$

if and only if the same increase (decrease) of deterrence reduces (increases) the share of cheaters more in r than in m:

$$\frac{\partial \pi_m}{\partial D^*} = -f(D^*)(1 - h_m) < -f(D^*)(1 - h_r) = \frac{\partial \pi_r}{\partial D^*}$$

If f is "bell shaped":

- $f(D^*) \to 0$ when deterrence is very low ($D^* \to -\infty$) or very high ($D^* \to +\infty$);
- in both cases the reaction to deterrence approaches zero for all groups, which become indistinguishable in this respect.

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Honesty of Migrants and Remainers

A migrant is someone born in the South and observed in the North at the Census time, or viceversa.

Let:

- π_{mlt} be the share of JBD cheaters among Migrants from locality l and born at time t
- π_{rlt} be the share of JBD cheaters among Remainers in locality l and born at time t.

In each locality, both Migrants and Remainers are likely to be:

- exposed to the same deterrence;
- have the same distribution of cheating benefits.

Therefore, observed cheating in the two groups is informative about intrinsic honesty.

A measure of JBD for group g in year t

Let:

- ρ^{+}_{gt} be average daily births between January 1 and 5 of year $t+1$
- ρ^{-}_{gt} be average daily births between December 16 and 31 of year t.

Then the index:

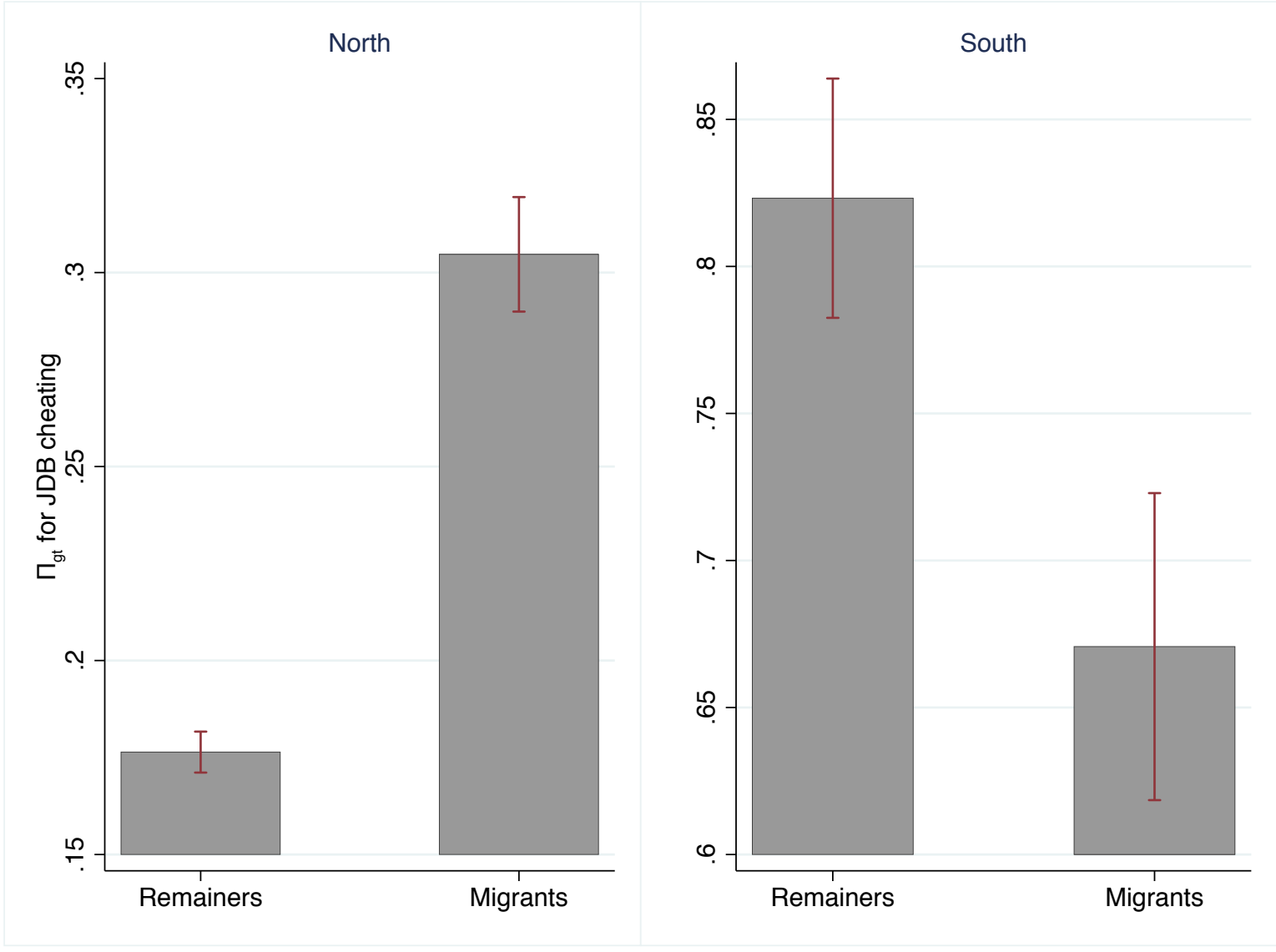
$$\pi_{gt} = \frac{\rho^{+}_{gt} - \frac{\rho^{+}_{gt}+\rho^{-}_{gt}}{2}}{\frac{\rho^{+}_{gt}+\rho^{-}_{gt}}{2}} = \frac{\rho^{+}_{gt}}{\frac{\rho^{+}_{gt}+\rho^{-}_{gt}}{2}} - 1$$

captures the share of JBD cheating families,

- i.e., with real birth before Dec. 31, and a false birth after Dec. 31.

- $\pi_{gt} = 0$ if no family cheats
- $\pi_{gt} = 1$ if all families with births before December 31 cheat
- $\pi_{gt} = \frac{1}{2}$ if half of the families with births before December 31 cheat

Geographic sorting on the basis of honesty (Hp1)



JBD cheating of migrants from South to North and viceversa

	π_{gt} = JBD Cheating			
Migrant X Southern	-.1525***	-.167***	-.097***	-.0652***
	[.032]	[.037]	[.018]	[.016]
Migrant	.1283***	.1275***	.0698***	.0467***
	[.003]	[.003]	[.018]	[.015]
Southern	.5185***	.4961***	.1065*	
	[.027]	[.025]	[.061]	
Constant	.1764***	.6001***	.6375***	.6796***
	[.033]	[.187]	[.100]	[.076]
Observations	11615	11615	11615	7106
Controls	N	Y	Y	Y
Province FE	N	Y	Y	Y
Municipality FE	N	N	N	Y

Note: Observations for all Italian municipalities in the period 1920-1955. Controls are average demographic characteristics of localities.

Why could there be sorting based on honesty?

A model is proposed by Michaeli et al. (2018):

- Localities in two regions – South and North - in which citizens play a public good game with mandatory contributions.
- Two types of citizens:
  - the Civic who always contribute because this is what one ought to do;
  - the Uncivic who contribute only if convenient given enforcement.
- The cost of enforcement decreases in the fraction of contributors.
- Good equilibrium in the North, with enforcement (all contributes), because the fraction of Civic is historically high to begin with.
- The South could be in both equilibria, but given the low initial fraction of Civic is in a bad equilibrium.
- This setting generates a civicness drain from South to North
  - due to better enforcement of civic behavior in the North,
  - which makes migration more attractive for the Southern Civic.

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Fascism and deterrence of BD cheating

