Religious Festivals and Economic Development: Evidence from Catholic Saint Day Festivals in Mexico*

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Abstract: Societies worldwide spend substantial resources celebrating religious festivals. How do festivals influence economic and social outcomes? We study Catholic patron saint day festivals in Mexico, exploiting two features of the setting: (i) municipal festival dates vary across the calendar and were determined in the early history of towns after Spanish conquest, and (ii) there is considerable variation in the intra-annual timing of agricultural seasons. We compare municipalities with "agriculturally-coinciding" festivals (those that coincide with peak planting or harvest months) to other municipalities, examining differences in long-run economic development and social outcomes. Agriculturally-coinciding festivals have negative effects on household income and other development outcomes. They also lead to lower agricultural productivity and higher share of the labor force in agriculture, consistent with agriculturally-coinciding festivals inhibiting the structural transformation of the economy. Agriculturally-coinciding festivals also lead to higher religiosity and social capital, potentially explaining why such festivals persist in spite of their negative growth consequences.

Keywords: Religion, Economic Development, Mexico, Catholicism, Liquidity Constraints

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1. Introduction

Religious festivals are prominent features of social life worldwide, and often account for substantial expenditures in even the poorest societies (Banerjee and Duflo, 2011). What impacts do religious festivals have on long-run economic development? Religious festivals may promote economic development, for example if they foster the development of social capital, enhance voluntary public good provision, or raise levels of trust in society (Putnam, 2000, McCleary and Barro, 2006a). On the other hand, devoting substantial resources and time to religious festivals may be detrimental to long-run economic growth if such devotion crowds out other growth-stimulating investments (Barro and McCleary, 2003).

Well-identified, causal estimates of the long-run impacts of religious practices have been difficult to obtain. This is because religious festivals are not generally assigned exogenously across individuals or geographic areas. The timing and features of religious festivals could be directly affected by economic development itself, or by other omitted variables that jointly affect development and features of festivals. Festival timing and characteristics could be chosen (or could evolve endogenously) to maximize positive effects or minimize negative effects on economic development. Additionally, religious festivals often affect an entire country at once, making it difficult to exploit within-country variation in festival characteristics. Both these challenges have led to an absence of causally well-identified evidence on how religious festivals impact long-run economic development.

In this paper, we make progress on a piece of the puzzle of religion's impact on society by studying religious festivals that were introduced by European conquerors. Many developing countries had religious festivals imposed on them by colonial powers, replacing endogenously-developed local religious traditions (Henrich, 2020). We investigate a particular religious practice in Mexico: patron saint day festivals. In Mexico and many other Roman Catholic countries, towns and cities celebrate the "patron saint day" of a particular saint or other holy figure that has been historically associated with the town. Hundreds of such celebrated figures have their saint day festivals that are spread throughout the calendar year, on dates set by the Catholic hierarchy in the Vatican.[1] These saint day festivals are typically local public holidays, and involve

[1]For example, towns whose patron saint is St. Arcadius (in Spanish, *Arcadio*) have their festival on January 12, while those with St. Fructus (in Spanish, *Fructuoso*) as their patron celebrate on October 25. For a fascinating exploration of the determinants of the number and geographic origins of Catholic saints since 1590, see Barro and McCleary (2016).

substantial financial expenditures by local households and governments. In Mexico and most of Latin America, patron saints were typically established at the time of a town's founding by Spanish colonizers, often centuries ago, and remained set thereafter.

To examine how religious festivals affect economic development, we take advantage of two features of the setting. First, festival dates vary greatly across localities, and were determined in the early history of towns following Spanish conquest. Second, the intra-annual timing of the main agricultural planting and harvest times varies tremendously across Mexico.[2] This means that, for some municipalities, the saint day festival coincides with the planting or harvest season, whereas in other municipalities there is no such coincidence.

We exploit this variation in festival timing and compare municipalities where the festival coincides with the main planting and harvest season to municipalities where they do not coincide to examine the impacts on economic development and social outcomes. We hypothesize that festivals that coincide with the planting or harvest seasons ("agriculturally-coinciding", or just "coinciding" festivals) negatively affect long-run development outcomes. During the planting and harvest seasons, households need to undertake investments and expenditures for agriculture. If households are liquidity-constrained, festival expenditures in these key time periods may crowd out agricultural investments. In the planting season, festival expenditures reduce funds available for investment in agriculture (e.g., in land preparation, fertilizer, and seeds). Festivals occurring during harvest times reduce households' total harvest income by requiring them to sell crops during peak harvest times, when crop prices are low (Burke et al., 2019). Harvest festivals therefore lower the realized value of harvested crops, and fewer resources are available to be saved and invested in the next planting season. Coinciding festivals thereby lead to lower agricultural productivity. Lower agricultural productivity results in less structural transformation of the economy from agriculture to manufacturing and services, and slower long-run economic growth.

To conduct our analysis, we created a new dataset of patron saint day festival dates for Mexican municipalities, assembling data from online data sources and phone interviews with municipality officials. We combine these data with data on locally-specific optimal planting and harvest dates to create measures of whether festivals occur during local planting or harvest periods.

[2] For example, in the state of Aguascalientes, the most important planting month is October, while in Nayarit it is April.

We then use numerous data sources from the Mexican government to explore municipality-level development outcomes in the present day.

The main identification assumption of our cross-sectional analysis is that the coincidence of a locality's festival date and the timing of its agricultural seasons is exogenous. This is a different and more plausible assumption than assuming festival dates are exogenous. While the history of saint day festival determination in Mexico is consistent with our main identification assumption, we present a number of empirical tests to examine whether this assumption is plausible, particularly after controlling for state fixed effects and exploiting only cross-town variation within Mexican states. First, we demonstrate that municipalities in Mexico show no tendency to have festivals occur away from planting or harvest periods. This helps rule out an important endogeneity concern, that municipalities intentionally choose the timing of festivals to avoid planting or harvest times. If this were occurring differentiallly for municipalities with certain characteristics, it would raise concerns about selection bias. Second, we show that the propensity to have a festival coincide with planting or harvest is not associated with important geographic and historical characteristics that may affect development. These tests provide evidence that the coincidence between a town's festival date and the timing of its agricultural season is plausibly exogenous, and can be used to examine the impacts of festival timing on economic development.

We first investigate the hypothesis that towns whose festivals occur during planting or harvest months, compared to towns whose festivals happen in other months, have worse development outcomes in the long run. We find that municipalities with agriculturally-coinciding festivals have lower household income, and also score worse on an index of economic development constructed from Mexican Census outcomes. These results are consistent with the hypothesis that festivals crowd out investments when they coincide with key agricultural periods.

In additional analyses, we explore potential mechanisms behind our results. We provide evidence that the long-run negative impacts of planting- or harvest-season festivals occur due to negative impacts on the agricultural sector. Locations with either planting or harvest festivals are less productive in agriculture. They have also experienced less structural transformation: they have higher shares of the labor force in agriculture, and lower shares in manufacturing and services. This latter finding is telling, given that improvements in agricultural productivity and the subsequent transition from agriculture towards the modern sectors is one of the most prominent features of the economic development process (Caselli, 2005, Herrendorf et al., 2014).

Further, we provide evidence that helps explain why planting and harvest festivals continue to persist, even given their negative impacts: they lead to higher religiosity. We use detailed survey data from the Americasbarometer from 2008 to 2018 and examine a variety of measures of religiosity. We find that municipalities where festivals coincide with planting or harvest have higher religious group participation rates and higher propensity to say that religion is important in one's life. Higher religiosity may lead to greater adherence to religious customs and traditions, including the celebration and timing of festivals, explaining why agriculturally-coinciding festivals are not changed even if they have negative development consequences. There may thus exist a self-reinforcing cycle in which coinciding festivals reduce development, but raise religiosity, and the increased religiosity helps coinciding festivals persist.

We also find that areas with agriculturally-coinciding festivals have lower income inequality. Lower income inequality may be a consequence of the negative development impact of coinciding festivals. This equity-efficiency trade-off is consistent with Mexican localities being on the initial development stage (left hand side) of the Kuznets curve (e.g. Kuznets, 1955, Robinson and Acemoglu, 2002).

The paper contributes to several literatures. First, we contribute to the literature on the impact of religion on economic development (see Iyer, 2016 and McCleary and Barro, 2006a, 2019 for reviews), which is part of a broader literature on culture and development (see reviews by Guiso et al., 2006 and Nunn, 2012). Prior work has found a negative correlation between religious behavior (e.g., attendance at religious services) and economic growth in cross-country comparisons (Barro and McCleary, 2003), and that individuals' religious beliefs are associated with attitudes conducive to economic growth (Guiso et al., 2003).[3] Our work is part of a more recent literature studying the impact of specific religious practices, with a strong focus on identifying causal effects. Campante and Yanagizawa-Drott (2015) exploit exogenous differences in the length of Ramadan fasting across countries and time due to the rotating Islamic calendar, finding that longer Ramadan fasting has short-run negative impacts on economic growth in Muslim countries.[4] Bryan et al. (2021) study the impacts of randomly-assigned Christian values education on labor market outcomes in the Philippines. Auriol et al. (2020) carry out experimental

[3] Alesina et al. (2020) study differences in inter-generational mobility within geographic regions across religious groups in Africa.

[4] Similarly, Stifel et al. (2011) explore the impacts of work-day taboos on agricultural outcomes in Madagascar, while Beam and Shrestha (2020) exploit differences in the importance of various Chinese Zodiac calendar years to examine impacts on fertility choices of ethnic Chinese in Malaysia.

games to explore the interaction between religiosity and insurance choices in Ghana. Relative to this more recent body of work, our paper is distinct in that we examine: 1) impacts of religious festivals using plausibly exogenous historical and geographic variation, and 2) long-run (rather than short-run) impacts on economic development outcomes.

Second, we contribute to the large social science literature on the impacts of religious practices on religiosity and social capital. Prior research has argued that religious practices have social capital benefits (e.g. Putnam, 2000, Deaton and Stone, 2003, Lim and Putnam, 2010). Clingingsmith et al. (2009) estimate the impact of the Muslim Hajj pilgrimage by examining visa lottery applicants in Pakistan, and find that pilgrimage increases religiosity and cultural values. These social capital benefits of religion are often cited as a potential reason for their persistence despite their effects on economic growth (Bentzen, 2019). Campante and Yanagizawa-Drott (2015) find that longer Ramadan fasting has positive impact on subjective well-being despite negative effects on economic growth. We contribute to this literature with evidence that a religious practice with negative economic effects, agriculturally-coinciding festivals, may nonetheless persist because of its positive impacts on religiosity.

Finally, we contribute to the literature on the comparative development of Latin America. Scholars have posited many reasons for Latin America's relatively poor long-run development path, including differences in factor endowments (Engerman and Sokoloff, 2002); the prevalence of colonial extractive institutions (e.g. Acemoglu et al., 2001, Acemoglu and Robinson, 2012, Dell, 2010); the high incidence of disease and use of labor coercion during Spanish colonial rule (Sellers and Alix-Garcia, 2018); missionary presence (e.g. Valencia Caicedo, 2019, Waldinger, 2017); and the negative consequences of the dismantling of local pre-colonial institutions (e.g. Diaz-Cayeros, 2011, Diaz-Cayeros and Jha, 2016). However, while the Catholic religion is a central part of many people's lives in Latin America, the consequences of its introduction in the region remain understudied.

Our findings concord with those of anthropologists who have highlighted potential negative impacts of saint day festivals on development. Harris (1964) argued that these festivals involved "enormous economic burdens" and "irrational uneconomic" behaviors that impeded development in Latin America, and Greenberg (1981, pg. 153-158) notes that the consequences of festivals for development depended on the exact timing of festival expenditures vis-a-vis the agricultural calendar.

The paper is organized as follows. Section 2 presents a conceptual framework linking festival timing with economic development. Section 3 provides background on Catholic saint day festivals in Mexico, their cultural and economic importance, and how they were chosen. Section 4 describes the data, and Section 5 describes the empirical strategy and tests the main identifying assumptions. Section 6 presents our primary empirical analyses. Section 7 explores the mechanisms underlying the main findings. Section 8 explores the impact of festivals on religiosity, social capital, and inequality. Section 9 concludes.

2. Conceptual Framework

We first consider theoretically how festivals occurring at different times of the year might affect long-run development. The overall argument is as follows. Some festivals occur in periods that have other high-return and time-sensitive investment opportunities. Given our interest in long-run development processes, and the fact that the vast majority of our locations historically began as agricultural areas, we focus on key time periods when there are high-return, time-sensitive agricultural investment opportunities: the planting and harvest periods. Festivals require expenditures, and because of liquidity constraints, an "agriculturally-coinciding" (or simply "coinciding"), festival leads to lower agricultural investments. Because festival timing is persistent, coinciding festivals lead to long-run reductions in agricultural productivity. Persistently lower agricultural productivity hinders the structural transformation out of agriculture and long-run economic growth. Agriculturally-coinciding festivals are a costlier signal of religious devotion, so areas with coinciding festivals could develop higher religiosity. Lower development also slows the secularization process, leading to higher religiosity. Increased religiosity can lead to resistance to changing religious traditions, including the celebration and timing of religious festivals. This can constitute a self-reinforcing cycle in which coinciding festivals persist due to higher religiosity, in spite of their negative economic consequences. Areas with coinciding festivals end up with lower levels of economic development in the long run.

2.1. *Planting and Harvest Investment Opportunities*

Agricultural production is seasonal, with distinct planting and harvest seasons. Planting and harvest seasons are locally-specific: they vary across localities due to climatic and geographic variation, but are common to households in the same locality. In these key seasons, households have the opportunity to undertake high-return investments, but face liquidity constraints that may limit their ability to take advantage of them.

In the planting season, there are high returns to investing in agricultural inputs such as fertilizer and seeds, as well as devoting intensive labor time to planting activities. A large literature in development economics documents the importance of liquidity and financial constraints in developing countries in general, and in agriculture specifically.[5]

Investments in the planting season are realized in the harvest season, some months later. Households in the same locality harvest simultaneously, leading to an outward shift in the local supply of crops. Markets are incompletely spatially integrated, so high local harvest-period supply leads to lower local crop prices. Gibson (1964) documents that this intra-annual maize price variation – with dramatic price declines at harvest time – was prominent in colonial Mexico owing to high transport costs between localities. This crop-price seasonality creates a high-return investment opportunity in the harvest period: delaying sale of harvested crops until later months when prices are higher. Households can take advantage of this investment opportunity by storing (not consuming) harvested crops, using savings or credit for household consumption during peak harvest months. Savings or credit constraints may limit the ability to take advantage of this harvest-period investment opportunity (Burke et al., 2019, Augenblick et al., 2021).

2.2. *Agriculturally-Coinciding Festivals*

Religious festivals are costly, but yield religious and possibly material benefits. Prior research has emphasized that costly signals of religious devotion can screen out the less-devoted community members, raising religious participation rates among the remainder (Iannaccone, 1992, Berman, 2000, Campante and Yanagizawa-Drott, 2015) and improving productive cooperation among adherents (Levy and Razin, 2014). Contributing to and participating in religious festivals can be seen as just such a costly signal of religiosity.

Festivals are locally-specific, celebrated by entire localities at once, but their specific timing on the calendar varies across localities. Because festivals happen at a particular point in calendar time, agriculturally-coinciding festivals can be particularly costly, as they affect liquidity-constrained households' ability to take advantage of other investment opportunities. Planting festivals divert resources and labor time from agricultural investments and activities. Harvest

[5] See Besley (1995) and Karlan and Morduch (2010) for reviews.

festivals lead households to sell more of their crops at times when crop prices are unusually low (to get access to funds for festival expenditures), reducing their ability to take advantage of storage and delayed crop sale.[6] The realized value of agricultural income is lower as a result, and fewer resources are available to save and invest in the next planting season. Negative economic consequences of Mexican saint day festivals, particularly "coinciding" ones that overlap with key agricultural periods, have been noted by anthropologists (e.g., Harris, 1964 and Greenberg, 1981).[7]

2.3. *Impact on Structural Transformation and Long-Run Economic Growth*

Planting festivals reduce the ability to invest in planting inputs and activities. Harvest festivals lead farm households to sell crops earlier than they would otherwise, reducing the returns to agriculture overall. The upshot is that areas with agriculturally-coinciding festivals have persistently lower agricultural productivity.

Persistently lower agricultural productivity in places with coinciding festivals could lead to worse long-run development outcomes. A long-running literature in development economics has argued that agricultural productivity growth can lead to overall economic growth by facilitating the structural transformation of the economy towards modern (manufacturing and services) sectors (declining shares of agriculture in GDP and in the labor force).[8] Recent theoretical work has formalized this point in two-sector growth models with an agricultural and a modern or non-agricultural sector.[9] When there are subsistence constraints (a minimum agricultural or food consumption requirement), demand for agricultural goods is income-inelastic, and the economy is closed to trade (so that domestic agricultural production is necessary), agricultural productivity needs to rise before labor moves from agriculture to the modern sectors. Agricultural productivity growth leads to overall economic growth and a structural transformation out of agriculture.

[6]In a related vein, Dillon (2020) finds that a shift in the Malawian school calendar that made school-fee payments due closer to the harvest period (when crop prices are unusually low) led to higher crop sales in that low-price period to pay for the school fees, and thus lower overall harvest income.

[7]One could imagine that harvest festivals may also have negative consequences for another reason: they may lead to higher temptation spending than festivals in other times of the year, because harvest time is an unusually high-income period. Duflo et al. (2011) study how temptation spending can deplete harvest earnings, so that fewer resources are available for investment in the next planting season. But there is actually little evidence that temptation spending rises when liquidity constraints are loosened (Banerjee et al., 2017, Evans and Popova, 2017, Kerwin et al., 2020).

[8]Key references include Schultz (1953), Johnston and Mellor (1961), Johnston and Kilby (1975), Timmer (1998), Johnson (2000). Outside of economics, Diamond (1997) makes a similar argument.

[9]See, among others, Laitner (2000), Caselli and Coleman (2001), Caselli (2005), Gollin et al. (2002, 2004, 2007), Restuccia et al. (2008). Herrendorf et al. (2014) review the literature on structural transformation and growth.

Recent empirical studies have examined this question, with some finding causal evidence that increases in agricultural productivity lead to structural transformation and economic growth.[10]

2.4. *Religiosity and the Persistence of Coinciding Festivals*

In empirical analyses below, we show that it is rare for a community to change their saint day festival celebration date, and find no empirical evidence of selective changing of patron saints to avoid agriculturally-coinciding festivals. If coinciding festivals lead to worse long-run development outcomes, why would they persist? Why don't communities simply celebrate their saints on different dates, or change their celebrated saints to ones whose festival dates do not coincide with planting or harvest?

There is the possibility of a self-reinforcing cycle, in which coinciding festivals raise religiosity, and the increased religiosity leads to persistence of coinciding festivals. Prior research suggests two channels through which coinciding festivals may raise religiosity. First, agriculturally-coinciding festivals have particularly high economic costs, which may make them particularly effective signals of religious commitment, leading localities with coinciding festivals to have higher religiosity. In club goods models of religion (Iannaccone, 1992, Berman, 2000), costly signals help screen out less-serious community members, and can raise religious participation among remaining adherents. Second, lower economic development may itself lead to lower religiosity. Many scholars have argued that low economic development leads to higher religiosity (lower secularization) (e.g., Durkheim, 1912). Empirical studies have found that higher income levels across societies are associated with more secular attitudes (lower religiosity),[11] and that higher education contributes to secularization.[12]

Whether coinciding festivals lead to higher religiosity directly (via more effective religious signaling) or indirectly (through their effects on economic development), the increased religiosity may increase adherence to religious traditions such as saint day festivals, and increase opposition to changing them. Overall then, there may then be a self-reinforcing cycle in which coinciding festivals reduce development and raise religiosity, and the increased religiosity promotes persistence of coinciding festivals.

[10]See, among others, Foster and Rosenzweig (2004, 2007), Nunn and Qian (2011), Hornbeck and Keskin (2014), Gollin et al. (2018), Bustos et al. (2020).

[11]For example, Barro and McCleary (2003), Lipford and Tollison (2003), McCleary and Barro (2006a), Paldam and Gundlach (2013).

[12]See McCleary and Barro (2006b), Hungerman (2014), Becker et al. (2017).

3. Saint Day Festivals in Mexico

3.1. Cultural and Economic Significance of Saint Day Festivals

Patron saint day festivals are yearly celebrations that occur in Catholic countries, especially those influenced by Spanish culture.[13] A saint day festival is usually dedicated to a patron saint or virgin who was determined to be the patron (protector) of a given locality. Hundreds of such celebrated saints have their saint day festivals on dates all throughout the calendar year, on dates set by the Catholic hierarchy in the Vatican. Festivals involve concerts, fireworks, feasting, and music, often for days before and after the festival date itself. Saint day festivals often begin and close with a mass in the saint's honor. Saint day festivals are typically local public holidays, and involve substantial financial expenditures by local governments as well as households (Lastra et al., 2009).

In Mexico, saint day festivals acquired major economic and cultural significance following Spanish conquest. As part of efforts to convert local populations to Catholicism, saint day festivals became "one of the most important activities of the municipal governments" (Tanck de Estrada, 2005, pg. 31). The historian Charles Gibson calculated that villages in the Valley of Mexico spent three fourths of their annual municipal income on religious festivals and church ornaments (Gibson, 1964). Villages held at least three religious festivals per year – the patron saint festival, Corpus Christi, and Holy Thursday – but the patron saint festival was considered the most important festival (Tanck de Estrada, 2005, Tanck de Estrada and Marichal, 2010). Historians and anthropologists have argued that the patron saint day festivals became particularly popular because they naturally commingled Spanish and indigenous religious elements, and allowed indigenous groups to celebrate saints in their own way, with their own interpretations, traditions, and customs (such as dances, music, and food) (Lastra et al., 2009, Beezley and Meyer, 2010).[14] Historically, the festivals generally lasted at least three days, began with a mass the first night, and was followed by elaborate processions, masses, sermons, music, dancing (combining Hispanic and indigenous dances), markets, fireworks, bull runs, and a communal meal for the whole village (Tanck de Estrada, 2005, Tanck de Estrada and Marichal, 2010).

[13]We use the terms "patron saint day festival" or "saint day festival" in this paper. This phrasing is synonymous with other terms used in the literature such as "patron saint day fiesta" and "patron saint fiesta".

[14]In fact, in many parts of Mexico, the name of the patron saint became part of the name of the town (O'Connor and Kroefges, 2008, pg. 310).

