Property rights reform, migration, and structural transformation in Mexico

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Abstract

We use the rollout of a large-scale land certification program in Mexico from 1993 to 2006 to study how rural reforms establishing secure property rights determine patterns of migration, relocation of economic activity, and structural transformation. We find that certification leads higher-skilled agricultural labor to migrate, leaving behind economies less concentrated in agriculture, and with no significant change in wages. States' manufacturing capitals see corresponding gains in urban population and agricultural employment. Average wages increase significantly in these manufacturing capitals, suggesting growth and demand effects that outweigh employment competition usually associated with immigration. Sectoral wages only rise significantly in services, indicating that imperfect substitutability of labor is empirically important to understanding structural transformation and internal migration. These results also imply that natives in non-tradeable sectors are the most likely beneficiaries of increased local demand under immigration.

1 Introduction

The sectoral and spatial transitions of labor from agriculture into manufacturing and services, and from rural to urban areas, have long been considered central features of economic development (Clark 1940; Harris and Todaro 1970; Duarte and Restuccia 2010). A wide variety of patterns exists in the way these features may interact, depending on whether structural transformation is driven by technological progress and income effects, relative input or output prices, or other sources, and whether there is international trade, and internal goods and labor mobility (Herrendorf et al. 2014). Yet while substantial theoretical and empirical macroeconomic literatures have arisen, the microeconomic foundations of the structural transformation and its relation to rural-urban migration remain poorly understood (Foster and Rosenzweig 2008).

In this paper, we argue that rural reforms establishing secure property rights to agricultural land drive a particular pattern of structural and spatial transformation. We consider a regime in which access to agricultural land was contingent on both the owner's presence and his continued active use of the land. Because migration required surrending this land without compensation, such policies restricted geographic labor mobility and led to an inefficient allocation of labor to agriculture. Coming onto this situation, a land certification program confers secure property rights, enables land rentals and sales within the community, and reduces the opportunity cost of migration (de Janvry et al. 2015). In this context, we argue that higher-skilled agricultural labor exploits the opportunity to migrate away from their origin municipalities, leaving behind economies less concentrated in agriculture, yet with no significant deterioration in wages. States' manufacturing capitals see corresponding gains in urban population and agricultural employment. Average wages increase significantly in our setting, which we attribute to growth and demand effects from immigrants with a preference for urban amenities that outweigh any employment competition. By sector, wages only rise significantly in services, confirming that imperfect substitutability of labor—across sectors, and/or between immigrants and natives—is empirically important to the process of structural transformation and internal migration. Finally, in such an environment, native employees in the non-tradeables sector are the most likely beneficiaries of increased local demand associated with immigration.

Our empirical evidence draws on Mexico's experience under agricultural land reform. In Mexico's first agricultural reform, from 1914 to 1992, agrarian communities called ejidos were created by expropriating large private landholdings and reallocating land to groups of peasant farmers. These lands were then managed by an ejido assembly, which granted community members use-based rights to directly cultivate individual agricultural plots, but no right to rent or sell agricultural land. The scale of this first reform was massive, and resulted in about half of Mexico's total land area and rural population (Dell 2012) living and working under a system of incomplete property rights. In anticipation of NAFTA, Mexico conducted a second agricultural reform in an effort to improve agricultural efficiency. This was a large-scale land certification initiative, called the Programa de Certificacion de Derechos Ejidales y Titulacion de Solares, or PROCEDE. The program was rolled out nationwide from 1993 to 2006 to issue certificates of ownership over ejido land, and was as large in scope as the first agricultural reform, with all but a small subset of ejidos certified by 2006.

