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JEL Classification: J61, C93, R23

Keywords: Migration Aversion to breaking rules, Italy

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Aversion to breaking rules and migration*

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Abstract

Migration movements may increase the geographic dispersion of the Aversion to Breaking Rules (ABR) in a population, with possible long-term economic consequences. We show this result with Italian Census data, using indicators of false birth date registrations for families of South-North migrants and remainers in the two macro-regions. Within locality×biennium cells, deterrence and cheating benefits are similar in the two groups and thus cheating differences are informative about the underlying ABR, as our theory suggests. We also exploit the Fascist reforms of 1926 as shocks to deterrence, offering additional information on the underlying ABR of migrant and remainer families.

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*We are grateful to Istat for giving us access to the individual observations of the restricted Census at the protected Adele sites. When the Covid pandemic started, access to the Adele sites was no longer permitted, but Istat allowed us to export group averages of the data, as described in the paper, in order for us to be able to continue our research. We are particularly indebted to several colleagues who shared with us their data: Ethan Ilzetzki and Saverio Simonelli (Vote Counting Rates); Josh Angrist, Eric Battistin, Daniela Vuri (school cheating); Lorenzo Casaburi and Ugo Troiano (ghost buildings). We also benefited from conversations with Vittorio Bassi, Diogo Britto, Adriano De Falco, Alice Dominici, Roberto Galbiati, Diego Gambetta, Giulia Giupponi, Joseph Heath, David Levine, Moti Michaeli, Massimo Morelli and Yannick Reichlin as well as from seminar presentations at Berkeley, Berlin, Bocconi, Boston College, Cornell, Dartmouth, Princeton, the 2020 Labor-ski seminar, University of Florida, University of Milan and UC Davis. The Online Appendix for this paper can be found at https://www.dropbox.com/s/o0kc8caflt7uhip/ACI_Online_Appendix_Sorting_ABR.pdf?dl=0

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1 Introduction

Aversion to Breaking Rules in a population (ABR) is unequally distributed across localities around the world, even across nearby localities.[1] In this paper we use Italian data to explore the hypothesis that migration movements may increase this inequality.[2] As suggested by Michaeli et al. (2020), members of a community who, ceteris paribus, dislike breaking rules may prefer to move elsewhere if they are continuously free-rided by too many peers who instead do not care about rules. At the same time, also low ABR subjects may prefer to leave a community if it becomes poor because of excessive free-riding.[3] Whether migration generates a drain or a gain of ABR, with potentially relevant economic consequences, is therefore an empirical question that we try to answer in this paper.

We can do so thanks to a novel measure of cheating (false birth date registrations) that, as we will see, correlates well with more traditional cheating indicators used in the literature (see footnotes 1 and 2). Given how large this literature is, a reader may wonder why such a novel measure might be worth a new paper. The reason is that, to our knowledge, this is the only cheating indicator that can be computed for small groups in the Italian population (although not for single individuals) at different points in time during the 20th century and specifically for parents of migrants out of a given locality and parents of remainers in the same locality.

Using Census restricted data we confirm anecdotal evidence suggesting that Italians, in some localities more than in others, have a significant tendency to register a false date of birth for their children. Starting in early December of each year, the frequency of registered births per day declines substantially, while an abnormally large mass of

[1] See, for example, Rupasingha, Goets, and Freshwater (2006), Braeseman and Stephany (2017), Cohn et al. (2019), Fisman and Miguel (2007) and Lowes et al. (2017).

[2] With specific attention to Italy, the path-breaking book of Putnam, Leonardi, and Nanetti (1993) explores systematically the heterogeneity of social capital measures, and ABR specifically, within and between regions. For more recent explorations, see Ichino and Maggi (2000), Guiso, Sapienza, and Zingales (2004), Durante (2010), Bigoni et al. (2016), Buonanno et al. (2015) and Michaeli et al. (2020).

[3] In the model of Michaeli et al. (2020), the prevailing outcome depends on the risk attitudes and on the beliefs about deterrence in the place of origin vs. the place of destination that characterize low and high ABR subjects.

registered births is concentrated in the first five days of the following month of January. We also observe a significantly lower number of births on the 17th of each month. We discuss possible motives for this tendency to lie in the registration of birth dates, like delaying school entry or compulsory military service in the case of "January birth date (JBD) cheating" and superstition in the case of "17 birth date (17BD) cheating". Irrespective of the motive, a parent who registers a false date of birth for a child violates the Italian penal code according to which, at least since 1889, any false declaration in a public or private deed is punishable by imprisonment from 3 to 10 years (*Codice Zanardelli*: art. 278 R.D. 30 June 1889, n. 6133).

Differences in observed cheating between migrants and remainers, however, do not necessarily imply differences in their underlying ABR, which is the trait in which we are interested. Using a simple theoretical model we show that only if two groups of agents have the same distribution of cheating benefits and face the same level of deterrence, one can infer differences in the underlying ABR from differences in observed cheating. The model also shows that agents with a sufficiently high private ABR are less likely to react to deterrence in case it changes.

This second and less obvious implication originates from the "lexicographic two–stages" decision process adopted by the agents in our model.[4] We assume that these agents first compare their cheating benefit with their own private ABR and only if the benefit is higher they compare it with deterrence and decide whether to cheat or not. We argue that this assumption is appealing and realistic based on the following intuition.[5] Readers of this paper would probably not murder anybody not because of a comparison between the benefit they would derive from this action and the expected cost of being caught and sent to jail. They just refuse to consider the possibility of murdering independently of deterrence. However, under a dictatorship the same readers might decide to join the fight against the regime and be prepared to kill. Once this

[4]See Tversky (1969), Tversky (1972), Manzini and Mariotti (2007), Masatlioglu, Nakajima, and Ozbay (2012) and specifically Manzini and Mariotti (2012), who build on Tversky's idea of "Elimination by aspects" to generate a model of "Choice by lexicographic semiorders".

[5]See Gigerenzer and Todd (1999) for evidence that "lexicographic two–stages" decision processes are widely used, although in different contexts. The evidence in Caplin, Dean, and Martin (2011) is instead relevant, more generally, for sequential decision procedures.

decision is taken, and only at this point, calculations about deterrence would become relevant.

Guided by the model, in the empirical analysis we concentrate on the most interesting and quantitatively relevant of the two forms of cheating: JBD. Starting from census data for the entire Italian population, our observations are groups of migrants (from South to North or viceversa) and remainers (in the corresponding macro-region), born in late December or early January in a narrowly defined locality during one of the 17 bienniums of the 1921-1954 period.[6] In each locality and biennium in which both migrants and remainers are born,[7] we estimate the probability of cheating in the families of these groups of subjects, finding that the parents of future migrants from South to North are on average less likely to cheat on their children's birth dates than the parents of remainers in the South. The opposite is instead observed for parents of migrants from North to South versus parents of remainers in the North. Inasmuch as individual traits like ABR are transmitted from parents to children,[8] we conclude from this evidence that migrants and remainers are non-randomly selected with respect to ABR and that an ABR drain may have affected at least some localities in the South.

We then exploit a pervasive set of institutional reforms implemented by the Fascist regime in 1926 to show empirically how cheating on the date of birth reacts to changes in deterrence. There are two reasons why these reforms are relevant in our context:

- they created a new local administrative authority (the "Podestà") to increase control of the central state on the daily life of citizens;

- they introduced measures to curb infant mortality, which included, crucially for our purpose, a registry of infant deaths occurring within 1 to 6 days from birth

[6]In 1954, a major reform of civil registries made doctors and obstetricians responsible for the registration of birth dates so that after this year the phenomenon rapidly disappears.

[7]In our analysis we cannot use locality×biennium cells in which no remainers or no migrants are born. This constraint is particularly binding for the North because migration flows from North to South are rare and small in size, as explained in detail in Section 4. Because of this constraint, results for migrants from North to South are valid only for few northern localities in which the analysis is possible.

[8]A large literature on parenting styles suggests that this is the case. See, for example, Tabellini (2008), Algan and Cahuc (2010), Houser et al. (2016), Lowes et al. (2017) and Doepke and Zilibotti (2017).

and an obstetrician service to help mothers giving birth at home.

As a result of these changes, JBD cheating declines immediately after 1926, particularly in the South of Italy, to then go back to pre-1926 levels in 1940, when Fascism begins to collapse. More importantly for our purposes, the reaction of JBD cheating to these changes in deterrence is smaller in absolute value for parents of migrants out of a given locality in the South than for parents of remainers in the same locality. Also on the basis of this second type of analysis, we conclude that on average families of migrants out of the South have a relatively higher ABR than families of remainers. Therefore, localities in which this difference coexists with large migration outflows may have suffered a drain of ABR during the 20th century.

In light of our theoretical model, these conclusions rest on the identifying assumption that within a given narrowly defined locality and period, the distribution of benefits and the level of deterrence are similar for migrant and remainer families. We provide evidence in favor of this assumption using the methodology proposed by Oster (2019). We find that unobservables in our regression analysis would have to be implausibly correlated with migration status to bring down to zero the coefficient indicating that migrants and remainers differ in terms of ABR.

Finally, restricting the analysis to the South where our coverage of the macro-region is more complete, we measure the ABR drain experienced by each locality with an index that takes into account both the gap in the ABR of migrant and remainer families as well as the intensity of the emigration flows. Controlling for the initial level of cheating as well as for other relevant observables and regional fixed effects, we show that localities experiencing a greater ABR drain display lower labor productivity in recent years and we discuss potential mechanisms for this finding. These estimates cannot, of course, be interpreted as causal but, relying again on Oster (2019), we find that the correlation with the ABR drain of the unobservable characteristics of localities would have to be implausibly high to bring down to zero the estimates of the effect of the ABR drain.

Before plunging into the details of our analysis, we reiterate that we do not need nor want to assume that obeying rules is always the "right thing to do", as we noted above in our example about breaking rules under a dictatorship. However, the finding of a negative correlation between our measure of ABR drain and economic outcomes suggests that in the context that we study we are capturing the drain of a trait with a positive value for the affected localities.

Our paper is organized as follows. We start in Section 2 by justifying why the anomalies concerning birth dates that we find in the Census can be considered as forms of cheating. In Section 3 we then rely on a theoretical model to show how information on cheating and deterrence can be used to make inference on the underlying ABR. Section 4 describes how we constructed the data set used in the analysis, starting from Census information. Section 5 presents evidence on the first prediction of the model, concerning the probability of cheating and the ABR of migrant and remainer families, while Section 6 exploits the surge and collapse of Fascism to infer the ABR of the two groups from their different reactions to changes of deterrence. Finally, Section 7 measures the ABR drain at the level of localities and shows that it is correlated with important economic outcomes. Section 8 concludes.

2 Two intriguing anomalies of Census birth dates

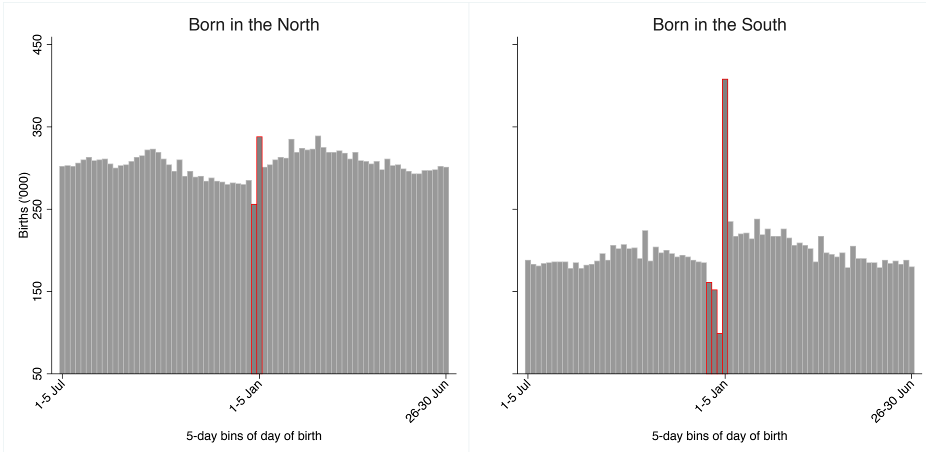
Using data from the 1991 Italian Census,[9] the left panel of Figure 1 displays, for the North of the country, the histogram of the number of births (in thousand) over days of the calendar year grouped in bins of five days. The right panel does the same for the South.[10] While we would expect an almost uniform distribution of birth dates over the year, it is evident that around mid December the frequency of births declines abnormally in the South, to then suddenly increase with a large spike in the first five days of January. In the North the pattern is similar, although less pronounced.