By the 1790s, patron saint day festivals had become so large that the colonial government imposed limits on municipal governments' festival spending, calling the "excesses" of the festivals "superfluous and vicious" (Tanck de Estrada and Marichal, 2010, pg. 352). These laws led to the formalization and increased prominence of the distinctive *mayordomia* (or *cargo*) social system, where a rotating set of households assumed responsibility for organizing and financing the annual festival of their town's patron saint (Beezley and Meyer, 2010, Lastra et al., 2009, Monaghan, 1990, Dewalt, 1975).[15]

Becoming a *mayordomo* (festival steward) brought great respect from the community, but involved significant expenditures, "in many cases to [the *mayordomos*'] own financial detriment" (Beezley and Meyer, 2010, pg. 159). *Mayordomos* had little flexibility on the required expenditure amounts because festival expenses were "fixed by custom and agreement" and "varied hardly at all from year to year" (Gibson, 1964, pg. 130). The financial strain for *mayordomos* was particularly high during years with poor harvests, as income "depended on the agricultural year and the market price of the produce" (Gibson, 1964, pg. 130). In fact, Brandes (1981, pg. 212) noted that the "invariably high" financial outlays for *mayordomos* were often so large "that villagers were forced to sell parcels of land in order to meet ritual responsibilities".

Estimates for *mayordomia* expenditures in the historical period are hard to come by; however, even in modern times, *mayordomia* households spend considerable amounts of money: Monaghan (1990, pg. 760) found that, in 1985, the *mayordomia* of the *Virgen del Rosario* in Santiago Nuyoó distributed "204,937 pesos' worth of foodstuff" alone, which is equivalent to approximately $46,425 in 2020 dollars. Greenberg (1981, pg. 149-152) finds that in Santiago Yaitepec, Oaxaca, in 1973, each *mayordomo* spent an average of 4,566 pesos ($2,211 in 2020 dollars) for the patron saint festival. Food and drink expenses made up about half of the *mayordomos'* expenditures and he calculated that these food expenditures alone would be enough "to provide [the village] 13.5 days worth of food per capita annually" (Greenberg, 1981, pg. 149).

In the 1960s and 1970s, anthropologists became very interested in understanding the saint day festival *mayordomia* system (and its persistence) in Mexico (for reviews, see Dewalt, 1975, Smith, 1977, Greenberg, 1981, Chance and Taylor, 1985). Dewalt (1979, pg. 201) noted that

[15] Historians and anthropologists have noted that the *mayordomia* social system became popular in Mexican villages (and other parts of Latin America, where it is also known as the *cargo* system) because it combined aspects of the *cofradía* system from Spain – religious co-fraternity groups – and indigenous communal associations (Lastra et al., 2009, Beezley and Meyer, 2010).

the "most striking element of these [*mayordomia*] systems is that generally poor peasants spend considerable time and money sponsoring fiestas to honor the saints", constituting "what appears to be economically irrational behavior".[16] They have proposed at least two main reasons for the persistence and importance of the *mayordomia* system (Chance and Taylor, 1985). First, serving as a *mayordomo* was a costly signal of religiosity and wealth to the community (Monaghan, 1990, Chance and Taylor, 1985). In the view of some anthropologists, serving as a *mayordomo* was a form of "conspicuous consumption" that allowed households to gain community respect (Dewalt, 1979). Second, due to the rotating nature of the *mayordomia* system, anthropologists argued that the system also served an important redistribution role within the community, both within a given year across households (Greenberg, 1981, Rosales Martínez et al., 2020), but also across time: *mayordomos* are found to receive preferential access to resources from future *mayordomos* because they are seen as having more reciprocity and religiosity (Monaghan, 1990).[17] (The view that serving as a *mayordomo* is a costly signal of religiosity, helping explain the system's persistence, concords with economics research on religious signaling that we discussed previously in Section 2.4.)

Today, saint day festivals continue to be highly significant in the lives of the people who believe and practice them to this day (Lastra et al., 2009, Rosales Martínez et al., 2020). Whereas larger cities have become more secular and the saint day festivals there have lost importance, festivals continue to be held in rural and agricultural villages in Mexico (Lastra et al., 2009). In rural villages, the festivals continue to be quite elaborate and costly, and continue to follow a "rigorous protocol... there must be vigils (*velaciones*), masses, ritual blessings and cleansings (*limpias*), processions, dances or dance dramas, music, fireworks, ritual meals, and the ritual handling of special objects and flowers" organized by the *mayordomos* and involve "the participation of men, women, and children of all ages" (Lastra et al., 2009, pg. 2).

[16] Likewise, Chance and Taylor (1985, pg. 7) note that for anthropologists "a salient feature of modern fiesta systems in [central Mexico] is that the offices of the ritual celebrations are considered to be *cargos*, a great economic burden."

[17] According to Chance and Taylor (1985), first- and second-wave anthropologists proposed two additional explanations – empowerment and exploitation – for the popularity of the festivals and the *mayordomo* system. First, by allowing indigenous groups to easily mix in their own religious traditions with the saint day festival organization and celebrations, the *mayordomo* system empowered local populations. Second, in contrast, because the festivals were imposed on indigenous groups by the Spanish and cost considerable sums of money, some anthropologists argue that the "repressive and abusive" festivals extracted wealth from poor households "originally into the hands of the clergy, then after Independence into those of *hacendados* and merchants" and these outsiders maintain the festivals for their own benefit (Harris, 1964, pg. 25-34).

3.2. *Exogeneity of Saint Day Festival Timing*

In Mexico and most of Latin America, patron saints were typically established at the time of a town's founding by Spanish colonizers. Because the timing of saint day festivals (relative to key agricultural periods) is central to our analysis, it is important to consider how localities came to celebrate their particular saint days. For countries where conquest and settlement by Europeans goes back centuries (to the 1500s in the case of Mexico), the origins of local festival celebrations are often shrouded in mystery, so the best one can do is collect a set of historical and ethnographic accounts of different places. The key question we have kept in mind is whether the localities ever intentionally choose the timing of saint day festivals (or inadvertently end up doing so) with an eye towards their long-run consequences, such as by avoiding the planting and harvest seasons. Evidence of such timing considerations would raise concerns about selection bias in our estimates.

In a review of the historical and ethnographic literature on saint day festivals in Mexico (e.g., Ragon, 2002, Nutini, 1976, Nutini, 1968, Brewster, 1904), we have found little evidence that such timing considerations come into play. The most important focus appears to be on choosing the saint him- or herself, with typically little mention of the date of the saint's festival. Once a locality has been matched to a saint, in nearly all cases it celebrates their saint day festival on the date given by the Catholic hierarchy in the Vatican that is common for all communities worldwide celebrating that saint.[18]

Some examples of the reasons behind the choice of particular saints by localities illustrates that considerations are typically orthogonal to considerations related to timing of the festival on the calendar. In many cases, saints were chosen based on structural, functional, or symbolic similarities with indigenous gods worshipped in the area (Nutini, 1968). Spanish friars seeking to convert the populations to Catholicism believed they would be more effective if they chose saints that had some resemblance to an indigenous god. For example, the village of San Juan Tianguismanalco was originally associated with the cult of the Aztec god *Tezcatlipoca*. The village was assigned the patron saint Saint John the Apostle given that this saint and Tezcatlipoca both represented youth (Nutini, 1976). In other cases, localities were assigned a patron saint based on salient characteristics of their community and particular functions of saints (Ragon, 2002). The

[18] In rare cases, we found in our data collection that communities in our sample celebrated a saint day festival on a date different from the official date prescribed by the Vatican (fewer than 5% of municipalities in our sample). These dates typically diverge by only a few days from the official date (on average two days of divergence). To rule out endogeneity of festival dates, in our analyses we use the official festival date prescribed by the Vatican for each saint, not a locality's potentially endogenously-chosen festival date.

patron saint of cooks, San Pascual Bailon, was chosen in Puebla, a region known for its cuisine (Brewster, 1904).

One category of explanation for the choice of saints does involve consideration of the *date* of the festival celebration. In some localities, Spanish conquerors chose saints whose festival date coincided with key dates in the Spanish conquest of or arrival in the locality. Many cities in Mexico take their saints (and often their locality names) on the basis of the saint whose feast was celebrated on the day the Spanish established or first visited the town (Ragon, 2002). For instance, the patron saint of Zacatecas was chosen to be the Virgin Mary because her feast day occurred on the date of the first camp of Juan of Tolosa – a Spanish *conquistador* – upon his arrival in Zacatecas. Importantly, the reason for the preference for certain festival dates has to do with historical events at the time of conquest, and should have no systematic relationship with the timing of agricultural seasons in the locality.

Interestingly, in some places saints were actually chosen at random. Some oral histories describe saint names being physically pulled out of a bowl, or the like. The motivation behind this method was that random selection would allow saints to "choose" the locality, and that this would enhance the supernatural protection thus afforded (Ragon, 2002).

Even if we believe that the choice of saints in the early history of towns (and the resulting coincidence of festival timing with agricultural seasons) is plausibly exogenous, one might worry that localities would seek to change their festival dates, once the consequences of their timing revealed themselves. There are indeed cases when communities changed their patron saints, but such cases appear to be rare. Patron saint celebrations are key components of a local community's history and culture. Perhaps unsurprisingly then, the few reported cases when communities changed their patron saint were motivated by a major negative shock, such as a flood, fire, or earthquake, and the switch was to a saint thought to protect against natural disasters (Ragon, 2002).[19]

Additional qualitative evidence on the exogeneity of the timing of saint day fiestas is provided by Atkinson and Fowler (2014), who studied how saint day festivals that coincide with voting days affect voter turnout. Atkinson and Fowler (2014) surveyed Catholic priests and officials in Mexico and asked how their particular parish chose their patron saint.[20] They found that "no

[19]However, in most cases following shocks, towns would often add additional patron saints to worship rather than replace the original saint (Ragon, 2002).

[20]Their sample was drawn from an online directory of dioceses and archdioceses in Mexico.

respondent indicated that the time of year for the fiesta was considered in this decision. Rather, patron saints resulted from idiosyncratic events" and that in many cases "Spanish colonizers chose the patron saint of the community for arbitrary reasons" (Atkinson and Fowler, 2014, pg. 47). This survey evidence from Atkinson and Fowler (2014) provides additional evidence that the saint day festival date of a particular town is exogenous to local characteristics.[21]

In sum, we find no evidence in historical and ethnographic accounts that endogeneity of festival dates is a worry in the Mexican context. In no case have we found a mention that a saint day was set (or changed) to avoid or coincide with important periods in the agricultural calendar. It is key that the focus is usually on choice of the saint (based on a diversity of rationales), and that the festival date then follows the annual religious calendar set by the Vatican. In other cases where early Spanish conquerors sought to implement a specific festival date, the choice was based on coincidence with initial dates of conquest or settlement, rather than anything to do with agricultural seasons.

4. Data

4.1. Data on Saint Day Festivals

We assembled a dataset of saint day festival dates for Mexican municipalities from a variety of sources. First, we determined the patron saint for each municipality in Mexico. An online data source, the *Encyclopedia of Municipalities in Mexico* (INAFED, 1988), provided information on the patron saint for 77.85% of municipalities. To collect a more complete set of patron saints across municipalities in Mexico, we supplemented the data by (i) directly contacting the municipalities in question by phone (13.97% of municipalities) and (ii) conducting online searches and finding at least two sources for each municipality (7.49%). For the direct phone calls, we focused on contacting municipal government officials, local churches, or schools. Overall, we were able to determine a patron saint for 99.3% of municipalities in Mexico.[22] Appendix A.1 provides information how we determined patron saints across municipalities in Mexico and the sources we used.

[21]Atkinson and Fowler (2014, pg. 47) provide the translated account for one parish on how their patron saint was chosen: "The people of God were consulted with the approval of the bishop. Here in Tamaulipas, there is great devotion to *Our Lady of Refuge* because we were officially put under the patronage of *Our Lady of Refuge* by the Spanish royalty during colonial times."

[22]For two municipalities, officials reported that they do not celebrate a patron saint. For the other 16 municipalities, we were unsuccessful in determining a patron saint.

Once we had determined the patron saint for (nearly all) municipalities, we then sought to ascertain the "official" (Vatican-prescribed) festival celebration date for that saint. We focus on the official timing rather than the date each municipality actually celebrates their festival, as the latter might be endogenous to local conditions and outcomes.[23] To determine the official saint day associated with each patron saint, we used a variety of sources. For 95.58% of municipalities, we used Roman Catholic Church documents to determine the official saint day.[24] For saints that were not included in Catholic Church records, we used online searches to determine the saint day (3.43% of municipalities). This sub-sample of saints is comprised of two types of saints: (i) saints celebrated in other countries on specified official dates but that are not mentioned in Vatican documentation (1.75%);[25] and (ii) saints that are "local" saints: saints not recognized or celebrated outside of that municipality in Mexico (1.68%). For our main analysis, we exclude this second subcategory ("local" saints) as the timing of their festivals is potentially endogenous; however, we show that our results are robust to their inclusion.[26] In Appendix A.1, we provide more information on the saint day dataset construction and the sources we used.

Overall, we are able to assign both a patron saint and a specific saint day festival date to 95.12% of municipalities in Mexico. The festival date is missing for 0.69% of municipalities for which we were unable to determine the patron saint from any source. The festival date is also missing for 4.19% of municipalities that celebrate "moving festivals" that do not have a fixed calendar date.[27] Our primary sample for analysis in this paper excludes municipalities with missing festival dates, but our results are robust to various ways of treating these missing-date municipalities.[28] Figure 1 provides a map of patron saint day festivals across Mexico (including "local" saints).

[23] As mentioned previously, most municipalities in our sample (86.23%) celebrate their saint day festival on exactly the date officially prescribed by the Vatican or other Roman Catholic authority outside of Mexico. Among those that do deviate from the official date, the mean number of days of divergence from the official date is seven.

[24] In some cases, municipalities reported celebrating a saint that is derived from a Vatican-recognized saint and celebrated on the same festival date, but the saint is referred to in the municipality by a different, local name. In these cases, we identified the relevant Vatican-recognized saint, and used the Vatican-prescribed festival date for that saint. We explain this process, the saints and municipalities affected, and the sources we used in detail in Appendix A.1.4.

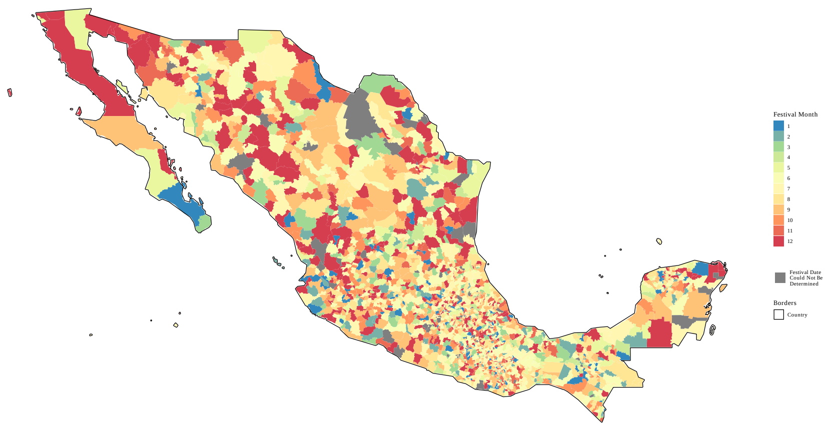
[25] For instance, the *Cristo Burgos* festival originated in Burgos, Spain as a veneration of the image of Christ on the cross, and is celebrated in Spain on September 14th (Archdiócesis de Burgos, 2015). The festival then spread to Mexico and other Catholic countries worldwide. One municipality in Mexico celebrates *Cristo Burgos*, and we assign the festival date of September 14th to this municipality.

[26] In Appendix Table A5, we show that municipalities with local saints are similar on geographic characteristics to municipalities where the saint is non-local. Additionally, Appendix Table A8 shows the main results are robust to inclusion of local saints in the sample.

[27] For example, the *Sagrado Corazón de Jesús* festival is celebrated on the Friday following the second Sunday of Pentecost – the seventh Sunday after Easter. Easter varies in timing year to year.

[28] In Appendix Table A4, we show that municipalities with missing dates have similar geographic characteristics to other municipalities. We also show the main results are very similar when we classify municipalities with missing festival dates either as having coinciding or non-coinciding festivals (see Tables A6 and A7).

Figure 1: Saint Day Festival Months - All of Mexico



Notes: The map presents the month that each municipality in Mexico celebrates its respective Catholic patron saint day festival. Municipalities where we were unable to determine the festival date are shaded in dark grey. See Appendix A.1 for more information on the construction of the festival date dataset.

4.2. Data on the New Spain Region of Mexico

Our primary analyses focus on a relatively homogeneous sample of municipalities in the former "New Spain" (*Nueva España*) region of Mexico. Municipalities in this region nearly all are suitable for growing maize, which simplifies the analysis by allowing us to focus on maize planting and harvest periods for each locality. Maize has been the primary staple crop in the region since pre-colonial times (Gibson, 1964). In other parts of Mexico outside of New Spain, there is more heterogeneity in both agricultural suitability and in the choice of the primary crop – which is often not maize. Thus, the choice of primary crop outside New Spain could possibly reflect endogenous choices to focus on certain non-maize crops in periods closer to the present day.[29] Focusing on New Spain therefore excludes areas that have historically been less suitable for agriculture. By focusing on an area that has been primarily maize-growing since pre-colonial times, we can sidestep concerns that a locality's primary crop (identified using modern-day data such as the Caloric Suitability Index) may be endogeneous to the economic development process.

New Spain is also distinct from other parts of Mexico on other dimensions relevant for our study. It was the first part of Mexico to be conquered and settled by the Spanish, and was the main administrative unit during early colonial history. The area thus has the longest history of colonial influence in Mexico, which may make Catholic religious traditions like saint day festivals

[29]The difference in agricultural suitability and in primary crops derives from differences in climate: New Spain is largely temperate and subtropical, while the north is mostly semi-arid and arid desert, while the southeast is tropical (Ricketts et al., 1999).

comparatively more important in this region. The historical accounts we cite above about the importance of festivals and the *mayordomia* system all refer to localities in New Spain. Today, saint day festivals remain more important in the former New Spain (central Mexico) than in the rest of the country (Lastra et al., 2009). Municipalities in New Spain are also distinctive in being much smaller in land area and more densely populated compared to municipalities in the rest of the country.[30] More compact, denser populations in New Spain may enhance the role of town-based community celebrations such as saint day festivals.

Figure 2 presents a map of the borders of the New Spain region of Mexico along with the main administrative borders of Mexico. We use the definition of New Spain as of 1786, as in Map 8 of Gerhard (1993a). Figure 3 presents a map of festival month dates across New Spain municipalities.[31]

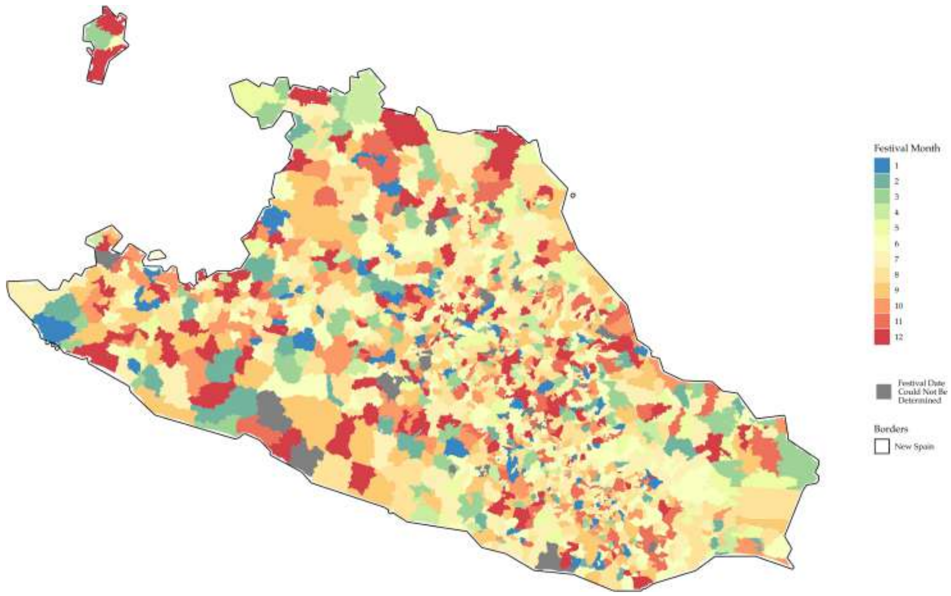
Figure 2: Administrative Borders and New Spain Region of Mexico

Notes: This map presents the administrative borders of Mexico in varying shades of gray: country border, state borders, and municipality borders. Additionally, the map presents the borders for the New Spain region of colonial Mexico as defined by Gerhard (1993a) in black.

[30] New Spain municipalities have mean land area of 336.1 square kilometers, compared with non-New Spain municipalities' mean of 2,385.9 square kilometers. Mean population density is 308.6 persons per square kilometer in New Spain municipalities vs. 98.0 persons per square kilometer in non-New Spain municipalities. Municipalities in New Spain comprise 60% of the Mexican population (authors' calculations from the 2010 Mexican Census).

[31] In Section 6, we show that our results are robust to considering the sample of all Mexican municipalities for which we have festival dates.

Figure 3: Saint Day Festival Months - *New Spain* Region of Mexico



Notes: The map presents the month that each municipality in the New Spain region of Mexico celebrates its respective Catholic patron saint day festival. Municipalities where we were unable to determine the festival date are shaded in dark grey. Additionally, the map presents the border for the New Spain region of colonial Mexico as defined by Gerhard (1993a) in black and the modern borders of States and Municipalities in gray. See Appendix A.1 for more information on the construction of the festival date dataset.

4.3. *Data on Crop Planting and Harvest Dates (FAO)*

Data on the optimal planting and harvest dates for a number of crops are constructed based on data from the Global Agro-Ecological Zones (GAEZ) project from the Food and Agriculture Organization (FAO). The GAEZ data provides global estimates for crop growth cycles and crop yields for a number of crops at a global grid-cell level (where each grid is $5' \times 5'$, or approximately 100 km^2). For each crop, the GAEZ data supplies the estimates on crop growth cycles and yields under two possible sources of water (rain-fed or irrigation) and under three alternative levels of inputs (low, medium, and high). For each input-water-crop combination, the GAEZ data offers estimates under conditions that are potentially unaffected by human intervention, and under conditions that could potentially reflect human intervention. The estimates incorporate the effect of moisture and temperature on the growth of the crop, the disease environment, as well as climatic-related pest, "workability", and disease constraints. The estimates used in the analysis in this paper for the planting and harvest dates are based on the agro-climatic growth cycles under rain-fed agriculture and low levels of inputs. We use these restrictions to remove potential concerns that the irrigation method and level of agricultural inputs reflect endogenous choices that could be potentially correlated with economic development.

