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Harbers, I.

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Legal identity for all? Gender inequality in the timing of birth registration in Mexico

Imke Harbers

Department of Political Science, University of Amsterdam, PO Box 15578, 1001NB Amsterdam, Netherlands



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ABSTRACT

Despite recent advances, many low and middle-income countries do not have a comprehensive system for civil registration. Progress towards the Sustainable Development Goal of providing 'legal identity for all' therefore requires an effort to ensure timely birth registration among societal groups that have remained at the margins. Timely registration is crucial for the effective guarantee of individual identities, since delays are associated with under-registration, and incorrect records. The paper examines gender inequality in registration. Based on demographic data for Mexico, a higher middle-income country that has recently made considerable progress with regard to birth registration, it shows that gender bias is expressed not only in the under-registration of girls, but also in systematically longer delays compared to their male counterparts. To understand this, the paper conceptualizes registration as an informed decision by citizens about the perceived costs and benefits of obtaining documents. The paper leverages a novel data source – a dataset of roughly 80 million records for births registered by the Mexican state between 1985 and 2014 – to investigate not just *whether* citizens obtain documents, but also *when* they do so. The analysis demonstrates that delays in registration decrease when obtaining documents provides tangible benefits for citizens. The introduction of Progresa, a conditional cash transfer program targeting poor households, is associated with shorter delays in registration among younger cohorts, and an increase in registration among women. Positive incentives for registration thus ensure that parents actively seek documents for their children. Conditional cash transfer programs, which operate in many countries, can play an important role in creating such incentives.

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1. Introduction

Accurate information about populations and territory is widely seen as a pre-requisite for effective public goods provision. Donors and international organizations have encouraged developing states to make further investments in their "information capacity" (Brambor, Goenaga, Lindvall, & Teorell, 2019), that is their ability to collect and process demographic data (AbouZahr et al., 2015). Despite recent advances, many low and middle-income countries do not have comprehensive systems of civil registration (Mikkelsen et al., 2015). The World Bank (2018a) estimates that across the globe almost one billion people remain "undocumented", and nearly one third of the global population of children under the age of five is unregistered (UNICEF, 2017). The aim of providing 'legal identity for all', one of the Sustainable Development Goals (target 16.9), is therefore an effort to better incorporate those who have remained at the margins of the state.

Civil registration speaks to "the right to have one's legal identity and relationship to significant others publicly recognized, securely registered, and accessible for personal use" (Szreter, 2007: 67). The most emblematic example is birth registration. In modern societies birth certificates are crucial to exercise the right to vote, to obtain a passport, and for accessing protections under the law, property rights or entitlements. Civil registration is not only a precondition for effective public goods provision (Soifer, 2013; Nistotskaya & D'Arcy, 2018), it constitutes a public good in and of itself (Setel et al., 2007). Yet, even though registration promises benefits to citizens, rates of birth registration have remained low in many countries. Why do citizens not make themselves "legible" to the state? The paper develops a framework to theorize citizens' decisions on whether and when to seek official documents based on the perceived costs and benefits associated with registration.

Substantively, the paper focuses on gender disparities in birth registration in Mexico. While identity documents are valuable for men and women, in the absence of comprehensive coverage of civil registries women are particularly likely to be left out. This reflects pre-existing gender inequalities, but also compounds them

E-mail address: i.harbers@uva.nl

(e.g. World Bank, 2018b). Women systematically lag behind men with regard to ID coverage, though the size of the gender gap varies across countries (UNICEF, 2013; Bhatia, Ferreira, Barros, & Victora, 2017). Across the globe, there is a two percent difference in ID coverage between men and women, with gender differences particularly pronounced in low-income countries (World Bank, 2018c, 2018e). Mexico has long struggled with inadequate coverage of civil registries, but has recently shown remarkable improvements (INEGI, 2011; Valdés, 2011). Regarding the gender gap, data from the 2015 UNICEF-MICS survey in Mexico show a one percent gap in registration coverage between boys and girls under the age of five. While this is substantial, it is well-below the global average. The case of Mexico may therefore hold valuable lessons for how to improve the coverage of civil registries and to reduce gender disparities in birth registration.

To analyze gender, the paper leverages a novel data source that makes it possible to investigate not just *whether* citizens obtain documents, but also *when* they do so. The timing of registration is important to better understand citizens' motivations to register, and thus to identify ways to increase coverage. The paper draws on a dataset of roughly 80 million records for births registered by the Mexican state between 1985 and 2014. These individual-level records have been anonymized, but contain information about the date of birth, date of registration, gender as well as geographic identifiers. They are compared to demographic data derived from different iterations of Mexico's national census, and other population statistics.

The contribution of the paper is twofold. First, the analysis reveals gender bias with regard to the timing of registration. The paper demonstrates that the delay in registration is longer for women and girls – on average – than for men and boys. Timing is an aspect of gender inequality in registration that has so far received limited attention since it cannot be identified in the cross-sectional household surveys on which previous studies have often relied (e.g. UNICEF, 2013; Bhatia et al., 2017). Even though late is better than never, delayed registration is associated with incomplete, incorrect, and unreliable identity information (AbouZahr et al., 2015). Delayed registration leaves individual identities unprotected for extended periods of time, and renders registration more onerous when it does occur, since additional documentation and the payment of fines are generally required (Harbitz & Tamargo, 2009; Pelowski et al., 2015). Timely registration is therefore important to guarantee the right to a legal identity for citizens.

Second, the paper demonstrates that timeliness of registration can increase when obtaining documents provides tangible benefits for citizens. Shouldering the immediate costs of registration for themselves or their children is difficult for marginalized citizens when the opportunity costs of not having documents are less visible, and may only become apparent in the future. The introduction of *Progres*a (later renamed *Oportunidades* and *Prospera*), a conditional cash transfer program targeting poor households and particularly women, is therefore associated with more timely registration among younger cohorts and an increase in registration among women. Program participation provided concrete and tangible benefits to those who had previously been left out of welfare programs, and to access those benefits citizens needed to obtain ID documents. Overall, the findings speak to the need to understand birth registration not just from the perspective of the state's desire to gather information, but also to take seriously citizens' incentives for seeking documents. Registration is a bilateral process that should appeal to citizens to promote voluntary compliance.

The next section of the paper develops a framework to better understand citizens' decisions on whether and when to obtain official documents. The third section provides case background on Mexico. Section four evaluates the coverage of birth registration

in Mexico, and section five demonstrates gender disparities in the timing of registration. Section six probes the argument that expected benefits can explain the timing of registration, especially for women by analyzing the effects of *Progres*a. The final section outlines policy implications of this study.