We use Mexico's implementation of PROCEDE from 1993 to 2006 as a large-scale natural experiment to examine the impacts on migration and structural transformation that result in moving from use-based to certificate-based land rights. We rely on a fixed effects specification that essentially compares changes in municipalities that had larger shares of their population in early-certified ejidos versus municipalities with smaller shares of their population in early-certified ejidos. In all specifications, we control for time-varying trends associated with the overall ejido share of the population, eliminating time-trending effects correlated with this observable difference in municipality composition. Moreover, when possible in our municipality-level specifications, we exploit only within-state variation across municipalities in early-certification shares, eliminating the concern that time-trending unobservables at the state-level might be simultaneously correlated with early-certification shares and our outcomes of interest. Thus, the main threat to identification is time-trending unobservables that vary differentially within a state across municipalities that have larger and smaller early-certification shares. We provide falsification tests suggesting that changes in migration over time were not correlated with the program's rollout.

In describing our results, we group outcomes according to "origin" or "net emitting" localities and municipalities versus "destination" or "net receiving" localities and municipalities. More specifically, we distinguish between outcomes within the manufacturing capitals of states as compared to the average municipality. With the reforms, the average municipality in our data became a net emitting municipality. Over 40% of its population was rural, with a substantial portion of its population attached to ejidos as PROCEDE was rolled out. As a result, the average municipality experienced significant outmigration as the labor constraints attached to ejido land use were relaxed. But these migrants had to decide where to move. To understand the implications of their movements for destination economies, we examine outcomes within the manufacturing capital of each state—defined as the single municipality in each state with the largest base of manufacturing employment in 1990. Typically, this will also be the population and services capitals of the state, and therefore represents access to all of the amenities, employment, and consumption options typically afforded by an urban environment. In focusing on the entire municipality rather than its principal city, we allow for the possibility that migrants move to rural areas in the periphery of cities, rather than to the cities themselves. We indeed find that manufacturing capitals tend to gain population in response to PROCEDE. Thus, we describe manufacturing capitals as net receiving economies, and study the effects associated with immigration to this particular, important type of migrant destination.

Our first set of results relate to the effects of rural reform and outmigration on the average, net emitting municipality. The average municipality in our data was 43% rural in 1990. Almost 10% of its population consisted of ejidatarios that were eventually certified, with about 5% of its population certified prior to 2000.[1] From 1990 to 2000, the average municipality population growth rate was about 9% per decade. The growth rate was slower in municipalities with greater percentages of the population in ejidos—on average, 2% below trend per decade. But outmigration due to PROCEDE further reduced the population growth rate, with point estimates suggesting an additional 1% decline in population growth. These population effects were concentrated in rural areas, which grew 2% below trend per decade, while there was no significant effect in urban areas.[2]

In these net emitting municipalities, we find that migration tends to be selective for the better-educated and those with higher incomes. There is no change in the lower income population (minimum wage or below), but significant declines in the middle (from 1 to 5 times the minimum wage) and higher income (over 5 times the minimum wage) populations. This is consistent with selective outmigration by better-educated, higher-income persons.[3] Further, the economy becomes less agricultural in employment. Yet there is no significant change in urbanization or aggregate growth in any major sector. While we cannot cleanly identify welfare impacts, it is notable that wages do not fall significantly in any sector despite the presumed loss in demand that should have accompanied the decline in population. Further, the sectoral balance within the remaining population represents a more diverse economy, in principle less vulnerable to volatility in agricultural markets. There is heterogeneity across subgroups within the municipality. While we find no effect on aggregate employment overall, agricultural and services jobs indeed decline significantly within rural areas. Changes in sectoral employment shares are significant within urban areas, but not rural areas; they are

[1]The relevant ejido population also include posesionarios and avecindados. In total, these comprise 13% of the average municipality population, with about 7% of population certified prior to 2000.

[2]Regression point estimates are scaled by the average ejido and early-certified shares in presenting these results. Note that while point estimates suggest some degree of urbanization, this impact was not significant.

[3]We may also infer that PROCEDE did not increase local returns to education sufficiently to reverse this selection effect. For example, if agricultural productivity increased substantially, we might expect that more educated households would be best able to exploit this increase. In this case, migration might have been selective for lower income rather than high income populations.

also significant among males, but not females. This is consistent with greater intersectoral and geographic mobility among men than women. Finally, even across subgroups, there are no significant changes in wages within net emitting municipalities.