We focus primarily on the planting and harvest cycle for maize, as maize is and has historically been the most important crop across Mexico for agriculture. Figure 4 presents a map of the optimal maize planting month in New Spain according to the GAEZ estimates, while Figure 5 displays a corresponding map of the length of the maize growth cycle.[32] The maps highlight the large amount of spatial variation in the optimal maize planting and harvest dates.[33]

We use the GAEZ data to construct the optimal planting date for each municipality by taking the average estimated planting date within grid cells in a municipality. Similarly, we construct the optimal harvest dates across Mexican municipalities by taking the average estimated optimal planting date and adding the average number of days until harvest from the GAEZ estimates for grid cells within each municipality.[34] Note that some municipalities in Mexico are not suitable for maize; we exclude these municipalities from the main analysis as we are not able to determine optimal planting and harvest dates for these municipalities.[35]

We then use the data on festival dates across Mexican municipalities detailed in Section 4.1 to construct a measure of the coincidence of timing of a municipality's saint day festival with its planting and harvest periods. Figure 6 presents a map of municipalities and whether they have agriculturally-coinciding festivals. We define agriculturally coinciding as an indicator variable equal to 1 if the saint day festival in municipality occurs either within 0 to 30 days before the optimal maize planting date or 0 to 30 days after the optimal maize harvest date according to FAO GAEZ data.[36]

We also use data on the potential caloric yield for crops across Mexico using the Caloric

[32]In some regions of Mexico, maize production is split into two seasons: a primary season that accounts for approximately 75 percent of total production (usually with planting occurring spring/summer), and a shorter secondary season (usually with planting occurring in the fall/winter) (USDA, 2017). The FAO GAEZ planting and harvest cycle estimates are for the primary season for each grid cell (Fischer et al., 2012). We focus on this primary maize season because it accounts for the majority of production.

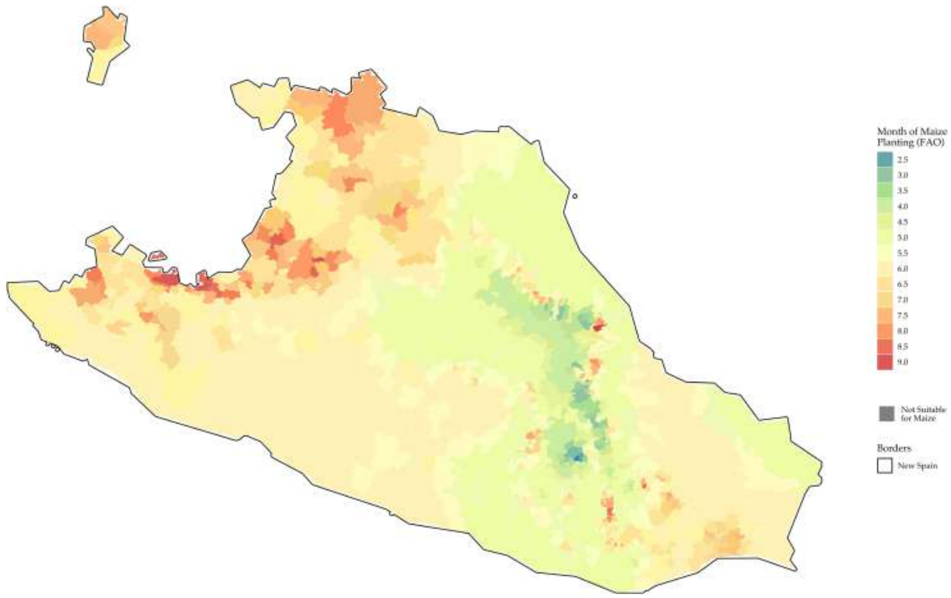
[33]Appendix Figures A5 and A6 present the equivalent maps for maize planting dates and maize growth cycle lengths for all of Mexico.

[34]One potential concern with the GAEZ data is that the predicted optimal planting and harvest dates might not be strong predictors of actual planting and harvest dates. Using data on the timing of maize harvesting from the *Servicio de Información Agroalimentaria y Pesquera (SIAP)*, we show in Appendix Figure A11 that the GAEZ optimal harvest month strongly predicts observed maize harvest timing across Mexico.

[35]This maize suitability restriction affects 0.53% of municipalities in the *New Spain* region of Mexico, and 2.07% of municipalities in Mexico as a whole.

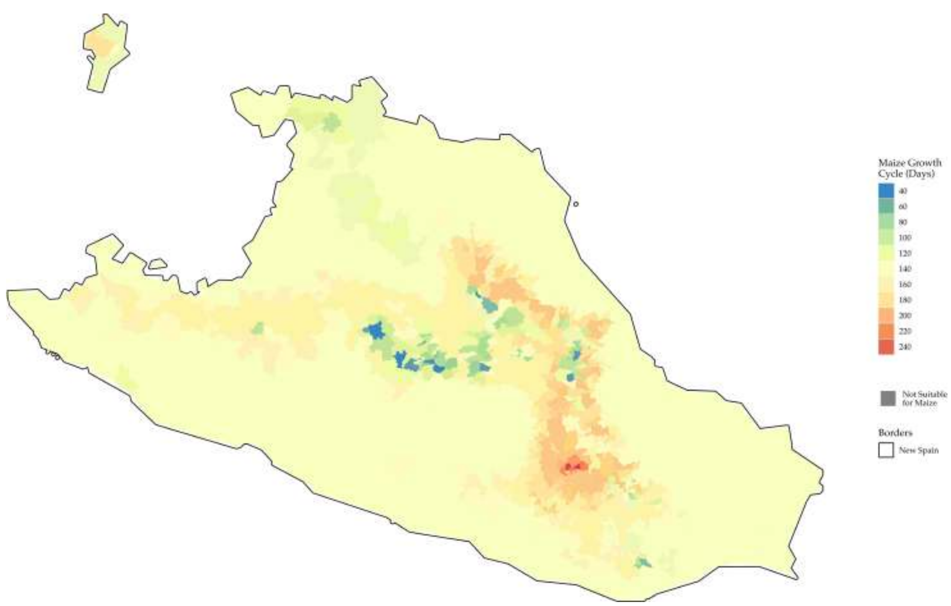
[36]Figure A1 presents a map of the overlap (in days) between the saint day festival and maize planting and Figure A2 presents a map of the overlap (in days) between the saint day festival and maize harvest. Figures A7 and A8 present the equivalent maps for the overlap (in days) between the saint day festival and maize planting and maize harvest for all of Mexico.

Figure 4: Optimal Maize Planting Date (FAO data) - *New Spain* Region of Mexico



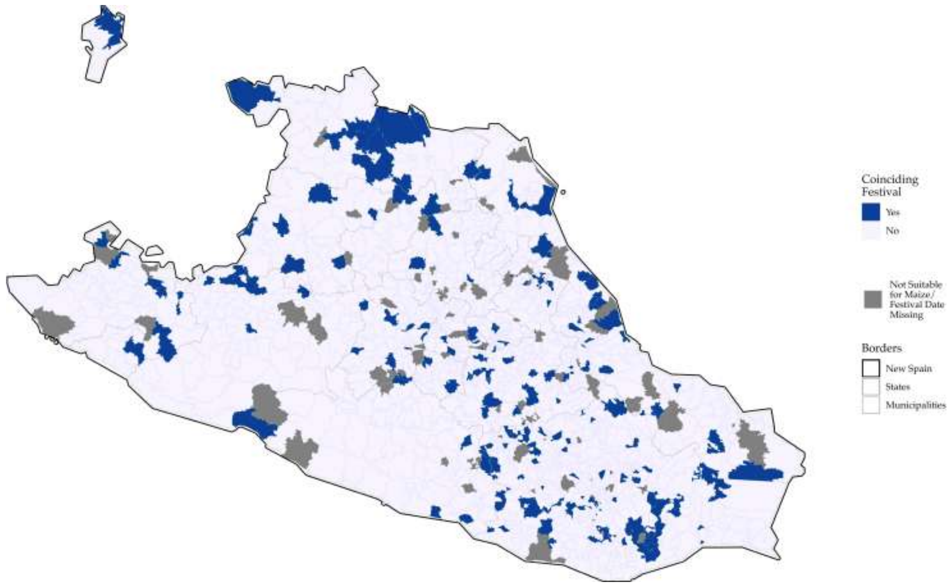
Notes: Optimal maize planting month according to FAO GAEZ data in the New Spain region of Mexico.

Figure 5: Maize Growth Cycle Length (FAO data) - *New Spain* Region of Mexico



Notes: Length (in days) of the optimal maize growth cycle according to FAO GAEZ data in the New Spain region of Mexico.

Figure 6: Agriculturally-Coinciding Festivals - *New Spain* Region of Mexico



Notes: Coinciding Festival is equal to "Yes" if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data and "No" otherwise for each municipality in the New Spain region of Mexico. Municipalities where we were unable to determine the festival date or are unsuitable for maize are shaded in dark grey.

Suitability Index (CSI) measures developed by Galor and Ozak (2016). The CSI measures calculate the potential caloric yield per hectare per year under rain-fed agriculture and low level of inputs for a variety of crops. The CSI is meant to ensure comparability in the measures of crop yields across space by capturing the nutritional differences across crops. We use the CSI data to determine the optimal planting and harvest date for the highest caloric-yielding crop in each municipality (instead of only examining maize crop cycles) as a robustness check. As expected, the highest caloric-yielding crop across Mexico tends to be maize according to the CSI measure (for crops where we have both CSI estimates and GAEZ growth cycle estimates). This is the case for 73.15% of municipalities. The other max CSI crops across Mexico are: foxtail millet (9.93% of municipalities), wetland rice (8.38%), wheat (5.25%), and groundnuts (0.53%).[37]

4.4. Data Sources for Development Outcomes

Our primary outcome variables (household income and an index of economic development) are at the municipality level, and come from the 2010 *Censo de Población y Vivienda* (Population Census

[37]Maize and groundnuts are crops native to the Americas. Foxtail millet, wetland rice, and wheat are not native to the Americas pre-1500 CE.

henceforth) from Mexico's National Institute of Statistics and Geography (INEGI).[38] This census interviewed over 106 million households across Mexico about their economic well-being, labor supply, asset ownership, and education. We also use municipality-level data on agricultural production from the *Servicio de Información Agroalimentaria y Pesquera* (SIAP) in our analysis of maize productivity. See Appendix A for further details.

4.5. *Data on Additional Covariates*

4.5.1. Geographic Data

We use several GIS and satellite datasets aside from the FAO GAEZ dataset described in Section 4.3. We use temperature and precipitation data from the Global Climate Database (Hijmans et al., 2005) and land suitability measures using data from the Atlas of the Biosphere (Ramankutty et al., 2002). We combine these datasets with the administrative shape file of municipality boundaries for the 2010 Population Census from the geo-statistics division of INEGI to construct municipality-level covariates. Additionally, we use the municipality shape file to construct municipality land area and municipality-centroid latitude and longitude. We describe these geographic datasets and variables in more detail in Appendix A.

4.5.2. Historical Data

We use historical measures of population density and climate from Sellers and Alix-Garcia (2018). The population measures during the colonial era were digitized from Gerhard (1993a,b). This source contains various data on the colonial governorships of New Spain, including records from Spanish administrators on the number of individuals paying tribute to the Spanish Crown.[39] Population data for 1900 are from the Mexican Historical Archive of Localities (AHL), maintained by INEGI. Measures of drought severity in the early colonial era are from the *North American Drought Atlas* (Cook and Krusic, 2004). These measures are important predictors of the dramatic decline in tributary population during the early colonial era and subsequent development (Sellers and Alix-Garcia, 2018).

[38]For more information on this census, see INEGI documentation.

[39]There are no other proxies for population for the colonial era. For the tribute data, certain groups – such as indigenous nobility and the clergy – were exempt. See Sellers and Alix-Garcia (2018) on how the tributary data are converted to population measures.

5. Empirical Strategy

5.1. *Estimating Equation*

In order to examine the economic effects of festival celebrations coinciding with planting and harvest seasons, we estimate the following empirical specification:

$$y_m = \alpha_{s(m)} + \beta \, \textit{Festival Coincides with Planting or Harvest}_m + \mathbf{X}_\mathbf{m}^{'} \mathbf{B} + \epsilon_m \quad (1)$$

where m indexes municipalities in Mexico; y_m is our outcome of interest; $s(m)$ is a function mapping municipalities to states in Mexico; $\alpha_{s(m)}$ represent state fixed effects to account for all time-invariant differences across states, such as geography or cultural factors that do not vary over time;[40] $\textit{Festival Coincides with Planting or Harvest}_m$ is an indicator variable equal to 1 if the saint day festival in municipality m occurs either within 0 to 30 days before the optimal maize planting date or 0 to 30 days after the optimal maize harvest date according to FAO GAEZ data;[41] $\mathbf{X}_\mathbf{m}$ is a vector of controls that includes fixed effects for the planting calendar month, fixed effects for the harvest calendar month,[42] and controls for geographic, climatic, and historical characteristics for municipality m; and ϵ_m is the error term of municipality m.[43]

The coefficient of interest is β, the effect of having festivals coincide with planting or harvest. Based on the social science literature on the economic impacts of religious celebrations, we hypothesize that $\beta < 0$ when examining long-run development differences; that is, having saint day festival expenditures occur in periods when they may crowd out other long term investments and liquidity is low is associated with worse development outcomes.

The main identifying assumption needed to interpret β as the causal impact of having festivals coincide with planting and harvest is that $E[\epsilon_m \,|\, \textit{Festival Coincides with Planting or Harvest}_m] = E[\epsilon_m] =$

[40] Across Mexico, there are 32 states. In the *New Spain* region of Mexico, there are 13 different states. Section 6.3.1 shows the results using the full sample of Mexican municipalities.

[41] We also show results separately for festivals that coincide with planting and festivals that coincide with harvest in Section 6.2. When we show results separately, we include p-values for testing differences across coefficients for festivals that coincide with planting and festivals that coincide with harvest; in almost all cases, we fail to reject the null hypotheses that the coefficients are the same. Additionally, we explore the sensitivity of the results to the definition of the 30-day windows in Appendix C and show that the results are robust to various windows prior to planting and following harvest.

[42] There are 22 planting and calendar month fixed effects (11 for planting and 11 for harvest; one calendar month in each set is the excluded category.)

[43] For municipality-level outcomes, we present robust standard errors. For individual-level outcomes, we cluster standard errors at the municipality level. We also show that our results are robust to spatial autocorrelation; we present our main results with Conley (1999) standard errors in Table A9. The Conley (1999) standard errors are very similar to the robust standard errors, suggesting that festival timing across Mexico does not display considerable spatial correlation.

0. That is, whether a municipality's saint day festival coincides with planting or harvest is exogenous to features of the municipality that could also affect economic development. We provide a number of empirical tests in the following section to examine whether this identifying assumption is valid.

Note that the measures we use for both festival dates and crop growth cycles are meant to increase confidence that the independent variables of interest are exogenous. First, for festival dates, instead of using the date when the municipality actually celebrates the saint, we use the official celebration date defined in the Roman Catholic Church's calendar for a municipality's patron saint (see Section 4.1). Second, for agricultural seasons, we use estimates from the FAO GAEZ data based on geographic and climate characteristics rather than the dates when households in a municipality perform planting and harvesting, which might be endogenous to levels of economic development. Using these measures for festivals and agricultural seasons increases confidence that the coincidence between festivals and the agricultural season is plausibly exogenous to other important municipality characteristics that might affect development.[44]

5.2. *Testing Identifying Assumptions*

One concern with estimating equation (1) is that perhaps saint day festivals were strategically assigned by the Spanish colonizers to avoid the agricultural season in some municipalities, but not in others.[45] This strategic assignment would imply that it would be less likely that municipalities have festivals that coincide with planting or harvest months compared to other time periods.

We first construct a dataset at the municipality-date level, with 365 observations per municipality (one for each calendar date). The dependent variable, $\textit{Festival Date}_{mt}$, is an indicator equal to one if municipality m's festival occurs on date t, and is zero otherwise. We then test whether municipalities are less likely to have festival days that coincide with planting and harvest months in the data by estimating the following regression equation:

$$\textit{Festival Date}_{mt} = \beta \, \textit{Planting or Harvest Month}_{mt} + \alpha_{s(m)} + \theta_t + \epsilon_{mt} \tag{2}$$

[44]Additionally, Section 3 provides qualitative historical evidence that saint day festival dates were often chosen due to plausibly exogenous reasons such as the date of conquest and similarities in features between a saint and local gods (but importantly, not on the basis of coincidence with agricultural planting or harvest seasons).

[45]For instance, in more populous municipalities, perhaps the Spanish avoided selecting patron saints that would coincide with planting seasons. This would imply that municipalities that happen to have festival coincide with planting or harvest may be less developed today due to omitted variables (e.g. less populous to begin with) rather than the festival directly.

where *Planting or Harvest Month*$_{mt}$ is an indicator equal to one if date t is either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for municipality m using FAO GAEZ data; $\alpha_{s(m)}$ represent state fixed effects; θ_t represent date-of-the-year fixed effects to account for all time-invariant differences across calendar dates in the popularity of a saint (to account for differences across dates in the propensity to have saint days according to the Roman Catholic Church calendar); and ϵ_{mt} is the error term of municipality m for date t. We cluster standard errors by municipality. If saint day festivals were strategically chosen by municipalities (or assigned by Spanish conquerors) taking into account agricultural planting and harvest times, then we would expect that $\beta \neq 0$. However, if the saint day festivals were assigned without taking into account the timing of the agricultural season, then we would expect that $\beta = 0$.

Table 1 presents the estimates for equation (2) examining the relationship between festival dates and planting and harvest months for maize, the main staple crop in Mexico. (To improve visibility of the coefficients, we multiply coefficients by 100.) Panel A presents the results examining whether the festival date coincides with either the planting or harvest month, while Panel B shows the results separately for coinciding with planting and coinciding with harvest. Once date-of-the-year fixed effects are included in the regression (Column 2 and after), estimates of the coefficients for β are consistently small in magnitude and are not statistically significantly different from zero at conventional levels. Across both panels, there is no evidence that festivals are more or less likely to coincide with planting or harvest months. Instead, the estimates suggest that festival dates occur throughout the calendar in a way that is consistent with festival days not being assigned strategically to avoid or coincide with planting and harvest. This evidence supports taking the coincidence of festival dates with planting or harvest to be exogenous.[46]

A second concern with equation (1) is that if festivals were assigned exogenously depending on characteristics that might matter for economic development – such as geography and climate – then municipalities that happen to have festivals coincide with planting or harvest would not be comparable to municipalities where this is not the case. If this were the case, then the estimates from equation (1) for our independent variables of interest would not be causal and would instead

[46]In Appendix Table A2, we conduct a similar analysis for municipalities in all of Mexico (including non-New Spain municipalities). Coefficient estimates are very similar, and lead to the same conclusions: once all control variables are included in the regression, there is little evidence that festival months tend to be more or less likely in planting or harvest months.

Table 1: Relationship Between Festival, Maize Planting, and Maize Harvest Months

	Dependent Variable: *Festival Date*			
	(1)	(2)	(3)	(4)
	Panel A: Planting or Harvest			
Maize Planting or Harvest Month	-0.092^{***}	-0.018	-0.018	-0.010
	(0.016)	(0.017)	(0.017)	(0.018)
Calendar Date Fixed Effects	N	Y	Y	N
State Fixed Effects	N	N	Y	N
Date by State Fixed Effects	N	N	N	Y
Observations	581,445	581,445	581,445	581,445
Clusters	1,593	1,593	1,593	1,593
Mean Dep. Var.	0.274	0.274	0.274	0.274
	Panel B: Planting and Harvest Separately			
Maize Planting Month	-0.143^{***}	-0.013	-0.013	0.001
	(0.019)	(0.021)	(0.021)	(0.022)
Maize Harvest Month	-0.041^{*}	-0.024	-0.024	-0.021
	(0.024)	(0.028)	(0.028)	(0.028)
Calendar Date Fixed Effects	N	Y	Y	N
State Fixed Effects	N	N	Y	N
Date by State Fixed Effects	N	N	N	Y
Observations	581,445	581,445	581,445	581,445
Clusters	1,593	1,593	1,593	1,593
Mean Dep. Var.	0.274	0.274	0.274	0.274

Notes: Observations are at the municipality-calendar date level for municipalities in the *New Spain* region of Mexico for which we have festival data. Standard errors are clustered at the municipality level. *Festival Date* is an indicator variable equal to 1 if the festival for a municipality occurs on that date. For ease of interpretation, we multiply all regression coefficients by 100. *Maize Planting or Harvest Month* is an indicator variable equal to 1 if a date falls within 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. *Maize Planting Month* is an indicator variable equal to 1 if a date falls within 0 to 30 days prior to the optimal maize planting date for a municipality using FAO GAEZ data. *Maize Harvest Month* is an indicator variable equal to 1 if a date falls within 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

be capturing impacts of these other differences between municipalities.

To examine whether this is the case, we estimate equation (1) and have the outcome y_m be a series of geographic, climatic, and historical characteristics that might affect development. Table 2 presents the estimates for this exercise. The estimates suggest that, conditional on state fixed effects and planting and harvest month fixed effects, municipalities that happen to have festivals coincide with planting or harvest are generally not significantly different than municipalities where this not the case for a number of characteristics that are potentially important for economic development.[47] The findings provide additional support for taking the coincidence of festival dates with planting or harvest seasons as plausibly exogenous (the identifying assumption of equation (1)).

6. Results: Differences in Development

6.1. Differences in Development

We now present regression results examining whether having saint day festivals coincide with planting and/or harvest seasons leads to differences in economic development in Mexico. We use data from the 2010 population census to estimate equation (1). To discipline the analysis and avoid data mining and specification search concerns for multiple outcomes, we focus on two main outcomes. The first is simply (the log of) mean household income in the municipality. Second, we construct an index of economic development using all questions in the census related to economic development within a municipality. Log household income is one component of the index, but other components are a wide range of municipality characteristics related to employment, educational attainment (by gender and for various age groups), and asset ownership. We construct the index as the first principal component of these measures of development. We explain the component measures in detail in Appendix A.

Table 3 presents the estimates for equation (1) for log household income (Panel A) and for the index of economic development (Panel B) as the dependent variables. Column (1) does not include state fixed effects, while columns (2)-(5) (our preferred specifications as explained in Section 5) include state fixed effects. Columns (3) and (4) include additional geographic controls

[47]Note that we do find statistically significant differences in slopes and latitudes at the 10% level. In subsequent regression tables we show how our estimates are sensitive to the inclusion of these and other controls, and the results are always robust to their inclusion or exclusion.