This is not the only anomaly in Census birth dates of Italians. Figure 2 shows the histogram of the number of birth (in thousand) by day of a month, again for the North

[9] 1991 is the first year in which publicly available Census data contain complete dates of birth, as well as cities of birth and residence. See the Online Appendix for a description of the data that completes the information provided in this and the next section. The anomalies described below are present also in more recent Census data, as we show in the Online Appendix.

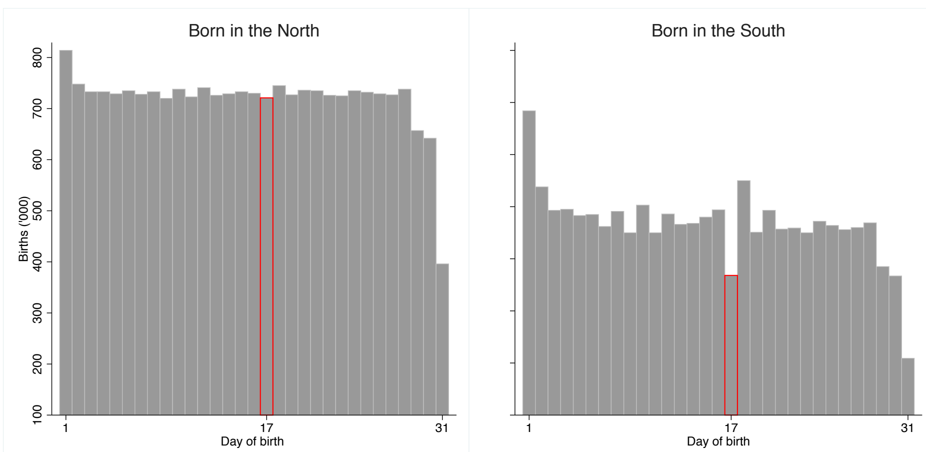
[10] The South is defined as the set of localities that between 1816 and 1861 were part of the "Kingdom of the two Sicilies", for reasons that will be made clear below. The North is the complement set.

Figure 1: The distribution of birth dates over the days of a calendar year



Notes: Restricted Census 1991 data, with exact birth date for the 1921-1954 cohorts. The figure plots the total births for bins of 5 days of a year. The South is defined as the set of localities that between 1816 and 1861 were part of the "Kingdom of the two Sicilies". See Figure 3 and footnote 16 for further details.

Figure 2: The distribution of birthdays over the days of a calendar month



Notes: Restricted Census 1991 data, with exact birth date for the 1921-1954 cohorts. The figure plots the total number of births by day of the calendar month. The South is defined as the localities that between 1816 and 1861 were part of the "Kingdom of the two Sicilies". See Figure 3 and footnote 16 for further details.

on the left and for the South on the right. It is evident in this figure that southern Italians are abnormally less likely to be born on the 17th of each month.[11]

Several features of these two anomalies are interesting and suggest that they should be

[11]In this figure we also see a spike on the first day of a generic month, that is almost entirely due to the spike on the first day of January displayed in Figure 1 and that here is averaged with the (regular) number of births on the first days of the other months.

interpreted as measures of cheating on the date of birth. Before exploring these features, we first provide some information on how we precisely measure these anomalies in the data.

2.1 Measurement of the anomalies and population groups

Starting from individual Census data, we have no way to establish whether the declared date of birth of a specific subject is true or false. The early January spike displayed in Figure 1 obviously refers also to subjects that are effectively born in the first five days of each year. We can claim that there is an anomaly only when we look at groups of subjects, defined with respect to space and/or time, and for some of these groups we detect a non-uniform distribution of birth dates per day of the year. For this reason, our units of observation will be groups of individuals in the population. Given our focus on geographic sorting, we will be particularly interested in groups of migrants and remainers. We define a migrant m as a subject who declares to be born in a locality of the South (North) but who is observed in the 1991 Census to live in a locality of the North (South). A remainer r is instead someone born in a given macro-region and still living there at the Census time.

With specific reference to the JBD anomaly, consider a group $g \in \{m, r\}$ of migrants or remainers born in a locality l immediately before or after the end of year t. Let ρ^+_{glt} be the number of births observed for this group between January 1 and 5 of year $t+1$ and ρ^-_{glt} be the corresponding number of births observed between December 27 and 31 of year t.[12] Then consider the index:

$$\widetilde{\Pi}_{glt} = \frac{\rho^+_{glt} - \frac{\rho^+_{glt}+\rho^-_{glt}}{2}}{\frac{\rho^+_{glt}+\rho^-_{glt}}{2}} = \frac{\rho^+_{glt}}{\frac{\rho^+_{glt}+\rho^-_{glt}}{2}} - 1. \tag{1}$$

This index measures the percent difference between the number of early January births and the average number of births in the December and January intervals; i.e., it measures, for a specific group g in locality l at time t, the size of the early January spike

[12] Our results are qualitatively unchanged if we use asymmetric intervals, with a longer one in December.

displayed in Figure 1 relative to the hypothetical number of births in the case of a uniform distribution around New Year's eve.

Note that $\widetilde{\Pi}_{glt} < 0$ when the number of early January births is lower than the number of late December births (i.e. when $\rho^{+}_{glt} < \rho^{-}_{glt}$), which is a rare pattern in our data, occurring only in very small localities with few births.[13] Given the possibility of small sample variability around the pattern implied by a uniform distribution of births per day of the year, we assume that these cases are not an anomaly. Anomalies can only take the form of the much more frequent shifts of December births to January. Under this assumption, we replace the negative values of $\widetilde{\Pi}_{glt}$ with zero and our indicator of anomaly becomes

$$\Pi_{glt} = \max\{0, \widetilde{\Pi}_{glt}\} \in [0, 1], \tag{2}$$

which is normalized in a way such that $\Pi_{glt} = 0$ in the absence of anomalies; $\Pi_{glt} = 1$ if all parents with births before December 31 declare that deliveries occurred in early January; and $\Pi_{glt} = \frac{1}{2}$ if only half of the parents do the same. Our results are robust to this adjustment, which allows us to interpret Π_{glt} as the share of births that are anomalous in group g of locality l and year t, in the sense that they occur before December 31 but are declared as occurring in the first five days of the following year. In the next section we explain why these anomalies are effectively forms of cheating on the date of birth and are not just curiosities unrelated to ABR.

2.2 Are these anomalies a form of cheating?

The maps in Figure 3 show that the two anomalies are markedly more frequent in localities that between 1816 and 1861 were part of the "Kingdom of the two Sicilies". What is particularly striking is that around the northern border of this kingdom there is a sharp discontinuity in the frequency of the two anomalies, which are almost absent in municipalities located just north of the border. Interestingly, this border also crosses the official boundaries of some modern regional administrations (specifically, Lazio, Umbria and Marche, as shown by d'Adda and de Blasio, 2017). So these anomalies appear to

[13]Only 4.3% of the group × locality × biennium cells that we consider (see Section 4) feature a $\widetilde{\Pi}_{l} < 0$. Moreover, 75% of these cells include less than 9 individuals.

be related more to institutions of the past than of the present, and specifically to state authorities known to be characterized by a less efficient administration and by lower levels of deterrence against the breaking of rules.[14] For example, the two anomalies are almost absent in the insular region of Sardinia that is usually included in the standard definition of "South" of Italy, but that was historically part of the northern Kingdom of Piedmont and Sardinia, ruled by the Savoy dynasty. Historians typically credit this kingdom with an efficient administration and with high levels of deterrence against crime.[15] These geographical and historical considerations constitute our first piece of evidence suggesting that the JBD and 17BD anomalies may be related to ABR and cheating. For these reasons, in Figures 1 and 2 and in the rest of the paper the "South" is defined as the set of localities that historically were part of the "Kingdom of the two Sicilies".[16]

Moreover, for each one of these two anomalies there is a well defined set of motives that are likely to induce parents to register a false date of birth for their children. In the 17BD case, superstition is the obvious driving motive since this number is associated to "La Disgrazia" (The Misfortune) in the traditional game of the Neapolitan Tombola.[17] As for JBD, the probably most important motive has to do with the fact that the activities of children typically take place within cohorts defined by the calendar year of birth. Therefore, a child born in December is always among the youngest in the groups of mates with whom she competes, physically or intellectually. If the same child is instead registered as being born in early January, she will be the oldest in her cohort. This is particularly relevant in the case of school activities, sport competitions and army enrollment, which was compulsory in Italy for cohorts born until 1985.[18]

[14]See for example Putnam, Leonardi, and Nanetti (1993), Di Liberto and Sideri (2015) and Bosker et al. (2008).

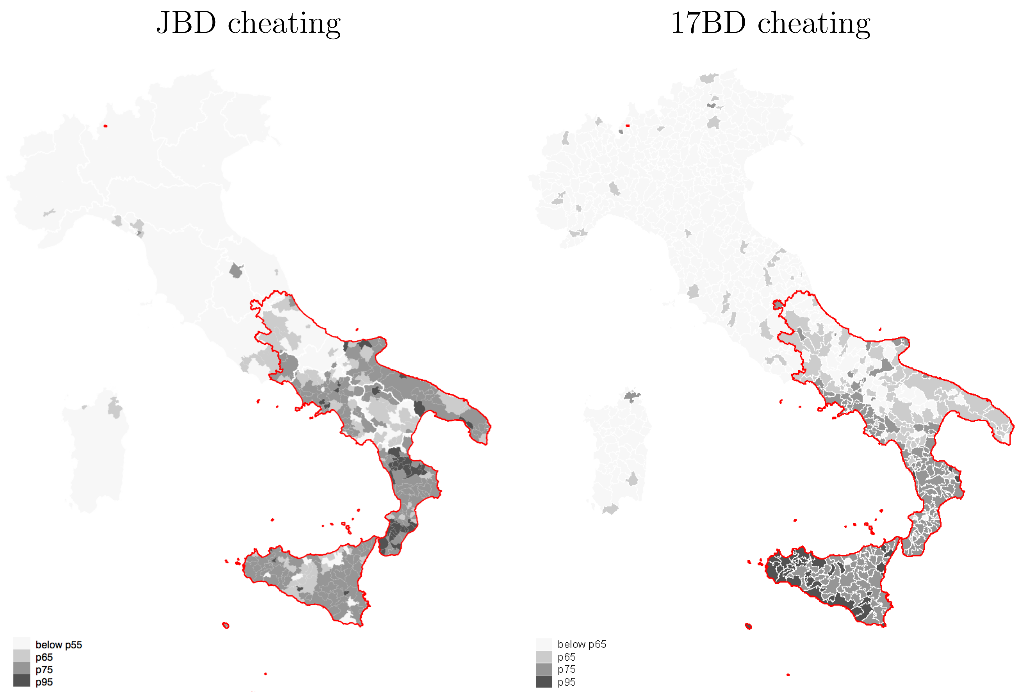
[15]See again Putnam, Leonardi, and Nanetti (1993). The Savoy unified Italy under their power in the second half of the 19th century.