Our second set of results relates to the effects of rural reform and immigration on states' manufacturing capitals, which are net receiving municipalities. Here we find significantly greater overall and urban population growth in response to PROCEDE. Aggregate agricultural employment increases significantly; point estimates are positive in other sectors but smaller and not significant. This suggests that native and immigrant laborers are not homogeneous within urban labor markets, and/or that there are important switching costs. But the influx of population is not sufficient to change the economic structure—employment shares by sector do not change significantly. On the other hand, average wages increase significantly.[4] But by sector, only service sector wages increase significantly. The fact that wage impacts can be sector-specific again points to non-homogeneous labor and inter-sectoral adjustment costs that prevent workers from switching sectors to exploit the higher wages. The fact that wages for services employees in particular increase may be explained in at least two ways. Because both agricultural and manufactured goods are tradable, even a balanced increase in local demand across sectors due to population growth would lead to stronger wage increases within services, so long as labor is not fully mobile across sectors. Alternatively, incoming migrant preferences may be biased toward services compared to the local population. In this case, price increases in services may reflect a composition effect consistent with selection effects for higher income migrants with a preference for amenities only available in cities. In either case, while we cannot directly identify welfare impacts, it seems likely that native households within the services sector are the most likely beneficiaries of increased local demand resulting from immigration.

The remainder of the paper is organized as follows. In Section 2 we provide details on the history of land reform in Mexico. Section 3 describes the data. Section 4 presents the identification strategy and results. Section 5 provides additional robustness checks and Section 6 concludes.

2 Land reform in Mexico

A major grievance of insurgent groups during the Mexican Revolution was the expropriation of indigenous lands by elites for incorporation into large estates. Mexico's first land reform was thus a response to demands by peasant revolutionaries, establishing constitutional pro-

[4] This is notable in contrast to work studying the effects of rural-urban immigration following adverse rural income shocks (Kleemans and Magruder 2015)

visions allowing large estates to be purchased or expropriated and reallocated to the landless. The result would be a 75-year land redistribution program, from 1914 to 1992, among the largest in the world, involving over 50% of Mexican territory (Yates 1981).

Expropriated lands were organized into agrarian communities called ejidos (Sanderson 1984). Ejido land included individual parcels available to community members under use-based rights, common property lands for grazing and forestry, and residential plots. Land sales and hired labor were prohibited. Importantly, community members (or "ejidatarios") were required to use the land productively (Cordova 1974). Land left idle for two years could be taken away, essentially imposing a permanent obligation that the ejidatario and his family had to cultivate the land or lose access. This rule was enforced by a state-level Agrarian Commission external to the ejido, which was charged with implementing federal legislation and responsible for land expropriations and reallocations.

Mexico's second land reform was a response to the impending implementation of NAFTA and elimination of import tariffs on agricultural goods. Land reforms establishing security of property rights to agricultural land were seen as essential in order to promote long-term investment by ejidatarios and maintain competitiveness (Heath 1990). Among its key provisions were the establishment of a national program, PROCEDE, to provide ejidatarios with certificates to their land; to allow certificate-holders the right to rent their plots, sell to other members of the ejido, hire labor, and fallow land; and to provide a mechanism to convert certificates into full private property (de Janvry et al. 1997). PROCEDE was rolled out nationally from 1993 to 2006, eventually certifying 92% of ejidos.

From an evaluation standpoint, the ideal program implementation would have been to randomly assign the year in which ejidos received certification through PROCEDE. In practice, de Janvry et al. (2014) show that where certification was completed earlier, ejidos were smaller, had a larger share of their land in parcels, were closer to large cities, were wealthier, had fewer nonvoting members, and were in municipalities that shared the political party of the state governor.