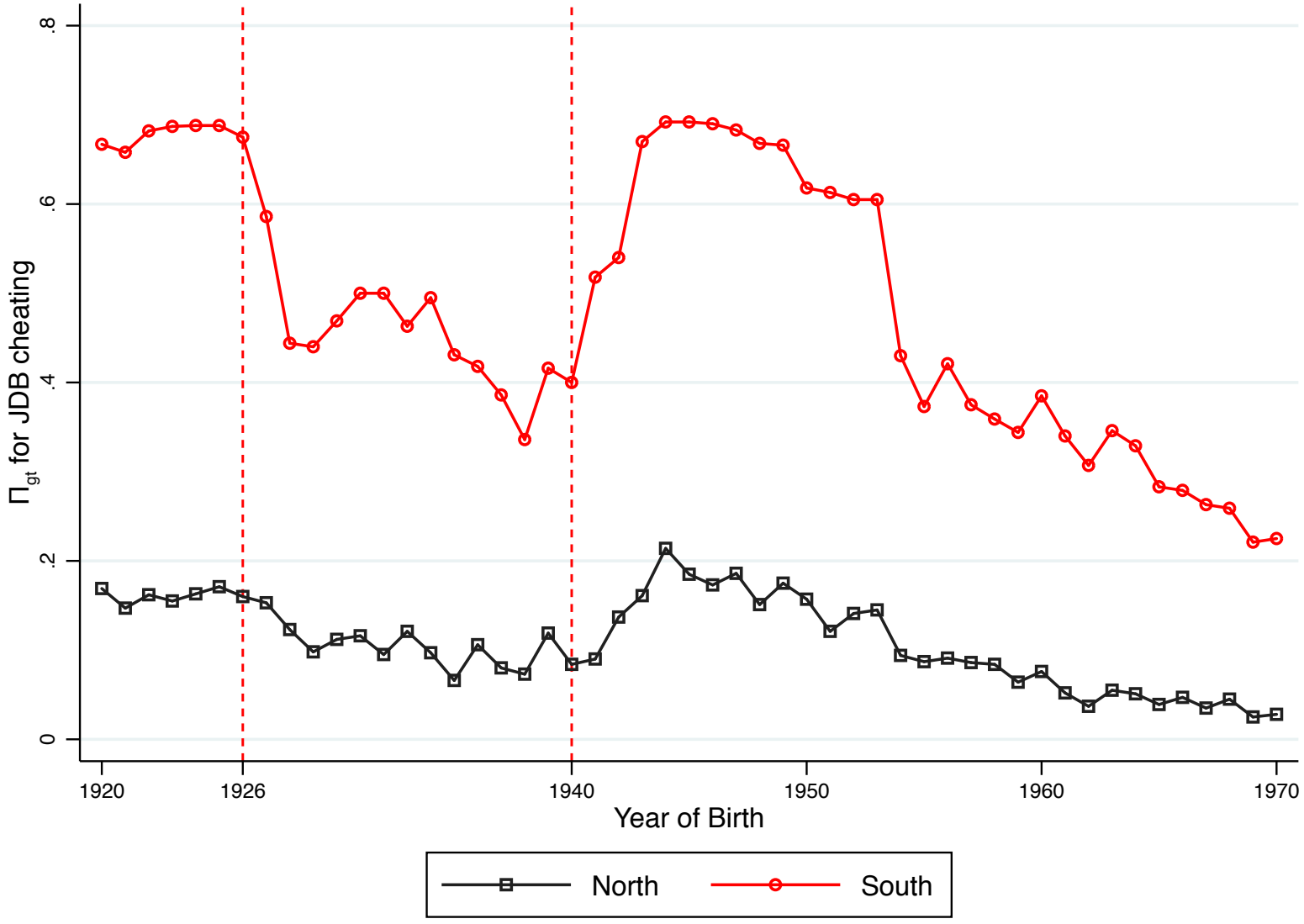
In 1926 the regime suddenly implements a wide set of reforms.

- Introduction of the "Podestà" in each city to increase control of the central state on the daily life of citizens.

- Pro-natality policies to compensate for the economic autarky plan and to increase the size of a potential army.
  - Creation of the ONMI "Opera Nazionale Maternita' e Infanzia":
    - an institution aimed (among other goals) at rapidly reducing the high infant mortality by providing obstetricians' help during births at home;
    - new census of infant mortality *occurring within 1 or 6 days from birth.*
  - Introduction of subsidies to fertility and marriages.
  - Introduction of taxes on singles.

These reforms had a big effect on JBD but not on 17BD cheating.

Evolution of JBD cheating in the North and in the South



Testing the effect of deterrence on Migrants and Remainers

In the following graph we plot:

- the change of the average share of JBD cheaters computed over intervals τ of two consecutive years,
- for Migrants out of the South,

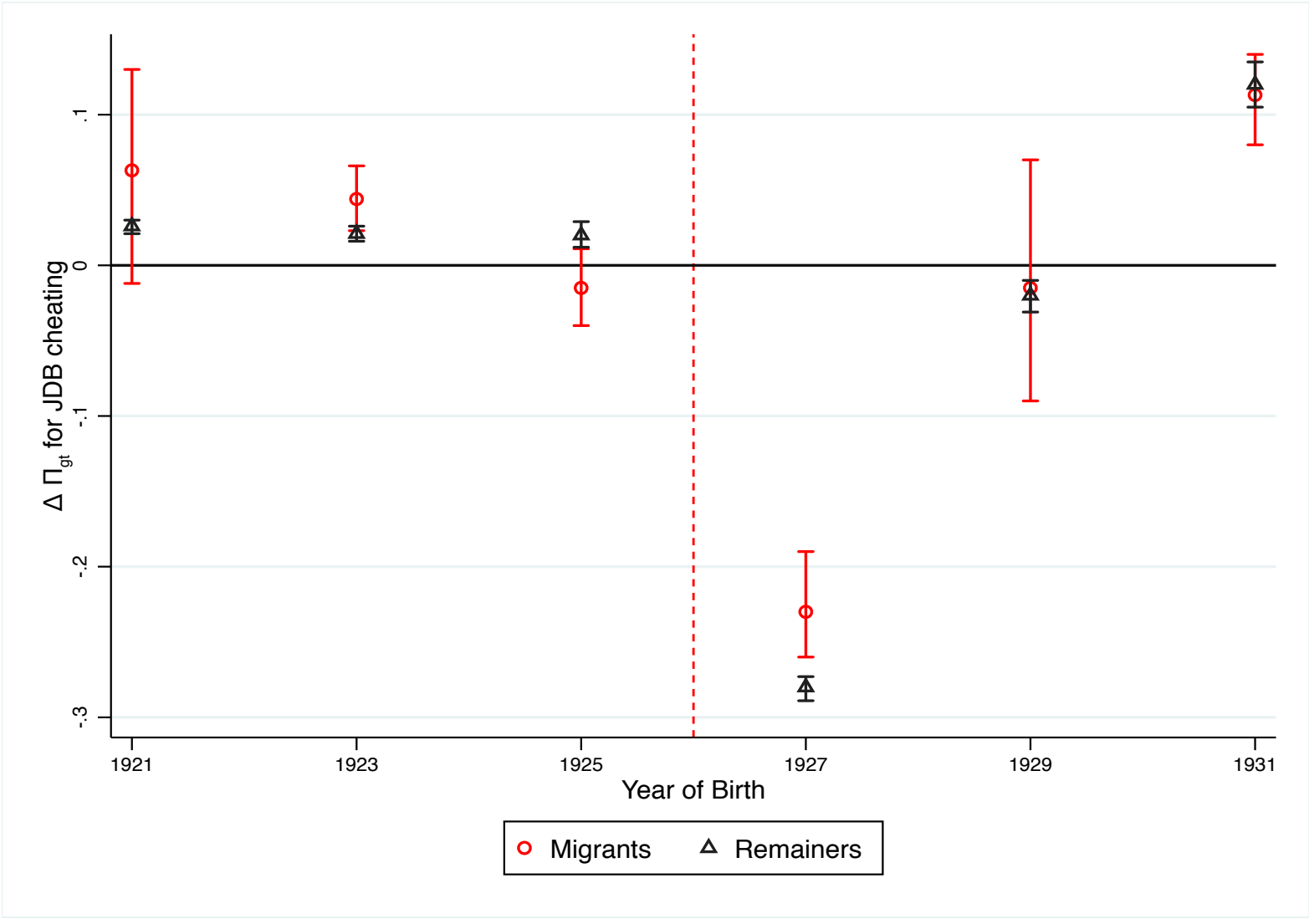
$$\pi_{ms\tau+1} - \pi_{ms\tau}$$

- and for Remainers in the South,

$$\pi_{rs\tau+1} - \pi_{rs\tau}$$

- between the periods immediately before and after the 1926 reforms.

The effect of deterrence on southern Migrants and Remainers



The effect of deterrence on Southern Migrants and Remainers

	π_{gt} =JBD Cheating		
Migrant X $\mathbb{I}$(27-28)	.038**	.038**	.04*
	[.018]	[.017]	[.020]
Migrant	-0.017	-0.011	-0.009
	[.012]	[.011]	[.013]
$\mathbb{I}$(27-28)	-0.236***	-0.239***	-0.237***
	[.025]	[.025]	[.028]
Province FEs	N	Y	Y
LLM FEs	N	N	Y
Observations	1,332	1,332	1,332

Note: Southern local labor market in the period 1925-1928

Interpretation of the effects of the deterrence shock (Hp2)

Among Migrants from South to North

- the long term share of cheaters is lower than for Remainers,
- the reduction of cheating in 1926 is smaller than for Remainers,

and therefore

- the share of honest agents is higher among Migrants from South.
- there is geographic sorting based on honesty.