[16]More precisely, we follow d'Adda and de Blasio (2017) in defining "South" as the set of localities belonging to the modern regions of Sicily, Calabria, Apulia, Campania, Basilicata, Molise, Abruzzo and to the provinces of Frosinone, Latina, and Rieti in the region of Lazio, the province of Ascoli Piceno in the Marche region, and a few municipalities in the province of Perugia.

[17]See Liccardo (2019).

[18]Practices aimed at shifting the activities of children to later born cohorts take the name of "Red Shirting" in the USA.

Figure 3: Birth date cheating and the "Kingdom of the two Sicilies"



Notes: Restricted Census 1991 data, with exact birth date for 1921-1954 cohorts. The figures plot the distribution of birthday cheating Π_l across local labor markets l, around January 1 of each year and on day 17 of each month. The red line indicates the historical borders of the "Kingdom of the two Sicilies".

Another relevant motive for shifting to early January the birth of a child born in December, is that it makes the child available at home for a longer time. If the child is male, military service will start one year later, while in the case of a female there will be more time to find a husband. As shown in the Online Appendix the JBD anomaly is observed for both females and males, although it is more pronounced for the latter. It is also observed for children that later reach high levels of education (e.g., more than high school) as well as for those who instead do not go beyond compulsory education or are dropouts. Therefore, both anomalies do not seem to be specifically related to family affluence. This is not surprising because motives like being older in a cohort, delaying the military service or having more time to find a husband are largely independent of family affluence.

The Census information at our disposal does not allow us to identify the specific motive, in the above list, that might have induced a particular parent or group of parents in our sample to violate the rule requiring to register newborn children with their correct date of birth. However, for our purposes this is not necessary. As explained in the model presented in Section 3, an agent cheats on a specific rule if she derives from this action a large enough benefit given her individual private ABR and the public common level of deterrence. The specific nature of the benefit that the agent derives is irrelevant for our purposes.

What is instead more relevant for us is the possibility to determine whether observing an agent cheating or not cheating is informative about her individual ABR. It is not obvious that this is the case. For example, if Italians in the North are not superstitious or have different forms of superstition, they will register correctly the date of birth of their children born on the 17th of a month not because they have a high ABR but because they do not derive any benefit from this specific form of cheating. And, more generally, if in a given locality deterrence is very high, rule breaking will be rare even if those who live in that locality would be prone to break rules in the absence of deterrence.

Therefore what we need for the purpose of this paper is not only that the JBD and 17BD anomalies can be characterized as forms of cheating, but also that they are informative on the underlying ABR of agents. Leaving to Section 3 the identification of conditions under which the observation of cheating in a group of agents is informative about their underlying ABR, here we briefly summarize the evidence, reported in the Online Appendix, that allows us to exclude that the JBD and 17BD anomalies are *certainly* unrelated to the voluntary decision to falsify the date of birth of a child.

Specifically, we can exclude that both anomalies are due to misreporting in the Census, while birth dates are registered correctly in vital statistics. If the anomalies were due to misreporting, they would not appear consistently also in the 2001 and 2011 Census data. Moreover, as we will show in Section 6, the frequency of the JBD anomaly decreases significantly immediately after the 1926 reforms implemented by the Fascist regime, and goes back to pre-Fascism levels when the regime collapses during the war. This frequency also drops almost completely in 1955, the year in which doctors and obstetricians became responsible for the registration of the date of birth following a major reform of civil registries.[19] There is no reason to think that misreporting in the Census should react to the same events.

The JBD anomaly may also be related to planned C-sections. However, note that these were probably rare between 1920 and 1955, although we could not find precise statistics. More importantly, planned C-sections can explain an anticipation of the date of birth but not a delay with respect to the natural due date.[20]

It is also unlikely that the two anomalies are due to the closure of the local offices where births are registered. This is obviously not the case for the 17BD anomaly. As for the JBD anomaly, if office closures around Christmas time were the reason, we should observe a similar drop of registered births around Easter, but this is not the case (see the Online Appendix). Moreover, there is no evidence that birth date cheating of both kinds is more frequent for families with a lower level of education and thus possibly more prone to make mistakes in bureaucratic practices. As already mentioned, in the Online Appendix we show that the anomalies are similarly frequent for children who later end up reaching a high level of education as well as for those who drop out of school or stop at compulsory levels.

It is instead possible to argue that these anomalies are simply due to "sloppiness" of some parents, which would lead them to register an incorrect date of birth of their children just out of lack of attention and not for any specific reason. According to this interpretation, the choice of January 1 for the birth of a child would just be due to the fact that this is an easy date to remember. If sloppiness were the reason, however, we should see spikes of births on the first day of each month, but this is not the case (see footnote 11). Moreover, sloppiness does not explain the drop in births at the end of the year. Finally, and more importantly, following rules is often costly and being sloppy about rules generates a benefit. So there is not much difference in breaking a rule to gain the benefit of being sloppy or to gain any other benefit. Sloppiness in rule following is in itself a symptom of low ABR.

In light of these considerations, we will from now on consider these two anomalies as

[19] Art. 4 of Law n.1228 of December 24, 1954.

[20] In fact, planned C-sections have been shown by Schulkind and Shapiro (2014) to play a role in the anticipation of birth to the last day of a year for fiscal purposes, which is totally plausible.

forms of cheating or rule breaking. Note that they offer two advantages in a study about ABR and migration. First they can be estimated, using Census information, for small population groups (like migrants and remainers) in given localities and at different points in time during the 20th century. Second, as shown in the Online Appendix, they also correlate well with more traditional cheating indicators like cheating in school exams, excessive absenteeism, ghost building, which instead cannot be computed for migrants and remainers in the same locality.[21]

Finally, note that cheating in the registration of the date of birth of a newborn child is a decision of the parents, while the decision to later migrate may be a decision of parents, if the entire family move, or just a decision of the child when she becomes an adult and decides to migrate alone. This is because, as already said, we define a person as a migrant if her place of residence in the 1991 Census is different from her place of birth, but we have no information on when migration took place. However, given the extensive evidence of inter-generational transmission of ethical values (see footnote 8), an agent in our analysis should be thought of as a family, which may or may not cheat and may or may not migrate at different points in time. We will use the words "agent", "subject" or "family" interchangeably in the sequel. For brevity, we will also use occasionally the words "migrants" and "remainers" to refer, respectively, to migrant and remainer families.

The next step in our analysis is to show under what conditions the birthday cheating indicators that we constructs for migrants and remainers are informative about the average ABR of the two groups. We do so with the model presented in the next section.

3 A model of cheating benefits, deterrence and ABR

We model the decision of a risk neutral agent to break a rule (or cheat, for brevity), which we denote as $C = 1$ as opposed to $C = 0$. The agent derives a utility benefit $B \in (-\infty, +\infty)$ from cheating, which is distributed according to $F(B)$. $D \in (-\infty, +\infty)$ denotes deterrence, i.e. the expected public penalty for cheating. Each agent is also char-

[21] We borrow information on these alternative indicators from Casaburi and Troiano (2016) and Angrist, Battistin, and Vuri (2017), and we are grateful to them for sharing their data.

acterized by an individual private Aversion to Breaking Rules (ABR), which we indicate with $A \in (-\infty, +\infty)$. We are interested in understanding under which conditions observing cheating by an agent is informative about her ABR.

The decision process that leads to cheating is lexicographic with two stages:[22]

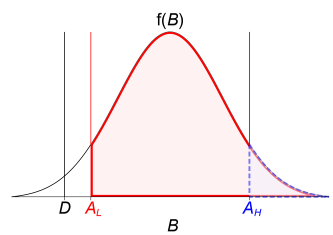
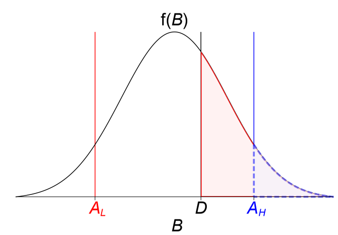
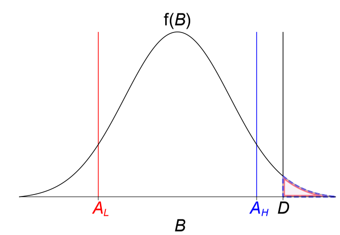
$$\begin{cases} \text{if } B \leq A \quad \Rightarrow \quad C = 0 \\ \\ \text{if } B > A \quad \Rightarrow \quad \begin{cases} \text{and } B \leq D \quad \Rightarrow \quad C = 0 \\ \\ \text{and } B > D \quad \Rightarrow \quad C = 1 \end{cases} \end{cases} \tag{3}$$

This process is meant to capture two features of the relationship between cheating and ABR that are crucial for our analysis. First, it is necessary to have information on benefits and deterrence to make inference about ABR from the observation of cheating. For example, $C = 0$ may be due to a high ABR but is also compatible with a low ABR if B is low or B is high but D is even higher. Second, the level of deterrence is irrelevant for agents who have a very strong private ABR. If A is very high, the agent is unlikely to cheat just because of her own ethics, even in a context in which deterrence is low. Only agents with relatively low ABR are likely to change cheating behaviour as a reaction to an increase of deterrence.

Now consider a population of agents who face the same deterrence D and the same distribution of benefits $F(B)$. These agents are divided in two groups characterized by different levels of ABR: $A_H > A_L$. Let $Pr(A = A_H) = \Omega_H$ be the frequency of agents with high ABR. Three interesting cases depend on whether D is lower, intermediate or higher with respect to A_L and A_H. These three cases are described, formally and graphically, in the first two rows of Table 1. The third row displays the equation that defines the probability of cheating Π_d, with d denoting the three possible levels of deterrence, $D = d \in \{\text{low}, \text{med}, \text{high}\}$, for the three cases.

[22]See footnotes 4 and 5 for the relevant literature on which we build this assumption.

Table 1: Predictions of the model with different levels of deterrence

	Deterrence	Low	Medium	High
		(1)	(2)	(3)
		$D < A_L < A_H$ 	$A_L < D < A_H$ 	$A_L < A_H < D$ 
	$\Pi_d =$	$[1 - F(A_L)](1 - \Omega_H) + [1 - F(A_H)](\Omega_H)$	$[1 - F(D)](1 - \Omega_H) + [1 - F(A_H)](\Omega_H)$	$[1 - F(D)]$
A)	$\frac{\partial \Pi_d}{\partial \Omega_H} =$	$[1 - F(A_H)] - [1 - F(A_L)] < 0$	$[1 - F(A_H)] - [1 - F(D)] < 0$	0
B)	$\frac{\partial \Pi_d}{\partial D} =$	0	$-f(D)[1 - \Omega_H] < 0$	$-f(D) < 0$
C)	$\frac{\partial \left\lvert \frac{\partial \Pi_d}{\partial D} \right\rvert}{\partial \Omega_H} =$	0	$-f(D) < 0$	0

We are interested in three predictions. The first prediction is about whether observing a high (low) probability of cheating Π_d in a population is indicative of a low (high) underlying frequency Ω_H of high ABR types. The second prediction is about whether an increase (decrease) of deterrence D decreases (increases) the probability of cheating Π_d. And the third one is about whether observing a big (small) absolute change of the cheating probability for a given change of deterrence D is indicative of a low (high) underlying probability Ω_H of high ABR types. It is crucial to keep in mind that these three predictions hold under the assumption that all agents have the same distribution of benefits $F(B)$ and face the same deterrence D.

Prediction (A) is presented in the fourth row of Table 1, which shows that $\frac{\partial \Pi_d}{\partial \Omega_H}$ is negative when D is low or intermediate. This implies, given the monotonicity of the relationship between Π_d and Ω_H, that observing more cheating in a population is indeed indicative of a lower frequency of high ABR agents if they all face the same deterrence and have the same benefits. The derivative is instead equal to zero when D is high, because in this case cheating depends only on deterrence for given distribution of benefits.