Table 2: Municipality Characteristics and Coinciding Festivals

	Non-Coinciding Festival			*Coinciding Festival*			T-test Difference
	Obs.	Mean	SE	Obs.	Mean	SE	(1)-(2)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Geographic Characteristics:							
Precipitation	1385	95.43	(1.23)	184	98.06	(3.66)	-2.63
Temperature	1385	19.07	(0.11)	184	19.67	(0.27)	-0.60
Land Suitability	1385	0.86	(0.00)	184	0.84	(0.01)	0.02
Maize Suitability	1385	34.10	(0.58)	184	34.59	(1.64)	-0.49
Area	1385	328.32	(13.35)	184	341.79	(40.68)	-13.47
Longitude	1385	-98.28	(0.05)	184	-98.19	(0.15)	-0.09
Latitude	1385	18.64	(0.04)	184	18.78	(0.13)	-0.14*
Log(Dist. to Mexico City)	1385	5.45	(0.02)	184	5.54	(0.04)	-0.09
Slope	1385	10.41	(0.17)	184	9.58	(0.47)	0.83*
Elevation	1385	1569	(21.00)	184	1459.18	(57.58)	109.81
Colonial Characteristics:							
Has Colonial Characteristics	1385	0.86	(0.01)	184	0.83	(0.03)	0.04
Drought in 1545 (%)	1195	99.67	(0.17)	152	98.03	(1.13)	1.64
Log(Pop. Density in 1570)	1195	0.53	(0.03)	152	0.40	(0.08)	0.13

Notes: Observations are municipalities in the *New Spain* region of Mexico. The value displayed for t-tests are the differences in the means across the groups, conditional on state fixed effects and fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. Robust standard errors are presented in parentheses. See Data Appendix for more information on variables. *Festival: Coincides* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either within 0-30 days prior to the optimal maize planting date or 0-30 days after the optimal maize harvest date for a municipality using FAO GAEZ data, and 0 otherwise. Note that we do not have colonial characteristics for all observations in our sample; therefore, we also show results for *Has Colonial Characteristics*, an indicator equal to 1 if a municipality is not missing colonial characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

and historical controls, respectively. Column (5) includes planting-month and harvest-month fixed effects to account for potential direct (time-invariant) impacts of having planting or harvest occur at different points in the calendar. The estimates presented in Table 3 show that having a festival coincide with either maize planting or harvest is associated with significantly lower levels of economic development. Having a festival occur either 0-30 days prior to planting or 0-30 days following harvest is associated with an approximate 0.20 standard deviation decrease in household incomes and the index of economic development. The results suggest that having an agriculturally-coinciding festival can leads to lower levels of economic development, potentially because the festivals crowd out additional investment (which we examine in Section 7).

It is of interest to explore what index sub-components are driving these impacts on the overall index of economic development. We therefore present the estimated effects for all the individual

Table 3: Development Outcomes and Coinciding Festivals

	Dependent Variable: Panel A: *Log HH Income*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.275^{***}	-0.204^{**}	-0.251^{***}	-0.255^{***}	-0.244^{***}
	(0.099)	(0.080)	(0.071)	(0.070)	(0.068)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Adjusted R2	0.004	0.347	0.538	0.543	0.560
Mean Dep. Var.	3.234	3.234	3.234	3.234	3.234
SD Dep. Var.	1.330	1.330	1.330	1.330	1.330

	Dependent Variable: Panel B: *Index of Economic Development*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.695^{**}	-0.422^{*}	-0.593^{***}	-0.613^{***}	-0.576^{***}
	(0.300)	(0.240)	(0.209)	(0.208)	(0.202)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Adjusted R2	0.002	0.348	0.566	0.572	0.591
Mean Dep. Var.	-0.589	-0.589	-0.589	-0.589	-0.589
SD Dep. Var.	4.039	4.039	4.039	4.039	4.039

Notes: Data is from the 2010 Mexico Population Census. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. *Index of Economic Development* is the first principal component index for a number of development outcomes in the census for a municipality (see Data Appendix). *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

index components in Figure 7. Overall, we find that the vast majority of the sub-components are negative and generally statistically significant. When we examine which components tend to have the largest negative effects, we find that having a festival coincide with either maize planting or harvest is associated with significantly lower household income, literacy, employment, and education. Additionally, we find that planting- and harvest-season festivals are associated with less asset ownership, but the results are less statistically precise for these sub-components. The results in Figure 7 provide evidence for the wide-ranging negative development consequences of agriculturally-coinciding festivals.

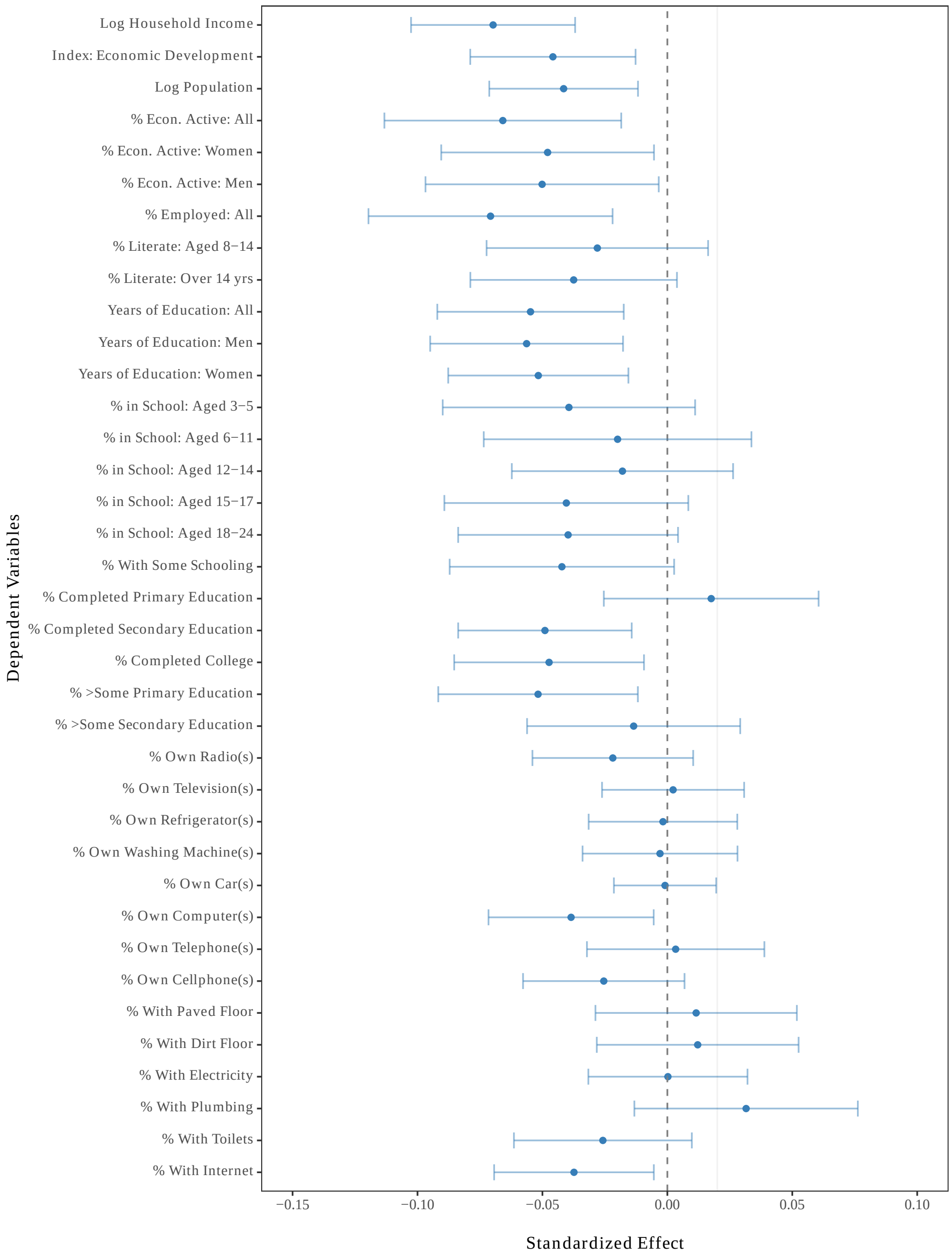
One natural question is whether the results are similar for festivals that coincide with planting and festivals that coincide with harvest. Table A3 presents the results separately examining the impacts of festivals that coincide with planting and festivals that coincide with harvest on log household income and the index of economic development. We find that both planting-coinciding and harvest-coinciding festivals are associated with worse development outcomes. For both planting-coinciding and harvest-coinciding festivals, the estimated effects are similar to the results from Table 3 in both magnitudes and statistical significance. Table A3 also shows p-values testing the null hypothesis that the coefficients for planting-coinciding festivals and harvest-coinciding festivals are the same. Across all specifications, we fail to reject the null hypotheses that the effect of planting-coinciding and harvest-coinciding festivals are identical.

6.2. *Impacts by Festival Timing Relative to Planting & Harvest*

In this section, we further explore the development results by examining how the timing of the festival affects development when we examine other periods before and after planting and harvest. To do so, we estimate the impacts of festivals coinciding with *other* months relative to planting and harvest months.

In particular, in Section 2, we hypothesized that having a festival coincide with planting/harvest may lead to lower long-run development due to festival expenditures crowding out of investments during low liquidity times. This argument implies that we should see the largest estimated effect when the festival coincides with planting/harvest, and smaller negative effects for other months near planting/harvest (e.g. 2 months before, 2 months after, 3 months before, etc.). This motivates an exercise where we examine festivals that occur in months leading up to

Figure 7: Development Outcomes and Coinciding Festivals:
Estimates for *Economic Development Index* Components



Notes: Data are from the 2010 Mexico Population Census for *New Spain* region of Mexico. The figure presents the estimated standardized coefficients and respective 95% confidence intervals from estimating equation (1) on the sub-components of the *Index of Economic Development*. The dependent variables are denoted on the y-axis. We first show the estimates for log household income, then for the *Index of Economic Development*, followed by estimates for each of the individual sub-components of the index (note, log household income is also one of the index components). See Data Appendix for more information. The independent variable is *Festival Coincides with Maize Planting or Harvest*: an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. The regressions control for the full set of controls: *State Fixed Effects*, *Geography Controls*, *Colonial Controls*, and *Planting & Harvest Month Fixed Effects*.

and following planting/harvest seasons but that do not coincide with planting/harvest seasons. To conduct this exercise we estimate the following specification:

$$y_m = \alpha_{s(m)} + \sum_{i=-3}^{3} \beta_i \textit{ Festival: } i \textit{ Months from Planting}_m + \sum_{j=-3}^{3} \gamma_j \textit{ Festival: } j \textit{ Months from Harvest}_m + \mathbf{X}_{\mathbf{m}}^{'} \mathbf{B} + \epsilon_m \quad (3)$$

where our coefficients of interest are β_i and γ_j, the effect of festivals occurring i or j months from planting or harvest, respectively; and other variables are defined as before in equation (1).

Figure 8 presents these estimates of interest from estimating equation (3) on log household income. The estimates are consistent with the hypothesis from Section 5: the largest estimated effect occurs when the festival coincides with the period prior to the planting month or following the harvest month, and smaller negative effects for other months near planting or harvest. These results are consistent with the hypotheses that festivals crowd out investments when they occur in times of particularly low liquidity.[48]

6.3. *Extensions & Robustness*

In this section, we conduct a number of robustness tests for our main results. First, we show that the results are robust to expanding the sample to include all municipalities in Mexico. Second, we show that our results are robust to using the agricultural seasons for the maximum Caloric Suitability Index (CSI) crop within each municipality instead of focusing solely on maize planting and harvest seasons. Third, we conduct a randomization inference exercise assigning placebo festival dates to show that the estimated impacts are not driven by outliers or observations with high leverage.

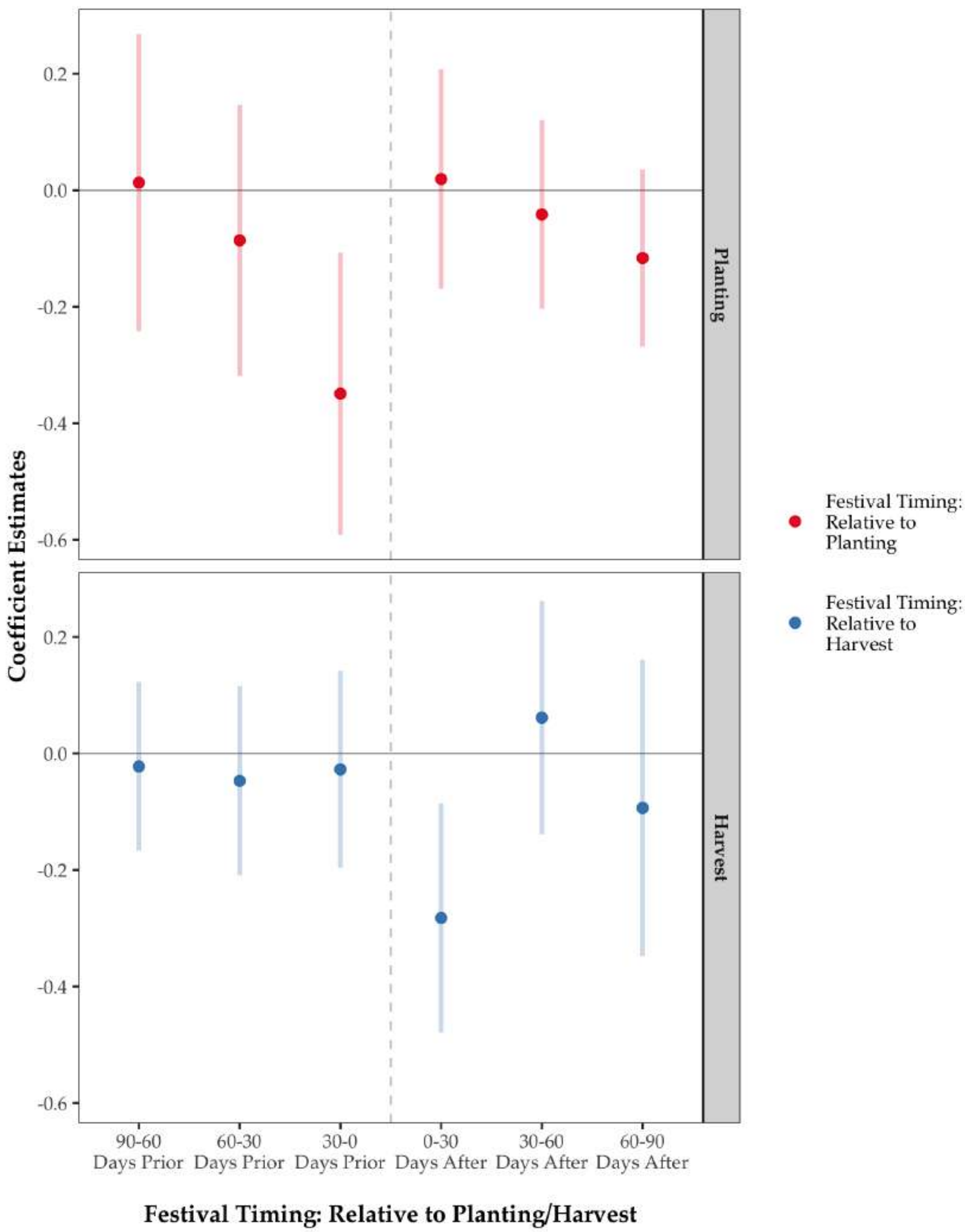
6.3.1. *Expanding Sample to Include All Mexican Municipalities*

For reasons detailed in Section 3, our main results limit the sample to municipalities in the former *New Spain* region of Mexico. In this section, we present our main results expanding the sample to include all municipalities in Mexico where we could determine the festival date.[49]

[48]This timing of the effects highlighted in Figure 8 also provides additional evidence that the results presented in Table 3 are due to the coincidence between festivals and planting and are not capturing some other difference between municipalities with/without this coincidence that is not related to the festivals themselves.

[49]See Figure 2 for a map of municipalities in Mexico that were and were not part of *New Spain*.

Figure 8: Impacts of Festival Coincidence with Other Months Relative to Planting and Harvest



Notes: Data are from the 2010 Mexico Population Census for the *New Spain* region of Mexico. The figure presents the estimated β_i and γ_j coefficients and respective 95% confidence intervals from estimating equation (3). The outcome variable is *Log Household Income*. *Festival Timing: Relative to Planting/Harvest* is defined as the number of months before/after a municipality celebrates its festival relative to planting (top panel) and harvest (bottom panel) according to FAO GAEZ data. The regressions control for the full-set of controls: *State Fixed Effects*, *Geography Controls*, *Colonial Controls*, and *Planting & Harvest Month Fixed Effects*.

Table 4 presents the estimates for all municipalities in Mexico from estimating equation (1) for household incomes and for the index of economic development using the coincidence between festivals and the optimal maize planting and harvest months. We find that the results are very similar to the results presented in Table 3 when we expand our sample to include all municipalities in Mexico. Specifically, we find that having the festival occur prior to planting or shortly after harvest is associated with significant decreases in economic development.[50] These results confirm the findings from the previous section and show that the results are robust to considering an alternative and larger sample.

6.3.2. Maximum Calorie Crops

As explained in Section 4.3, we also consider an alternative measure of how festivals coincide with agricultural seasons. Specifically, instead of examining only maize planting and harvest, we use data from Galor and Ozak (2016) on the Caloric Suitability Index (CSI) for each crop within each municipality to construct measures of the coincidence between the festival date and the optimal planting/harvest date of the maximum CSI crop for each municipality. As before, the crop calendar data are from FAO GAEZ. This provides an additional check on the results presented above by considering a measure that examines a larger set of crops instead of just maize.

Table 5 presents the estimates for estimating equation (1) for household incomes (Panel A) and the index of economic development (Panel B) using the coincidence between festival month and optimal planting and harvest months for the maximum CSI crop. The results are similar to the results presented in Table 3 and show that having the festival coincide with planting or harvest is associated with significant decreases in economic development.[51]. These results confirm the findings from the previous section and show that the results are robust to considering alternative crop calendars.

[50] Appendix Table A1 presents the equivalent balance table as in Table 2 for all of Mexico and shows the municipalities where the festival coincides with maize planting or harvest months are similar on important observables as well for this broader sample.

[51] Appendix Table A10 presents the equivalent balance table as in Table 2 and shows the municipalities where the festival coincides with the max CSI crop's planting or harvest months are similar on important observables as well. We also replicate the month-by-month analysis from section 6.2 using the CSI measure and present the results in Figure A10. We find that the effect of the coincidence between the festival and max CSI crop seasons is largest exactly when the festival coincides with the planting month

Table 4: Development Outcomes and Coinciding Festivals:
All of Mexico

	Dependent Variable: Panel A: *Log HH Income*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	−0.009	−0.099	-0.138^{**}	-0.140^{**}	-0.134^{**}
	(0.080)	(0.063)	(0.056)	(0.056)	(0.055)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	2,277	2,277	2,277	2,277	2,277
Adjusted R2	-0.000	0.351	0.518	0.522	0.531
Mean Dep. Var.	3.379	3.379	3.379	3.379	3.379
SD Dep. Var.	1.316	1.316	1.316	1.316	1.316
	Dependent Variable: Panel B: *Index of Economic Development*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	0.103	−0.231	-0.348^{**}	-0.353^{**}	-0.326^{*}
	(0.249)	(0.194)	(0.171)	(0.171)	(0.170)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	2,277	2,277	2,277	2,277	2,277
Adjusted R2	-0.000	0.379	0.557	0.560	0.570
Mean Dep. Var.	-0.084	-0.084	-0.084	-0.084	-0.084
SD Dep. Var.	4.052	4.052	4.052	4.052	4.052

Notes: Data is from the 2010 Mexico Population Census. Observations are municipalities in Mexico. Robust standard errors are presented in parentheses. *Index of Economic Development* is the first principal component index for a number of development outcomes in the census for a municipality (see Data Appendix). *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Development Outcomes and Coinciding Festivals:
Using Maximum Caloric Suitability Crop Cycles

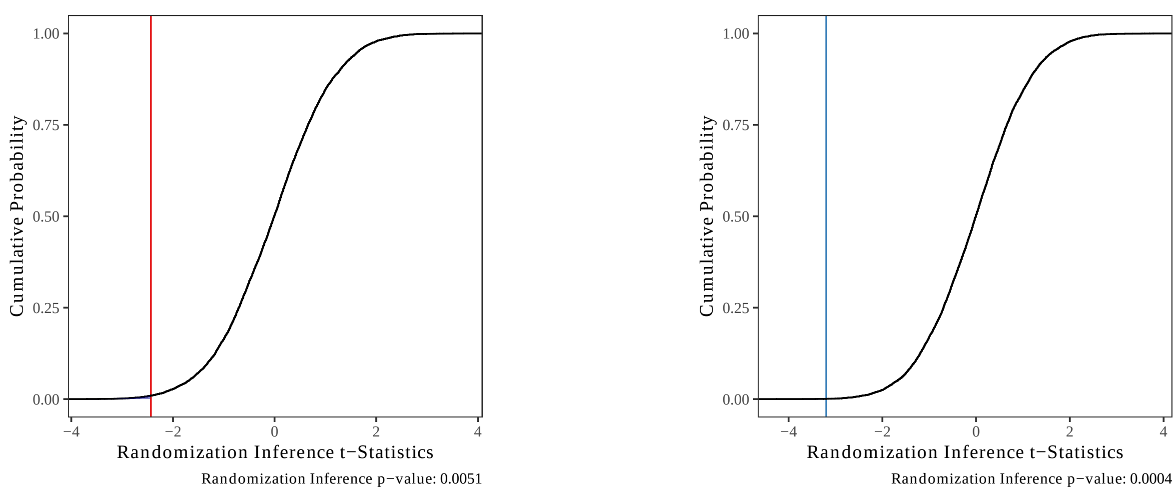
	Dependent Variable: Panel A: *Log HH Income*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Max CSI Crop Planting or Harvest	-0.247^{**}	-0.156^{*}	-0.203^{***}	-0.210^{***}	-0.196^{***}
	(0.104)	(0.086)	(0.073)	(0.072)	(0.071)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Adjusted R2	0.003	0.346	0.543	0.548	0.555
Mean Dep. Var.	3.234	3.234	3.234	3.234	3.234
SD Dep. Var.	1.330	1.330	1.330	1.330	1.330
	Dependent Variable: Panel B: *Index of Economic Development*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Max CSI Crop Planting or Harvest	-0.497	-0.169	-0.341	-0.363^{*}	-0.291
	(0.312)	(0.258)	(0.217)	(0.214)	(0.208)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Adjusted R2	0.001	0.347	0.567	0.572	0.588
Mean Dep. Var.	-0.589	-0.589	-0.589	-0.589	-0.589
SD Dep. Var.	4.039	4.039	4.039	4.039	4.039

Notes: Data are from the 2010 Mexico Population Census. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. *Index of Economic Development* is the first principal component index for a number of development outcomes in the census for a municipality (see Data Appendix). *Festival Coincides with Max CSI Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal planting date or 0 to 30 days the optimal maize harvest date for the maximum caloric suitability crop for a municipality using FAO GAEZ data. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, mean max CSI crop suitability, and fixed effects for the max CSI suitability crop. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for the max CSI crop for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.3.3. Randomization Inference Exercise

One potential concern with the main results in Table 3 is that they might be driven by outlier municipalities or high-leverage observations. To provide potentially more robust inference, we follow Young (2018) and conduct a randomization inference exercise where we randomly assign whether or not a festival in municipality coincides with planting or harvest months. Specifically, we conduct 10,000 simulations where we randomly assign whether or not a festival coincides with planting or harvest for each municipality and estimate equation (1). Figure 9 presents the empirical cumulative distribution functions of the estimated t-statistics for all the simulations, and denotes the estimated t-statistics from our sample with vertical lines. We also present the randomization inference p-values in the bottom right of the figures. We find that the estimated t-statistics in our sample for having a festival coincide with maize planting or harvest are much larger and more negative than the majority of placebo festival assignments, and that the randomization inference p-values are below 0.01. The results from this randomization inference exercise suggest the estimated impacts of festivals coinciding with planting and harvest are specific to the actual festival dates we observe across Mexico.