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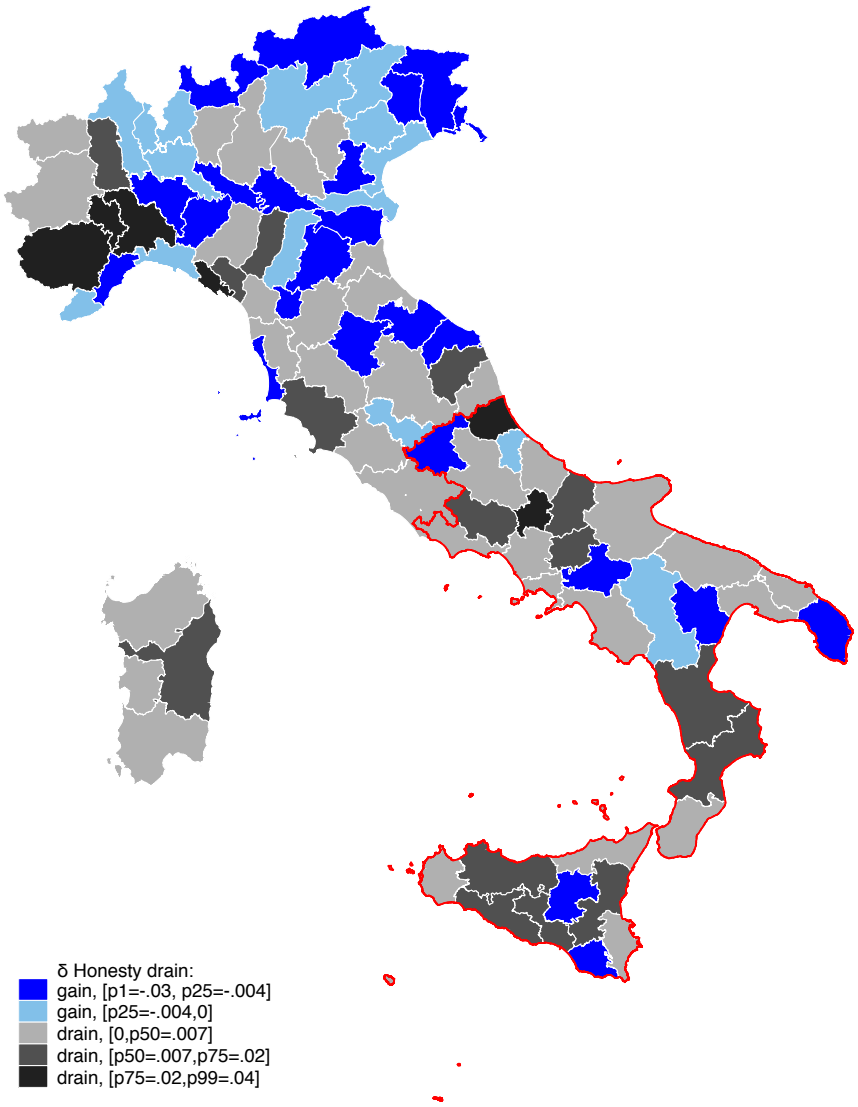
Honesty drain across Italian Provinces, due to migrations

In each locality l (province) we measure JBD cheating of

- "born" in l: π_{lb} (emigrants and remainers)
- "remainers" in l in 1991 : π_{lr} (born who remain)

The honesty drain due to emigrants is:

$$\delta_l = \pi_{lr} - \pi_{lb}$$



Anatomy of the honesty drain δ_l

$$\delta_l = \pi_{lr} - \pi_{lb} = (1 - F(D^*))(h_{lb} - h_{lr})$$

Let N_g be the number of agents in group $g \in \{lb, lr, lm\}$.

Then, the emigration rate in l is

$$\eta_l = \frac{N_{lm}}{N_{lb}}$$

and the fraction of honest agents born in l is:

$$h_{lb} = (1 - \eta_l)h_{lr} + \eta_l h_{lm}$$

Therefore

$$\delta_l = (1 - F(D^*))[\eta_l(h_{lm} - h_{lr})]$$

and the honesty drain is positive if the fraction of honest agents is larger among migrants than among remainers:

$$\delta_l \geq 0 \qquad \Longleftrightarrow \qquad h_{lm} - h_{lr} \geq 0$$

The size of δ_l depends also on $(1 - F(D^*))$ and on η_l.

Why a honesty drain may have bad economic consequences

A honesty drain in a locality may

- reduce reciprocal trust;
- reduce social capital;
- increase crime;
- reduce investment;
- impair the functioning of institutions;
- ...

with negative consequences for economic and social outcomes.

The indicators of province performance

- Evasion of public TV fees
- Cheating in standardized school tests (Angrist et al., 2017)
- Vote counting productivity (Ilzetsky Simonelli, 2019)
- Average provincial income declared for tax purposes
- ...

Evasion of public TV fees and cheating in standardized school tests

	Evasion of public TV fees in 2014		Cheating in school test in 2011/12 Math		Literacy	
δ_l	0.021**	0.016*	0.018**	0.010*	0.014**	0.008*
	(0.009)	(0.009)	(0.007)	(0.006)	(0.006)	(0.004)
Literacy 1921		0.142***		0.267***		0.209***
		(0.038)		(0.035)		(0.028)
Observations	95	95	95	95	95	95

Vote counting productivity (Ilzetsky Simonelli, 2019)

	2016-12	2016-12	2016-04	2016-04
δ_I	-0.074***	-0.053***	-0.075***	-0.066***
	(0.023)	(0.019)	(0.018)	(0.017)
Literacy 1921		-0.682***		-0.318***
		(0.083)		(0.108)
Observations	95	95	95	95

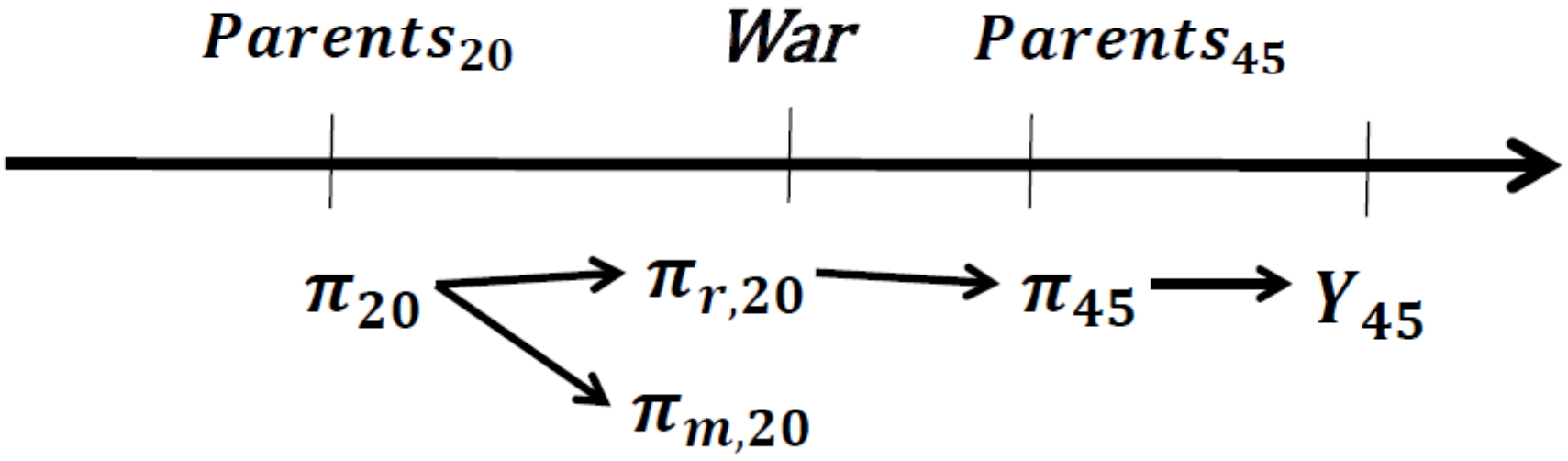
Average provincial income for tax purposes

	Log(av. income 2012-2017)	
δ_l	-0.033**	-0.012*
	(0.014)	(0.006)
Literacy 1921		-0.695***
		(0.044)
Observations	95	95

Exploiting generations to identify the causal effect of a honesty drain

Omitting the locality indicator l, let:

- $t = 45$ indicate the generation of parents having newborns in 1945-51: the "post-war adults" born approximately 25 years before;
- $t = 20$ indicate the generation of parents having newborns in 1920-26: the "parents of the post-war adults".
- Y_{45} be a local outcome for generation 45.



Exploiting generations to identify the causal effect of a honesty drain

Abstracting from covariates, we want to estimate:

$$Y_{45} = \alpha + \beta \pi_{45} + \varepsilon_{45} \tag{1}$$

where β is the causal effect of JBD cheating of post-war adults on the post-war outcome Y_{45}.

As in Algan and Cahuc (2010), we can construct valid instruments based on "inherited honesty" from previous generations.

Evolution of the share of cheaters across generations

JBD cheating evolves across generations according to

$$\pi_{45} = \pi_{r20} + \omega_{45} \tag{2}$$

where

- π_{r20} is JBD cheating of parents of the remainers born in 1920-26;
- ω_{45} is an innovation shock ($\perp \pi_{r20}$).

If η_{20} is the emigration rate of children born in 1920-26:

$$\pi_{20} = (1 - \eta_{20})\pi_{r20} + \eta_{20}\pi_{m20} \tag{3}$$

where

- π_{m20} is JBD cheating of parents of the emigrants born in 1920-26.

Instruments for JBD cheating of post-war adults

JBD cheating of the parents of the remainers born in 1920-26 is:

$$\pi_{r20} = \frac{1}{1-\eta_{20}}\pi_{20} - \frac{\eta_{20}}{1-\eta_{20}}\pi_{m20} \tag{4}$$

Therefore the law of motion of JBD cheating is

$$\pi_{45} = \frac{1}{1-\eta_{20}}\pi_{20} - \frac{\eta_{20}}{1-\eta_{20}}\pi_{m20} + \omega_{45} \tag{5}$$

Eq. (5) offers two instruments for the JBD cheating of postwar adults:

- π_{20}: JBD cheating of all the parents of post-war adults;
- π_{m20}: JBD cheating of the parents of emigrant post-war adults.

which can be used for IV estimation of the outcome equation 1

$$Y_{45} = \alpha + \beta\pi_{45} + \varepsilon_{45}$$

Threats to identification

The instruments are valid if JBD cheating of previous generations does not enter directly the outcome equation.