2. Register when it's necessary: the timing of registration and the emergence of gender bias

Contemporary states are engaged in extensive efforts to collect information about populations and territory. Enumeration refers to census-like activities, where the state takes stock of the population or territory under its jurisdiction at one specific point in time. Civil registration, by contrast, requires a continuous "administrative system to record occurrence and characteristics of major vital events (notably, births and deaths)" immediately or shortly after they occur (AbouZahr et al., 2015: 1373). Whereas enumeration emphasizes the extraction of information from society, registration speaks to the state's role as a provider of public goods. It involves a more active state, and one that provides citizens with an important resource: a document to prove age and identity (Szreter & Breckenridge, 2012).

To effectively exercise their legal rights, citizens "must have a document that officials accept as evidence of citizenship, be that document a birth certificate, passport, or identity card" (Scott, 1998: 83). This gate-keeping function and the ability to control access to the community clearly places a powerful tool in the hand of states (Cooper, 2002), and might therefore be seen as just another facet of the state's power vis-à-vis society. Yet, identity documents constitute a "resource which can be empowering and of high economic and social utility to individuals, by enabling their legally-recognized personhoods to pursue their own self-interested purposes, completely independently of the state's policies and plans" (Szreter & Breckenridge, 2012: 22). Birth registration matters not only because it alerts the state to the existence of a new citizen, but because of what it enables these citizens to do for themselves during the course of their lives. Official documents are a pre-condition for social inclusion (Hunter, 2018), since they allow citizens "to make claims of nationality, benefit from government schemes, open a bank account, travel, and vote" (Bhatia et al., 2017). While citizens may find ways to circumvent the need for official documents, the lack of legal status leaves them dependent on informal workarounds.

The insecure nature of alternative forms of identification compared to official documents can be illustrated with the analogy of land titles. The importance of cadastral records for the protection of property rights is widely recognized (De Soto, 2000; D'Arcy & Nistotskaya, 2018). Cadasters not only provide the state with information about the tax base, they also confer rights to those holding titles vis-à-vis other citizens and the state. While citizens in the developing world often exercise de facto ownership of land even in the absence of formal titles, their ability to leverage these claims independently of contingent arrangements remains more limited than with formal titles. Returning to the case of birth registration, citizens with official documents can better protect their rights in interactions with the state and other citizens. There is also evidence for a virtuous cycle where citizens who can document their legal identity gain easier access to public services, and then subsequently interact more confidently with public institutions to obtain additional services, resulting in a cumulative positive effect set in motion through registration (Hunter, 2018). Overall, the literature on the implications of birth registration for development suggests that (1) birth certificates are not merely pieces of paper with little tangible value for citizens, and (2) that their presence or absence reinforces and compounds inequalities in society, rather

than merely reflecting them (Hunter & Brill, 2016; Hunter, 2018). Women in particular tend to benefit from having identity documents, since it strengthens the basis for claims to property, financial assets or social services (World Bank, 2018b).¹

In light of these benefits, why do states not universally commit to comprehensive registration? A civil registry requires a continuous, functioning and minimally competent bureaucracy throughout the territory, and is therefore costly. The majority of the world's unregistered population is concentrated in low and low-middle income countries, particularly in Asia and Africa (World Bank, 2018a). Still, neither the level of economic development nor technology by themselves adequately explain variation in the quality of civil registration. Some countries were able to achieve near-universality in contexts of widespread illiteracy (e.g. Nistotskaya & D'Arcy, 2018), while middle-income countries like Mexico continue to grapple with poor records despite the advent of computers (Mikkelsen et al., 2015; Hunter & Brill, 2016).

Where birth registration is not universal, coverage is skewed heavily towards more affluent strata of society. Restricting access to identity documentation may then reflect an explicit strategy by states seeking to limit access to public services among those most in need of welfare provisions (Cooper, 2002; Bowles, 2019). Investing in a system of civil registration is therefore "an act of political will, a demonstration by national authorities of stewardship" (Setel et al., 2007: 1575). Ultimately, the state's desire for information provides insufficient incentives for the development of an effective system of civil registration. States have often preferred to rely on cheaper alternatives such as periodical surveys or the census (Mahapatra et al., 2007; Oommen, Mehl, Berg, & Silverman, 2013). While states may have substitutes for the information generated from civil registration, citizens often do not. To obtain official documents, they cannot bypass the state. This gate-keeping role creates a duty upon states to ensure that the system is accessible to citizens. Even biometric ID cards, which are generally not available to infants or young children, cannot adequately replace civil registries (AbouZahr et al., 2015: 1379).

2.1. Accessing the system: registration from the citizen perspective

The lack of legal identity can be *absolute*, which reflects a situation where the birth has never been registered and legal documents were never issued, or *relative*, when the birth was registered, but no documents were issued, issued documents were lost and cannot be replaced, or personal data in the records is incorrect (Harbitz & Tamargo, 2009). In light of the evident advantages of registration, why do many citizens not seek documents that accurately prove their legal identity? Registration requires some degree of voluntary compliance from society, and thus raises the question under which conditions citizens are willing to make themselves legible to the state. The decision to register can be conceptualized as a deliberate choice in which citizens weigh the costs and benefits associated with seeking documents for themselves or their children (Pelowski et al., 2015). Conceiving of registration as an informed decision helps understand not only *whether* citizens register, but also *when* they do so.

A review compiled by the World Bank's ID4D initiative outlines a range of costs associated with registration (World Bank, 2016; also UNICEF, 2013). In many countries, registration requires payment of a fee, and parents (or citizens seeking documents) have to make a trip to the registrar's office. For poor parents, and geographically isolated populations, the monetary cost of the fee and

travel can create a substantial barrier. This is compounded by the need to take time off from work (often for both parents), and the costs of obtaining pre-requisite documents, such as a birth notification issued by a medical professional, and parents' birth or marriage certificates. An additional barrier to registration is the lack of information about the process. Surveys show that in many countries parents of unregistered children are not aware of the need to register their children, nor of the potential benefits (UNICEF, 2013: 20). Generally, the more complex the registration process, and the lower the density of registration centers, the higher the hurdles for citizens. To make the benefits of registration available to all citizens, the state would have to actively reach out to marginalized populations.

Beyond formal barriers, bureaucratic requirements for registration create opportunities for rent-seeking by bureaucrats, as citizens unable to navigate the bureaucracy become subject to arbitrary and discretionary treatment, or have to rely on (paid) intermediaries (Pelowski et al., 2015: 898). Less tangible, but nevertheless often substantial obstacles, are implicit or explicit discrimination against minority groups or marginalized populations. Mothers often face discrimination when seeking to register their children without a male spouse who acknowledges paternity. Children of single and adolescent mothers are less likely to be registered in Latin America (Harbitz & Tamargo, 2009). Prior experiences with corrupt or unresponsive public officials can serve as a powerful disincentive. Populations who, for historical reasons, are distrustful of the state, are therefore generally less likely to register (Mahapatra et al., 2007). Moreover, even when minority populations register, their personal data is more likely to be incorrect, for instance because registrars have inadequate knowledge of indigenous languages, and therefore misspell names (Harbitz & Tamargo, 2009: 9). This then makes it difficult, if not impossible, to retrieve records or to replace lost documents.