Figure 9: Randomization Inference Exercise – Placebo Festivals



(a) Festival Coincides w/ Planting

(b) Festival Coincides w/ Harvest

Notes: The figures present the cumulative distribution functions for the estimated t-statistics for the randomization inference exercise. Specifically, we conduct 10,000 simulations where we randomly assign whether or not a festival coincides with planting (Sub-Figure (a)) or harvest (Sub-Figure (b)) for each municipality and estimate our main specification, and then plot the cumulative distribution function for the estimated t-statistics. The dependent variable is *Log Household Income*. All regressions include state fixed effects, *Geography Controls*, and *Colonial Controls*. Observations are municipalities in the *New Spain* region of Mexico. Additionally, the figure presents the estimated t-statistic for our sample in red (for festivals that coincide with planting) and blue (for festivals that coincide with harvest), and reports the randomization inference p-value on the bottom right of each figure.

7. Mechanisms

The results so far establish that festivals that coincide with planting or harvest lead to worse economic development outcomes in the long-run. We now explore mechanisms behind this effect. We argue that the impacts of planting- and harvest-season festivals emerge because both seasons are times when investment opportunities for rural households are high. Planting- and harvest-season festivals therefore crowd out these time-sensitive agricultural investments. While there may be offsetting increases in social capital stemming from festivals, the net effect of planting- or harvest-season festivals is to compromise long-run growth. To explore the mechanisms for these hypotheses, we conduct a number of empirical tests using Census data and maize yield and production data from the *Servicio de Información Agroalimentaria y Pesquera* (SIAP).

7.1. Industry Employment Shares and Structural Transformation

We examine the impact of festivals on municipality-level measures of structural transformation, guided by the conceptual framework presented in Section 2. Two-sector growth models of structural transformation would predict that lower agricultural productivity (due to having agriculturally-coinciding festivals) would lead to less structural transformation out of agriculture. (Herrendorf et al., 2014, Caselli, 2005).

To examine the impact of festivals on industrial structure, we use IPUMS microdata from the 2010 Mexican Population Census. The IPUMS microdata provides a 10 percent random sample of each census and provide population weights for each observation. We use this microdata to construct municipality-level measures of the share of workers in different industries (agriculture, manufacturing, and services), and the share of workers in rural localities (defined in the census as localities with fewer than 2500 individuals). Table 6 presents estimates of the impact of planting and harvest festivals on industrial structure. We find that municipalities where festivals coincide with planting or harvest have a higher share of workers engaging in agriculture and a significantly lower share of workers in services. This is consistent with the prediction that the transition away from agriculture is hampered in areas with lower agricultural productivity (due to having an agriculturally-coinciding festival). Relatedly, we find that having festivals coincide with planting or harvest is associated with higher share of the population in rural areas. By inhibiting the development of agriculture, planting and harvest festivals appear to retard the structural transformation of localities out of agriculture and into modern economic sectors.

Table 6: Industry Employment and Coinciding Festivals

	Dependent Variable: % in			
	Agriculture	*Manufacturing*	*Services*	*Rural Localities*
	(1)	(2)	(3)	(4)
Festival Coincides with Maize Planting or Harvest	0.036***	−0.004	−0.030**	0.047**
	(0.014)	(0.007)	(0.012)	(0.022)
State Fixed Effects	Y	Y	Y	Y
Geography Controls	Y	Y	Y	Y
Colonial Controls	Y	Y	Y	Y
Planting-Month Fixed Effects	Y	Y	Y	Y
Harvest-Month Fixed Effects	Y	Y	Y	Y
Observations	1,593	1,593	1,593	1,593
Adjusted R2	0.487	0.236	0.437	0.414
Mean Dep. Var.	0.414	0.114	0.465	0.622

Notes: Data are from the 2010 Population Census. Observations are municipalities in the *New Spain* region of Mexico. Standard errors are clustered at the municipality level. *% in Agriculture* is the share of workers in a municipality who work in agriculture. *% in Manufacturing* is the share of workers in a municipality who work in manufacturing. *% in Services* is the share of workers in a municipality who work in the service industry. *% Rural* is the share of individuals in a municipality who reside in rural locations (defined as as localities with 2,500 or fewer inhabitants). *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

7.2. *Agricultural Productivity*

We next examine whether there are significant differences in agricultural productivity between municipalities where festivals coincide with planting or harvest compared to other municipalities. One important implication of the conceptual framework discussed in Section 2 (and the structural transformation results in Section 7.1) is that the remaining agricultural sector in municipalities where where festivals coincide with planting and harvest should be both larger and less productive. We test whether municipalities where festivals coincide with planting or harvest have lower maize yields compared to other municipalities using data from the *Servicio de Información Agroalimentaria y Pesquera* (SIAP). Table 7 presents the estimates for how festivals coinciding with planting or harvest affect maize yields. We find that municipalities where festivals coincide with planting or harvest have lower agricultural productivity: having festivals that coincide with planting or harvest is associated with an 0.07 standard deviation decrease in maize yields.

Consistent with the conceptual framework discussed in Section 2, we find that festivals that coincide with planting or harvest have lower agricultural productivity, limiting the structural transformation of municipalities and their long-run economic development.

Table 7: Maize Productivity and Coinciding Festivals

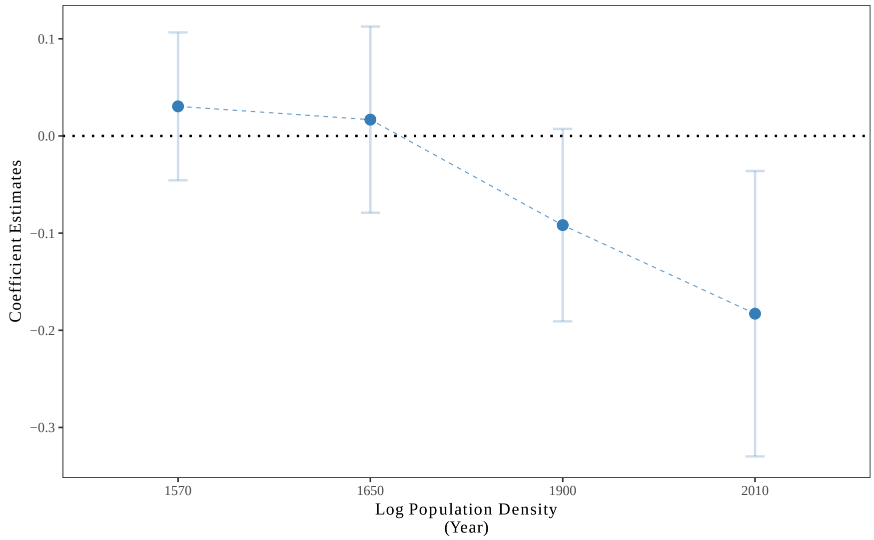
	Dependent Variable: *Maize Yield*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-1.877^{***}	-0.937^{**}	-1.371^{***}	-1.348^{***}	-1.249^{***}
	(0.543)	(0.452)	(0.461)	(0.462)	(0.454)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,578	1,578	1,578	1,578	1,578
Adjusted R2	0.002	0.256	0.330	0.328	0.330
Mean Dep. Var.	5.396	5.396	5.396	5.396	5.396
SD Dep. Var.	10.923	10.923	10.923	10.923	10.923

Notes: Data is from the *Servicio de Información Agroalimentaria y Pesquera* (SIAP) for 2010. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. *Maize Yield* is the mean maize yield in tons per hectare for a municipality in 2010. *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

7.3. *Development Across Time*

The results so far highlight that festivals that coincide with planting or harvest are associated with worse development outcomes, and that these effects are driven by less structural transformation. We now explore the question of when these differences in development emerged. We use a historical measure of economic development across municipalities of Mexico from Sellers and Alix-Garcia (2018) to ask at what point in time the effects of festivals coinciding with planting or harvest may have emerged. We focus on population density, which is often used as a proxy for economic development, particularly in historical studies in which data on other development outcomes are not available (e.g., Acemoglu et al., 2002). We examine impacts on population density across municipalities in Mexico in 1570, 1650, 1900, and today, and plot the coefficients for the effect of festivals coinciding with planting or harvest on these measures in Figure 10.

Figure 10: Population Density and Coinciding Festivals



Notes: Data on log population density for 1570, 1650, and 1900 is from Sellers and Alix-Garcia (2018). Data on population density for 2010 is from the 2010 Mexico Population Census. The figure presents the estimated coefficients and respective 95% confidence intervals from estimating equation (1) for various measures of log population density across time. Observations are municipalities in the *New Spain* region of Mexico. The independent variable is *Festival Coincides with Maize Planting or Harvest*, an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to optimal maize planting month or 0 to 30 days after the optimal maize harvest month for that municipality using FAO GAEZ data. The regressions control for the full-set of controls: *State Fixed Effects*, *Geography Controls*, *Colonial Controls*, and *Planting & Harvest Month Fixed Effects*.

We find that having agriculturally-coinciding festivals does not affect population density in 1570 or 1650, but does lead to lower population density in 1900 and in 2010. The negative point estimate is larger in magnitude in 2010 than in 1900, but confidence intervals are large and we cannot reject that the effects on population density are similar in 1900 and 2010. The results indicate that the impacts of coinciding festivals on development emerged sometime after 1650, were already perceptible in the data by the end of the 19th century, and have possibly become larger over roughly the century since then.

8. Religiosity, Social Capital, and Income Inequality

We now explore how festivals coinciding with planting and harvest affect religiosity, social capital, and income equality.

8.1. Religiosity and Social Capital

To examine the impact of festivals on religiosity and social capital, we use survey data from the Americasbarometer from 2008 to 2018. To examine differences in religiosity, we construct an index from three questions related to religiosity: the importance of religion to an individual, church attendance, and religious group attendance. First, for the importance of religion question, the survey asks how important religion is to a respondent. Second, for church attendance, the surveys ask how frequently an individual goes to church. Finally, for religious group attendance, the survey asks respondents how frequently an individual participates in religious group meetings. We define our religiosity index as the first principal component of these three religion questions.[52] To measure social capital, we construct an index from questions on the frequency with which a respondent participates local group meetings. We include participation in community improvement groups, parental associations, municipal meetings, and political associations.[53] We define our index as the first principal component of these four questions. We describe the questions used in more detail in Appendix A.

Table 8 presents the estimates for how festivals that coincide with planting and harvest affect religiosity and social capital, while Figure 11 presents the estimates for the individual components of the religiosity and social capital indexes. We find that municipalities where festivals coincide with planting and harvest have higher levels of religiosity. Additionally, we find that the same pattern of effects holds for each of the religiosity index components (see Figure 11). We also find suggestive evidence that municipalities where festivals coincide with planting and harvest have higher levels of social capital. Figure 11 presents the results for each component of the social capital index; interestingly, we find that coinciding festivals are associated with more community improvement participation rather than political group participation (which might be influenced by factors that are less local to a municipality).

Why would festivals that coincide with planting or harvest be associated with higher religiosity? As discussed in Section 2, agriculturally-coinciding festivals, as higher-cost signals of religious adherence, could lead to stronger selection of religious individuals into communities,

[52]Note that these are the full set of religion questions in the LAPOP surveys; however, they were not asked in every wave consistently. Therefore, our index is only defined for survey waves in which all three questions were present. However, we show in Figure 11 that the results hold for each individual component when we include all waves that asked each question.

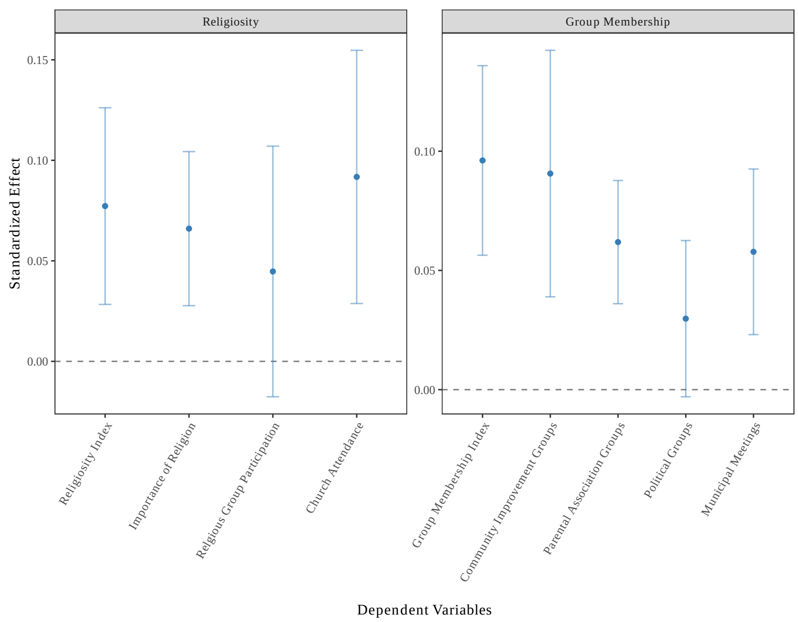
[53]These are the full set of groups that appear consistently in all waves we examine. In Figure 11, we show the results for each individual component.

Table 8: Religiosity, Social Capital, and Coinciding Festivals

	Dependent Variable: *Religiosity Index*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	0.189	0.135	0.185	0.204	0.324**
	(0.292)	(0.210)	(0.205)	(0.216)	(0.163)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	3,030	3,030	3,030	3,030	3,030
Clusters	118	118	118	118	118
Adjusted R2	0.084	0.102	0.110	0.114	0.121
Mean Dep. Var.	0.019	0.019	0.019	0.019	0.019
SD Dep. Var.	1.351	1.351	1.351	1.351	1.351
	Dependent Variable: *Group Membership Index*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	0.088	0.062	0.259**	0.269**	0.534***
	(0.072)	(0.062)	(0.103)	(0.106)	(0.130)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	5,770	5,770	5,770	5,770	5,770
Clusters	148	148	148	148	148
Adjusted R2	0.022	0.042	0.049	0.049	0.052
Mean Dep. Var.	0.048	0.048	0.048	0.048	0.048
SD Dep. Var.	1.297	1.297	1.297	1.297	1.297

Notes: Data are from the Americas Barometer (LAPOP) data. Observations are individuals in municipalities in the *New Spain* region of Mexico. Standard errors are clustered at the municipality level. *Religiosity Index* is the first principal component of the following variables: *Importance of Religion*, *Church Attendance*, and *Religious Group Attendance*. *Importance of Religion* is a 1-4 categorical variable that measures how important religion is to a respondent, ranging from 1="Not Important at All" to 4="Very Important". *Church Attendance* is a 1-5 categorical variable that measures how frequently an individual goes to church, ranging from 1="Never" to 5="More than Once a Week". *Religious Group Attendance* is a 1-4 categorical variable that measures how frequently an individual participates in religious group meetings, ranging from 1="Never" to 4="Once a Week". *Group Membership Index* is the first principal component for the frequency with which a respondent participates in the following group meetings: community improvement, parental associations, municipal meetings, or political associations. *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. All regressions controls for respondent age, age squared, gender, and include survey-wave fixed effects. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 11: Social Capital Outcomes and Coinciding Festivals:
Estimates for *Religiosity Index* and *Group Membership Index* Components



Notes: Data are from the Americas Barometer (LAPOP) data for *New Spain* region of Mexico. The figure presents the estimated coefficients and respective 95% confidence intervals from estimating equation (1) on the sub-components of the *Religiosity Index* and the *Group Membership Index*. The dependent variables are denoted on the x-axis. We first show the estimates for each index, followed by estimates for each of the individual sub-components of the index. (See Data Appendix for more information.) The independent variable is *Festival Coincides with Maize Planting or Harvest*: an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. The regressions control for the full-set of controls: *State Fixed Effects*, *Geography Controls*, *Colonial Controls*, and *Planting & Harvest Month Fixed Effects*.

leading to higher religiosity overall. In addition, lower economic development resulting from agriculturally-coinciding festivals might also slow the secularization process and increase religiosity. The resulting increase in religiosity could help explain why agriculturally-coinciding festivals persist: more religious communities may hold more tightly to their religious traditions and put up more resistance to changing them, even in the face of their negative economic consequences.

8.2. Inequality

We also investigate the impact of agriculturally-coinciding festivals on income inequality. There could be an impact of coinciding festivals on inequality, for two reasons. First, because coinciding festivals might lead to higher religiosity and social capital, these festivals might also lead to more informal redistribution and, therefore, lower inequality. Second, as economic growth typically coincides with increases in income inequality, we may also expect that agriculturally-coinciding festivals may reduce inequality.

We use IPUMS microdata from the 2010 Mexican Population Census to construct municipality-level measures of income inequality. The IPUMS microdata provides a 10 percent random sample of each census and provides population weights for each observation. We construct measures of the inter-quartile range (IQR) of earned income for individuals in a municipality, where earned income is defined as an individual's total income from their labor (from wages, a business, or a farm) in the previous month.

Table 9 presents regression estimates on how festivals coinciding with planting or harvest affect income inequality. We find that municipalities where festivals coincide with planting or harvest have lower levels of income inequality.[54] This finding that agriculturally-coinciding festivals lead to both lower development and less inequality suggest an equity-efficiency trade-off in this context (e.g. Kuznets, 1955, Robinson and Acemoglu, 2002).

9. Conclusion

We examine how the timing of religious festivals affects long-run economic development. Our analysis focuses on the New Spain region of Mexico, and studies the impacts of locally-specific

[54]Similarly, Figure A12 presents the estimates on income inequality of the timing of the festival month relative to planting and harvest month from estimating equation 3). As in Section 6.2, we find that the largest estimated effect on inequality occurs when the festival coincides with the planting or harvest month, and smaller negative effects for other months near planting or harvest.

Table 9: Income Inequality and Coinciding Festivals

	Dependent Variable: *IQR of Earned Incomes*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-363.8^{***}	-245.0^{**}	-324.7^{***}	-331.5^{***}	-319.6^{***}
	(131.1)	(105.3)	(95.5)	(94.2)	(92.5)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Adjusted R2	0.003	0.360	0.529	0.536	0.550
Mean Dep. Var.	2168.357	2168.357	2168.357	2168.357	2168.357
SD Dep. Var.	1833.200	1833.200	1833.200	1833.200	1833.200

Notes: Data are from the 2010 Mexico Population Censuses from IPUMS. Observations are municipalities in the *New Spain* region of Mexico. Standard errors are clustered at the municipality level. *IQR of Earned Incomes* measures the inter-quartile range of individuals total income from their labor (from wages, a business, or a farm) in the previous month for individuals residing in a given municipality. *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Catholic saint day festivals (that have been set for centuries) that happen to coincide with key periods in local agricultural calendars – the planting and harvest seasons. We argue, drawing on qualitative and quantitative evidence, that whether a locality's saint day festival coincides with its planting or harvest season can be taken to be exogenous, or unrelated with other determinants of long-run development outcomes. We assembled a unique dataset of festival dates across municipalities in Mexico, and combined it with data on locally-specific harvest and planting periods. We find that municipalities with "agriculturally-coinciding" festivals have worse long-run economic development, as measured by mean household income as well as an index of development outcomes. A key mechanism appears to be that festival expenditures reduce agricultural productivity and slow the structural transformation out of agriculture. We also argue that the persistence of such coinciding festivals from historical times to the present may reflect the fact that coinciding festivals also lead to higher religiosity, higher social capital, and lower income inequality. Higher religiosity, in particular, could lead localities with coinciding festivals to maintain their festival traditions even in the face of negative economic development consequences.

Our findings contribute to the literature on the economics of religion, by shedding light on the economic consequences of variation in an important and widespread religious practice, festival celebrations. We also bring a new insight to the development economics literature: festival celebrations can inhibit time-sensitive agricultural investments, and over the long run lead to persistently lower agricultural productivity and less transformation of the economy out of agriculture. Because our study relies on comparing outcomes across municipalities that (nearly) all celebrate Catholic saint day festivals, and only exploit variation in the "agricultural coincidence" of festivals, we cannot speak to whether such festivals have positive or negative consequences for development overall. It is possible that *non*-coinciding festivals could be good for development, and our finding that coinciding festivals have negative consequences is relative to that positive baseline effect. We also, of course, cannot go further and say whether festivals are good or bad for development in Mexico overall, or (to stretch even further) what impacts Catholicism has had on development in Latin America.

We refrain from speculating whether our results have relevance for major economic or social policies. That said, our findings do help explain the existence of a specific institution observed in many countries with large Christian populations: the practice by employers of withholding a portion of annual compensation until December, when a "thirteenth salary" (often referred to as *aguinaldo*) is paid (Globalization Partners, 2019). The practice is typically presented as a way to provide workers with liquidity for Christmas celebration expenses. Our findings suggest that *aguinaldo* practices may also reduce the crowd-out of other investments that coincide with festival seasons.

As is the case for all empirical research, future studies should seek to determine the external validity of these findings. The rest of the Catholic world provides natural new contexts in which to conduct follow-on investigations, potentially using analogous empirical strategies exploiting the coincidence of festival dates with agricultural seasons. Researchers should also explore other contexts where there may be exogenous variation in whether localities celebrate festivals at all, to shed light on the extensive margin impacts of festivals. In addition, it would be valuable to conduct household-level studies to provide direct micro-level evidence on the types of investments that are crowded out by coinciding festivals, and whether the incidence of such crowding out varies with household characteristics. We view these as promising directions for future research.

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Appendix for

Religious Festivals and Economic Development: Evidence from Catholic Saint-Day Celebrations in Mexico

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Contents

Appendix A. Data Appendix

A.1. Patron Saint and Festival Date Data

As discussed in the main text, in our empirical analyses we assign patron saint celebration dates as prescribed by the Vatican (or, in a minority of cases, official religious sources outside of Mexico) so as to reduce concerns about the endogeneity of festival dates. In this section, we describe the sources we used to determine: 1) official patron saint celebration dates, and 2) the patron saint celebrated by each municipality.

A.1.1. Official Patron Saint Celebration Dates

1. a. We use three main sources to determine official patron saint celebration dates. 94.83% of municipalities have saints that are sourced using one of these three sources (in order of the frequency with which we used the source):
    i. The General Roman Calendar (Calendarium Romanum) (Catholic Church, 1969):
        - Catholic Church (1969). *Calendarium Romanum (1969)*
    ii. The Roman Martyrology (Martirologio Romano) (Catholic Church, 1956):
        - Catholic Church (1956). *Martirologio Romano (1956)*
    iii. The Book of Saints (Watkins, 2015):
        - Watkins, Basil. *The Book of Saints: A Comprehensive Biographical Dictionary*, Bloomsbury Publishing Plc (2015)

   b. In a small number of cases an official patron saint celebration date was not found in the sources above. In these cases, we use a variety of online religious sources cited below. We ensured that we had least two online sources per saint. Only 3.44% of municipalities have saints that are sourced using online sources.