Prediction (B) is presented next and says that $\frac{\partial \Pi_d}{\partial D}$ is either zero (when D is low) or negative (when D is intermediate or high). While it is intuitive that an increase of deterrence should induce a decline of cheating in general, the model shows that this is not the case when deterrence is so low that, given $F(B)$, the decision to cheat depends only on the private ABR for all subjects.

Finally, Prediction (C), in the last row of the Table, is less obvious and shows that at intermediate values of deterrence the frequency of high ABR agents is lower when a change of deterrence (in whatever direction) induces a larger absolute change in observed cheating. That is, $\frac{\partial \left| \frac{\partial \Pi_d}{\partial D} \right|}{\partial \Omega_H}$ is negative. This (cross partial) derivative is instead equal to zero at low and high levels of deterrence because in the first case the decision to cheat depends just on A_L and A_H, while in the second it depends just on D. Only in the intermediate case it depends on both ABR and deterrence.

Note that Predictions (A) and (C) offer two independent ways to make inference on the frequency of high ABR agents in a population. One is based on the observation of the probability of cheating, while the other is based on the sensitivity of the cheating probability to a change of deterrence.

In light of these predictions, let's now consider a locality in which agents are divided in two groups: $g = m$ for migrants and $g = r$ for remainers. In each of these two groups agents may have a high ABR (A_H) or a low ABR (A_L). Let Π_{glt} be the share of JBD cheaters among agents in group g who are born in locality l at time t. Our maintained assumption, for which we will provide evidence in our empirical analysis, is that within a given narrowly defined locality and time period migrants and remainers are exposed to the same deterrence and have a similar distribution of cheating benefits.

The three predictions of the model allow us to infer the frequency of high ABR agents among migrants and remainers from observations about their probabilities of cheating and about the sensitivity of these probabilities to changes in deterrence. Specifically:

A) If

$$\Pi_{mlt} < \Pi_{rlt}$$

then deterrence must be medium or low and

$$[\Omega_H]_{mlt} > [\Omega_H]_{rlt}$$

i.e., a higher probability of cheating among remainers implies a higher frequency of high ABR agents among migrants.

B) If, for both $g = \{m, r\}$,

$$\frac{\partial \Pi_{glt}}{\partial D} < 0$$

then deterrence must be medium or high.

C) If

$$\left[\frac{\partial \left|\frac{\partial \Pi}{\partial D}\right|}{\partial \Omega_H}\right]_{mlt} < \left[\frac{\partial \left|\frac{\partial \Pi}{\partial D}\right|}{\partial \Omega_H}\right]_{rlt}$$

then deterrence must be medium and

$$[\Omega_H]_{mlt} > [\Omega_H]_{rlt}$$

i.e., a higher reaction to deterrence of remainers, in terms of absolute changes of the probability of cheating, implies a higher frequency of high ABR agents among migrants.

In the next sections we confront these predictions with the evidence on JBD cheating, which is more interesting and quantitatively relevant than the corresponding evidence for 17BD cheating.

4 What is an "observation" in our empirical analysis

In the 1991 Census, Istat divides the Italian territory into 784 Local Labor Market (LLM: "Sistemi Locali del Lavoro"). Due to laws on the protection of statistical confidentiality, we were not allowed to extract data for three local labor markets in the North because of their small sample size. So in the end we study 781 LLMs, of which 454 are in the North and 327 in the South. Using restricted information on complete dates of birth (day, month and year) for each Italian alive in 1991, we first identify subjects that are born in a LLM of the South (North) and live in a LLM of the North (South). We define these subjects as migrants. Remainers are instead subjects who are born in a LLM of the South (North) and live in the same macro-region of birth (although not necessarily in the same locality).

We restrict the analysis to subjects born in the last 5 days of December and in the first 5 days of January, because these are the subjects for which JBD cheating can be measured.[23] The implicit, but reasonable, assumption is that within each locality and time period the parents of subjects born in other days of the year would have on average behaved like those who gave birth around New Years' Eve if they had been in the same condition, as far as the decision to possibly falsify the date of birth of their children were concerned.

The analysis is further restricted to cohorts born between 1921 (life expectancy in this cohort is higher than 70 years),[24] and 1954 (because, as already said, in 1955 doctors

[23] As already mentioned (see footnote 12), our analysis is qualitatively unchanged if we use asymmetric intervals, with a longer one in December.

[24] See the World Bank Website.

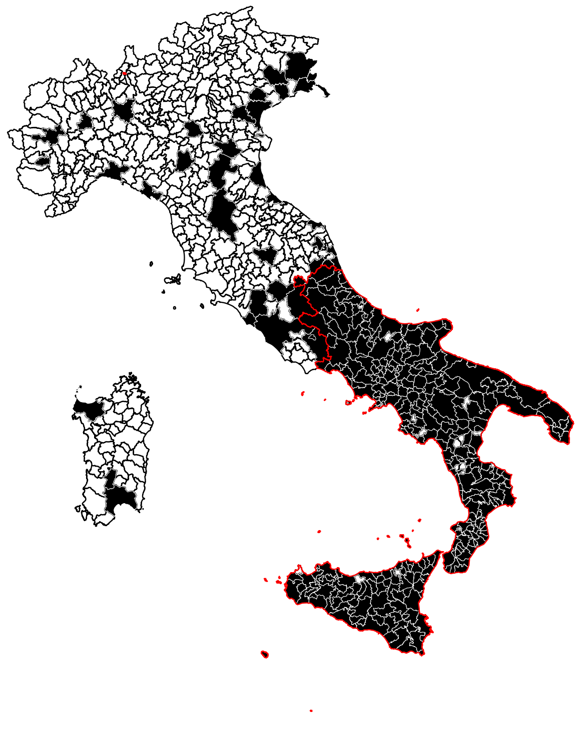
and obstetricians became responsible for the registration of birth dates). We divide this period in 17 bienniums that constitute our time unit of analysis.

In Sections 5 and 6, we compare migrants and remainers within the same locality and biennium because, as we will see, only within these space×time cells we can convincingly claim that the two groups face the same deterrence and have the same distribution of cheating benefits. Because of this restriction, in the South out of $5,559 = 327 \times 17$ theoretical cells defined by locality and biennium, we have to drop 567 cells in which there are no migrants born around New Years' Eve and 35 cells in which the same condition applies to remainers. However, all the 327 LLMs are still represented in the data after this selection, although some of them only for a number of bienniums that is smaller than 17.

In the analysis of reactions to changes of deterrence in Section 6 we further consider three sub periods defined by the surge and collapse of Fascism: the first period consists of the 3 bienniums between 1921 and 1926, which is the year of implementation of the reforms that, as we will see, increase deterrence against JBD cheating; the second period covers the 7 bienniums between 1927 and 1940, which is the year in which WW2 begins for Italy and Fascism starts to collapse; and the remaining period covers the 7 bienniums between 1941 and 1954. Since in Section 6 we want to compare JBD cheating of migrants and remainers born in locality×bienniums cells belonging to each of the three periods, we further drop the localities for which this comparison is impossible in at least one period. This condition occurs in 22 localities so that the final number of southern LLMs that we consider in the empirical analysis of Sections 5 and 6 is 305. Not all these localities are observed for all bienniums, but all of them are observed in at least one biennium of the three Fascism-related periods and all of them always feature the births of both migrants and remainers for a total of 9,632 group×locality×biennium cells. The fraction of migrants in these cells ranges between a minimum of 3% to a maximum of 86%, with a mean of 28%, a median of 25% and a standard deviation of 16 percentage points.

Migration movements from North to South are significantly much less frequent. Out of $7,718 = 454 \times 17$ theoretical cells defined by locality and biennium for the North, we

Figure 4: Local labor markets with enough emigration for our analysis



Notes: Black areas indicate local labor markets with sufficient emigration for our analysis. White areas refer to local labor markets with insufficient emigration and are therefore excluded from the analysis. The red solid line indicates the border of the "Kingdom of the two Sicilies".

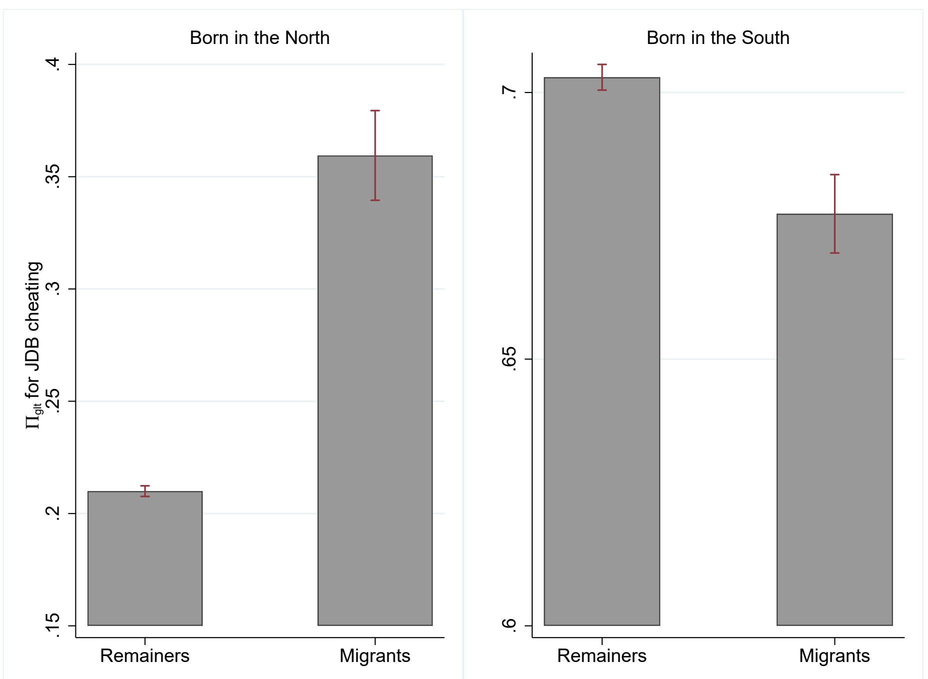
have to drop 7,093 cells in which there are no migrants born around New Years' Eve and 53 cells in which the same condition applies to remainers. When we further drop localities to allow for the analysis in Section 6, we are left with 38 northern localities that are observed in at least one biennium of the three Fascism-related periods and feature the births of both migrants and remainers, for a total of 728 group×locality×biennium cells. The fraction of migrants in these cells ranges between a minimum of 0.3% to a maximum of 24%, with a mean of 4%, a median of 2% and a standard deviation of 5 percentage points.

Figure 4 shows the location, along the Italian peninsula, of the 305 southern localities and of the 38 northern localities within which a comparison between migrants and remainers born in the same biennium is possible. While in the South the coverage is almost complete and we miss only few very small localities, in the North we cannot claim any representativeness. We will nevertheless report results also for these few northern localities in the analysis of Section 5 and in the Online Appendix because, as we will see, they provide interesting insights.

5 Geographic sorting based on ABR

If within the same locality and biennium migrants and remainers face the same deterrence and have the same distribution of cheating benefits, Prediction (A) of the model in Section 3 says that the probability of JBD cheating in the two groups is informative about the respective underlying fractions of high ABR agents.

Figure 5: Descriptive evidence on geographic sorting based on ABR: Prediction (A)



Notes: The figure reports averages and 95% confidence intervals of JBD cheating for migrants and remainers in the 38 Local Labor Markets (LLM) in the North of Italy (left) and in the 305 LLM in the South (right). JBD cheating (Π_{glt}) is the share of births that occurred before December 31 but are declared as occurring in the first five days of the following year in group g, locality l and biennium t. Observations are weighted by the number of births in the cell.