In light of such direct and concrete costs, it makes sense for citizens to delay registration until a situation arises in which documents are necessary, or when having documents generates a tangible benefit. Ultimately, whether the costs of registration are worth bearing depends on the expected opportunity costs of not having them. Where costs are immediate, but expected benefits are elusive, or only expected to occur in the distant future, this creates incentives for parents to delay registration. Delay is a rational response by citizens confronting an inaccessible system, or one that they find difficult to navigate. Yet, while delayed registration is better than no registration, it is clearly suboptimal (Hunter, 2018: 11; AbouZahr et al., 2015: 1375). The more time passes between birth and registration, the more difficult it becomes to verify basic information like date of birth, place of birth, and familial relations. This not only leaves identities unprotected in the period in-between birth and registration, it also renders later claims less convincing, since their basis is hard to verify (Figueroa Campos, 2011). Without timely birth registration, a legal claim to an inheritance can be on shaky grounds, even though a person may be entitled to it. Ultimately, the delayed registration of children is "the precursor to problems related to lack of legal identity in adulthood" (Harbitz & Tamargo, 2009: 9), since it is associated with incomplete, incorrect, and unreliable identity information (AbouZahr, 2015: 1375). If registration does not occur quickly, it is less likely to occur at all as going through the process becomes progressively more difficult. While it can be rational for parents not to register their children immediately after they are born given concrete and tangible costs, over time the opportunity costs of not having documents become substantial. Without identity documents citizens are at a disadvantage when accessing public services, and defending their legal rights vis-à-vis other citizens or the state.

¹ For a review of the literature on the importance of civil registration and vital statistics for women see the knowledge briefs on gender and CRVS by the Centre of Excellence for CRVS Systems available at <https://crvssystem.ca/knowledge-briefs-gender-and-crvs> (accessed July 26th, 2018).

2.2. How does gender bias in registration emerge?

Gender bias in the timing of registration emerges when the perceived or actual utility of identity documents is different for boys and girls. In societies with a gendered division of labor, incentives to register thus vary by gender. There are two pathways toward gender difference in registration. First, for the reasons outlined above, parents may delay registration until a situation arises in which documents have a concrete utility, and this situation might arise sooner for boys than for girls. While parents may then not consciously treat girls differently, a difference in the timing of registration results from gendered opportunity differences outside the home. In many countries, girls still lag behind in terms of school attendance, for instance, and school enrollment or graduation are often milestones that prompt registration (Pelowski et al., 2015). Military service, which in Mexico and other Latin American countries is compulsory only for men, constitutes another milestone that may prompt registration.

Second, in anticipation of women's domestic roles, parents may believe that documents are not as valuable for girls as for boys, therefore prioritizing the registration of boys within the household when resources are scarce. This constitutes a more explicit form of bias. Documents are valuable in interactions with the state and broader society. They are needed to complete administrative procedures, such as applying for a passport, claiming public services or benefits, or opening a bank account. A gendered division of labor, where women are expected to perform domestic roles, therefore creates incentives for parents to give precedence to the timely registration of boys (Harbitz & Tamargo, 2009). Parents might feel the need to protect the inheritance of land rights for a son, rather than a daughter, who is expected to marry into another family. In many countries, women who work outside the home are more likely to work in the informal than in the formal sector (World Bank, 2011:79–80), which again reinforces the perception that documents are particularly valuable for boys.

Given well-documented patterns of gender discrimination in many societies, including Mexico (INMUJERES, 2017), it is important to analyze whether inequalities between women and men begin early in life, namely with birth registration. If so, we would expect fewer girls to be registered shortly after birth than counted in the census. We would also expect the registration of girls to be delayed longer than the registration of boys.

3. Case background: civil registration in Mexico

Mexico, along with other middle-income countries in Latin America, has booked significant progress over the past two decades with regard to expanding birth registration (INEGI, 2011; Hunter & Brill, 2016; Hunter, 2019). Nevertheless, as recently as 2009 the director of the Mexican civil registry estimated that 1 in 5 Mexicans lacked documents proving legal identity, thus effectively rendering them “undocumented” in their own country (Valdés, 2011: 11). Despite recent advances in expanding coverage, the benefits of registration have long eluded many Mexicans. The Mexican case may therefore hold valuable lessons for how to improve the coverage of civil registries in countries characterized by less comprehensive systems of civil registration than might be expected on the basis of their socio-economic development.

The introduction of civil registration in Mexico has been closely intertwined with the process of independent state-making. The 1859 *Ley Orgánica del Registro Civil* constituted a first attempt by the state to establish a civil registry, but coverage and compliance increased only very slowly. Notably, demographic patterns among registered births provide early evidence for gender bias. In the 1940s, vital registries for several Mexican states indicate a

male/female ratio of 1.20, indicating 120 men registered to every 100 women (Welti Chanes, 2011: 91). Since the natural male/female ratio at birth is around 1.04 (Mathews & Hamilton, 2005), this suggests that boys were more likely to obtain legal documents than girls.

Rather than create positive incentives to stimulate voluntary compliance, the state's approach to increasing coverage of civil registration has generally been coercive. The civil code of 1928 established strict time frames for registration, and imposed fines for delays. Nevertheless, compliance remained low. While elites appear to have been aware that the coercive approach was counterproductive (Welti Chanes, 2011: 89–90), penalties for registration outside the legal timeframe are still the norm, though enforcement is uneven (Freyermuth Enciso, Ochoa Torres, & Muñoz Hernández, 2017). Those trying to register late often face bureaucratic hurdles and additional requirements for documentation. Generally, political elites have attributed low registration rates to insufficient civic-mindedness among citizens (“*falta de cultura*”), rather than to state-imposed barriers.² In the 2015 UNICEF-MICS survey, by contrast, parents of unregistered children pointed to a range of costs associated with registration. The most important of these are difficulty obtaining necessary pre-requisite documents, costs in terms of money or time, and distance to the civil registration office. Moreover, some parents indicated a lack of knowledge about the process as reason for non-registration.³

The lack of reliable data on births and deaths in some parts of Mexico has made it difficult to calculate even the most basic epidemiologic statistics (Diaz Cayeros et al., 2016: 150; Freyermuth Enciso et al., 2017). In one study, public health officials estimate that twenty percent of deaths before the age of five in poor municipalities had remained unreported. Children identified by the study whose deaths had not been reported had not been registered at birth, and did not possess birth certificates when they died (Hernández et al., 2002: 396). The Migration Policy Institute notes that under-registration “affects marginalized sectors of the population, including street children; children from single-parent families in rural areas; indigenous children; children of internally displaced persons or refugees; and the children of migrants, especially unauthorized migrants and minorities like the indigenous and Afro-Mexicans” (Mercado Asencio, 2012).