The assumption is debatable but can be tested using a different set of instruments generated by the reactions the 1926 increase of deterrence:

- $\frac{\partial \pi_{27}}{\partial D^*_{27}} = -f_{27}(D^*_{27})(1 - h_{27})$:

  reaction of the parents of all post-war adults born in 1927-28;

- $\frac{\partial \pi_{m27}}{\partial D^*_{27}} = -f_{27}(D^*_{27})(1 - h_{m27})$:

  reaction of the parents of emigrant post-war adults born in 1927-28.

The two sets of instruments allow for an over-identification test.

Conclusions

In this paper we have studied the historical tendency of Italians to register a false date of birth if they are born:

- near the end of the year, shifting the date to early January;
- on the 17th of each month, shifting the date before or after.

and we have exploited a measure of cheating built upon this falsification tendency to show that:

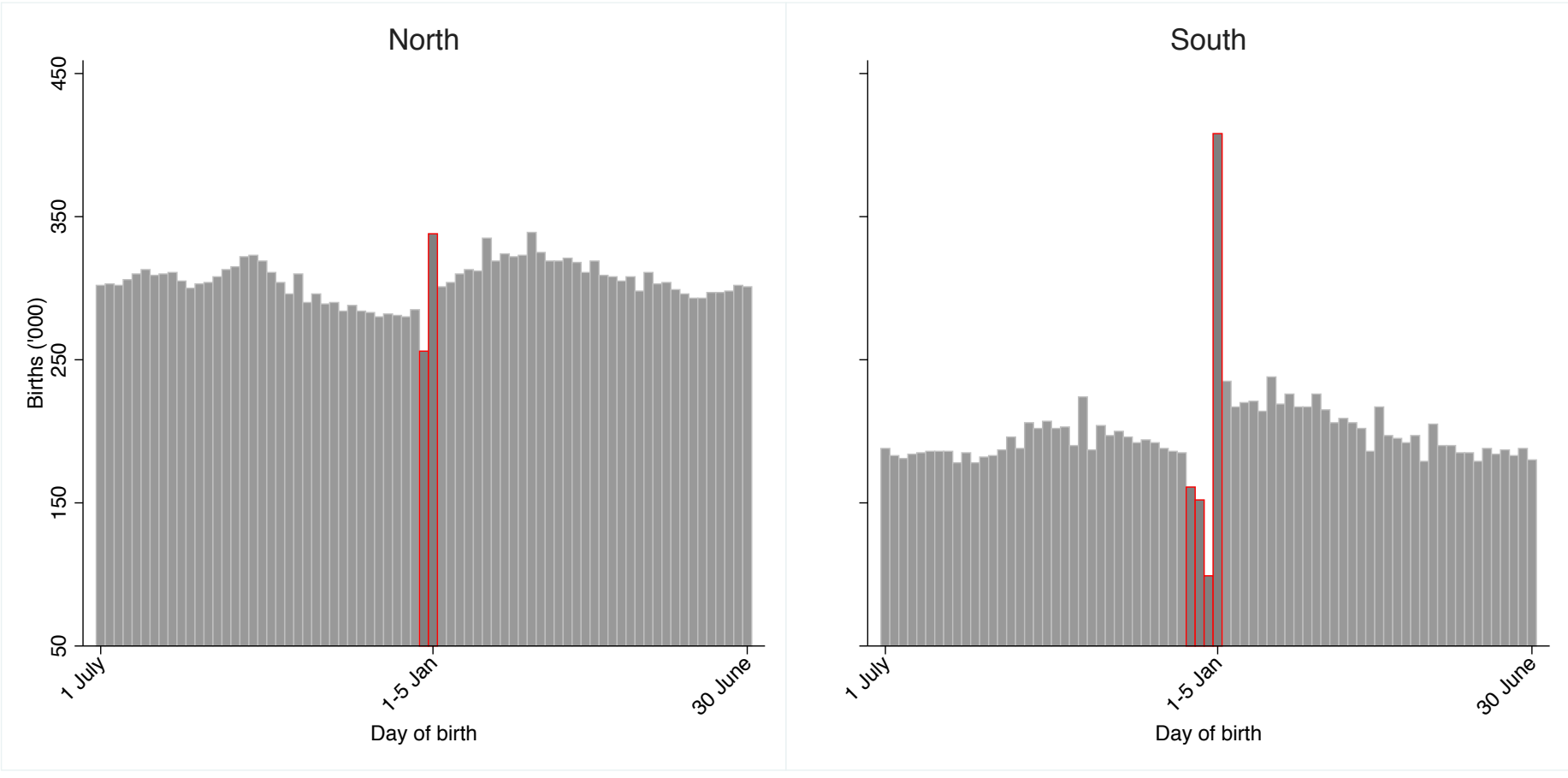
1. these measures of dishonesty can be constructed for migrants and remainers at the city/time level in Italy;
2. January Birthdate Cheating is informative of intrinsic honesty because it reacts to the 1926 Fascist reforms that increased deterrence;
3. Italians sort themselves across geographic areas on the basis of their honesty;
4. geographic sorting based on honesty has contributed to the lower economic and social performance of Italian southern provinces.

17 - La disgrazia



Back

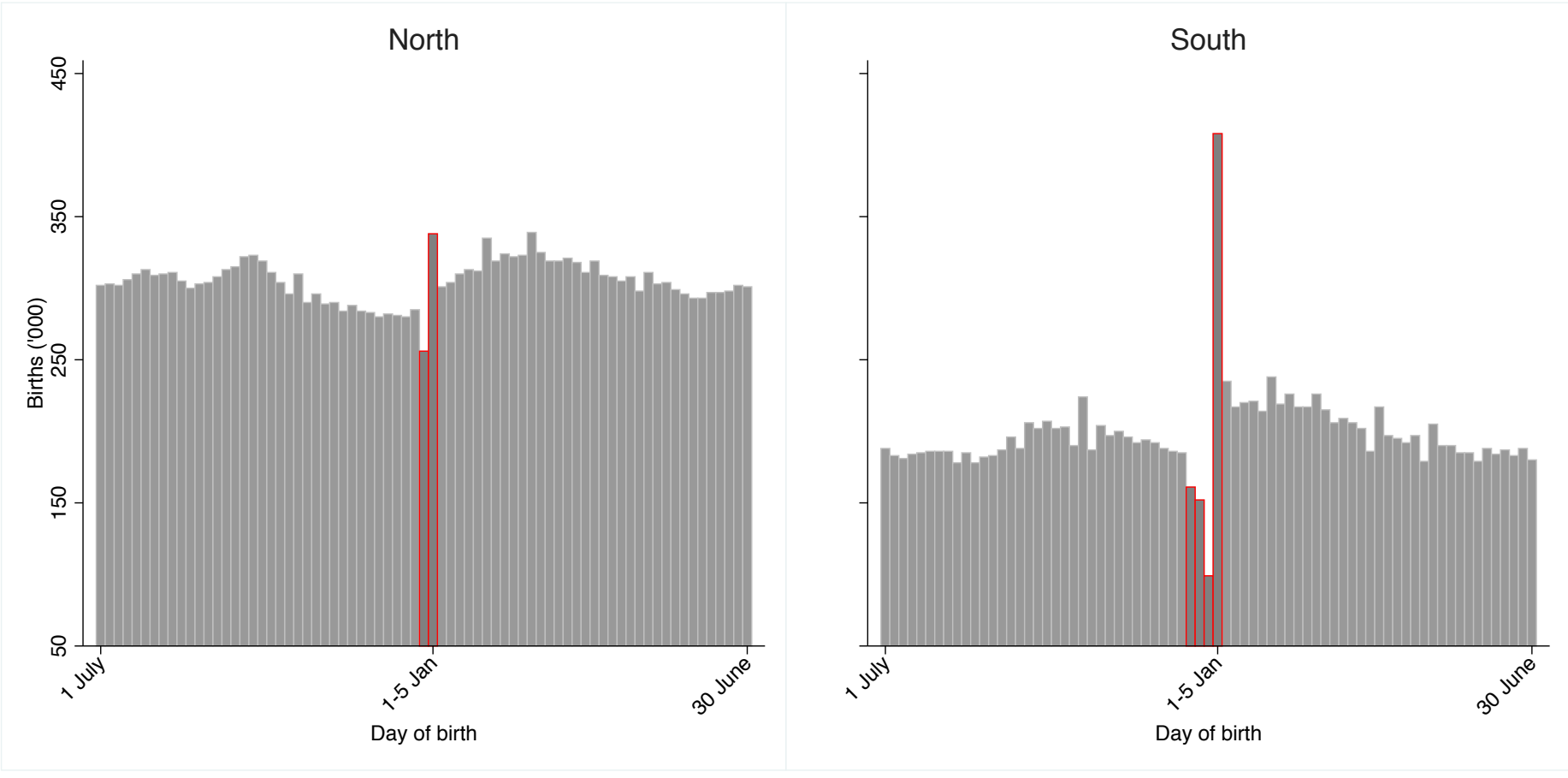
North-South differences in JBD cheating - 2001 Census