Figure 5 reports preliminary descriptive evidence about Prediction (A), in which each cell of migrants or remainers (g), in a locality (l) and biennium (t) is weighted by the population that the cell represents (i.e. by the number of births around New

Year's Eve), to give more weight to cells in which our measure of cheating is more precise. Aggregating over all time periods, the left panel compares the probability of JBD cheating of the families of migrants and remainers born in the 38 northern localities in which this comparison is possible, as explained in Section 4. The share of JBD cheaters is about 35% among migrants from North to South while it is 15 percentage points lower among remainers in the North and the difference is statistically significant. On the contrary, the right panel shows that in the 305 southern localities for which the comparison is possible, the share of cheaters is higher among remainers in the South than among migrants from South to North. The difference is relatively small (about 2.5 percentage points) but statistically significant. This descriptive evidence suggests that migrants from South to North and viceversa were not randomly selected from the respective populations with respect to ABR.

Given the large migration rates from South to North (28% on average in our dataset), this non-random selection may have induced a drain of families with high ABR out of the South even if the average difference between the cheating probability of migrant and remainer families is small in this macro-region. We will quantify precisely the size of this drain in Section 7. In the opposite direction, migration rates were significantly less intense (4% on average in our dataset), but in the few localities in which they took place the cheating probability of migrant families is substantially higher than that of remainer families, suggesting the possibility of a localized drain of low ABR families from North to South in specific geographical contexts.

This analysis is of course only suggestive because it does not control for the possibility that migrants in different localities and time periods face different levels of deterrence and have different distributions of cheating benefits. To make progress in this direction, Table 2 reports controlled estimates of the shares of JBD cheating families in the four groups defined by migration status (migrant or remainer) and macro-region of birth (North or South). These estimates are obtained with the following regression:

$$\Pi_{glt} = \beta_1 + \beta_2 South_{glt} + \beta_3 Migrant_{glt} * North_{glt} + \beta_4 Migrant_{glt} * South_{glt} + \gamma X_{glt} + \psi_{lt} + \epsilon_{glt}, \tag{4}$$

that we estimate on the sample of the 10,360 group×locality×biennium cells (9,632 in

Table 2: JBD cheating of Migrant and Remainer families: Prediction (A)

	(1)	(2)	(3)	(4)
Migrant*South (β_4)	-0.021**	-0.011***	-0.013***	-0.013***
(Mig.S-Rem.S)	(0.009)	(0.004)	(0.004)	(0.004)
Migrant*North (β_3)	0.197***	0.104***	0.096***	0.114***
(Mig.N-Rem.N)	(0.050)	(0.024)	(0.026)	(0.020)
South (β_2)	0.492***			
(Remainers,South)	(0.040)			
β_1	0.212***			
(Remainers,North)	(0.037)			
Observations	10,360	10,360	10,360	10,360
Population represented by cells	430,709	430,709	430,709	430,709
R-squared	0.506	0.801	0.805	0.807
LLM x Biennium FE	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes
Controls interacted	No	No	No	Yes
Oster δ for $\beta_3 = 0$		5.618	4.510	4.795
Oster δ for $\beta_4 = 0$		6.854	11.51	11.41
p-value of F-test for controls			0	0

Notes: The table reports OLS estimates based on data for 305 Local Labor Markets (LLM) in the South of Italy and 38 in the North, observed for at most 17 bienniums between 1921 and 1954 (*** p<0.01, ** p<0.05, * p<0.1). Observations are weighted by the number of births in the cell defined by a group g of migrant or remainers in a locality l and biennium t. Standard errors are clustered at the locality level. The dependent variable is Π_{glt}, the share of births that occurred in the five days before December 31 but are declared as occurring in the first five days of the following year in each cell. β_1 and β_2 in column 1 are estimates of the share of cheaters in the group of remainers in the North and in the South, respectively. β_3 captures the difference in cheating between the migrants from North to South and the remainers in the North and β_4 is the difference between the migrants from South to North and the remainers in the South. The β_1 and β_2 coefficients in columns 2, 3 and 4 are not reported because they do not have a meaningful interpretation given the inclusion of the interaction between LLM and biennium fixed effects. The Population represented by cells is the total number of birth on which the regression would be run if individual observations had not been collapsed at the cell level. Controls include the average year of birth, the share of female, the share of people with primary education and the share with tertiary education. In column 4 we add all possible interactions among the controls. δ's are the statistics proposed by Oster (2019) capturing how much the unobservable characteristics would have to be correlated with migration status more than the observed ones in order to conclude that migrant and remainer families have the same cheating probability. The p-value in the last row refers to an F-test for the joint significance of all included controls.

the South and 728 in the North) constructed as described in the previous section. Each cell is again weighted by its size (i.e. by the number of newborns around New Year's

Eve), which is equivalent to running the regression on individual data with clustering at the cell level and attributing to each subject the birthday cheating of its cell.[25] In the regression of Table 2, in which an observation is a group–locality–biennium cell, standard errors are instead clustered at the locality level. ψ_{lt} is the interaction between locality and biennium fixed effects.[26] X_{glt} are average characteristics of migrants or remainers in these cells (share of females, average year of birth, share with primary education and share with tertiary education)[27] and ϵ_{glt} contains unobservable characteristics of groups, localities and periods. Note that, based on the discussion in Section 2, gender, education and year of birth are likely to capture the most important determinants of the benefits of JBD cheating, while LLM×biennium fixed effects should control almost perfectly for the level of deterrence.

In column 1 no control is included and the Table reproduces the evidence of Figure 1. Among remainers in the North the share of cheaters is about 21% while it is 49 percentage points higher among remainers in the South. However, note again that this difference is not informative about underlying differences in ABR because deterrence and the distribution of benefits cannot be assumed to be similar in the two macro-regions. Within the same macro-region, migrants born in the North add 19.7 percentage points of cheating probability to the level of remainers born in the same region, while migrants born in the South have a lower probability of cheating (by 2.1 percentage points) with respect to remainers in the same regions. All these differences are statistically significant at conventional values.

In columns 2, 3 and 4 of Table 2 we progressively add more stringent controls which are meant to purge the comparison of migrant and remainer families from confounders related to differences in benefits and deterrence. Specifically, since observations are weighted by the number of subjects in each cell, in column 2 we can include the inter-

[25]See Angrist and Pischke (2009). If the regression had been run at the individual level, the number of observations would have been 430,709, which corresponds to the total Italian population in the 1991 census who was born around New Year's eve in the localities we consider and in the 1921-1954 period.

[26]When this interaction is included in equation 4 the β_1 and β_2 are of course not identified.

[27]Secondary education, corresponding to junior-high (8 years) or a high school degree (13 years), is the omitted category. Primary education corresponds to 5 years of elementary schools. Tertiary education corresponds to more than high shool.

action between LLM and biennium fixed effects (ψ_{lt}); column 3 adds the X_{glt} controls linearly; and column 4 adds a fully saturated specification of the same X_{glt} controls. Even in these more demanding comparisons, migrant families from North to South have a cheating probability that is 10–11 percentage points higher than that of remainer families in the North, while for migrants in the opposite direction the analogous probability is 1.1–1.3 percentage points lower than the one of remainers in the South.

These controlled estimates give further support to the conclusion that, in light of Prediction (A), some sorting related to ABR has occurred in Italy. Depending on the intensity of migration flows out of the different LLMs, this sorting may have induced, locally, a drain of families with high ABR from South to North and a drain of families with low ABR in the opposite direction.

This conclusion rests, however, on the identifying assumption that, within a given LLM/biennium cell and controlling for what we can observe, the distribution of benefits and the level of deterrence are similar for migrants and remainers. The δ statistics proposed by Oster (2019) and reported in the table for the parameters β_3 and β_4 provide evidence in favor of this assumption. To interpret this parameter in our context, note that comparing the last 3 columns of the table with the first column, the R^2 indicates that the locality and biennium fixed effects together with the observed characteristics of migrants and remainers in each LLM×biennium cell explain about 30 additional percentage points of the variability of the probability of cheating, on top of the 50% explained by the uncontrolled specification in the first column. Therefore, these controls must capture a good part of the variability of deterrence and cheating benefits. However, the estimated coefficients β_3 and β_4, that indicate the existence of sorting related to ABR, remain relatively stable when these controls are included.

In light of this evidence, the δ statistic proposed by Oster (2019) measures by how many times the remaining characteristics of localities that we do not observe (i.e., the unobservable determinants of deterrence and benefits) should be correlated with migration status in each macro-region of birth in order to bring down to zero the β_3 and β_4 coefficients, given that these unobservables can only explain the small remaining variability of the cheating probability. For example, with reference to the comparison between columns 4 and 1, a $\delta = 4.795$ for β_3 says that if the unobservable characteristics (which explain only 20% of the variability of the outcome) could be included, they would have to be about 4.8 times more correlated with migration status than the observed ones in order to conclude that migrants and remainers born in the North have the same cheating probability. As for β_4, the analogous correlation would have to be about 11.4 times higher to conclude that there has been no drain of high ABR families out of the South. Such high correlations between unobservable characteristics and migration status are arguably implausible, in a context in which they explain only a relatively small part of the variability of the outcome.

6 Surge and collapse of Fascism: deterrence shocks

Next we move to Predictions (B) and (C) of the model presented in Section 3, exploiting historical events related to the surge and collapse of Fascism in Italy. We will show that these events generate variations of deterrence that we can exploit to assess whether JBD cheating reacts to deterrence (Prediction B), and whether the frequency of high ABR families can be claimed to differ between migrants and remainers depending on how the two groups react to the same change of deterrence (Prediction C).

6.1 The 1926 Fascist reforms

The Fascist party rises to power in October 1922, with the "March on Rome" and by 1926 its control on the Italian parliament is essentially unchallenged. In this year Mussolini, thanks to the acquired power, introduces a wide set of reforms aimed at extending to the entire public administration the control of the Fascist party, even in the most remote localities of the country. These reforms are also meant to increase natality, because population growth is viewed by Mussolini as a major engine of the autarchic economy that he envisages for the country and as a source of military power for the colonial wars he wants to fight.

Leaving the details to the wide existing literature on this period of the Italian history,[28] here we just describe the main features of the 1926 reforms that generate, im-

[28] See for example De Felice (2004), Gentile (2013), and specifically Melis (1996) for the history of

plicitly, an increase of deterrence against JBD cheating. First, a new local authority is introduced at the level of each municipality: the "Podestà", who is nominated by the Government instead of being elected by citizens like a mayor. The goal of this new authority is to increase the control of the central state and specifically of the Fascist party on the daily life of citizens. The introduction of the Podestà would not "per se" be relevant for deterrence against JBD cheating, but it does so in conjunction to the implementation of pro-natality policies, which are under the control of the Podestà at the local level.

The heart of these pro-natality policies is the creation of a new national agency to help mothers and young children, the "Opera Nazionale Maternità e Infanzia" (ONMI).[29] One of its main stated goals is to make sure that all births, even those occurring at home, receive the assistance of certified obstetricians. This is because infant mortality soon after delivery is still high in Italy in these years and the regime wants to reduce it to boost population growth. One of the duties of the Podestà is to make sure that OMNI has the resources to successfully operate at the local level and to achieve its goals. In order to monitor the success of this strategy, the regime introduces the first census of infant mortality, which registers at the local level the number of deaths of newborn babies occurring within 6 days from birth. It is immediately evident that in this new context the control of the regime on the exact date of birth of children becomes extensive. Breaking rules related to the correct registration of birth dates is now more difficult, due to the increased presence of obstetricians at the time of birth.