4. Evaluating the coverage and content of demographic data in Mexico

Before analyzing evidence for gender bias in registration, it is useful to more closely assess the overall quality of vital registration in Mexico. Broadly, demographic data can be undermined by errors of *coverage* and/or *content*. Coverage errors indicate either the omission of people who should have been included, or the duplication of records. The failure to collect data in parts of the country, to leave out some people, or counting others twice, are coverage errors. Identifying the existence and extent of coverage errors generally requires an alternative source of information that comes closer to the real number. Content errors indicate incorrect or incomplete information in the recorded data. To gauge the extent of content errors researchers look for patterns in the data that are demographically implausible. Examples of such measures are indices that gauge the prevalence of “age heaping”, that is sudden spikes in the age distribution, or implausible gender ratios. Even

² A volume edited by Luz María Valdés (2011) to commemorate the 150th anniversary of the civil registry in Mexico outlines many of these debates.

³ For a summary of the MICS data see Instituto Nacional de Salud Pública y UNICEF México. 2016. Encuesta Nacional de Niños, Niñas y Mujeres 2015 – Encuesta de Indicadores Múltiples por Conglomerados 2015, Informe Final. Ciudad de México, México: Instituto Nacional de Salud Pública y UNICEF México.

though content and coverage errors indicate distinct problems with demographic data, they often occur together.

This paper's main source of data is a set of roughly 80 million records of births registered between 1985 and 2014. Anonymized datasets for all births registered in a given year are compiled on the basis of state-level data by Mexico's Ministry of Public Health as part of the *Subsistema de Información sobre Nacimientos* (SINAC). For each individual, the records contain demographic information about the date of birth, date of registration, gender as well as geographical identifiers for municipalities. The raw datasets are organized by year of registration (rather than year of birth).⁴ Crucially, the dataset contains only records of births that were indeed registered, and there is no way to assess whether any specific record constitutes a duplicate or is incorrect.⁵ Comparing information about those registered to broader demographic patterns, and to census data is therefore the best way to explore the characteristics of those who "are born and die without leaving a trace in any legal record" (Setel et al., 2007: 1).

4.1. Analyzing the coverage of birth registration: comparing aggregate data

A UN assessment of data quality in the census puts Mexico in the middle category on a five-point scale, rating census data in 2000 as "approximate" based on the Whipple Index for age heaping. This index identifies the extent of age misreporting by examining spikes in the age distribution. Birth records are logically prior to heaping in the census. When respondents do not have birth records, and thus no means to verify their date of birth, they are less likely to recall their exact age or birthdate (Lee & Zhang, 2017). A closer look at age distribution for male and female respondents reveals that heaping is more prevalent among women than among men. In the 1990 census, the Whipple Index indicates that data for male respondents are "approximate" (Whipple Index = 123.5) whereas they are only "rough" for female respondents (126.8) according to the UN classification. In 2000 overall data quality has improved to "approximate" for both genders, but women still lag behind (116.5 for men; 116.9 for women).⁶ This greater prevalence of heaping among women constitutes a first piece of evidence for gender inequality in registration.

The Mexican census questionnaire asks women with children when their youngest child was born. This enumeration-based statistic provides the best available count of the number of births, but it only offers a snapshot across ten-year intervals for the years preceding the census. Moreover, the gender of the child is not recorded, so that there is no reliable breakdown of the number of girls and boys born even for these years. The *Instituto Nacional de Estadística, Geografía e Informática* (INEGI), Mexico's statistical agency, uses this census question to estimate how many children are registered within the first year of their life. This is defined by INEGI (2011) as "timely registration", even though it does not correspond to the legal time frame of six months.⁷ Data show that the percentage of births registered within twelve months has increased

significantly between 1999 and 2009, the years prior to the 2000 and 2010 census. In 1999 just 79% of births were registered in the first year. By 2009 that percentage had increased to 93%.

These national figures hide significant subnational variation. Fig. 1 compares births registered to births counted in the census by state. The proportion of births that occurred in 1999 and 2009, and that were registered within 12 months ('timely registration' in Fig. 1) are calculated on the basis of the census estimate per state.⁸ First, looking at timely registration in 1999, only around 50% of births in the states of Chiapas and Guerrero were registered within 12 months, compared to more than 90% in the states of Tlaxcala and Zacatecas. This indicates that location has a substantial impact on timely registration. All states increased rates of timely registration between 1999 and 2009, but states such as San Luis Potosí, Estado de México and the Federal District, exceed universal coverage, and thus 100 percent timely registration, in 2009. More children were therefore registered during the year than had been counted in the census. To make sense of this, it is necessary to recognize that infants counted in the census cannot be individually matched with specific registrations. In a comparison of aggregate numbers, each registered birth is conceptualized as a valid, first-time registration.

Since aggregate numbers for the country as a whole fall short of 100 percent, it is possible that the excess in some states results from a mismatch between the state of residence, the state of birth and the state of registration. Families with children born and counted in one state could have registered their children in a neighboring state, and misreported their residence. Since urban areas have a greater density of hospitals and other facilities, cross-state mobility could account for some of the surplus.

To further explore this discrepancy, Fig. 1 compares the census count to all births reported to have occurred in 1999 and 2009 registered by 2014 ('overall registration' in Fig. 1). For overall registration, the number of states that exceed universality sharply increases. Moreover, it is remarkable that top and bottom performers with regard to timely registration now exceed 100 percent. That the predominantly poor and rural states of Chiapas and Guerrero exceed 100 percent undermines internal migration as a likely explanation. At least for these states, duplication of records is more plausible, also in light of the substantial differences between timely and overall registration. Duplication results from inadequate controls when processing information, and the inability of registrars to retrieve recorded data to distinguish between new registrations, and instances where previously issued documents have been lost (Harbitz & Tamargo, 2009). A study of birth registration in marginalized municipalities in Chiapas found that guidelines for verifying information are regularly ignored, or applied inconsistently (Freyermuth Enciso et al., 2017). The ability to process information, one of the constituent parts of a well-functioning registration system (Szreter & Breckenridge, 2012), thus appears to lag behind the ability to gather information.

Crucially, despite encouraging trends in the Fig. 1, survey data demonstrate that under-registration is still a concern. Data from the 2015 Multiple Indicator Cluster Survey (UNICEF-MICS) indicate that 5.15 percent of boys and 6.14 percent of girls under the age of

⁴ Raw data from the Secretaría de Salud are not consistent in terms of variables and variable codes across years, so the coding had to be harmonized.

⁵ In a few instances, it is obvious that a record is incorrect. There are about 25,000 cases in which the date of registration is prior to the date of birth, which then generates a negative age at registration. In these cases, it is most likely that the registrar simply noted the wrong year of birth when filling out the form.