Note: restricted Census 2001 data with precise birth date

Back

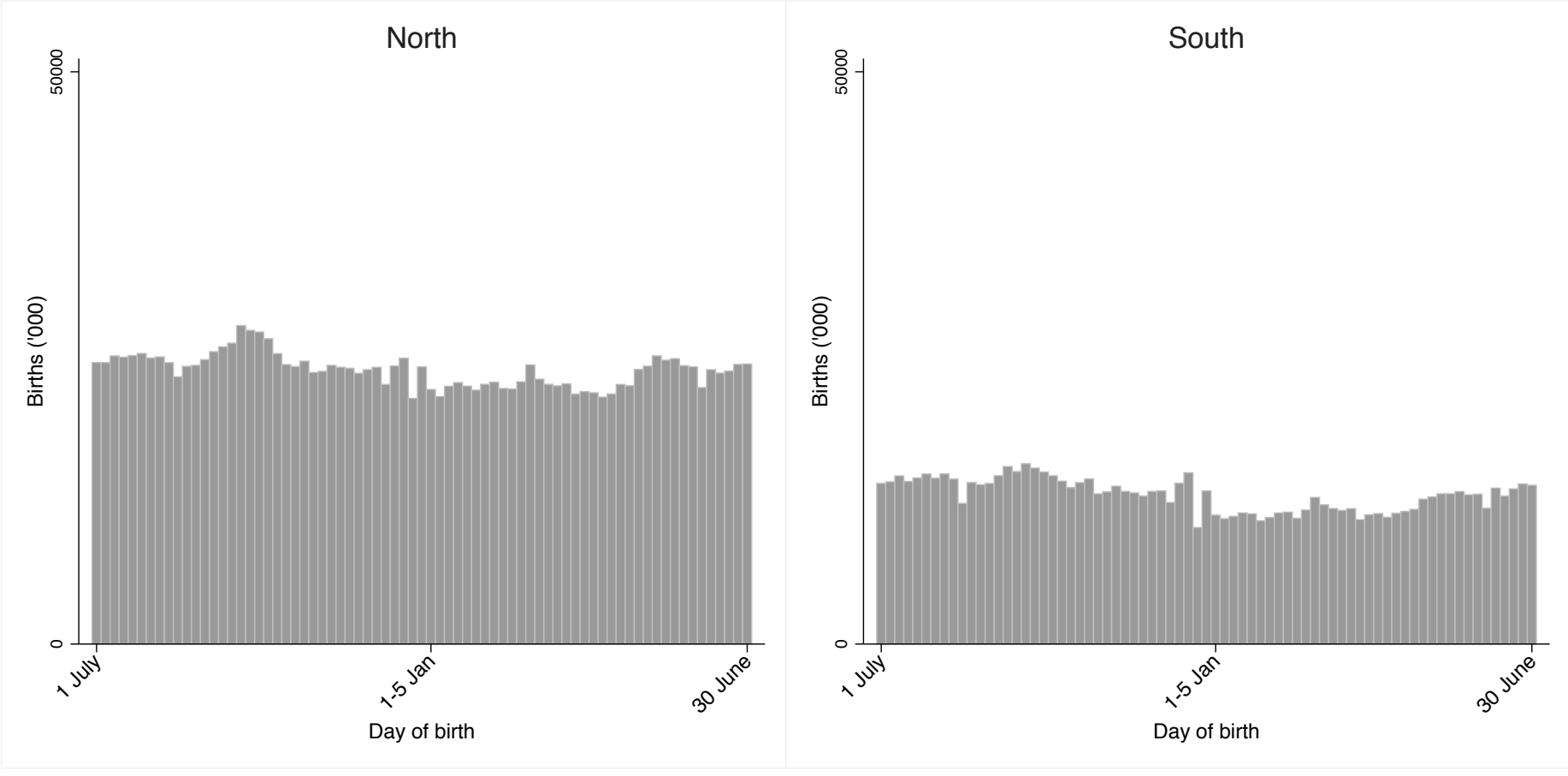
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Back

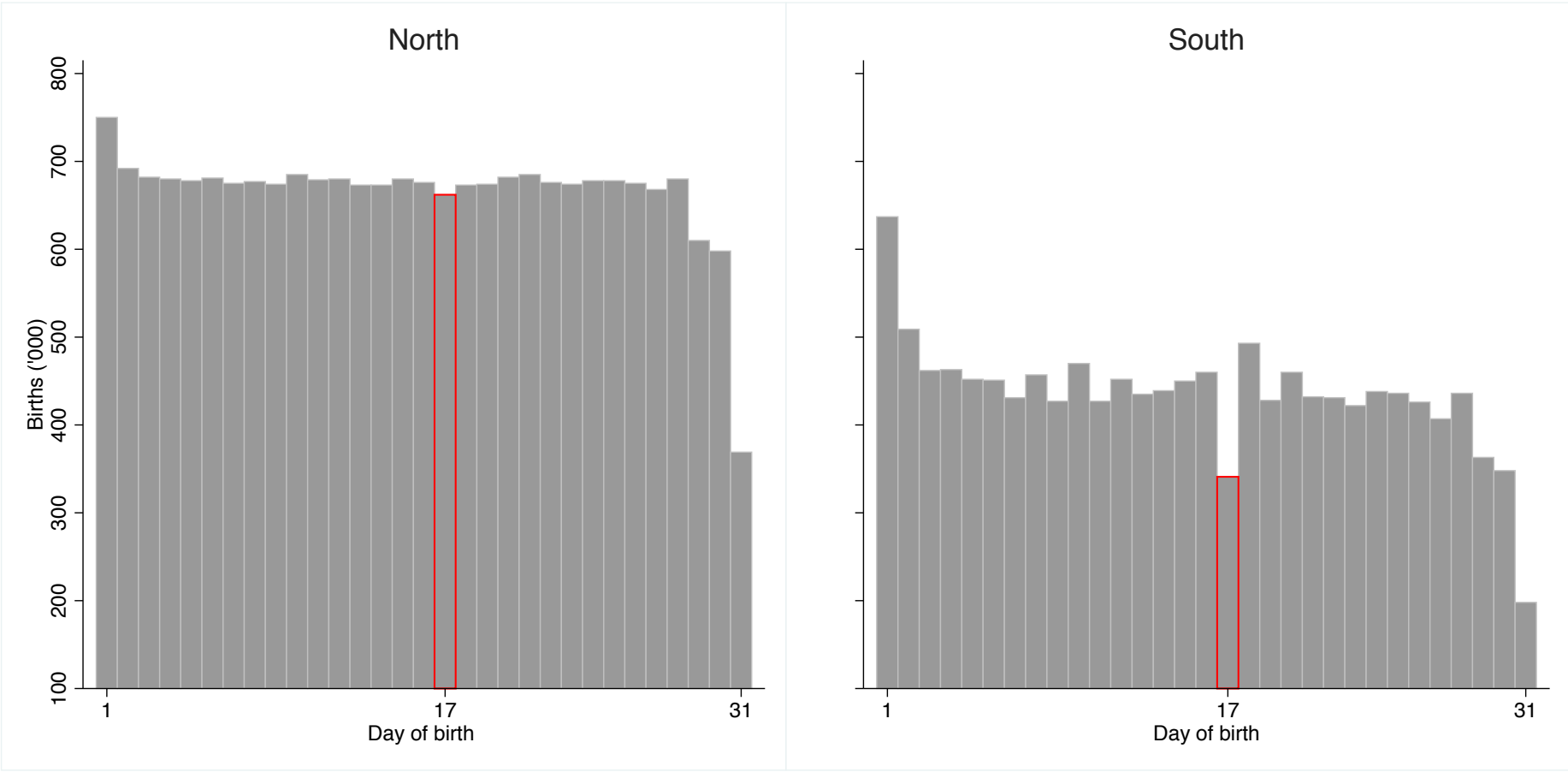
North-South differences in JBD cheating - Cohorts 2005-2010