We adopt several strategies to address identification concerns. All regressions control for state-by-year time trends. This eliminates the concern that time-trending unobservables at the state-level might be simultaneously correlated with early-certification shares and our outcomes of interest. In addition, differences between early- and late-certified ejidos are not a threat to econometric identification if they are uncorrelated with the economic outcomes of interest. Thus, we verify that changes over time in migration prior to the program were not correlated with the date of program completion. While we study multiple economic outcomes in addition to migration, this is the key economic channel through which we hypothesize most of our economic effects occur, as well as the only outcome variable for which we have sufficient pre-program data to perform this test. Finally, we interact fixed municipality characteristics found to be correlated with program completion with time effects in order to account for the possibility that migration and other economic outcomes changed for reasons related to these characteristics.

3 Data

Information on the rollout of PROCEDE is based on a set of ejido digital maps created during the certification process. GIS ejido boundaries are available for the 26,481 ejidos that completed the program during the period from 1993–2006. The digital maps, as well as administrative data for 28,614 ejidos including the date of certification and the number of ejido community members, were obtained from the National Agrarian Registry (RAN). Of these ejidos, 20,524 (or 71%) were certified from 1993 to 1999, while 8,090 (or 28%) were certified after 1999.

Next, the primary economic data in the analysis are the 1980, 1990, and 2000 population censuses carried out by INEGI. Population data are available for all years; demographic and employment data are available for 1990 and 2000. Demographics include literacy, education, and housing characteristics. Employment outcomes include labor force participation, employment, and sector of occupation. The population census categorizes employment of persons 12 and older into three groups: the primary sector (agriculture, ranching, forestry, and fishing), the secondary sector (construction, mining, manufacturing, and electricity), and the tertiary sector (commerce, communications, transportation, services, public administration, and defense). Nationally, 23%, 28%, and 46% of employment in 1990 were in the primary, secondary, and tertiary sectors, respectively. Employment became more service-based and less agricultural by 2000, with employment shares of 16%, 28%, and 53% in the primary, secondary, and tertiary sectors, respectively.

The census data are available at the state, municipality, and locality levels. These data may be merged with information on the rollout of PROCEDE at the state and municipality levels using geographic identifiers available in both datasets. To conduct analyses at the locality-level, ejidos and localities must be matched spatially. We considered the locality to match an ejido if the centroid of the locality was located inside the boundaries of one of the ejidos in the GIS database. This process matched 27,334 localities to 11,581 different ejidos. Of these ejidos, 8,454 (or 73%) were certified from 1993–1999, and 3,100 (or 27%) after 1999.

Third, we use the 10% microdata samples prepared by IPUMS and INEGI from the 1990 and 2000 population censuses. Geographic identifiers are available at the municipality-level. The 1990 data are a self-weighting sample of private dwellings extracted from the full census microdata. The 2000 census incorporates a short form completed by enumeration and a long form completed by sampling; the microdata are provided for the long form. The 2000 sample was stratified geographically and sampled clusters of dwellings within strata. The final microdata dataset is a two-year pooled cross-section of income, work hours, occupation, and demographics for about 8 million persons in 1990 and 10 million persons in 2000. Weighted averages are constructed at the municipality level using the survey weights, as well as by subgroups including urban, rural, male and female subpopulations. When needed, we construct municipality aggregates, such as total agricultural income earnings, by computing average income per agricultural employee in the microdata, multiplied by the complete census count of primary sector employees in that municipality.[5]

Fourth, we use data on annual real GDP by state and industry from INEGI for 1993 and 2000. We group industries into the primary, secondary, and tertiary sectors as in the population census.[6] Nationally, 6%, 26%, and 68% of GDP in 1993 were in the primary, secondary, and tertiary sectors, respectively; this would become 5%, 28%, and 67% by 2000.

4 Results

4.1 Locality analysis

First, we use the matched 1990 and 2000 locality-level population censuses. The locality-level analysis captures both migration of individuals and entire families. Three key characteristics of this dataset are its inclusion of localities of all sizes and levels of income, its geographical coverage (nationwide), and its time span (up to seven years with a certificate).