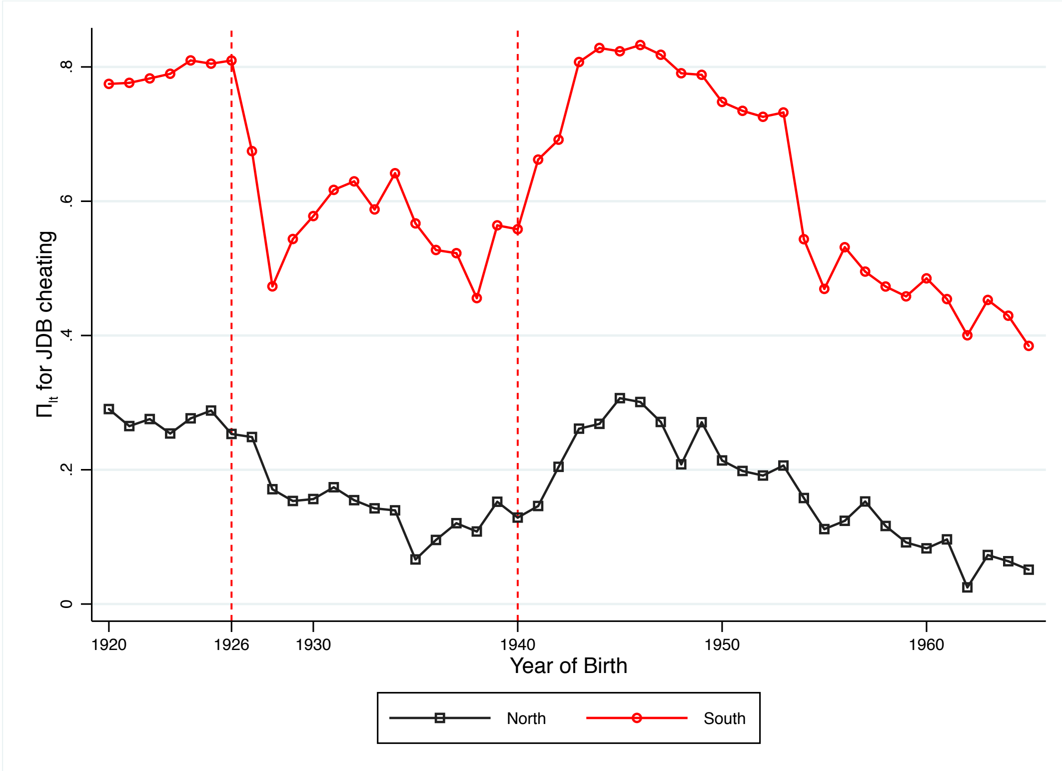
6.2 Overall effects of the reforms in the North and in the South

The effect of these reforms on the probability of JBD cheating in the North and in the South is displayed in Figure 6 and does not leave doubts about the fact that this probability reacts as expected to both increases and decreases of deterrence. Averaging across cells of migrants and remainers and across localities within each macro-region, this figure plots for each year t the JBD probability in the North (squares) and in the South (circles).

the Italian public administration.

[29]See Minesso (2007).

Figure 6: JBD cheating and the effect of the 1926 Fascist reforms: Prediction (B)



Notes: The figure reports the time series of Π_{lt} (the share of births that occurred before December 31 but are declared as occurring in the first five days of the following year) between 1920 and 1965, separately for the North and the South. The sample includes individuals born in the LLMs that we can include in our analysis (38 in the North and 305 in the South, see Section 4). The vertical dashed lines represents the start and the end of the period of Fascist deterrence.

Before 1926 the probability of JBD cheating is about 80% in the South and suddenly drops below 50% during the first two years of implementation of the reforms. It then remains at levels that are much lower than the pre-reforms ones until WW2 begins for Italy in 1940. At that point, it starts to increase again, while the Fascist administration becomes progressively more focused on the war effort than on internal issues. By 1943, when the Fascist regime collapses, JBD cheating is back to the same levels of the pre-1926 period, as if nothing had happened in between. It falls again in 1955, following the already mentioned 1954 reform of civil registries that made doctors and obstetricians responsible for the registration of births.

In the North the probability of JBD cheating is always considerably lower, as expected from the evidence in Figure 5, and the reaction to the reforms of the Fascist regime is much less pronounced, although still visible. However, nothing can be said, based on this figure, on the aggregated underlying fraction of high ABR families in the South or in the North because it is implausible that the levels of deterrence and the distribution of JBD cheating benefits are comparable in the two macro-regions. Therefore, Prediction (C) of the model does not apply to the North-South comparison. At the same time, Figure 5 clearly shows that Prediction (B), about the effect of changes in deterrence on the probability of cheating, holds within each macro-region. Specifically, at least in the South, this probability reacts to deterrence as in the case in which deterrence has initially intermediate values (see Table 1).

6.3 Effects of changes in deterrence on migrants and remainers

The surge and collapse of the Fascist regime are helpful in exploring the differences in ABR between migrant and remainer families that drive the reactions of the two groups to changes of deterrence induced by those historical events. For this purpose, we estimate, separately for each macro-region, this equation:

$$\Pi_{glt} = \beta_1 + \beta_2 Fascism_t + \beta_3 Migrant_{glt} + \beta_4 Migrant_{glt} * Fascism_t + \gamma X_{glt} + \psi_{lt} + \epsilon_{glt}, \quad (5)$$

in which one observation is a cell defined by a group (g) of remainers or migrants born in a locality l (305 in the South and 38 in the North) and in a biennium t. As in Table 2, each observation is weighted by the population it represents (i.e. by the number of newborns around New Year's Eve). *Fascism* is a dummy taking value 1 between 1927 and 1940; X_{glt} are the same observable controls introduced in the previous section (average year of birth, share of females, share of primary and share of tertiary educational degrees in each of the two groups), ψ_{lt} are interactions between locality and biennium fixed effects (which we can include since the regressions are weighted by the population in each cell) and ϵ_{glt} captures unobservable time-varying characteristics of groups in each locality. Standard errors are clustered at the locality level.

Results for subjects born in the South are reported in Table 3. In column 1 no control is included and, coherently with the evidence of Section 5, in the bienniums in which Fascism is not in power, remainers born in the South have a higher probability of JBD cheating (β_1: 77.6%) than migrants born in the South and later moving to North (for

Table 3: Reactions to deterrence in the South: Predictions (B) and (C)

	(1)	(2)	(3)	(4)
Fascism $*$ Migrant (β_4)	0.024***	0.024***	0.018**	0.017**
(M.F.-M.NF) – (R.F. -R.NF)	(0.009)	(0.008)	(0.008)	(0.008)
Migrant (β_3)	-0.031***	-0.020***	-0.019***	-0.020***
(Mig–Rem, No Fascism)	(0.007)	(0.004)	(0.004)	(0.004)
Fascism (β_2)	-0.201***			
(Rem Fascism–Rem No Fascism)	(0.009)			
β_1	0.776***			
(Remainers, No Fascism)	(0.013)			
Observations	9,632	9,632	9,632	9,632
Population represented by cells	332,704	332,704	332,704	332,704
R-squared	0.205	0.513	0.523	0.539
LLM x Biennium FE	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes
Controls interacted	No	No	No	Yes
Oster δ for $\beta_4 = 0$		117.9	9.023	8.738
Oster δ for $\beta_3 = 0$		6.555	6.622	7.098
p-value of F-test for controls			0	0

Notes: The table reports OLS (difference-in-difference) estimates based on data for 305 Local Labor Markets (LLM) in the South of Italy, observed for at most 17 bienniums between 1921 and 1954 (*** p<0.01, ** p<0.05, * p<0.1). Observations are weighted by the number of births in the cell defined by a group g of migrant or remainers in a locality l and biennium t. Standard errors are clustered at the locality level. The dependent variable is Π_{glt}, the share of births that occurred in the five days before December 31 but are declared as occurring in the first five days of the following year in group g, locality l and biennium t. β_1 in column 1 estimates the share of cheaters in the group of remainers in the South in the periods 1921-1926 and 1940-1954. β_2 estimates the difference in cheating for remainers in the South between the period of Fascist deterrence (1927-1939) and the periods 1921-1926 and 1940-1954. β_3 captures the difference in cheating between the migrants from South to North and the remainers in the South in the periods 1921-1926 and 1940-1954. β_4 is the diff-in-diff estimate that captures the difference in reaction to Fascist deterrence between migrants from South to North and remainers in the South. The β_1 coefficients in columns 2, 3 and 4 are not reported because they do not have a meaningful interpretation given the inclusion of LLM fixed effects. The Population represented by cells is the total number of birth on which the regression would be run if individual observations had not been collapsed at the cell level. Controls include the average year of birth, the share of female, the share of people with primary education and the share with tertiary education. In column 4 we add all possible interactions among the controls. δs are the statistics proposed by Oster (2019) capturing how much the unobservable characteristics would have to be correlated with migration status more than the observed ones in order to conclude that migrant and remainer families have the same cheating probability. The p-value in the last row refers to an F-test for the joint significance of all controls included. The Online Appendix reports complete table with coefficients and standard errors of all the covariates.

whom it is 3.1 percentage points lower: β_3). During the Fascist period, the probability of JBD cheating falls by 20.1 percentage points for remainers (β_2), and this is the effect of the more stringent deterrence implied by the 1926 reforms against this form of rule breaking. However, the reaction of migrant families to the same increase of deterrence is smaller in absolute value by 2.4 percentage points (β_4). All these differences are statistically significant at conventional values.

This combination of results implies that remainer families react more than migrant families, in absolute terms, to the increase of deterrence. In the other columns of Table 3, we improve the quality of the comparison between migrants and remainers by progressively adding controls and thus increasing the plausibility that the comparison keeps the distribution of cheating benefits and the changes of deterrence constant across the two groups. Focusing on our preferred specification in column 4, which controls for the interaction between locality and biennium fixed effects ψ_{lt} as well as for a fully saturated specification of the X_{glt} controls, we reach the same conclusions of column 1. Within the population born in the South, migrants cheat less than remainers before and after the fascist period (β_3: -2 percentage points). More importantly for Prediction C of the model, as a reaction to Fascist deterrence, migrants decrease their probability of JBD cheating less than remainers in absolute terms (β_4: 1.7 percentage points).

Relying again on Oster (2019), the estimates of the parameter δ reported in this Table are reassuring. Given the relative stability of β_3 and β_4 across columns in conjunction with the sizeable increase in the R^2 when controls are included, the correlation between unobservable characteristics and migration status would have to be, respectively, 7.1 and 8.7 times higher than the analogous correlation for the included observable characteristics, in order to bring down to zero the estimates of the parameters β_3 and β_4.

In light of Prediction (C) of the model the results described in this section lead to the same conclusion reached in Section 5. On average, within a given combination of LLMs and bienniums, the frequency of high ABR families is greater among migrants from South to North than among remainers in the South because of both the observed differences in the cheating probabilities and in the reactions to changes of deterrence. Hence, a drain of high ABR families from South to North has occurred at least in some

LLMs and bienniums. In the next section we quantify this drain and study its correlation with economic outcomes across localities.[30]

7 Economic consequences of sorting based on ABR

Having established, with the two different empirical strategies suggested by our theoretical model, that migrants between the South and the North of Italy are non-randomly selected with respect to their ABR, our next and final goal is to measure the drain (or gain) of high ABR families that localities may have experienced because of these internal migration movements. Such measure should reflect not only the difference in ABR of migrant and remainer families, but also the size of migration flows. A small outflow of very different migrants as well as a big outflow of randomly selected migrants would obviously not generate a relevant drain of high ABR. We also want to assess to what extent this phenomenon is heterogeneous across localities and whether it is quantitatively large enough to possibly have detectable economic consequences.