A.1.2. Determining Patron Saints for Municipalities in Mexico:

1. We use three primary sources to identify the patron saint of each municipality:

   a. **Encyclopedia:** We use the online Encyclopedia of Municipalities (INAFED, 1988, available at http://www.inafed.gob.mx/work/enciclopedia/) to determine the patron saint for approximately 1,900 of the municipalities in Mexico.

   b. **Direct Phone Calls to Municipalities:** We called approximately 300 municipalities to determine their patron saint. When calling municipalities, we first attempted to contact municipality government offices, followed by local churches and schools. To verify the accuracy of the information given to use over the phone, we also provide additional sources in the form of online links for over half of the "called" municipalities.

   c. **Additional Online Sources:** In cases where we could not contact anyone with phone calls, and we did not find any information in the Encyclopedia, we used online sources such as news articles and government websites. We required at least two web sources before determining the saint. We use websites as sources for 180 municipalities.

A.1.3. Coding Patron Saint Dates

We used the following guidelines when coding patron saint dates:

i. We use a missing value code, 98, to indicate that the festival is a "moving festival", one for which the official date differs from year to year. 4.19% of municipalities in Mexico have moving festivals, and are considered missing from our dataset for analysis.

ii. In cases where the festival is not moving but spans a few days we use the first date of the festival. For example, "Día de los Muertos" is a two-day festival from November 1-2. We use November 1st as the official date. We assume that any diversion of resources, time, etc. due to a festival would have already happened by the first date of the range.

iii. In some cases, our research indicates that a municipality celebrates a particular Vatican-recognized saint, but has renamed it for the purpose of calling this saint their patron saint. In these cases, we consider the original Vatican-recognized saint as the municipality's saint, and use the Vatican-prescribe official celebration date (as usual). We detail these cases and the sources used to determine these "renamed" saints below in Section A.1.4.

iv. In some cases, municipalities in Mexico celebrate a "local" saint: a saint that is not recognized or celebrated outside of that municipality in Mexico. Because these saints might be endogenously selected, we provide a variable that codes whether or not a saint is a "local saint". The variable "local_saint" has three possible values: 0,1,2. A saint is coded as "0" if the official celebration date of a saint is set outside of Mexico. A saint is coded as "1" if the saint is found to be specific to Mexico, and thus not have an official celebration date that is set outside of Mexico (1.67% of municipalities in Mexico). A "2" indicates the saint has indeterminate origins (1.71% of municipalities in Mexico). (Our main analyses do not include municipalities with "local" saints, but we show robustness of our results to including them. When we include municipalities with local saints in our robustness analyses, we use celebration dates actually used by municipalities, since "official" Vatican-prescribed celebration dates do not exist for such saints.)

v. We use another missing value code, 99, to indicate a municipality where a saint was found in the encyclopedia or via phone calls but we were unable to find credible sources corroborating an official date or saint. This occurred in four municipalities across all of Mexico.

vi. We also use the missing value code 99 to represent municipalities for which we were unable to determine any Saint. In one municipality, this was because the municipality does not celebrate a patron saint. For the remaining 20 missing saint days, we were unable to determine a patron with credible online sources or phone calls.

A.1.4. Information on "Renamed" Patron Saints

Below, we detail the specific "renamed" saints that our research indicates are simply venerations of another official Vatican-recognized saint, the municipality code where they occur, and the sources used to determine this.

- Acatlan in Veracruz de Ignacio de la Llave (clave: 30002) celebrates la Virgen de los Remedios which is the same saint as la Natividad de Maria (Díaz 2018), (VistasGallery, n.d), (Sistema de Información Cultura 2021).
- Agualeguas in Nuevo Leon celebrates la Virgen de Agualeguas (clave: 19002) which is the same saint as la Virgen de la Concepcion (Nuevo Leon, n.d), (Nuevo Leon Turismo, n.d)
- Apizaco in Tlaxcala (clave: 29005) celebrates la Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).

- Atlacomulco in Mexico (clave: 15014) celebrates el Senor del Huerto which is the same saint as Lunes Santo (Turismo Ejea, n.d).
- Atlamajalcingo del Monte in Guerrero (clave: 12009) celebrates la Virgen de Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- Bustamante in Nuevo Leon (clave: 19008) celebrates Santo Cristo (el Senor de Tlaxcala) which is the same saint as el Transfiguracion del Senor (Lemus 2016), (Pueblos Mágicos, n.d), (Villarreal 2006).
- Canitas de Felipe Pescador in Zacatecas (clave: 32006) celebrates la Virgen de San Juan which is the same saint as la Asuncion de Maria (Holy Family Catholic Church, n.d), (Library of Congress, n.d), (IMER 1970).
- Charcas in San Luis Potosi (clave: 24015) celebrates la Virgen de las Charcas which is the same saint as Natividad de Maria (Eichmann-Oehrli 2004), (De la Rosa, 2020).
- Compostela in Nayarit (clave: 18004) celebrates la Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- Cunduacan in Tabasco (clave: 27006) celebrates el Senor de la Salud which is the same saint as Cristo de la Salud (Valdemoro Turismo 2020).
- Emiliano Zapata in Hidalgo (clave: 13021) celebrates la Virgen de San Juan de los Lagos which is the same saint as la Asuncion de Maria (Holy Family Catholic Church, n.d), (Library of Congress, n.d), (IMER 1970).
- Espita in Yucatan (clave: 31032) celebrates el Nino Jesus which is the same saint as Nino de Atocha (Rodriguez 2018), (Sistema de Información Cultural de Costa Rica 2021), (Divino Nino Jesus Catholic Mission 2021)
- Huamantla in Tlaxcala (clave: 29013) celebrates la Virgen de la Caridad which is the same saint as Natividad de Maria (ZENIT 2014), (Ruiz Scaperlanda, 2007), (Lamas 2004).
- Huatlatlauca in Puebla (clave: 21070) celebrates Nuestra Senora de los Reyes which is the same saint as Asuncion de Maria (Catedral de Sevilla 2020), (Real Hermandad de Nuestra Senora de los Reyes, n.d), (Catedral de Sevilla 2020), (A.VRyS, n.d).
- Huiramba in Michoacan de Ocampo (clave: 16039) celebrates el Nino Jesus which is the same saint as Nino de Atocha (Rodriguez 2018), (Sistema de Información Cultural de Costa Rica 2021), (Divino Nino Jesus Catholic Mission 2021).
- Izamal in Yucatan (clave: 31040) celebrates la Virgen de Izamal which is the same saint as Virgen de la Concepcion (SSVM, n.d), (Yucatan Today 2019), (Pueblos Mágicos, n.d).
- Jonuta in Tabasco (clave: 27011) celebrates el Senor de la Salud which is the same saint as Cristo de la Salud (Valdemoro Turismo 2020).
- La Concordia in Chiapas (clave: 7020) celebrates la Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- Los Reyes de Juarez in Puebla (clave: 21118) celebrates Nuestra Senora de los Reyes which is the same saint as Asuncion de Maria (Catedral de Sevilla 2020), (Real Hermandad de Nuestra Senora de los Reyes, n.d), (Catedral de Sevilla 2020), (A.VRyS, n.d).
- Monterrey in Nuevo Leon (clave: 19039) celebrates la Virgen del Roble which is the same saint as la Virgen de la Esperanza (Díaz 2017), (de Cos 2018).

- Nacajuca in Tabasco (clave: 27013) celebrates la Virgen de los Remedios which is the same saint as la Natividad de Maria (Díaz 2018), (VistasGallery, n.d), (Sistema de Información Cultura 2021).
- Naucalpan de Juarez in Mexico (clave: 15057) celebrates la Virgen de los Remedios which is the same saint as La Natividad de Maria (Díaz 2018), (VistasGallery, n.d), (Sistema de Información Cultura 2021).
- Ocotlan in Jalisco (clave: 14063) celebrates la Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- Oteapan in Veracruz de Ignacio de la Llave (clave: 30120) celebrates el Senor de la Salud which is the same saint as Cristo de la Salud (Valdemoro Turismo 2020).
- Patzcuaro in Michoacan de Ocampo (clave: 16066) celebrates la Virgen de la Salud which is the same saint as Virgen de la Concepcion (Roman Catholic Diocese of Chalan Kanoa 2018), (Pátzcuaro Info 2020).
- Reyes Etla in Oaxaca (clave: 20077) celebrates Nuestra Senora de los Reyes which is the same saint as la Asuncion de Maria (Catedral de Sevilla 2020), (Real Hermandad de Nuestra Senora de los Reyes, n.d), (Catedral de Sevilla 2020), (A.VRyS, n.d).
- Sabanilla in Chiapas (clave: 7076) celebrates la Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- San Juan Juquila Mixes in Oaxaca (clave: 20200) celebrates la Virgen de Juquila which is the same saint as la Virgen de la Concepcion (St. Mary Parish 2018), (Ramirez 2019), (Jiménez 2020).
- San Juan del Rio in Durango (clave: 10028) celebrates la Virgen de los Remedios which is the same saint as la Natividad de Maria (Díaz 2018), (VistasGallery, n.d), (Sistema de Información Cultura 2021).
- San Pedro Cholula in Puebla (clave: 21140) celebrates la Virgen de los Remedios which is the same saint as la Natividad de Maria (Díaz 2018), (VistasGallery, n.d), (Sistema de Información Cultura 2021).
- Soyalo in Chiapas (clave: 7085) celebrates la Virgen de la Caridad which is the same saint as la Natividad de Maria (ZENIT 2014), (Ruiz Scaperlanda, 2007), (Lamas 2004).
- Tamazula de Gordiano in Jalisco (clave: 14085) celebrates la Virgen del Sagrario which is the same saint as la Asuncion de Maria (Revista Catedral 1970), (Catedral Primada, n.d).
- Tamiahua in Veracruz de Ignacio de la Llave (clave: 30151) celebrates La Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- Tepatitlan de Morelos in Jalisco (clave: 14093) celebrates la Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- Tepic in Nayarit (clave: 18017) celebrates la Virgen en su Santuario which is the same saint as la Virgen de Guadalupe (Nayarit en Linea 2013) , (Shrine of Our Lady of Guadalupe, 2021), (Nayarit Enamora, n.d) (NNC 2016), (Presa 2019).
- Tlalnepantla de Baz in Mexico (clave: 15104) celebrates la Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- Tonanitla in Mexico (clave: 15125) celebrates la Virgen de los Remedios which is the same saint as la Natividad de Maria (Díaz 2018), (VistasGallery, n.d), (Sistema de Información Cultura 2021).

- Tototlan in Jalisco (clave: 14105) celebrates el Senor de la Salud which is the same saint as Cristo de la Salud (Valdemoro Turismo 2020).
- Union de San Antonio in Jalisco (clave: 14109) celebrates la Virgen de la Misericordia which is the same saint as la Virgen de las Mercedes (ACI Prensa 2020), (Aleteia 2019).
- Villa Union in Coahuila de Zaragoza (clave: 5037) celebrates el Nino de los Peyotes which is the same saint as Dulce Nombre de Jesus (Telepaisa, n.d), (ACI Prensa 2021).
- Zacatecas in Zacatecas (clave: 32056) celebrates la Virgen del Patrocinio which is the same saint as la Natividad de Maria (EcuRed, n.d), (Manresa Ignacio Abadal 1800).
- Zihuateutla in Puebla (clave: 21213) celebrates Manuelito which is the same saint as Corpus Cristi (El Caminante 2019), (Presidencia Municipal de Zihuateutla, n.d).

A.2. Geographic Data and Variables

- **Precipitation and Temperature:** Precipitation and temperature data are provided by the Global Climate Database created by Hijmans et al. (2005) and available at http://www.worldclim.org/. These data provide monthly average rainfall in millimeters. We calculate the average rainfall for each month in each municipality and average this over the twelve months to obtain our yearly precipitation measure in millimeters of rainfall per year. Similarly, we calculate the average temperature for each month in each municipality and average this over the twelve months to obtain our yearly temperature measure in centigrades.
- **Land Suitability:** Land suitability is the soil component of the land quality index created by the Atlas of the Biosphere available at http://www.sage.wisc.edu/iamdata/ used in Michalopoulos (2012) and Ramankutty et al. (2002). These data use soil characteristics (namely soil carbon density and the acidity or alkalinity of soil) and combines them using the best functional form to match known actual cropland area and interpolates this measure to be available for most of the world at the 0.5 degree in latitude by longitude level. This measure is normalized to be between 0 and 1, where higher values indicate higher soil suitability for agriculture.
- **Elevation and Slope:** The elevation and slope data are provided by the Global Climate Database created by Hijmans et al. (2005) and available at http://www.worldclim.org/. These data provide elevation information in meters at the 30 arc-second resolution (approximately at the 1 km^2 level near the equator). The elevation measure is constructed using NASAs SRTM satellite images (http://www2.jpl.nasa.gov/srtm/).

A.3. Mexico Census Data and Indexes

- **Population Census:** We use municipality-level data from the 2010 *Censo de Población y Vivienda* produced by the National Institute of Statistics and Geography (INEGI) of Mexico. For more information on this census, see INEGI documentation at https://www.inegi.org.mx/programas/ccpv/2010/. This census interviewed over 106 million households across Mexico about their economic well-being, labor supply, asset ownership, and education. We construct an index of economic development using all questions in the census related to economic development within a municipality. We construct the index as the first principal component of these measures of development. Figure 7 presents the components of this index. The index includes all questions on educational attainment, workforce participation, literacy, asset and ownership. We list each index component and its definition below:

– **Log Population:** This measures the log of the number of inhabitants for each municipality in 2010.

– **Log Household Income:** To construct a measure of household income, we use the IPUMS 10% sample and take the log of each adult respondent's household income.[55] We then construct the average for each municipality.

– **% Economically Active:** Share of a municipality's population that is "economically active", defined by INEGI as: in a given reference week (e.g. previous week), an individual over 12 years of age performed any work (including informal work), had a job but did not work, or were actively looking for work.

– **% Economically Active - Men:** Share of a municipality's population of men over 12 years of age that is economically active.

– **% Economically Active - Women:** Share of a municipality's population of women over 12 years of age that is economically active.

– **% Employed:** Share of a municipality's population that is "economically occupied", defined by INEGI as: in a given reference week, an individual over 12 years of age performed any work (including informal work) or had a job but did not work.

– **% Literate - Aged 8-14:** Share of a municipality's population of individuals aged between 8 and 14 years that know how to read and write.

– **% Literate - Aged over 14 Years:** Share of a municipality's population of individuals aged over 14 years that know how to read and write.

– **Average Years of Education - All:** Average years of education for a municipality's population aged over 15 years.

– **Average Years of Education - Men:** Average years of education for a municipality's population of men aged over 15 years.

– **Average Years of Education - Women:** Average years of education for a municipality's population of women aged over 15 years.

– **% in School - Aged 3-5:** Share of a municipality's population of children between the ages of 3 and 5 that attend at least some school in a year.

– **% in School - Aged 6-11:** Share of a municipality's population of children between the ages of 6 and 11 that attend at least some school in a year.

– **% in School - Aged 12-14:** Share of a municipality's population of individuals between the ages of 12 and 14 that attend at least some school in a year.

– **% in School - Aged 15-17:** Share of a municipality's population of individuals between the ages of 15 and 17 that attend at least some school in a year.

– **% in School - Aged 18-24:** Share of a municipality's population of individuals between the ages of 18 and 24 that attend at least some school in a year.

– **% with Some Schooling:** Share of a municipality's population over 15 years of age that has attended at least some schooling in their lifetime.

– **% Completed Primary Education:** Share of a municipality's population over 15 years of age that has completed primary education (6 years).

– **% Completed Secondary Education:** Share of a municipality's population over 15 years of age that has completed secondary education. (3 additional years)

[55] The INEGI municipality-level extract does not include this, but we were able to construct this using the IPUMS extract.

- **% Completed College:** Share of a municipality's population over 18 years of age that has completed any form of post-secondary schooling.
- **% with At Least Some Primary Education:** Share of a municipality's population over 15 years of age that has at least attended and completed some primary education (>0 years of schooling).
- **% with At Least Some Secondary Education:** Share of a municipality's population over 15 years of age that has at least attended and completed some secondary education (>6 years of schooling).
- **% Own Radio(s):** Share of a municipality's households that own at least one radio.
- **% Own Television(s):** Share of a municipality's households that own at least one television.
- **% Own Refrigerator(s):** Share of a municipality's households that own at least one refrigerator.
- **% Own Washing Machine(s):** Share of a municipality's households that own at least one washing machine.
- **% Own Car(s):** Share of a municipality's households that own at least one car.
- **% Own Computer(s):** Share of a municipality's households that own at least one computer.
- **% Own Telephone(s):** Share of a municipality's households that own at least one telephone (landline).
- **% Own Cellphone(s):** Share of a municipality's households that own at least one cellphone.
- **% with Paved Floor:** Share of a municipality's households that have non-dirt floors in their households (e.g. cement, wood, tiled, or other).
- **% with Electricity:** Share of a municipality's households that have access to electric-powered light at their home.
- **% with Plumbing:** Share of a municipality's households that have water accessed through plumbing from the government ("public network") in their home.
- **% with Toilets:** Share of a municipality's households that have toilets at their home.
- **% with Internet:** Share of a municipality's households that have access to the internet at their home.

A.4. Americasbarometer (LAPOP) Data and Indexes

- **Data:** we use survey data from the Americasbarometer from 2004 to 2018. To examine differences in religiosity, we construct an index from three questions related to religiosity: the importance of religion to an individual, church attendance, and religious group attendance. We construct our index as the first principal component of these questions; we describe each question/component below.

  - **Importance of Religion:** is a 1-4 categorical variable that measures how important religion is to a respondent, ranging from 1="Not Important at All" to 4="Very Important".
  - **Church Attendance:** is a 1-4 categorical variable that measures how frequently an individual goes to church, where 1="Never", 2="Once or Twice a Year", 3="Once or Twice a Month", and 4="Once a Week".

– **Religious Group Attendance:** is a 1-4 categorical variable that measures how frequently an individual participates in religious group meetings, ranging from 1="Never" to 4="Once a Week".

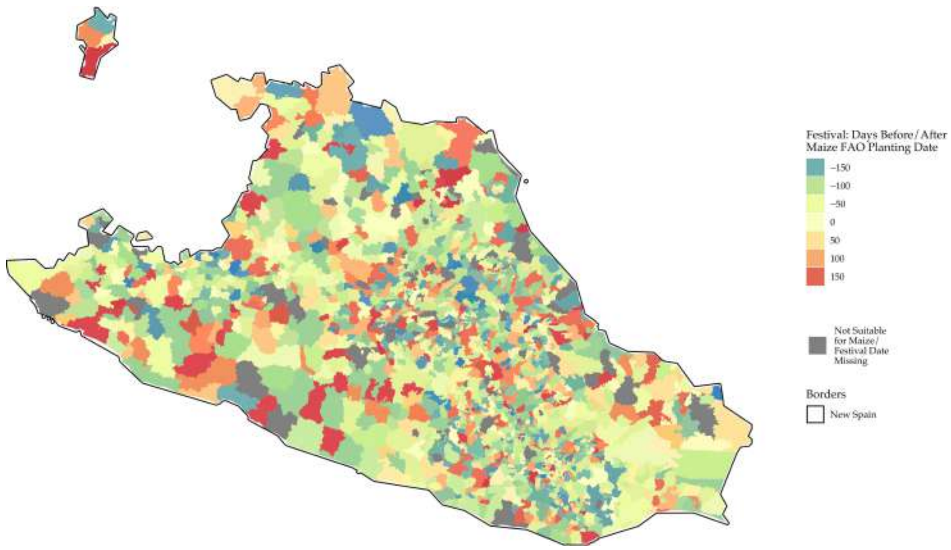
To examine differences in social capital, we construct an index using questions related to the frequency of attending various group meetings. We include questions on the following groups: community improvement groups, parent associations, municipal meetings, or political associations.[56] Each group meeting question is a 1-4 categorical variable that measures how frequently an individual goes to meetings for each group – where 1="Never", 2="Once or Twice a Year", 3="Once or Twice a Month", and 4="Once a Week" – except for municipal meetings, which is an indicator variable equal to 1 if the respondent attends municipal meetings. We construct our index as the first principal component of these questions.

[56] These are the groups listed in each wave of the data.

Appendix B. Additional Maps

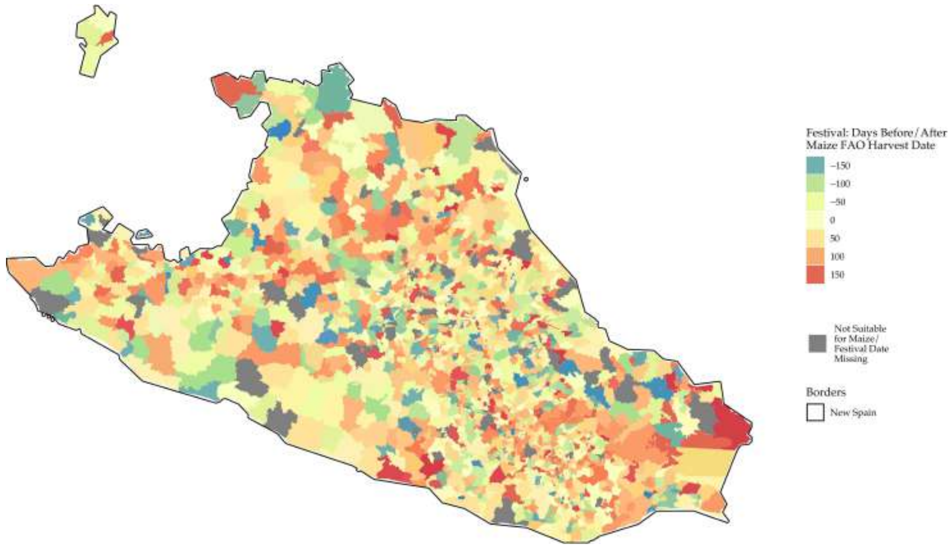
B.1. Additional Maps – New Spain

Figure A1: Days Between Festival and Optimal Planting Date - *New Spain* Region of Mexico



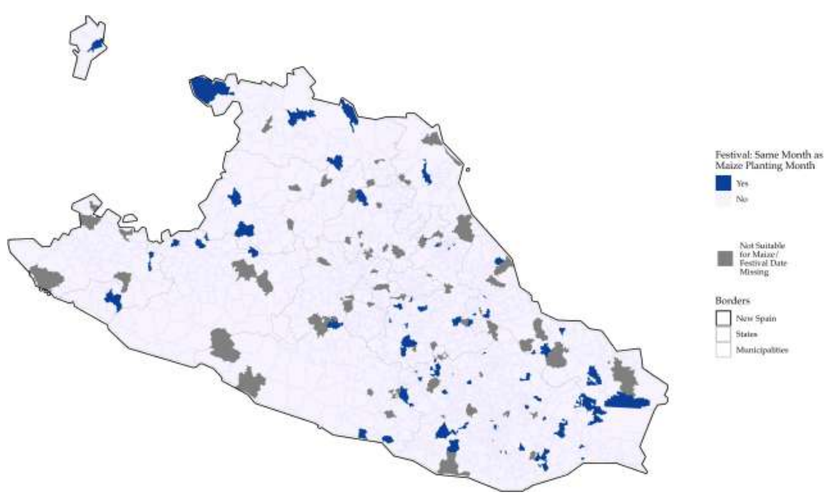
Notes: Difference (in days) between the patron saint day festival date and the optimal maize planting date (from FAO GAEZ data) for each municipality in the New Spain region of Mexico. (Negative values correspond to festivals that occur before planting; positive values correspond to festivals that occur after planting.) Municipalities where we were unable to determine the festival date are shaded in dark grey.