⁶ Data come from Table 1c in the UN Demographic Yearbook available at (https://unstats.un.org/unsd/demographic/products/dyb/DYBcensus/V1_Table1c.pdf), accessed October 9th, 2018.

⁷ Mexican states have substantial leeway in implementing the federal mandate for registration in their civil codes. The time allowed for registration without incurring a late penalty (*registro tardío o extemporáneo*) varies and ranges from as little as 15 days to 365 days. The standard of 12 months employed by INEGI is therefore a conservative interpretation of delayed registration.

⁸ The methodology used to calculate the proportion differs slightly from INEGI's approach. For one, the comparison is based on the state of residence listed on the birth certificate, rather than the state of registration. Moreover, INEGI uses a cohort approach for the registration data, and counts all births registered in 1999 or 2009 where less than 12 months have passed since birth. This also includes births that took place during the previous year. To be able to also capture overall registration, I instead include only births that occurred in the relevant year and differentiate between births where less than 12 months passed between birth and registration and the overall number of births with a reported birth year of either 1999 or 2009. Replication materials required to produce the figures and tables in the paper are available through Harvard Dataverse: <https://doi.org/10.7910/DVN/E2FJOI>.

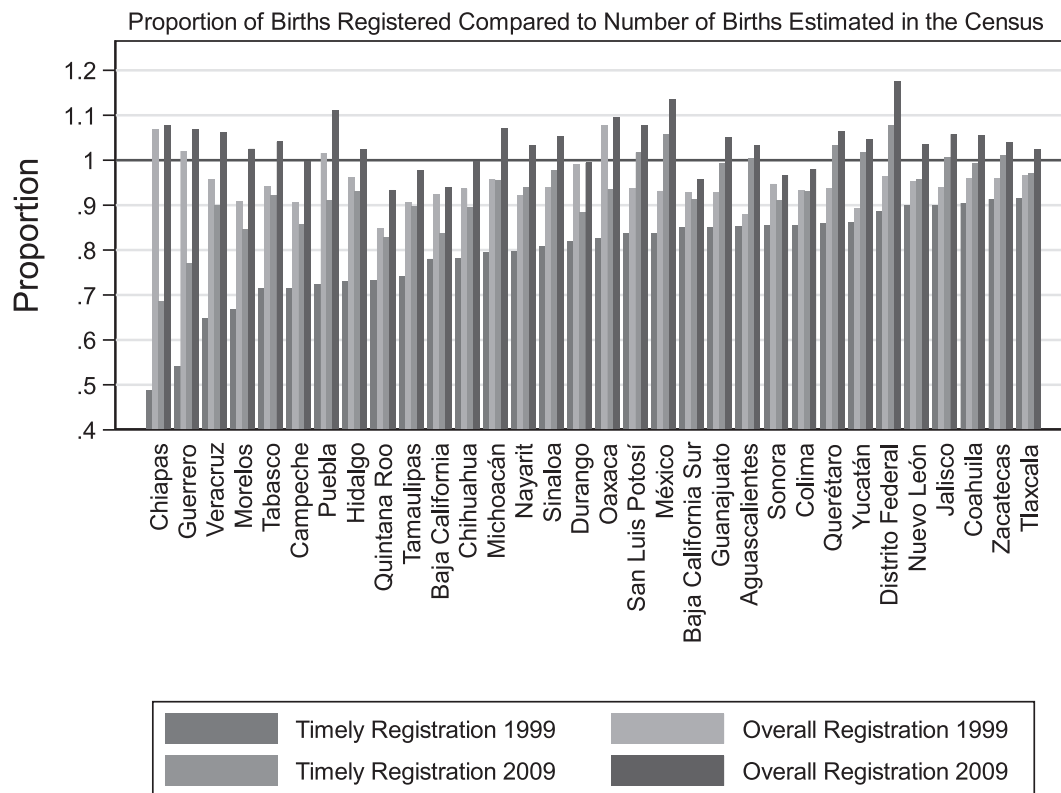


Fig. 1. Comparing coverage and timely registration with aggregate numbers. Sources: Census (2000 and 2010) and Dataset of births registered between 1985 and 2014.

five had not been registered. Moreover, the survey asks not only whether a child has been registered, but also whether interviewers were able to actually see the certificate.⁹ The discrepancy between the two questions is substantial. For almost 1 in 4 children reported as having been registered, interviewers were unable to verify the existence of a birth certificate. Survey data, which have been used in cross-national studies of birth registration (e.g. Bhatia et al., 2017), may therefore underestimate the extent of under-registration. While surveys make it possible to link individual characteristics, such as gender, to registration, social desirability bias could influence responses, as even parents who decide not to register their children tend to be aware of the need to do so (Pelowski et al., 2015). Moreover, birth records may have been misplaced or lost, thus leading to a 'relative lack of legal identity' for citizens who cannot easily retrieve and replace them (Harbitz & Tamargo, 2009).

In Mexico, over- and under-registration thus exist simultaneously. Overall, the aggregate analysis suggests that there are substantial coverage errors in birth registration, but it is difficult to know exactly who is left out. Duplication makes it impossible to estimate the pervasiveness of under-registration and, vice versa. Moreover, since there is no reliable count of the number of births by gender, evidence for a gender bias in the coverage of birth registration is mostly indirect, but the MICS survey and age heaping in the census suggest that women are less likely to possess identity documents. The following section examines gender ratios in birth registration and the census to assess inequality in coverage.

5. Analyzing gender inequality in registration

To explore whether gender influences registration it is useful to compare the gender distribution in the registration records to the census. In the 2000 census, the male-to-female ratio among babies in their first year of life was 1,04, which is in line with what is widely considered the natural ratio at birth (Mathews & Hamilton, 2005).¹⁰ Among registered children born in 1999 the ratio is similar (1,04), but a gender gap becomes apparent when comparing the ratio among infants registered within 12 months (1,04) to those registered outside the official time frame (1,01). The same gendered pattern of delayed registration emerges when comparing timely registration for birth years from 1985 to 2014 (1,04) to births registered after twelve months (1,01).

Fig. 2 offers a comparison of male/female ratios for registered births to the same cohort in the 2000 census. For each state, the male/female ratio in the census is compared to the ratio among births registered within twelve months, and to the ratio for delayed registration. Positive values on the y-axis indicate more girls among registered births than in the census, whereas negative values indicate more boys. Two key insights emerge from the figure. First, for timely registration, male/female ratios in the census are fairly close to the ratios among registered births. Where discrepancies exist between the two, they generally suggest that more boys were registered than expected based on the census cohort. Second, the picture flips for delayed registration. Discrepancies

¹⁰ Note that this is distinct from the census count of births, since it only includes surviving children who are alive at the time of the census. Infants who die before the age of one would be included in the census count of previous births, but not counted in the census. Since infant mortality is higher among boys than girls (Drevenstedt, Crimmins, Vasunilashorn, & Finch, 2008), this implies that the male/female ratio among one-year-olds in the census would be slightly lower than among births. In Latin America, there is no evidence for systematic gender bias in abortions, and thus a skewed gender ratio at birth (World Bank, 2011: 77).