Note: Pupils enrolled in elementary school in academic year 2015/16

Back

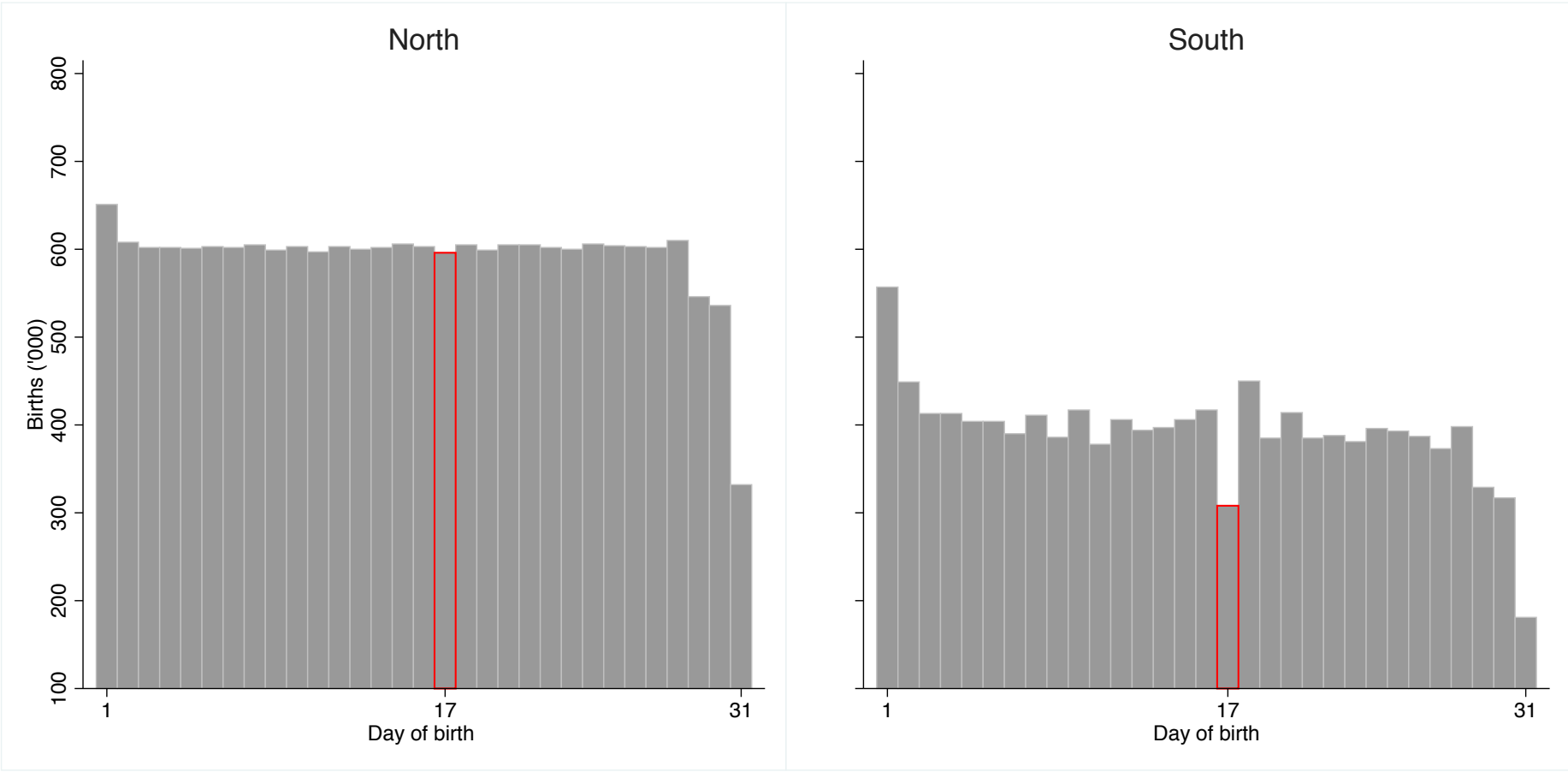
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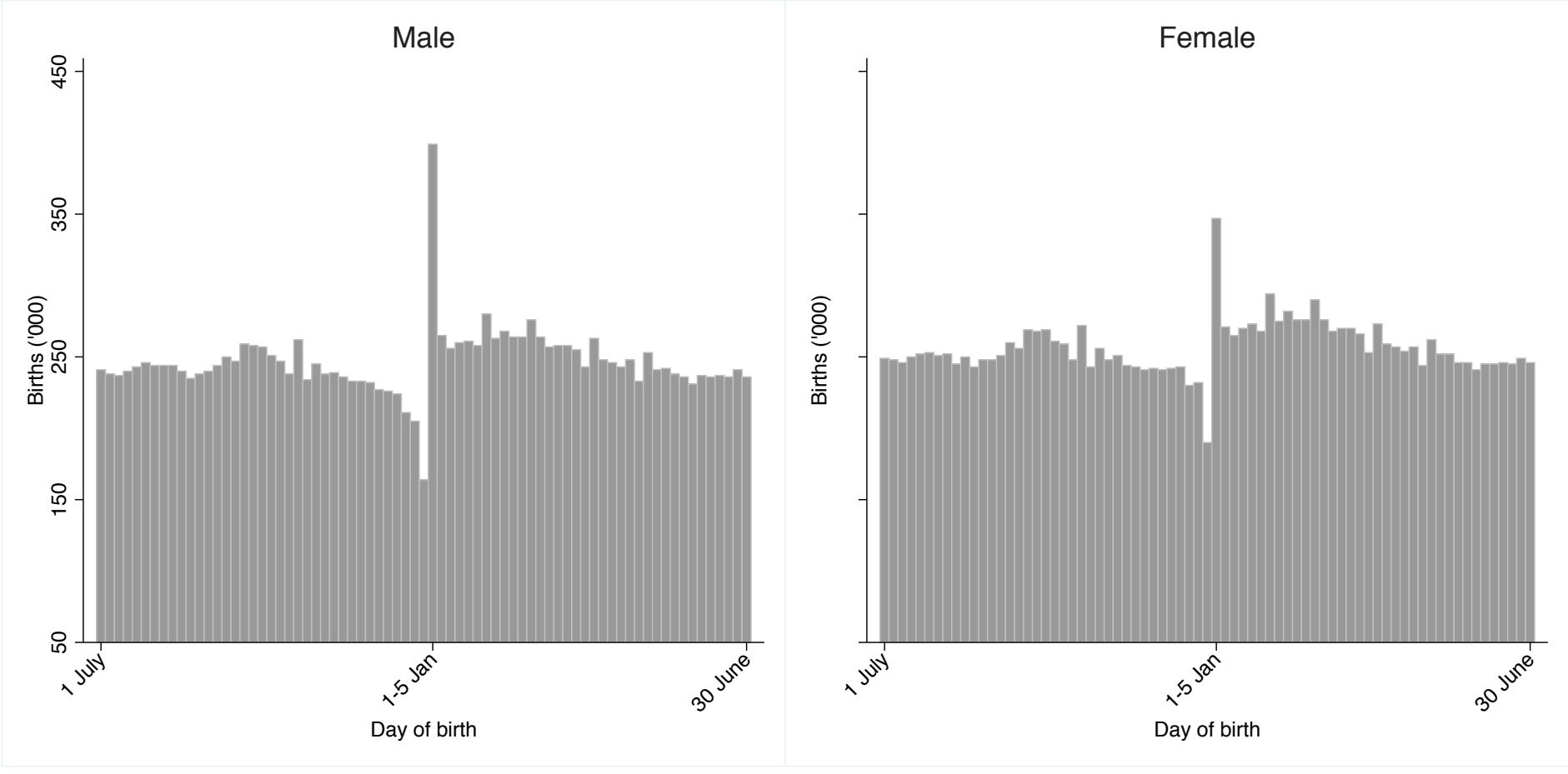
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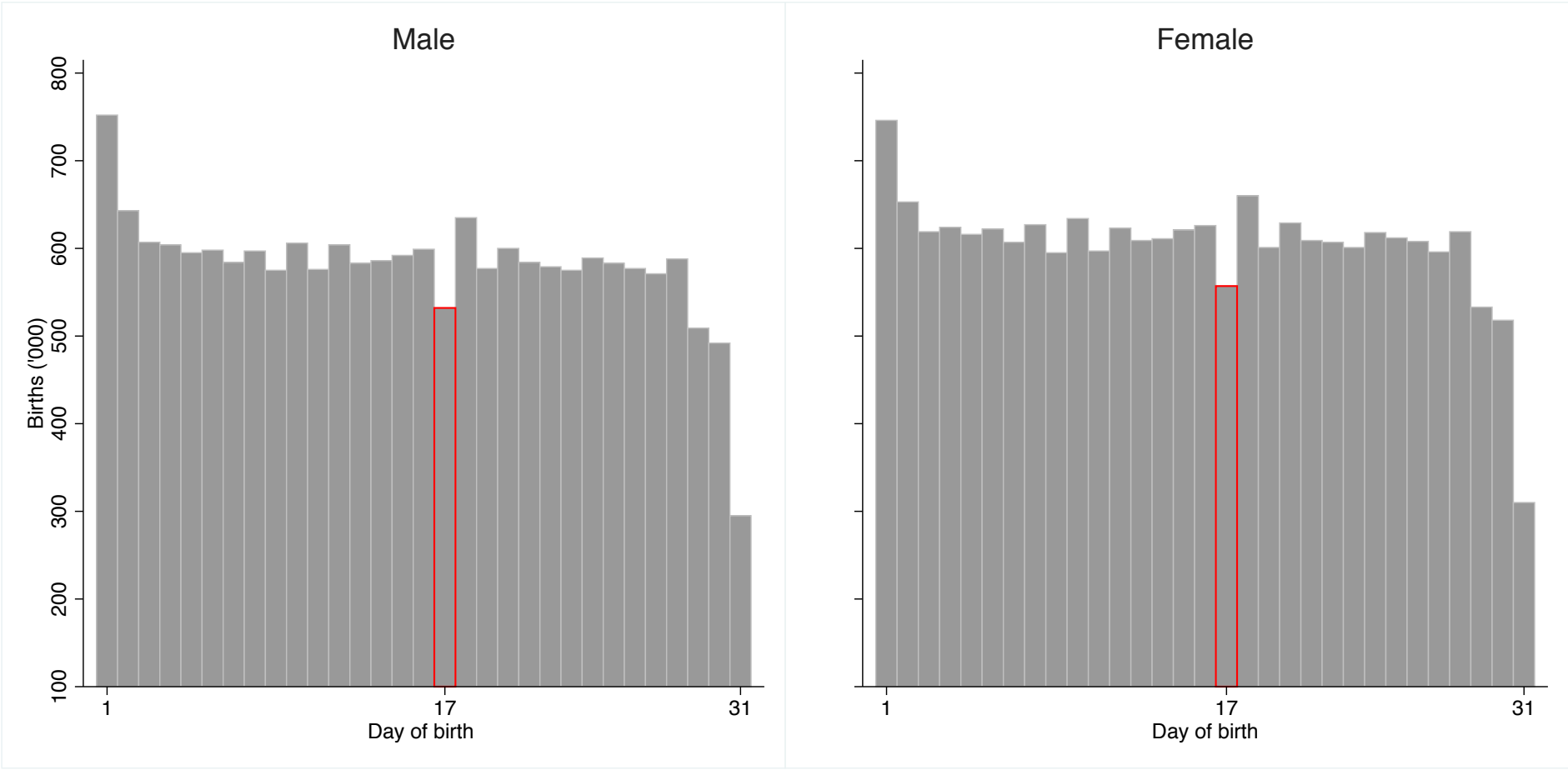
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Back