To this end, we restrict again the analysis to LLMs of the South because only in this macro-region we can be confident that, within a locality, the probability of cheating of migrant and remainer families is informative about the underlying ABR of the two groups.[31] Moreover, we abstract from time differences along the 20th century and for each LLM we collapse biennium observations to a single period from 1927 to 1954, keeping the period 1921-26 to measure baseline characteristics.

7.1 A measure of ABR drain or gain

Consider a locality l of the South and two overlapping sets of agents: the set of all those who are born in l, denoted with b, and its subset containing those who are born and also remain in l, i.e. the remainers considered so far in the paper and denoted by r. The

[30] To save on space, we leave to the Online Appendix the analogous analysis of the reactions to Fascist deterrence for agents born in the North because, as explained in Section 4, this exercise can be conducted for only a limited number of localities.

[31] For completeness, we report in the Online Appendix also results that include the 38 localities of the North for which a drain can be computed with the methodology presented in this section. Results are similar, both in terms of point estimates and significance.

complement of the set r in the b set are migrants to the North, denoted by m. Consider the quantity

$$\theta_l = \Pi_{rl} - \Pi_{bl} \tag{6}$$

which measures the difference in the probability of JBD cheating of remainers in l versus born in l. If $\theta_l = 0$, obviously the cheating probability of remainer and migrant families must be identical and both groups are random samples of the population of families giving birth in l with respect to JBD cheating. Therefore, even in the presence of a large migration outflow there would be no drain or gain of high ABR families in this case. If instead $\theta_l > 0$, it must be the case that remainer families cheat more frequently than migrant families and therefore more frequently than the average family of children born in l. In this case, given Prediction (A) of the model, θ_l measures the ABR drain suffered by locality l because it measures how the fraction of high ABR agents has changed in the remaining population after the South–North emigration process has taken place. Viceversa, $\theta_l < 0$ indicates that locality l experienced a gain of ABR for the opposite reason. Note that θ_l does not consider other types of migration in and out of a locality l. The focus on South to North migration only is justified by three empirical observations. First, until the late '70s of the past century, immigration from abroad was essentially absent in Italy. Second, migration flows from North to South were so small in the period to be practically irrelevant. Third, migration within the South was practically irrelevant as well in the same period.[32]

To see formally why θ_l is a measure of ABR drain or gain, let N_{gl} be the number of agents in group $g \in \{b, r, m\}$ and locality l. Then, the emigration rate out of l is:

$$\eta_l = \frac{N_{ml}}{N_{bl}} \tag{7}$$

[32]For the first observation, see Del Boca and Venturini (2005); for the second, see Section 4; for the third, see Bonifazi (2009) who shows that South–North migration rates are more than four times larger than within South rates. Using Istat migration matrices (Annali di Statistica Serie VIII - Vol.17, pag. 684, table 11.VII), South–North migration rates are 3.4 times larger. However, none of these two sources refers exactly to our period of observation. We could of course compute analogous statistics with our census data, but at the time we are writing we cannot access them at the protected Adele–Istat sites, because of measures to contain the diffusion of the Covid 19 virus.

and the fraction of high ABR agents born in l is:

$$\Omega_H^{bl} = (1 - \eta_l)\Omega_H^{rl} + \eta_l \Omega_H^{ml} \tag{8}$$

Based on the evidence presented in Sections 5 and 6, we can safely assume that southern localities are on average in the case of medium deterrence among the three described in Table 1. Then, substituting in equation (6) the corresponding expressions for the probability of cheating in Table 1, the ABR drain/gain can be written as:

$$\theta_l = \eta_l (F_l(A_H) - F_l(D_l))(\Omega_H^{ml} - \Omega_H^{rl}) \tag{9}$$

which shows that if $A_H > D_l > A_L$ (medium deterrence) a locality l experiences a drain of ABR ($\theta_l > 0$) if and only if the fraction of high ABR agents is larger among migrants than among remainers:[33]

$$\theta_l \geq 0 \quad \iff \quad \Omega_H^{ml} - \Omega_H^{rl} \geq 0 \tag{10}$$

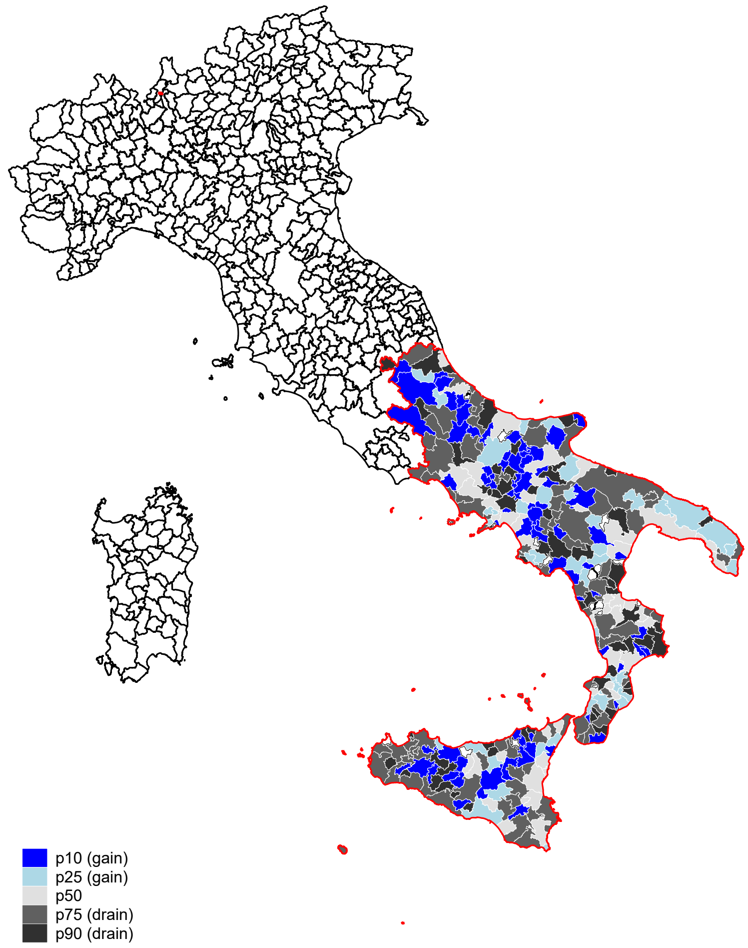
The size of θ_l depends also on $(F_l(A_H) - F_l(D_l^*))$ and importantly on η_l. Note that the distribution F_l is allowed to change with l. Interestingly, we know from the evidence of Sections 5 and 6 that the differences in the cheating probabilities and in the reactions to changes of deterrence of migrants and remainers are quantitatively small, suggesting that the difference $\Omega_H^{ml} - \Omega_H^{rl}$ must be similarly small (possibly around 1.3% based on column 4 of Table 2). However, emigration rates from South to North are sizable (28% on average in our data) and therefore even a small in absolute size but positive (negative) $\Omega_H^{ml} - \Omega_H^{rl}$ may translate into a quantitatively relevant drain (gain) θ_l. Moreover, the emigration rates from South to North range between 3% and 86% across southern localities (see Section 4), which makes the drain/gain θ_l very heterogeneous across LLMs within the macro-region.

This heterogeneity is confirmed in Figure 7 which shows a map of the southern LLMs in which the coloring type and intensity indicate whether a locality experiences a drain or a gain of ABR and its size. The Table on the left of the figure provides descriptive

[33] The probabilities Ω_H^{gl} may themselves be functions of η_l, with no consequences for our analysis. In our data we find that the correlation between η_l and $(\Omega_H^{ml} - \Omega_H^{rl})$ for the 327 southern localities is equal to -0.13 with a robust standard error of 0.07.

Figure 7: ABR drain or gain across LLMs during the 20th century

θ_l	
Mean	.002
Std. Dev.	.018
Min	-.187
10^{th} percentile	-.016
Median	.003
90^{th} percentile	.020
Max	.137
Skewness	-.796
Share with $\theta_l < 0$	.475



Notes: The figure describes the location along the peninsula of the 305 southern LLMs for which we can compute the ABR drain θ_l and shows the border of the Kingdom of the two Sicilies. The coloring type and intensity indicate whether a locality experiences a drain ($\theta_l > 0$) or a gain ($\theta_l < 0$) of ABR and its size. The table provides the correspondent descriptive statistics that are weighted by the size of each locality (total number of birth around New Year's eve between 1921 and 1954).

statistics that are weighted by the size of each locality (total number of birth around New Year's eve between 1921 and 1954.) The support of the distribution of θ_l ranges between -18.7 and +13.7 percentage points, with the 10th and 90th percentiles respectively equal to -1.6 and +2.0 percentage points. On average, the drain θ_l is small in size (the mean is 0.2 percentage points) but its variability across localities is substantial and our goal is to exploit it in order to understand whether it may have had economic consequences. To this end, in the next section we study the correlation between the ABR drain/gain experienced by a locality and some relevant economic outcomes. Since we standardize

θ_l in the analysis that follows, note that one standard deviation corresponds to 1.8 percentage points and that about 2 standard deviations imply a change of drain from the 10th to the 90th percentile.

7.2 Economic consequences of a drain of ABR

To assess whether the ABR drain measured in the previous section correlates with relevant economic outcomes across localities, we estimate this equation:

$$Y_l = a + b\ \theta_l + c\ \Pi_{l21} + g\ X_l + \psi_l + \epsilon_l, \tag{11}$$

where: Y_l is a current outcome in locality l, θ_l is the ABR drain measured across all bienniums between 1927 and 1954, Π_{l21} is the probability of JBD cheating in l measured in 1921-26, X_l is a set of locality controls (see the note to Tables 4 and 5) and ψ_l is a set of fixed effects for the 7 current administrative regions that partition the South as defined by the Kingdom of the two Sicilies. Similarly to the regressions considered in previous sections, here we weight observations by the population size that they represent, i.e. by the total number of births in each locality during the 1921-1954 period.

The parameter of main interest is b, which in general does not have a causal interpretation and offers only a suggestive controlled correlation. However, using again the methodology of Oster (2019), we can determine whether it is plausible that the unobservable confounders for which we cannot control are sufficiently correlated with θ_l, relative to how the observable controls X_l are, to bring down to zero the estimate of b in equation (11).

We focus on two economic outcomes. The first one is the measure of vote counting rate per hour (VCR) proposed for Italy by Ilzetzki and Simonelli (2017).[34] They observe that ballot counting in Italian elections is a labor intensive task that must be performed in the same way over the entire country and that does not require any piece of physical capital to be performed. The technology and the tools used by vote counters are also the same in all electoral polling stations and the citizens who perform this job receive a monetary compensation that is independent of the time spent to complete the job.

[34] We are very grateful to Ethan Ilzetzki and Saverio Simonelli for sharing their data with us.

Moreover, they are allowed to take a paid leave from their employers for all the time that is needed to complete the votes' count, so that also the opportunity cost is controlled for. According to Ilzetzki and Simonelli (2017) this measure of "pure" labor productivity accounts for about half of the North-South gap in total labor productivity measured with the Bureau van Dijk data on which we come back below (see footnote 36).

While in political or administrative elections ballots may differ across localities because of the number of competing candidates, this problem does not exist for national referenda, in which only Yes/No ballots need to be counted. For this reason we use the VCR measure that Ilzetzki and Simonelli (2017) provide for the 2016 Italian referendum on the constitutional amendments proposed by the Renzi government. This referendum attracted a lot of attention and raised a very intense debate in the country, which generated a very large turnout (65.5%). It ended up becoming a referendum in favor or against Matteo Renzi himself, who in fact lost the battle and his quick political decline started immediately after. Vote counting in this referendum was perceived as extremely important by all citizens and political parties.