Figure A2: Days Between Festival and Optimal Harvest Date - *New Spain* Region of Mexico



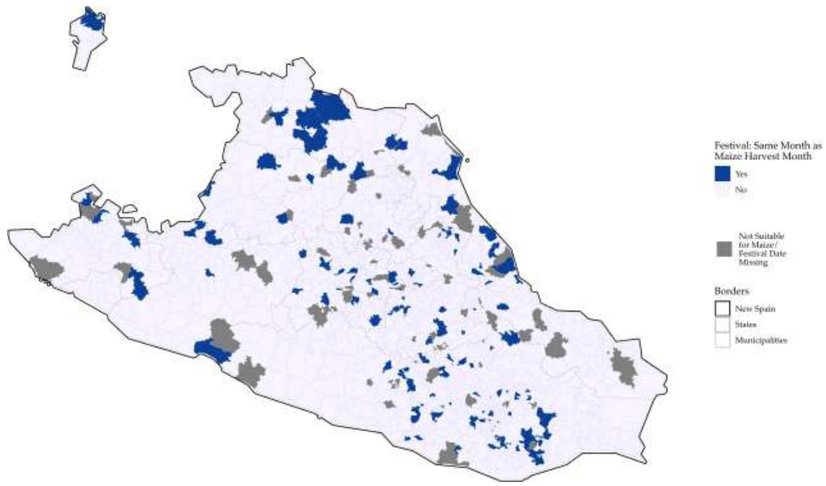
Notes: Difference (in days) between the patron saint day festival date and the optimal maize harvest date (from FAO GAEZ data) for each municipality in the New Spain region of Mexico. (Negative values correspond to festivals that occur before harvest; positive values correspond to festivals that occur after harvest.) Municipalities where we were unable to determine the festival date are shaded in dark grey.

Figure A3: Coincidence of Festivals and Optimal Planting Month
New Spain Region of Mexico



Notes: The map presents whether the month that each municipality in the *New Spain* region of Mexico celebrates its respective patron saint day festival falls 0-30 days prior to the optimal maize planting date according to FAO GAEZ data. Municipalities where we were unable to determine the festival date are shaded in dark grey.

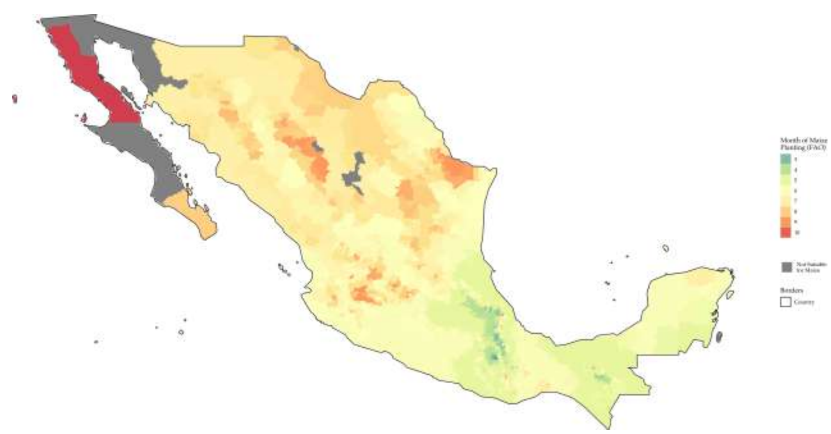
Figure A4: Coincidence of Festivals and Optimal Harvest Month
New Spain Region of Mexico



Notes: The map presents whether the month that each municipality in the *New Spain* region of Mexico celebrates its respective patron saint day festival falls 0-30 days after the optimal maize harvest date according to FAO GAEZ data. Municipalities where we were unable to determine the festival date are shaded in dark grey.

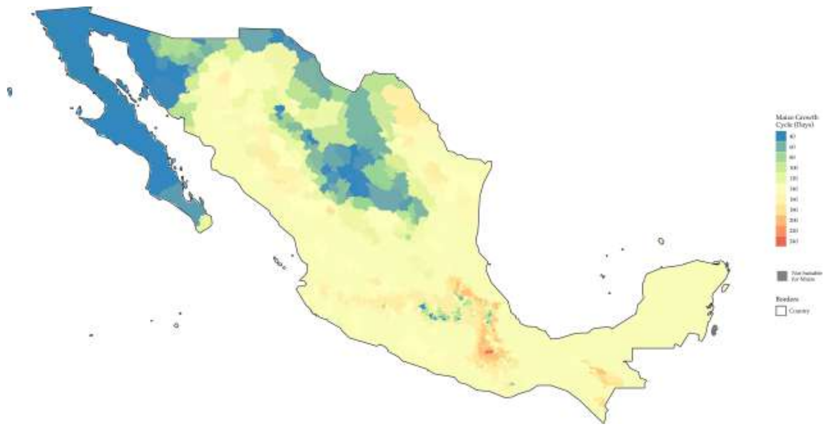
B.2. Additional Maps – All of Mexico

Figure A5: Optimal Maize Planting Date (FAO data)



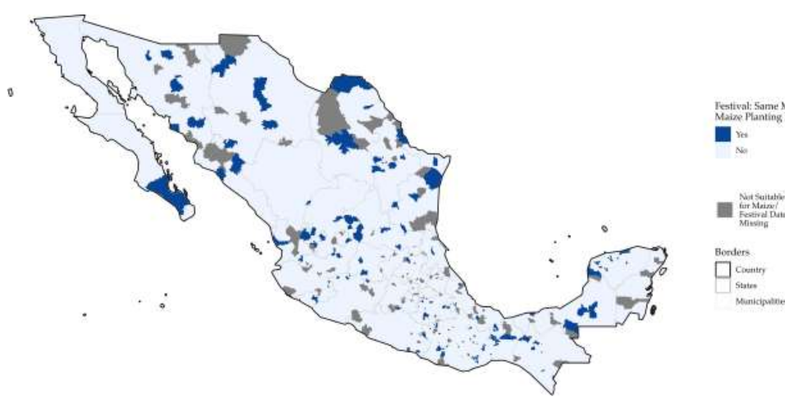
Notes: Optimal maize planting month according to FAO GAEZ data for each municipality in Mexico.

Figure A6: Maize Growth Cycle Date (FAO data)



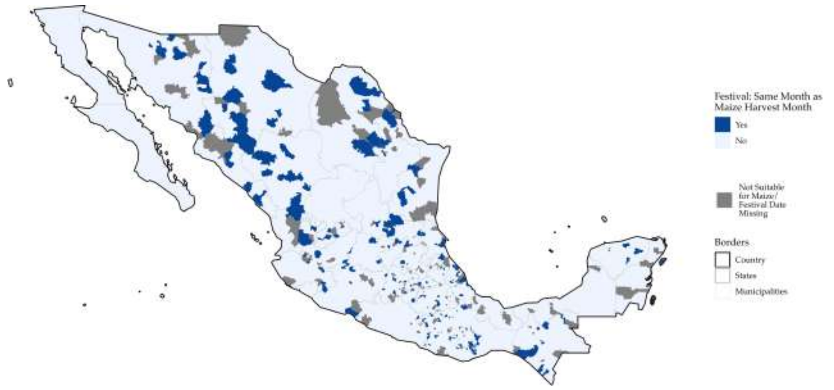
Notes: Length (in days) of the optimal maize growth cycle according to FAO GAEZ data for each municipality in Mexico.

Figure A7: Coincidence of Festivals and Optimal Planting Month



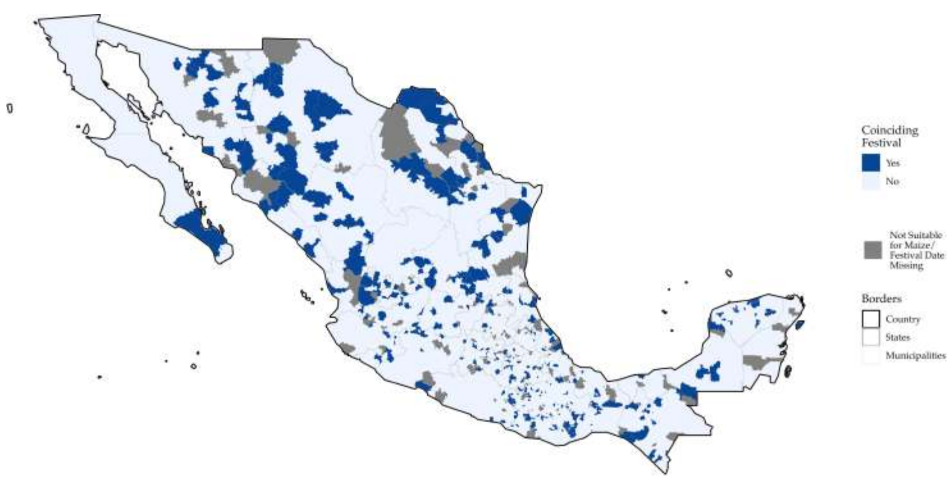
Notes: The map presents whether the date that each municipality in Mexico celebrates its respective patron saint day festival falls 0-30 days prior to the optimal maize planting date according to FAO GAEZ data. Municipalities where we were unable to determine the festival date or are unsuitable for maize are shaded in dark grey.

Figure A8: Coincidence of Festivals and Optimal Harvest Month



Notes: The map presents whether the date that each municipality in Mexico celebrates its respective patron saint day festival falls 0-30 days after the optimal maize harvest date according to FAO GAEZ data. Municipalities where we were unable to determine the festival date or are unsuitable for maize are shaded in dark grey.

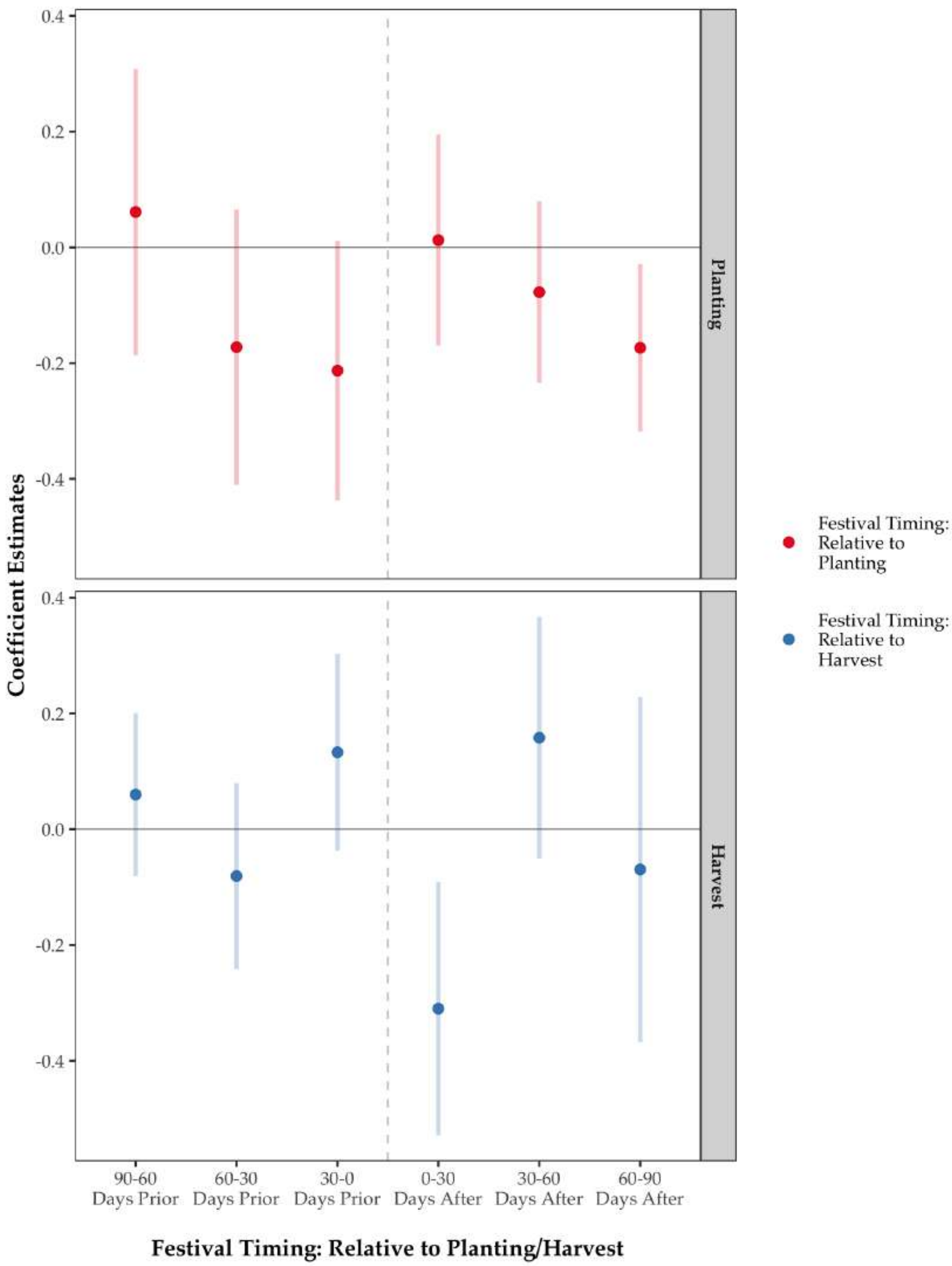
Figure A9: Agriculturally-Coinciding Festivals



Notes: Coinciding Festival is equal to "Yes" if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data and "No" otherwise for each municipality in Mexico. Municipalities where we were unable to determine the festival date or are unsuitable for maize are shaded in dark grey.

Appendix C. Additional Figures

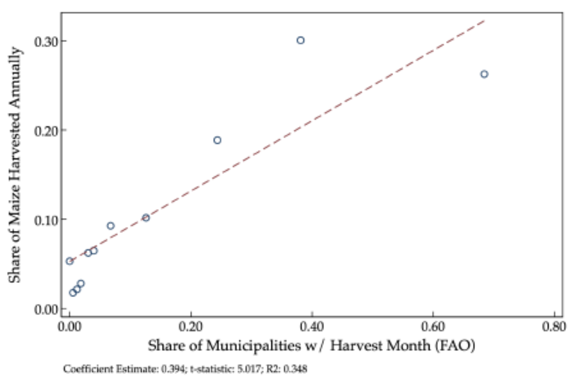
Figure A10: Impacts of Festival Coincidence with Other Months Relative to Planting and Harvest: Using the Maximum CSI Crop



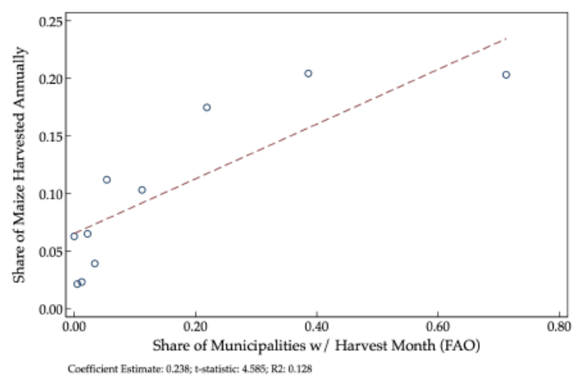
Notes: Data are from the 2010 Mexico Population Census for the *New Spain* region of Mexico. The figure presents the estimated β_i and γ_j coefficients and respective 95% confidence intervals from estimating equation (3). The outcome variable is *Log Household Income*. *Festival Timing: Relative to Planting/Harvest* is defined as the number of months before/after a municipality celebrates its festival relative to planting (top panel) and harvest (bottom panel) according to FAO GAEZ data for the maximum CSI crop in each municipality. The regressions control for the full-set of controls: *State Fixed Effects*, *Geography Controls*, *Colonial Controls*, and *Planting & Harvest Month Fixed Effects*.

Figure A11: Validating FAO Maize Crop Calendar Data:

Relationship Between FAO Predicted Maize Harvest Timing and Actual Maize Harvest



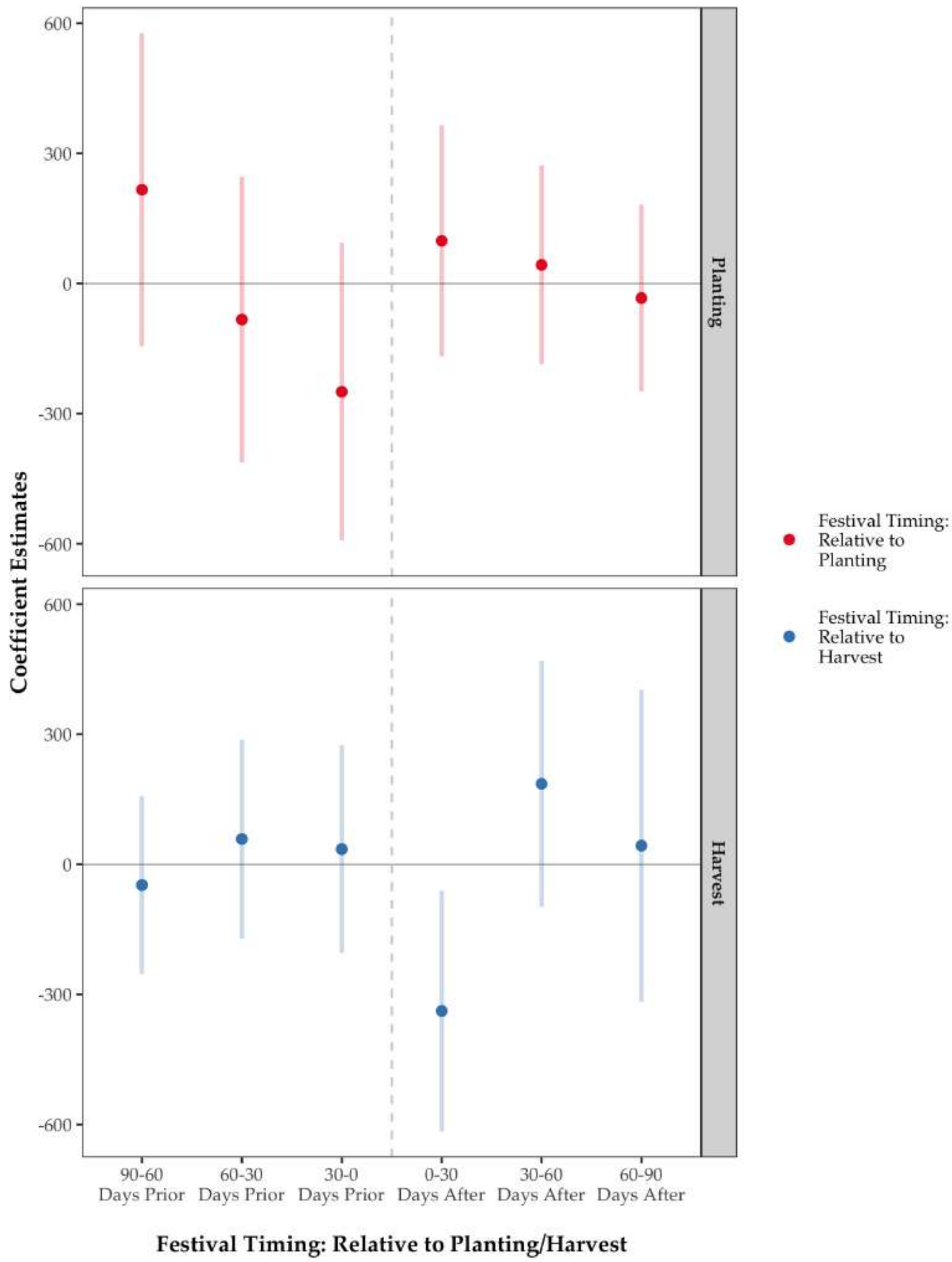
a. *New Spain* Region



b. All of Mexico

Notes: The figure presents binscatters between the share of a state's total maize harvest that occurs on a given month and the share of municipalities in a state that have their maize harvest on a given month according to the FAO GAEZ data. The unit of observation is a state-month pair. State harvest Data are from the *Servicio de Información Agroalimentaria y Pesquera (SIAP)* for 2015. The bottom-right of each figure presents the estimated bivariate coefficient, t-statistic, and R^2. Standard errors are clustered at the state level.

Figure A12: Impacts on Inequality For Festival Coincidence by Months Relative to Planting and Harvest



Notes: Data are from the 2010 Mexico Population Censuses from IPUMS for the *New Spain* region of Mexico. The figure presents the estimated β_i and γ_j coefficients and respective 95% confidence intervals from estimating equation (3). The outcome variable is the *IQR of Earned Incomes* – the inter-quartile range of individuals' total income from their labor (from wages, a business, or a farm) in the previous month for individuals residing in a given municipality. *Festival Timing: Relative to Planting/Harvest* is defined as the number of months before/after a municipality celebrates its festival relative to planting (top panel) and harvest (bottom panel) according to FAO GAEZ data. The regressions control for the full-set of controls: *State Fixed Effects*, *Geography Controls*, *Colonial Controls*, and *Planting & Harvest Month Fixed Effects*.