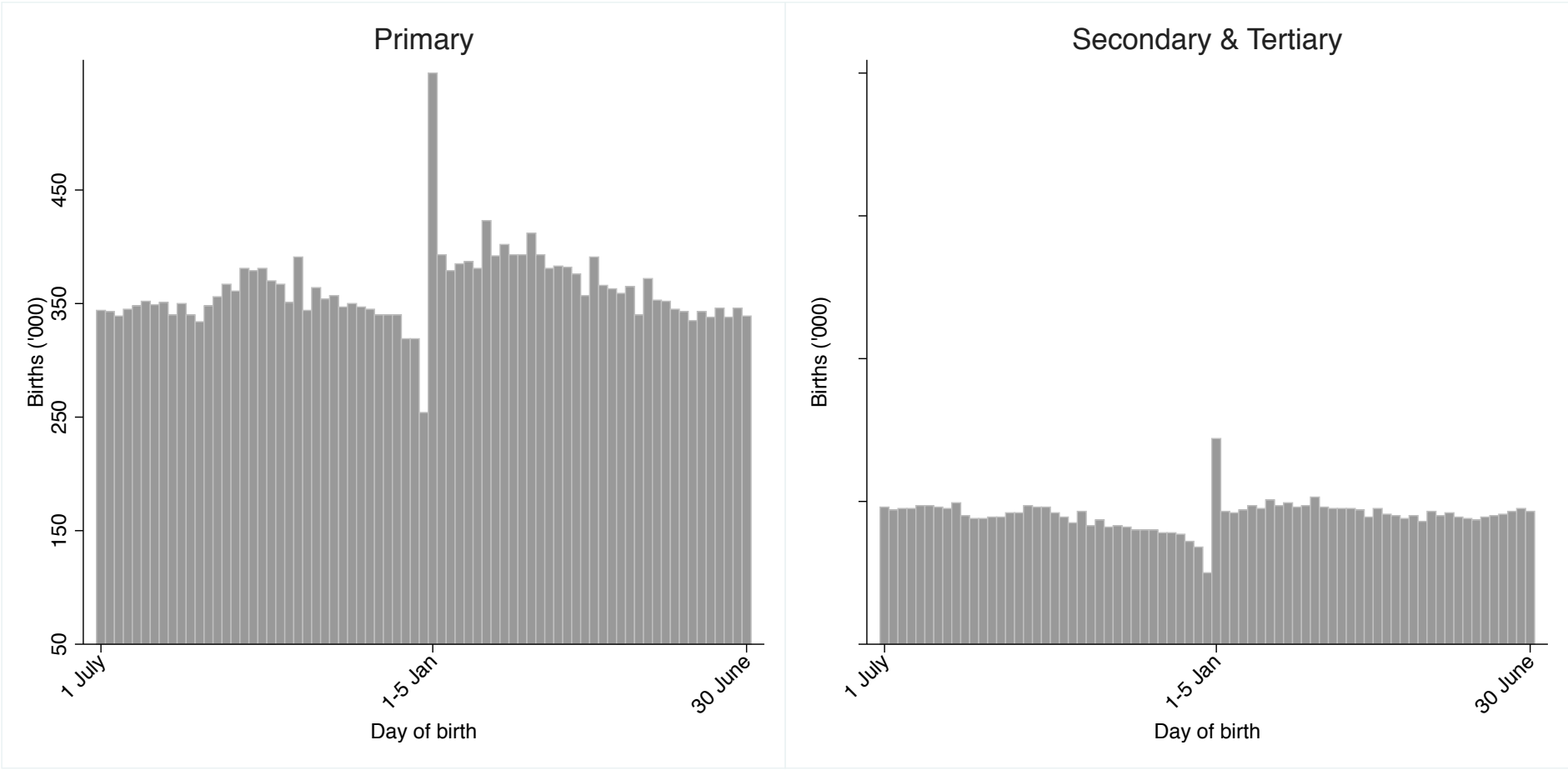
JDB and gender of the child



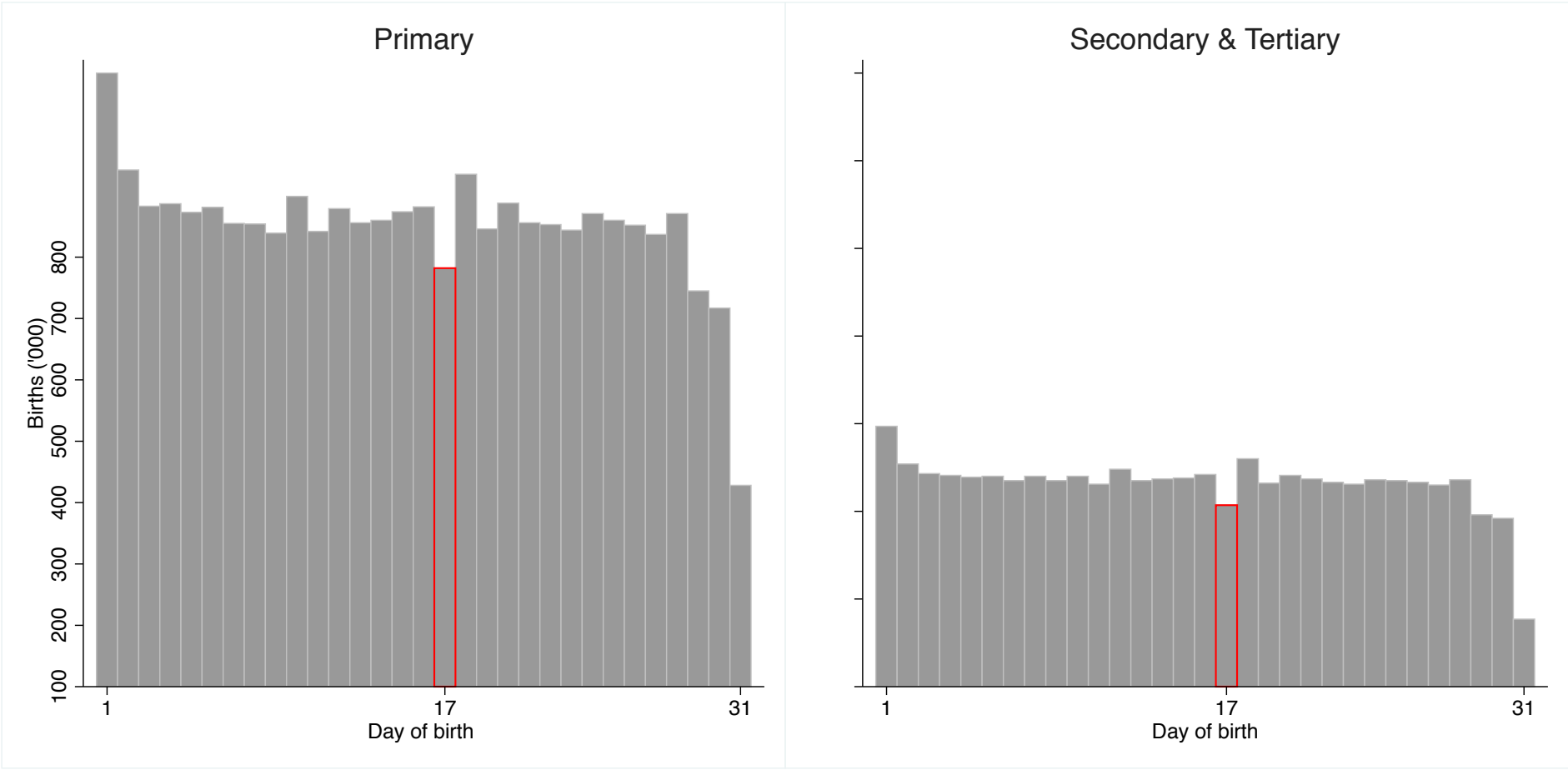
17DB and gender of the child



JDB and education of the child

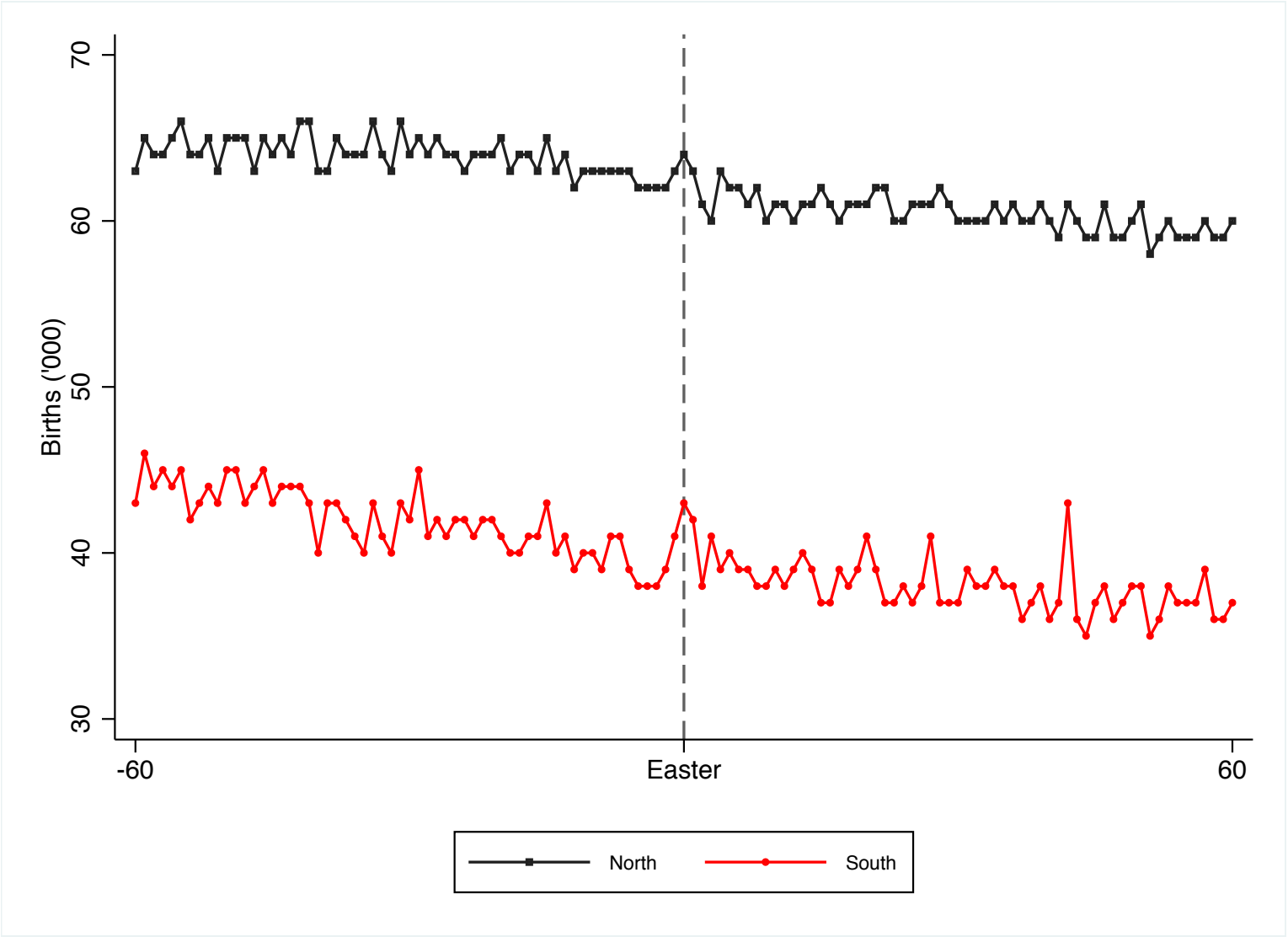


17DB and education of the child



Back

Easter day cheating



Back

Correlation between cheating measures across cities

	JBD	Invalsi math	Invalsi literacy	Absenteism	Ghost buildings	17BD
JBD	1					
Invalsi math Angrist et al. (2017)	0.8238	1				
Invalsi literacy Angrist et al. (2017)	0.8336	0.9577	1			
Absenteism Ichino, Maggi (2000)	0.3586	0.3095	0.299	1		
Ghost buildings Casaburi, Troiano (2015)	0.6142	0.4752	0.4642	0.5898	1	
17BD	0.5811	0.6487	0.609	0.2687	0.4106	1

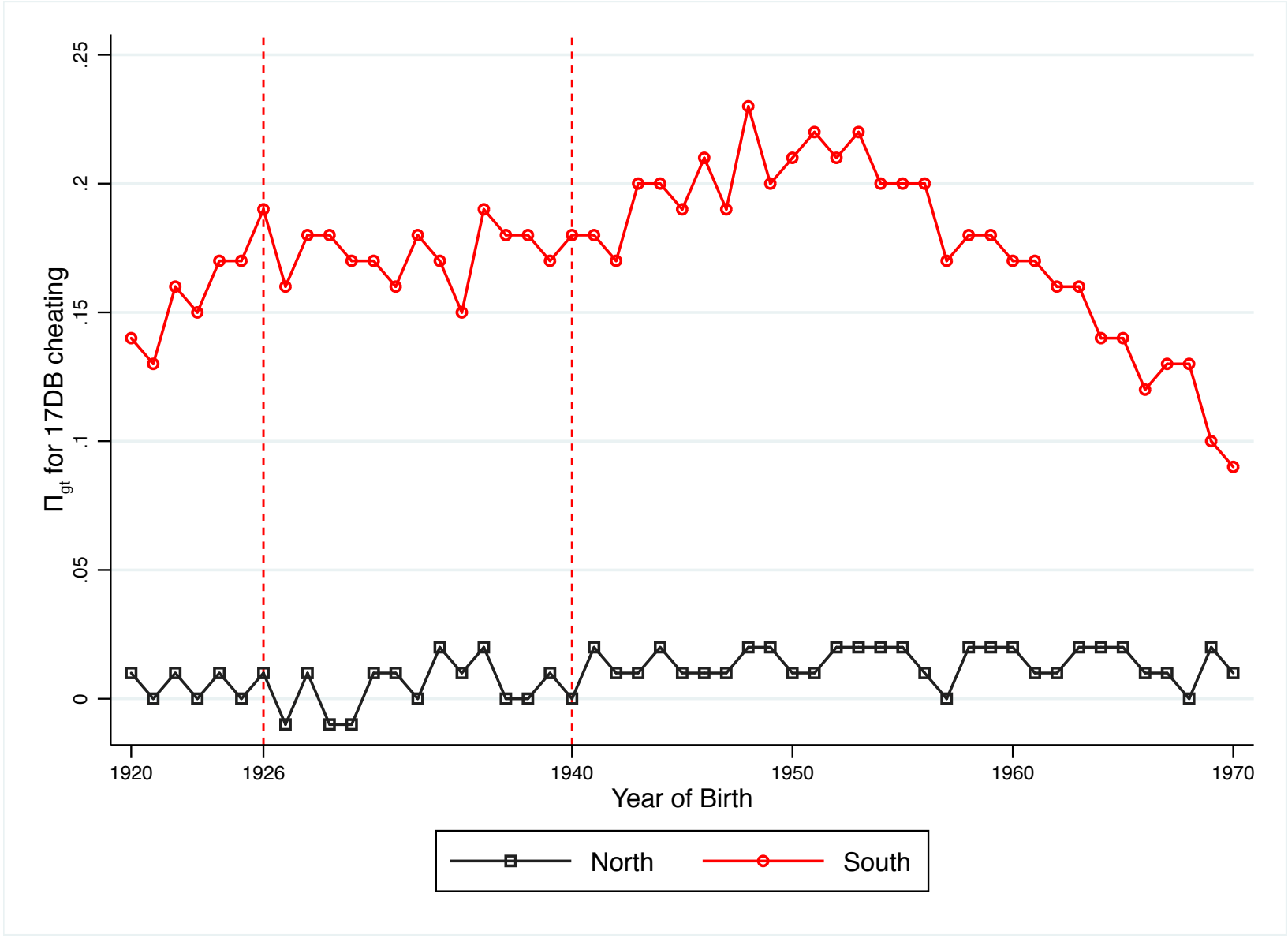
▸ Principle Component ◂ Back

JBD cheating and PCA of other cheating indicators

	Cheating January 1	Cheating 17	Cheating January 1	Cheating 17
PC Dishonesty	.151***	.061***	.45***	.024***
	(.003)	(.002)	(.003)	(.002)
Kingdom=1			.44***	.150***
			(.007)	(.005)
Obs	3381	3381	3381	3381
R2	0.43	0.3	0.7	0.44

Back

Evolution of 17BD cheating in the North and in the South



Interpretation

The absence of a drop for 17BD cheating shows that:

- the 1926 fascist reform did not care about superstition,
- or that "one day" cheating was hard to detect,
- 17BD cheating is less informative for our purposes.
- deterrance for 17BD cheating was extremely low so that no reaction would be detected as showed by hypothesis 2 of the model

◂ Back