⁹ The survey question is "Does (name) have a birth certificate?". If the answer is affirmative, the interviewer is instructed to ask "May I see it?". For more information on the questionnaire see the MICS website (<http://mics.unicef.org/>, accessed October 11th, 2018).

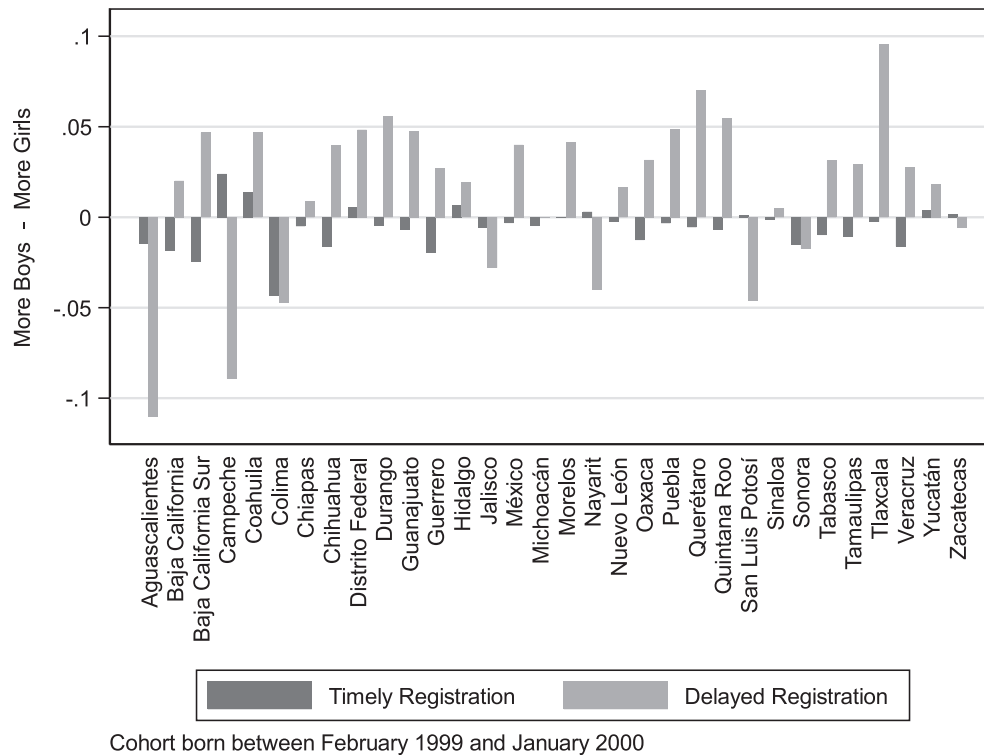


Fig. 2. Comparison of male/female ratios in the census and among registered births.

between census ratios and ratios for registered births now become more pronounced. Moreover, for delayed registration, for most states the graph indicates more girls than would be expected on the basis of the gender ratio in the census. While this graph cannot speak to overall gender differences in the coverage of birth registration, it does indicate that delayed registration is more prominent among girls than among boys in this cohort.

In addition to comparisons of different sources of aggregate data, coverage errors can also be uncovered by examining demographic patterns within a single data source. Fig. 3 calculates the proportion of women in the birth registration dataset by year of birth and year of registration. The male/female ratio among those born and registered between 1985 and 2014 is 1,04 (indicating 104 men for every 100 women), and fairly stable throughout the time period. The ratio by birth year is well above the ratio in the overall dataset, though, which is indicated by the horizontal solid line (1,01). This overall ratio also includes births before 1985 that were registered with sometimes significant delays. The second line, which refers to the male/female ratio by year of registration, is uneven, and drops sharply after 2000. This suggests that there was a “stock” of older unregistered women in the population (Hunter, 2018), and that women who had previously been undocumented are registering after 2000.

To further probe the gendered nature of delayed registration, Fig. 4 examines the average age at registration in months by gender and year of registration. The delay is always longer for women and girls, even though both lines track each other fairly closely over time. Peaks in the average age at registration suggest that older citizens are obtaining birth records. We would expect to see the demand for birth records among older cohorts rise when the relevance and value of documents for these citizens increase. In Fig. 4, there seem to be two such occasions. The first, small spike occurs in the mid-1990s. This first rise in the demand for records coincides with the establishment of a national voter registry under the auspices of the Federal Electoral Institute (IFE). The IFE was

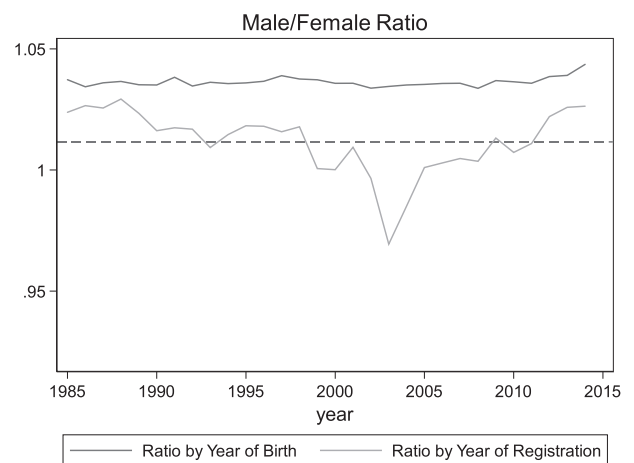


Fig. 3. Gender distribution among registered births. Source: Dataset of births registered between 1985 and 2014.

created in 1990 in the aftermath of the 1988 federal elections, which were marred by substantial irregularities and allegations of fraud. IFE, which has now been transformed into the National Electoral Institute (INE), is widely credited with cleaning up the electoral process in Mexico, and paving the way for a peaceful, electoral transfer of power. IFE created and maintained a national registry of voters, and the voter ID issued by IFE (*credencial para votar*) serves as the equivalent of a national picture ID.