For the purpose of our analysis, the VCR has one interesting advantage, particularly in the case of a referendum with major potential consequences depending on the outcome, like the one of 2016. Consider two persons with opposite preferences about the referendum outcome, who have to count votes in a context in which both of them are sure that the other respects rules and does not cheat. In this case, they could speed up vote counting by splitting the ballots between them without any double or joint checking. If instead they do not trust each other, they will want to double check and jointly assess any ballot. This extreme example makes it clear why we can expect to observe a negative correlation between the ABR drain θ_l and the VCR in the same locality, for given initial conditions.

Estimates of equation (11) in which the outcome Y_l is the log of the VCR are presented in Table 4. In the first row we report results for the coefficient b while, as an interesting benchmark, the second row focuses on the coefficient of an indicator of brain drain. We measure this second kind of drain with the same methodology of Section 7.1, using the share of secondary and tertiary graduates in place of the probability of cheating. Both kinds of drain indicators are standardized to facilitate the comparison of the estimated coefficients. Interestingly their correlation is very low (0.04 and statistically not different from zero).

Table 4: ABR drain and Vote Counting Rate for the 2016 referendum

VARIABLES	(1)	(2)	(3)	(4)
ABR Drain (standardized)	-0.040**	-0.037**	-0.025*	-0.027*
	(0.016)	(0.015)	(0.015)	(0.015)
Brain Drain (standardized)	-0.009	-0.010	-0.004	-0.006
	(0.020)	(0.018)	(0.016)	(0.015)
Observations	305	305	305	305
R-squared	0.020	0.037	0.192	0.283
Initial Period Controls	No	Yes	Yes	Yes
Region FE	No	No	Yes	Yes
Employment and Geography Controls	No	No	No	Yes
Drain mean	0.002	0.002	0.002	0.002
Drain S.D.	0.018	0.018	0.018	0.018
Outcome Levels Mean	186.657	186.657	186.657	186.657
Outcome Levels S.D.	32.759	32.759	32.759	32.759
Oster δ for ABR drain		5.158	3.666	4.303

Notes: The table reports OLS estimates based on data for 305 Local Labor Markets (LLM) in the South of Italy (*** p<0.01, ** p<0.05, * p<0.1). Observations are weighted by the number of births in each locality l. Standard errors are robust for heteroskedasticity. The dependent variable is the logarithm of vote counting rate per hour in the 2016 constitutional referendum. The ABR drain (θ_l) is the difference in the probability of JBD cheating of remainers in l versus born in l and measures how the the fraction of high ABR agents has changed in the remaining population after the emigration process has taken place. θ_l is standardized. The Brain Drain is standardized as well and measures how the the fraction of agents with secondary or tertiary education has changed in the remaining population after the emigration process has taken place. The initial period controls are the probability of JBD cheating for the same locality in the cohort born in the 1921–26 period and the share of illiterates from the 1921 Census. Region fixed effects are for the 7 current administrative units partitioning the South, as defined by the Kingdom of the two Sicilies. The employment controls are: employment rate, share of agricultural employment, share of manufacturing employment, share of service employment from the 1936 census, total population in the LLM and population density from the 1921 census. The geography controls are dummies for: coastal land, low lands, low mountains, high mountains, flood risk, rock slide risk. The Online Appendix reports the complete table with coefficients and standard errors of all the covariates.

In the specification of column 1, which does not include any control variable, a one standard deviation increase of the ABR drain reduces the VCR by 4% and this estimate is significantly different from zero at conventional values. The corresponding estimate for the brain drain is about only 1% and is not statistically different from zero. The second column includes initial conditions for both type of drains, as captured by the probability of JBD cheating for the same locality in the cohort born in the 1921–26 period and by the share of illiterates from the 1921 Census. The estimates of both coefficients are practically unchanged. The next column adds fixed effects for the 7 modern administrative regions corresponding to our definition of South (see footnote 3), and both coefficients are estimated to be lower in this specification, but the one for the ABR drain still implies a loss of 2.5% of VCR. Finally, in column 4 we include a large set of predetermined employment and geography controls,[35] and the coefficient for the ABR drain remains statistically significant at -2.7%, while the one for the brain drain remains insignificant but it increases back to a level similar to the uncontrolled specification of column 1.

The substantial stability across columns of the ABR drain coefficient is remarkable given the increase of the R^2, from 0.02 in column 1 to 0.28 in column 4. As a result, the estimates of the Oster (2019) δ parameter reported at the bottom of the Table indicate that the characteristics of localities that we do not observe would have to be at least 4.3 times more correlated with the ABR drain than the observed ones in order to conclude that the coefficient for this drain is actually indistinguishable from zero.

Another interesting benchmark to assess the quantitative relevance of the estimates of the coefficient b in Table 4 is offered by the overall North-South VCR gap which is equal to 38%. Using the most conservative estimate in column 4, a reduction of the ABR drain by one standard deviation would reduce the overall North-South VCR gap by about 7.1 percent.

In Table 5 we follow again Ilzetzki and Simonelli (2017) and use Bureau van Dijk data covering all firms required to register their balance sheets, to look at the effect of ABR drain on a more conventional indicator of labor productivity at the firm level.[36]

[35]Employment rate, share of agricultural employment, share of manufacturing employment, share of service employment from the 1936 census; total population in the LLM and population density from the 1921 census; dummies for coastal land, low lands, low mountains, high mountains, flood risk, rock slide risk.

[36]The data source is the ORBIS database from Bureau van Dijk, which provides accounting books information for the universe of companies who are required to register their balance sheets at the

Table 5: ABR drain and Firm Labor Productivity

VARIABLES	(1)	(2)	(3)	(4)
ABR Drain (standardized)	-0.017**	-0.016*	-0.014**	-0.014**
	(0.008)	(0.009)	(0.007)	(0.007)
Brain Drain (standardized)	0.007	0.010	0.002	0.004
	(0.010)	(0.011)	(0.008)	(0.008)
Observations	187,389	187,389	187,389	187,389
R-squared	0.001	0.002	0.280	0.283
Initial Period Controls	No	Yes	Yes	Yes
Region FE	No	No	Yes	Yes
Industry FE	No	No	Yes	Yes
Capital Controls	No	No	Yes	Yes
Employment and Geography Controls	No	No	No	Yes
Drain mean	-0.002	-0.002	-0.002	-0.002
Drain S.D.	0.034	0.034	0.034	0.034
Outcome Levels Mean	22.789	22.789	22.789	22.789
Outcome Levels S.D.	14.642	14.642	14.642	14.642
Oster δ for ABR drain		22.68	43.93	-31.98

Notes: The table reports OLS estimates based on data for 305 Local Labor Markets (LLM) in the South of Italy (*** p<0.01, ** p<0.05, * p<0.1). Observations are weighted by the employment share of each firm within a locality l. Standard errors are clustered at the locality level. The dependent variable is the logarithm of firm value added per employee, averaged over the 2009-2018 period. The ABR drain (θ_l) is the difference in the probability of JBD cheating of remainers in l versus born in l and measures how the the fraction of high ABR agents has changed in the remaining population after the emigration process has taken place. θ_l is standardized. The Brain Drain is standardized as well and measures how the the fraction of agents with secondary or tertiary education has changed in the remaining population after the emigration process has taken place. The initial period controls are the probability of JBD cheating for the same locality in the cohort born in the 1921–26 period and the share of illiterates from the 1921 Census. Region fixed effects are for the 7 current administrative units partitioning the South, as defined by the Kingdom of the two Sicilies. Industry fixed effects are defined as 2-digit NACE classification. Capital controls are the logarithm of capital per employee and the share of high education individuals in the SLL. The employment controls are: employment rate, share of agricultural employment, share of manufacturing employment, share of service employment from the 1936 census, total population in the LLM and population density from the 1921 census. The geography controls are dummies for: coastal land, low lands, low mountains, high mountains, flood risk, rock slide risk, volcanic risk. The Online Appendix reports the complete table with coefficients and standard errors of all the covariates.

Chambers of Commerce, i.e. all companies except sole proprietorship enterprises and partnerships. After selecting the subsample of firms with non-missing employment, value added and capital information, this data set covers 656,518 firms that correspond to roughly 40% of all firms in Italy. Labor productivity is calculated as the value added per employee, averaged over the 2009-2018 period and measured in 2019 Euros.

We therefore estimate the following modified version of equation (11):

$$Y_{lf} = a + b\ \theta_l + c\ \Pi_{l21} + g\ X_{lf} + \psi_l + \epsilon_{lf}, \tag{12}$$

in which the subscript f denotes a firm. In this specification, as in Ilzetzki and Simonelli (2017), we cluster standard errors at the locality level and we weight observations by the employment share of each firm within locality l. In this way we give more weight to larger firms and obtain estimates that are informative at the locality level.

Also for this outcome we estimate a substantial loss of at least 1.4% induced by one additional standard deviation of the ABR drain. The estimated coefficient for the analogous measure of brain drain is instead essentially null. The specifications in the different columns include the progressively wider sets of controls described for Table 4, augmented with industry fixed effects, log of physical capital per employee and human capital intensity in the LLM. The stability of the estimates of the coefficient b across columns is remarkable also in this case, particularly in light of an increase of the R^2 from 0.001 in column 1 to 0.283 in column 4. Once again because of this combination of results, the estimates of the Oster (2019) δ parameter reach extremely high absolute values (up to 31.98 in column 4). Using our preferred estimate in column 4 the overall North-South labor productivity gap, which is equal to 34%, would decrease by about 4.1% in association with a decrease of one standard deviation of the ABR drain.

Although none of these estimates can be considered as causal, they are jointly compatible with the possibility that the more severe ABR drain experienced by some localities during the 20th century may have induced a lower labor productivity in recent times.

8 Conclusion

We have studied the historical tendency of Italian parents to register a false date of birth for their children if they are born near the end of a year, shifting this date to early January. We have shown why we believe that this is not a data anomaly of the Census. On the contrary, it reflects a conscious decision by parents who expect themselves (and their children) to derive a benefit from breaking the rule requiring not to lie in declarations made before public officials.

With respect to other cheating indicators used in the literature, the one we can derive from false birth date registrations has the advantage that it can be constructed for migrants and remainers born in narrowly defined localities and at different points in time during the 20th century, while being positively correlated with more conventional indicators. Guided by a simple theoretical model of the decision to break a rule, we show that differences in the probability of cheating of migrants and remainers are informative about the underlying fraction of families in the two groups which are more Averse to Break Rules. This is because, within our space×time cells, the two groups appear to share similar cheating benefits and deterrence. We also use historical events related to the surge and collapse of the Fascist regime to show, with a different empirical exercise guided by our model, that families of migrants from South to North are more Averse to Breaking Rules than families of remainers in the South, because they react less in terms of cheating probability to changes in deterrence. Using the procedure proposed by Oster (2019) we argue that our results are unlikely to be confounded in relevant ways by the characteristics that we cannot observe in our data.

We therefore conclude that migrants between Italian regions during the 20th century were non-randomly selected with respect to their ABR. This is particularly true for migration flows from South to North that are significantly more sizeable than those in the opposite direction. As a result, some localities of the South experienced a reduction of the average ABR in their remaining population. We find a large heterogeneity in ABR drain across localities in the South, of which some gained and some lost families with high ABR.

Finally, we measure the size of the ABR drain or gain experienced by each locality and we correlate this measure with two labor productivity indicators derived from Ilzetzki and Simonelli (2017). Results are suggestive that a non-random selection of migrants based on ABR may have had important economic consequences, in terms of a productivity loss in localities that experienced a more intense ABR drain.

We believe our results are of general relevance beyond Italy because they give a warning about the possibility that some localities may be caught in a vicious circle of increasing diffusion of cheating attitudes and emigration of families who are more Averse to Break Rules. Finding ways to break this vicious circle is crucial in some Italian localities and maybe elsewhere.

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