Sensitivity to 30-Day Window Used to Define Coinciding with Planting or Harvest Months

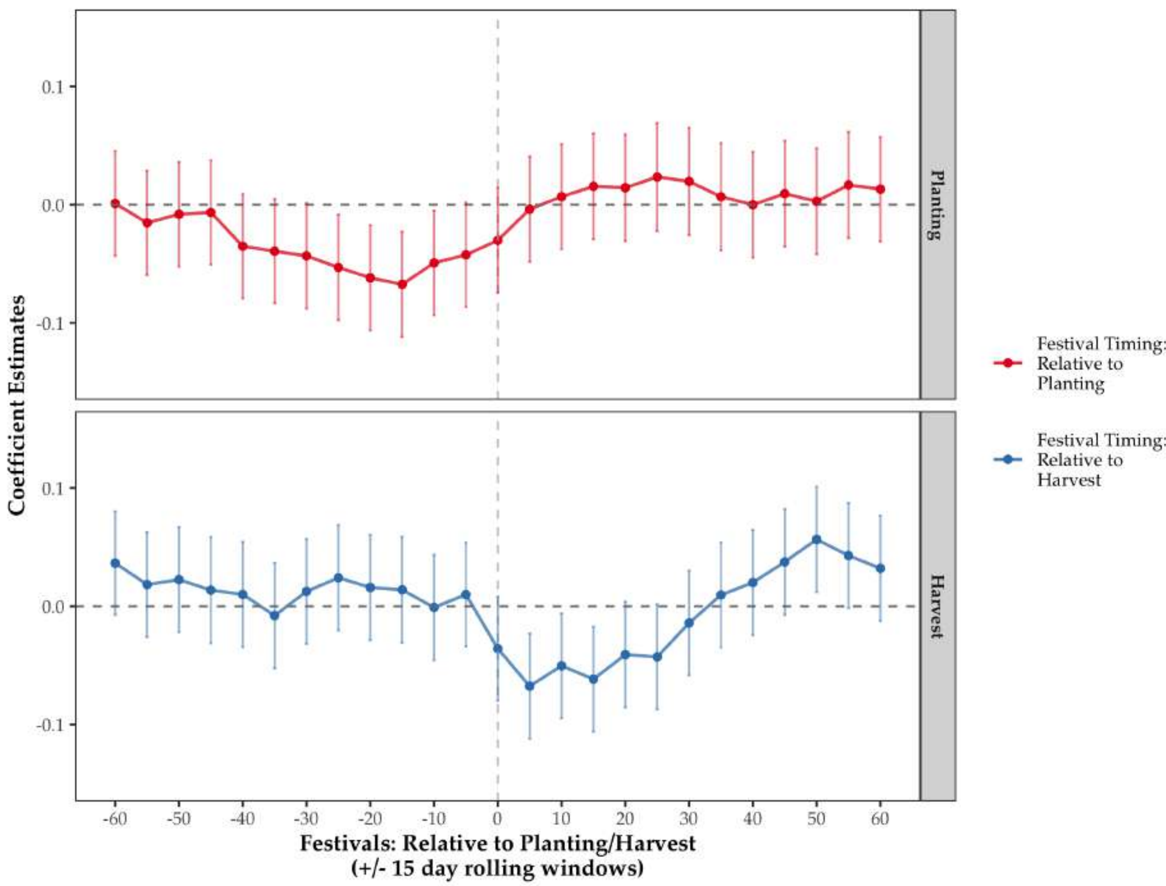
We vary the 30-day window (relative to planting and harvest) used to estimate our main specification and examine when the negative impacts of festivals seem to arise. Specifically, in equation (1), we focus on the periods when having a festival coincide with planting/harvest may lead to lower long-run development: periods when festival expenditures crowding out of investments during low liquidity times. We defined these periods are being 0-30 day prior to planting and 0-30 after harvest. However, there are many other 30-day windows one could use to define these overlap periods. Thus, we conduct an exercise to explore the timing of the main impacts by varying the 30-day window across time and estimating our main impacts. To conduct this exercise we estimate the following specification:

$$y_m = \alpha_{s(m)} + \beta_i \textit{ Festival: } i \pm 15 \textit{ days from Planting}_m + \gamma_i \textit{ Festival: } i \pm 15 \textit{ from Harvest}_m + \mathbf{X}_{\mathbf{m}}^{'}\mathbf{B} + \epsilon_m \quad \text{(A1)}$$

where our coefficients of interest are β_i and γ_j, the effect of festivals occurring $i \pm 15$ days from planting or harvest for various values of i; and other variables are defined as before in equation (1). In other words, equation (A1) estimates our main specification but instead uses various rolling 30-day windows relative to planting and harvest.

Figure A13 presents the coefficient plot for the estimates of interest from estimating equation (A1) on the index of economic development used in Table 3. The estimates suggest an interesting time dimension to the impacts of festivals on development. First, the negative estimated effects of festivals coinciding with planting appear for various rolling windows prior to planting but converge toward zero following planting. Second, we observe the opposite timing for harvest festivals: the negative estimated effects of festivals coinciding with harvest only begin to appear following harvest (and are statistically insignificant and close to zero prior to harvest). Additionally, the estimates show that the main results are not particularly sensitive to the specific 30-day window we consider. These results are consistent with the hypotheses that the timing of festivals is important for understanding their development consequences, and that festivals can crowd out investments and decrease development when they occur in times of when time-sensitive investment opportunities exist.

Figure A13: Impacts of Festival Timing Relative to Planting and Harvest Dates



Notes: Data are from the 2010 Mexico Population Census for the *New Spain* region of Mexico. The figure presents the estimated β_i (top panel) and γ_i (bottom panel) coefficients and respective 95% confidence intervals from estimating equation (A1) for $i \in -60{,}60$ days. The outcome variable is *Log Household Income*. *Festival :* $i \pm 15$ *days from Planting* (top panel) is an indicator variable equal to 1 if the festival occurs $i \pm 15$ from the optimal planting date according to FAO GAEZ data (where negative values of i means that the festival occurs prior to planting); *Festival :* $i \pm 15$ *days from Harvest* (bottom panel) is an indicator variable equal to 1 if the festival occurs $i \pm 15$ from the optimal harvest date according to FAO GAEZ data (where negative values of i means that the festival occurs prior to harvest). The regressions control for the full-set of controls: *State Fixed Effects*, *Geography Controls*, *Colonial Controls*, and *Planting & Harvest Month Fixed Effects*.

Appendix D. Additional Tables

Table A1: Municipality Characteristics and Coinciding Festivals
All of Mexico

	Non-Coinciding Festival			Coinciding Festival			T-test Difference
	Obs.	Mean	SE	Obs.	Mean	SE	(1)-(2)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Geographic Characteristics:							
Precipitation	1746	89.55	(1.08)	273	85.85	(2.87)	3.70
Temperature	1746	19.58	(0.10)	273	20.23	(0.22)	-0.65
Land Suitability	1746	0.81	(0.01)	273	0.75	(0.02)	0.06
Maize Suitability	1746	32.24	(0.50)	273	30.99	(1.24)	1.25
Area	1746	620.73	(31.81)	273	973.90	(114.66)	-353.17
Longitude	1746	-98.58	(0.09)	273	-99.22	(0.29)	0.63
Latitude	1746	19.60	(0.06)	273	20.59	(0.22)	-0.99**
Log(Dist. to Mexico City)	1746	5.71	(0.02)	273	5.96	(0.05)	-0.25
Slope	1746	9.33	(0.16)	273	8.28	(0.38)	1.05**
Elevation	1746	1429.96	(20.10)	273	1258.70	(50.72)	171.26
Colonial Characteristics:							
Has Colonial Characteristics	1746	0.78	(0.01)	273	0.73	(0.03)	0.05
Drought in 1545 (%)	1370	98.18	(0.36)	200	97.50	(1.11)	0.68
Log(Pop. Density in 1570)	1370	0.32	(0.03)	200	0.02	(0.08)	0.30

Notes: The value displayed for t-tests are the differences in the means across the groups, conditional on state fixed effects. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. See Data Appendix for more information on variables. *Festival: Coincides* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either within 0-30 days prior to the optimal maize planting date or 0-30 days after the optimal maize harvest date for a municipality using FAO GAEZ data, and 0 otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A2: Relationship Between Festival, Maize Planting, and Maize Harvest Months
All of Mexico

	Dependent Variable: *Festival Date*			
	(1)	(2)	(3)	(4)
	Panel A: Planting or Harvest			
Maize Planting or Harvest Month	-0.049^{***}	0.002	0.002	0.005
	(0.014)	(0.015)	(0.015)	(0.016)
Calendar Date Fixed Effects	N	Y	Y	N
State Fixed Effects	N	N	Y	N
Date by State Fixed Effects	N	N	N	Y
Observations	831,105	831,105	831,105	831,105
Clusters	2,277	2,277	2,277	2,277
Mean Dep. Var.	0.274	0.274	0.274	0.274
	Panel B: Planting and Harvest Separately			
Maize Planting Month	-0.090^{***}	0.007	0.007	0.021
	(0.018)	(0.019)	(0.019)	(0.021)
Maize Harvest Month	-0.007	-0.004	-0.004	-0.011
	(0.021)	(0.023)	(0.023)	(0.025)
Calendar Date Fixed Effects	N	Y	Y	N
State Fixed Effects	N	N	Y	N
Date by State Fixed Effects	N	N	N	Y
Observations	831,105	831,105	831,105	831,105
Clusters	2,277	2,277	2,277	2,277
Mean Dep. Var.	0.274	0.274	0.274	0.274

Notes: Observations are at the municipality-month level for municipalities in Mexico for which we have festival data. Standard errors are clustered at the municipality level. *Festival Date* is an indicator variable equal to 1 if the festival for a municipality occurs on that date. For ease of interpretation, all coefficients are multiplied by 100. *Maize Planting or Harvest Month* is an indicator variable equal to 1 if a date falls within 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data.*Maize Planting Month* is an indicator variable equal to 1 if a date falls within 0 to 30 days prior to the optimal maize planting date for a municipality using FAO GAEZ data. *Maize Harvest Month* is an indicator variable equal to 1 if a date falls within 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Development Outcomes and Planting- and Harvest-Coinciding Festivals

	Dependent Variable: Panel A: *Log HH Income*				
	(1)	(2)	(3)	(4)	(5)
Festival: 0-30 Days Prior to Maize Planting	-0.368^{**}	-0.152	-0.268^{**}	-0.291^{***}	-0.322^{***}
	(0.149)	(0.126)	(0.112)	(0.110)	(0.108)
Festival: 0-30 Days After Maize Harvest	-0.217^{*}	-0.237^{**}	-0.241^{***}	-0.233^{***}	-0.195^{**}
	(0.125)	(0.097)	(0.086)	(0.086)	(0.085)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Adjusted R2	0.004	0.347	0.537	0.543	0.560
Mean Dep. Var.	3.234	3.234	3.234	3.234	3.234
SD Dep. Var.	1.330	1.330	1.330	1.330	1.330
P-Value: Difference	0.422	0.577	0.844	0.666	0.344
	Dependent Variable: Panel B: *Index of Economic Development*				
	(1)	(2)	(3)	(4)	(5)
Festival: 0-30 Days Prior to Maize Planting	-0.775^{*}	-0.035	-0.361	-0.443	-0.567^{*}
	(0.459)	(0.391)	(0.356)	(0.353)	(0.339)
Festival: 0-30 Days After Maize Harvest	-0.645^{*}	-0.663^{**}	-0.737^{***}	-0.718^{***}	-0.582^{**}
	(0.376)	(0.284)	(0.243)	(0.244)	(0.239)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Adjusted R2	0.002	0.348	0.566	0.571	0.591
Mean Dep. Var.	-0.589	-0.589	-0.589	-0.589	-0.589
SD Dep. Var.	4.039	4.039	4.039	4.039	4.039
P-Value: Difference	0.820	0.177	0.370	0.511	0.970

Notes: Data is from the 2010 Mexico Population Census. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. *Index of Economic Development* is the first principal component index for a number of development outcomes in the census for a municipality (see Data Appendix). *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Municipality Characteristics and Undetermined Festival Date

	Festival Date Determined			*Festival Date Undetermined*			T-test Difference
	Obs.	Mean	SE	Obs.	Mean	SE	(1)-(2)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Geographic Characteristics:							
Precipitation	1569	95.74	(1.17)	46	101.68	(7.93)	-5.94
Temperature	1569	19.14	(0.10)	46	20.10	(0.61)	-0.96
Land Suitability	1569	0.86	(0.00)	46	0.81	(0.03)	0.05
Maize Suitability	1569	34.16	(0.55)	46	36.85	(2.96)	-2.69
Area	1569	329.90	(12.71)	46	416.61	(81.26)	-86.71
Longitude	1569	-98.27	(0.05)	46	-98.10	(0.28)	-0.17
Latitude	1569	18.66	(0.04)	46	19.14	(0.23)	-0.48*
Log(Dist. to Mexico City)	1569	5.46	(0.02)	46	5.41	(0.10)	0.05
Slope	1569	10.32	(0.16)	46	8.71	(1.00)	1.60*
Elevation	1569	1556.12	(19.74)	46	1314.65	(134.19)	241.47
Colonial Characteristics:							
Has Colonial Characteristics	1569	0.86	(0.01)	46	0.83	(0.06)	0.03
Drought in 1545 (%)	1347	99.48	(0.20)	38	100	(0.00)	-0.52
Log(Pop. Density in 1570)	1347	0.52	(0.03)	38	0.53	(0.21)	-0.01

Notes: The value displayed for t-tests are the differences in the means across the groups, conditional on state fixed effects. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. See Data Appendix for more information on variables. Sample is limited to the *New Spain* region of Mexico. *Festival Date Undetermined* is an indicator variable equal to 1 if we were unable to determine the patron saint day festival in a municipality, and 0 otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Municipality Characteristics and "Local" Patron Saints

	Official Patron Saint			*Local Patron Saint*			T-test Difference
	Obs.	Mean	SE	Obs.	Mean	SE	(1)-(2)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Geographic Characteristics:							
Precipitation	1615	95.91	(1.16)	60	84.50	(4.18)	11.41
Temperature	1615	19.17	(0.10)	60	18.69	(0.50)	0.47
Land Suitability	1615	0.86	(0.00)	60	0.88	(0.02)	-0.02
Maize Suitability	1615	34.23	(0.54)	60	36.93	(2.59)	-2.69
Area	1615	332.37	(12.57)	60	445.03	(70.19)	-112.66
Longitude	1615	-98.27	(0.05)	60	-99.55	(0.28)	1.28
Latitude	1615	18.67	(0.04)	60	19.29	(0.17)	-0.62*
Log(Dist. to Mexico City)	1615	5.46	(0.02)	60	5.26	(0.10)	0.19
Slope	1615	10.27	(0.16)	60	9.08	(0.63)	1.19*
Elevation	1615	1549.24	(19.57)	60	1692.05	(100.74)	-142.81
Colonial Characteristics:							
Has Colonial Characteristics	1615	0.86	(0.01)	60	0.95	(0.03)	-0.09
Drought in 1545 (%)	1385	99.49	(0.19)	57	100	(0.00)	-0.51
Log(Pop. Density in 1570)	1385	0.52	(0.03)	57	0.42	(0.16)	0.10

Notes: The value displayed for t-tests are the differences in the means across the groups, conditional on state fixed effects. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. See Data Appendix for more information on variables. *Local Patron Saint* is an indicator variable equal to 1 if the patron saint in a municipality is not an official Vatican patron saint, and 0 otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Robustness to Missing Festival Dates: Development Outcomes (Assuming All Municipalities with Missing Festival Dates Have Coinciding Festivals)

	Dependent Variable: Panel A: *Log HH Income*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.191^{**}	-0.173^{**}	-0.220^{***}	-0.219^{***}	-0.208^{***}
	(0.090)	(0.073)	(0.063)	(0.063)	(0.062)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,639	1,639	1,639	1,639	1,639
Adjusted R2	0.002	0.345	0.538	0.543	0.558
Mean Dep. Var.	3.239	3.239	3.239	3.239	3.239
SD Dep. Var.	1.328	1.328	1.328	1.328	1.328
	Dependent Variable: Panel B: *Index of Economic Development*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.478^{*}	-0.328	-0.485^{**}	-0.492^{**}	-0.459^{**}
	(0.277)	(0.227)	(0.194)	(0.194)	(0.191)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,639	1,639	1,639	1,639	1,639
Adjusted R2	0.001	0.344	0.563	0.568	0.586
Mean Dep. Var.	-0.576	-0.576	-0.576	-0.576	-0.576
SD Dep. Var.	4.039	4.039	4.039	4.039	4.039

Notes: Regressions in this table are identical to those in Table 3, except that municipalities with missing festival dates (previously not included in sample) are now included in the sample, and we assume that their festivals *all* coincide with planting or harvest. Data is from the 2010 Mexico Population Census. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. *Index of Economic Development* is the first principal component index for a number of development outcomes in the census for a municipality (see Data Appendix). *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. For this table, we assume all undetermined festival dates are coinciding festivals. textitGeography Controls includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: Robustness to Missing Festival Dates: Development Outcomes (Assuming No Municipalities with Missing Festival Dates Have Coinciding Festivals)

	Dependent Variable: Panel A: *Log HH Income*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.280^{***}	-0.205^{***}	-0.249^{***}	-0.254^{***}	-0.243^{***}
	(0.099)	(0.079)	(0.070)	(0.070)	(0.068)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,639	1,639	1,639	1,639	1,639
Adjusted R2	0.004	0.345	0.538	0.543	0.558
Mean Dep. Var.	3.239	3.239	3.239	3.239	3.239
SD Dep. Var.	1.328	1.328	1.328	1.328	1.328
	Dependent Variable: Panel B: *Index of Economic Development*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.708^{**}	-0.428^{*}	-0.592^{***}	-0.613^{***}	-0.574^{***}
	(0.300)	(0.239)	(0.208)	(0.207)	(0.202)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,639	1,639	1,639	1,639	1,639
Adjusted R2	0.002	0.344	0.564	0.569	0.587
Mean Dep. Var.	-0.576	-0.576	-0.576	-0.576	-0.576
SD Dep. Var.	4.039	4.039	4.039	4.039	4.039

Notes: Regressions in this table are identical to those in Table 3, except that municipalities with missing festival dates (previously not included in sample) are now included in the sample, and we assume that *none* of their festivals coincide with planting or harvest. Data is from the 2010 Mexico Population Census. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. *Index of Economic Development* is the first principal component index for a number of development outcomes in the census for a municipality (see Data Appendix). *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. For this table, we assume all undetermined festival dates are not coinciding festivals. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Robustness to Including "Local" Patron Saints: Development Outcomes and Coinciding Festivals

	Dependent Variable: Panel A: *Log HH Income*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.261^{***}	-0.183^{**}	-0.234^{***}	-0.239^{***}	-0.229^{***}
	(0.099)	(0.080)	(0.070)	(0.070)	(0.068)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,625	1,625	1,625	1,625	1,625
Adjusted R2	0.003	0.347	0.537	0.543	0.559
Mean Dep. Var.	3.251	3.251	3.251	3.251	3.251
SD Dep. Var.	1.329	1.329	1.329	1.329	1.329

	Dependent Variable: Panel B: *Index of Economic Development*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.661^{**}	-0.350	-0.539^{**}	-0.559^{***}	-0.529^{***}
	(0.301)	(0.243)	(0.211)	(0.210)	(0.204)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,625	1,625	1,625	1,625	1,625
Adjusted R2	0.002	0.349	0.565	0.570	0.589
Mean Dep. Var.	-0.528	-0.528	-0.528	-0.528	-0.528
SD Dep. Var.	4.048	4.048	4.048	4.048	4.048

Notes: Regressions in this table are identical to those in Table 3, except that municipalities celebrating "local" saints (those not appearing in official Roman Catholic records outside of Mexico, previously not included in sample) are now included in the sample, and we use their actual festival celebration dates to determine whether they coincide with planting or harvest. Data are from the 2010 Mexico Population Census. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. *Index of Economic Development* is the first principal component index for a number of development outcomes in the census for a municipality (see Data Appendix). *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. For this table, we assume all undetermined festival dates are not coinciding festivals. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Robustness to Spatial Autocorrelation:
Development Outcomes and Coinciding Festivals

	Dependent Variable: Panel A: *Log HH Income*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.275^{**}	-0.204^{**}	-0.251^{***}	-0.255^{***}	-0.244^{***}
	(0.107)	(0.080)	(0.082)	(0.079)	(0.075)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Conley Window (kms)	100	100	100	100	100
Mean Dep. Var.	3.234	3.234	3.234	3.234	3.234
SD Dep. Var.	1.330	1.330	1.330	1.330	1.330

	Dependent Variable: Panel B: *Index of Economic Development*				
	(1)	(2)	(3)	(4)	(5)
Festival Coincides with Maize Planting or Harvest	-0.695^{**}	-0.422^{*}	-0.593^{***}	-0.613^{***}	-0.576^{***}
	(0.342)	(0.252)	(0.226)	(0.220)	(0.212)
State Fixed Effects	N	Y	Y	Y	Y
Geography Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Planting-Month Fixed Effects	N	N	N	N	Y
Harvest-Month Fixed Effects	N	N	N	N	Y
Observations	1,593	1,593	1,593	1,593	1,593
Conley Window (kms)	100	100	100	100	100
Mean Dep. Var.	-0.589	-0.589	-0.589	-0.589	-0.589
SD Dep. Var.	4.039	4.039	4.039	4.039	4.039

Notes: Data are from the 2010 Mexico Population Census. Observations are municipalities in the *New Spain* region of Mexico. Conley (1999) standard errors are presented in parentheses with the cut-off window denoted as the *Conley Window* in kms. *Index of Economic Development* is the first principal component index for a number of development outcomes in the census for a municipality (see Data Appendix). *Festival Coincides with Maize Planting or Harvest* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal maize planting date or 0 to 30 days after the optimal maize harvest date for a municipality using FAO GAEZ data. For this table, we assume all undetermined festival dates are not coinciding festivals. *Geography Controls* includes mean temperature, mean precipitation, mean land suitability, the surface area, centroid latitude, centroid longitude, mean elevation, mean slope, log distance to Mexico City, and mean maize suitability for the municipality. *Colonial Controls* includes drought intensity in 1545 and log population density in 1570 using data from Sellers and Alix-Garcia (2018). For these colonial controls, values for municipalities with missing information are set to zero, and we control for an indicator variable equal to 1 if the municipality is not missing these colonial characteristics. *Planting & Harvest Month Fixed Effects* includes fixed effects for the optimal planting-month and harvest-month for maize for each municipality according to FAO GAEZ data. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A10: Municipality Characteristics and Coinciding Festivals
Using Maximum Caloric Suitability Crop Cycles

	Non-Coinciding Festival			*Coinciding Festival*			T-test Difference
	Obs.	Mean	SE	Obs.	Mean	SE	(1)-(2)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Geographic Characteristics:							
Precipitation	1406	95.12	(1.21)	187	97.70	(3.61)	-2.57
Temperature	1406	19.06	(0.11)	187	19.64	(0.27)	-0.58
Land Suitability	1406	0.86	(0.00)	187	0.85	(0.01)	0.02
Maize Suitability	1406	34.51	(0.58)	187	34.78	(1.62)	-0.27
Area	1406	328.13	(13.21)	187	341.75	(40.16)	-13.62
Longitude	1406	-98.32	(0.05)	187	-98.23	(0.15)	-0.09
Latitude	1406	18.65	(0.04)	187	18.79	(0.12)	-0.14
Log(Dist. to Mexico City)	1210	5.40	(0.02)	155	5.48	(0.05)	-0.08
Slope	1406	10.35	(0.17)	187	9.54	(0.46)	0.81
Elevation	1406	1572.20	(20.92)	187	1466.56	(57.63)	105.65**
Colonial Characteristics:							
Has Colonial Characteristics	1406	0.86	(0.01)	187	0.83	(0.03)	0.03
Drought in 1545 (%)	1210	99.67	(0.17)	155	98.06	(1.11)	1.60
Log(Pop. Density in 1570)	1210	0.53	(0.03)	155	0.42	(0.08)	0.12*

Notes: The value displayed for t-tests are the differences in the means across the groups, conditional on state fixed effects. Observations are municipalities in the *New Spain* region of Mexico. Robust standard errors are presented in parentheses. See Data Appendix for more information on variables. *Festival Coincides* is an indicator variable equal to 1 if the saint day festival in a municipality occurs either 0 to 30 days prior to the optimal planting date or 0 to 30 days after the optimal harvest date for the maximum caloric suitability crop for a municipality using FAO GAEZ data, and 0 otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.