The second spike occurs after 2000, and had also emerged in Fig. 3. This increase in the registration of older citizens, especially women, coincides with the roll-out of the conditional cash transfer program Progresa, which provides benefits to families, with a specific emphasis on women. As Hunter and Brill (2016) have highlighted for Brazil and Bolivia, with the expansion of CCTs official

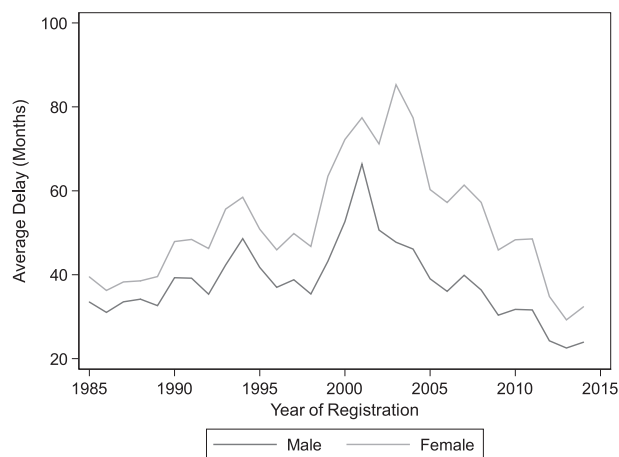


Fig. 4. Gender gap in the delay of registration by year of registration. Source: Dataset of births registered between 1985 and 2014.

documents, like birth records, acquired a concrete, tangible value for marginalized populations. Similarly, newly introduced non-contributory pension schemes and other means-tested social programs tended to require identity documents. In Fig. 4, the distance between the male and female line widens after 2000, which speaks to the role of social policies aimed at female beneficiaries in expanding the coverage of birth registration among women.

In light of recent improvements in the coverage of birth registration, one might assume that gender inequalities in the timing of birth registration are a thing of the past. The gap in Fig. 4, for instance, is mostly driven by past under-registration among women who are now included in the system. To examine whether inequality in the timing of registration persists, Fig. 5 displays the average delay for girls and boys by birth year, as well as the percentage difference between the two groups. On both fronts, the figure provides encouraging news. The average delay in registration and the gender gap decrease substantially throughout the time period. Yet, while there is progress towards more timely registration for each cohort, the average delay in registration is still always longer for girls than boys. That the male and female lines appear to converge toward the end of the time period is good news, but could at least partially be an artefact of the shorter possible interval between birth and registration. If more of the remaining unregistered children are female, the figure would underestimate the gender gap in the timing of registration, as well as the average delay. As highlighted in Section 4, data from the 2015 UNICEF-MICS survey indicate that 5.15 percent of boys and 6.14 percent of girls under the age of five in surveyed households had not been registered, suggesting that the gap might indeed be wider than it appears. Despite this note of caution, the broader picture is one of substantial progress towards more timely registration for boys and girls born over the last two decades.

6. Creating incentives for registration – The role of Progresa

What drives this progress in the coverage and timeliness of birth registration? While the previous section provides preliminary evidence that tangible benefits influence the timing of registration, this section probes the argument more systematically. Specifically, it examines whether the introduction of Progresa, a conditional cash transfer program that increased the value of documents for marginalized citizens, prompted progress in registration. Progresa constitutes the cornerstone of a new protection regime intended to provide targeted poverty relief (Díaz-Cayeros et al., 2016). In addition to conditional cash transfers, such new formula-based

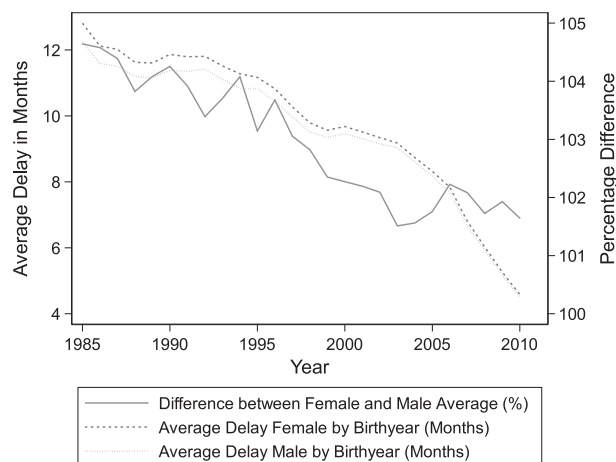


Fig. 5. Gender gap in the delay of registration by birth year. Source: Dataset of births registered between 1985 and 2014.

social policies included non-contributory pensions and health insurance for those not covered by programs based on formal sector employment. Progresa, the largest of these new programs in Mexico, began operating in small, rural localities in 1997. By 2000, the program had been introduced in all rural municipalities classified as highly marginalized by the Mexican Population Council (CONAPO). Coverage subsequently expanded to urban areas in 2002. The program now operates nationwide and covers about 6 million eligible families, that is one fourth of the population. Mexico was an early adopter of CCTs as an instrument of social policy, and the success of the program has played an important role in promoting adoption in other countries. Benefits are based on household composition, and therefore require beneficiaries to document the identity of all eligible household members (Hunter & Brill, 2016, Hunter, 2018). Transfers are assigned directly to mothers on the condition that children regularly attend school, and that household members receive preventive health care. To reduce gender gaps in education, the grant amount, which increases for advanced grades, is slightly higher for girls than for boys. The program design therefore aims to reduce gender disparities.

In the current analysis, the contextual change induced by the introduction of Progresa is observed at the level of municipalities, which is the lowest administrative unit for which identifiers of birth records are consistently recorded. For each municipality the intensity of program participation in a given year is captured by the percentage of households benefitting from the program. The overall number of households per municipality, as well as data for a series of municipal-level controls, come from the census and have been interpolated between census years to obtain annual data.¹¹

To examine the effect of the program on registration during the first phase of the rollout, when not all eligible rural municipalities were yet fully covered, Table 1 reports the results of a multi-level analysis of individuals born in 1998 that registered in rural municipalities. The dependent variable is the interval between birth and registration in months. The main independent variables are CCT enrollment in 1998 at the municipal level, and gender at the individual level. Since the rollout during this first phase prioritized the

¹¹ Information about the number of participating households per year and municipality comes from the program website (https://evaluacion.prospera.gob.mx/es/dig/inf_geo.php, accessed November 5th, 2018). For a comparable approach to calculating the intensity of program participation see Parker and Vogl (2018). Municipalities located in the state of Oaxaca had to be excluded from the analysis because municipal-level identifiers for births registered in the state are only recorded after 2001.

Table 1
Multilevel analysis of delays in registration for individuals born in 1998 and registered in rural municipalities.

	(1)	(2)	(3)
Individual-level			
Female			0.276*** (0.043)
Municipal-level			
CCT Enrollment 1998		0.087*** (0.01)	-0.111*** (0.01)
Marginalization Index			7.646*** (0.357)
Indigenous Population (%)			0.04 (0.027)
Ruggedness Terrain			0.004** (0.001)
Intercept	11.742*** (0.252)	9.434*** (0.367)	11.198*** (0.371)
Between Cluster Variance	62.531 (2.858)	58.286 (2.669)	32.162 (1.501)
Between Individuals Variance	273.892 (0.501)	273.892 (0.501)	273.875 (0.501)
ICC	0.186	0.175	0.105
Individuals (N)	598,261	598,261	598,261
Number of Municipalities (n)	1,010	1,010	1,010

Note: Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Minimum number of observations per municipality is 3, maximum 6882, and average 592.3.

most marginalized municipalities, it is necessary to control for the degree of marginality. Other relevant contextual controls are the percentage of the population that speaks an indigenous language and the ruggedness of the terrain, captured by the standard deviation of altitude among localities within the municipality.

The results of the individual-level analysis show that CCT enrollment is strongly associated with a shorter delay in registration, suggesting that the prospect of program benefits prompted parents to register their children more quickly. The average delay in registration in rural municipalities in 1998 is 14 months.¹² In model 3, a one standard deviation increase in CCT enrollment in the municipality (21 percent) decreases the delay in registration by 2.3 months. Consistent with the analysis in the previous section, the positive coefficient for girls provides evidence for gender disparities in the timing of registration even after controlling for other factors. Among the cohort born in 1998, the average delay for girls is about 8 days longer than for boys, all else equal. At the municipal level, marginalization and the ruggedness of the terrain – two variables that capture the costs of registration – are also associated with longer delays. The coefficient for the population that is indigenous is not significant in these models.

To further explore how positive incentives shaped birth registration over time, the models presented in Table 2 examine the average annual delay in registration at the municipal-level by gender between 1998 and 2010. The empirical strategy leverages the fact that the Progresa rollout was geographically uneven, and the panel structure of the data makes it possible to control for differences across municipalities with fixed-effects.¹³ For each gender, the average annual delay is calculated in two ways to capture registration dynamics among distinct groups. First, models where the average delay by birth year is the dependent variable (Models 1 &

2) analyze whether an increase in CCT enrollment is associated with a decrease in the average delay among cohorts born during the operation of the program. In these models, we would expect to observe a negative coefficient for CCT enrollment as the financial benefits of the program induce parents to register their children more quickly. Results in Table 2 support this relationship for both genders.¹⁴

Second, models where the dependent variable is the average delay by year of registration (Models 3 & 4) explore whether an increase in CCT enrollment is associated with an increase in the average delay in registration as older cohorts are prompted to seek registration to be able to benefit from the program. Analogous to the spikes in Figs. 3 and 4 above, a positive and significant coefficient for CCT enrollment in these models suggests that more older citizens are seeking documents in a given year. In the analysis, the expected relationship is only supported for women, not for men. Substantively, this suggests that among older cohorts, Progresa was particularly important for the registration of women. The program's emphasis on mothers, and the distribution of benefits to women, meant that obtaining identity documents provided tangible benefits especially for those who had previously remained undocumented.

Third, models where the dependent variable is the overall number of registrations by gender per municipality-year (Models 5 & 6) explore whether an increase in CCT enrollment is associated with an increase in the overall number of registrations. The positive and significant coefficient for CCT enrollment in these models provides further support for the notion that Progresa promoted registration among those who had not obtained documents in the past. The program therefore appears to have contributed to reducing the “stock” of unregistered citizens (Hunter, 2018).

7. Conclusion

Based on demographic data for Mexico, the paper shows that women and girls are less likely to enjoy the benefits of timely birth registration than their male counterparts. Methodologically, the paper draws on a novel data source, a dataset of individual records of births registered over three decades. Cross-national scholarship on birth registration has generally relied on household surveys (e.g. Bhatia et al., 2017), and therefore been unable to uncover such systematic delays. This paper shows that gender bias in registration is expressed not only in an overall under-registration of girls, but also in systematically longer delays.

In addition, the study probes under which conditions gender bias can be reduced, and coverage of birth registration increased. One policy implication that follows from the analysis is to ensure that the right to a “legal identity for all” (SDG target 16.9) is also realized for girls, investments in the supply-side of civil registration are likely insufficient. In societies with a gendered division of labor, incentives to obtain documents also vary by gender, even though the official costs of obtaining documents are identical for boys and girls. The conceptual framework in this study speaks to the role of expected benefits in influencing not just whether citizens obtain documents, but also when they do so. Parents may delay registration until a situation arises in which documents have concrete use, and this situation might arise sooner for boys than for girls if opportunities outside the household are gendered. Moreover, in anticipation of women's domestic roles, parents may

¹² Note that this is about five months longer than the national average delay for the same year reported in Fig. 5, since delays tend to be longer in rural than in urban areas. Descriptive statistics are reported in the Appendix.

¹³ A Hausman test suggest that fixed effects are more appropriate than random effects for these data. The results of random effects models with municipal-level controls for time-invariant or slowly changing variables are reported in the Appendix.

¹⁴ To interpret the substantive significance of results in fixed effects models, Mummolo and Peterson (2018) highlight the need to identify plausible variation in the treatment. Here, a one standard deviation change in CCT enrollment in the within-unit variation over time is associated with a 0.42 decline in the average delay for male citizens, and 0.39 decline in the average delay for female citizens, which constitute a 4.7% and 4.3% decline compared to the respective means for male (8.9 months) and female (9.1 months) citizens in the data. Following their guidelines, Figures A1 and A2 in the appendix provide histograms of the within-unit ranges of CCT enrollment after fixed effects.

Table 2
Municipal-level analysis of average delays by gender, 1998–2010.

	(1) Average Delay by Year of Birth, Females	(2) Average Delay by Year of Birth, Males	(3) Average Delay by Year of Registration, Females	(4) Average Delay by Year of Registration, Males	(5) Number of Registrations by Females	(6) Number of Registrations by Males
CCT Enrollment (%)	−0.049*** (0.002)	−0.052*** (0.002)	0.143*** (0.036)	0.016 (0.029)	0.55*** (0.140)	0.541*** (0.134)
Constant	12.169*** (0.075)	11.987*** (0.071)	51.945*** (1.198)	43.100*** (0.976)	668.335*** (4.727)	681.219*** (4.532)
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Municipal FEs	Yes	Yes	Yes	Yes	Yes	Yes
R-square (within)	0.41	0.43	0.1	0.09	0.02	0.02
Observations	24,438	24,438	24,415	24,414	24,415	24,414
Number of Municipalities	1,886	1,886	1,886	1,886	1,886	1,886

Note: Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Full models with year dummies are reported in the appendix.

believe that documents are not as valuable for girls as for boys, therefore prioritizing the registration of boys when resources are scarce. In addition to ensuring that the system of registration is as accessible as possible, it is therefore necessary to create positive incentives for registration to achieve gender parity. Conditional cash transfer programs, such as Progresa, play an important role in creating such incentives and ensure that registration has immediate and tangible benefits. Social policy programs that require identity documents, especially those targeting women and girls, may therefore contribute to reducing gender disparities in the timing of birth registration. By contrast, coercive approaches to promoting compliance with registration, such as the fines and bureaucratic hurdles for delays that are in place in many countries, including Mexico, do not appear to have a positive impact on increasing timely registration.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.worlddev.2019.104775>.

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