We first compare the evolution of local outcomes over time in a standard two-period fixed effects regression. Let i index localities, j index ejidos, m index municipalities, s index states, and t index time. Then we estimate:

$$y_{ijmst} = \mu_j + \eta Year2000_t + \delta EarlyCert_j \times Year2000_t + \varepsilon_{ijmst} \tag{1}$$

where y_{ijmst} is an outcome of interest, such as population or employment, the μ_j coefficients are ejido fixed effects, the variable $Year2000_t$ is an indicator equal to 0 in 1990 (before any certification) and equal to 1 in year 2000 (after certification had begun), and $EarlyCert_j$ is an

[5]Nominal values are used throughout. In the regression analyses, any currency effects of the 1994 peso crisis and other price changes are absorbed by the state-by-year fixed effects.

[6]The industries defined for state-level GDP are: 1) agriculture, forestry, and fishing; 2) mining; 3) manufacturing; 4) construction; 5) electricity, gas, and water; 6) commerce, restaurants, and hotels; 7) transportation, storage, and communication; 8) financial services; and 9) other services. We define industry 1 as the primary sector, combine industries 2 through 5 as the secondary sector, and all others as the tertiary sector.

indicator equal to 1 if the ejido was certified prior to 2000, and 0 otherwise. This is a standard, two-period, difference-in-difference regression where identification comes from changes in outcomes correlated with changes in certification status between 1990 and 2000. Any time-invariant ejido characteristic that is correlated with the program rollout is accounted for by the municipality fixed effects μ_j. Time trends that are common across ejidos are accounted for by the time effect η.

Table 1 reprises key results from de Janvry et al. (2015). The dependent variable is the total population (or its logarithm) of locality i in year t. The regression results show that the program induced migration at the locality level. The first row in the table shows that ejido localities lost around 9.6 persons or 21 percent of their population between 1990 and 2000 (the time effect). The coefficients on the interaction term in the second row indicate that PROCEDE was associated with an additional reduction in population of approximately 3–4 individuals, in a setting where the average locality has 99 individuals (Column 1), or 4 percent of its population (Column 2). As a falsification test, we use 12,455 localities with available population in 1980 to estimate a version of the above regression for the period 1980–1990. The estimate in column 3 indicates that the difference in population change in the 1980–1990 decade between early and late certified localities was very small and not significant. This similarity in pre-program population trends suggests that our estimate is not driven by pre-1990 differences in population change between early program and late program areas.

Table 2 explores selected employment outcomes in the locality after certification, i.e., among the population that remains behind. Column 1 indicates that certification leads to a 10% decline in the labor force (i.e., the population economically active, which includes both the employed and those actively seeking work). On the other hand, Column 2 shows that there is no change in the population not economically active. Interpreted as selection, this implies that active labor force participants are more likely to emigrate than the inactive population. Column 3 confirms that overall employment also declines by 10% following certification. Columns 4–6 consider log employment within the primary, secondary, and tertiary sectors. Only primary sector employment changes significantly, declining by 14%. That the percentage declines in employment are considerably larger than the percentage declines in population, with no offsetting increases in workers outside of the labor force, suggests it is primarily employed agricultural workers who emigrate.

Table 3 demonstrates that the local labor market looks significantly different after certification. There is a significant 3pp decline in the share of employment in agriculture, and a 1pp increase in the share of employment in manufacturing. Notably, however, this economic restructuring results from the decline in agricultural employment, rather than due to growth in manufacturing employment.

Finally, Table 4 shows that educational indicators in the locality decline after certification. This suggests that the more educated members of the population were most likely to emigrate. Other welfare indicators have mixed signs. The percentage of households with dirt floors and lacking sewage connections declined, while the percentage lacking electrical connections increased. While we cannot definitively distinguish selection effects versus direct impacts, it may be that persons with the ability to migrate were most likely to reside in electrified households. The remaining population is nevertheless able to invest in private durables, like improved flooring and water connections.

4.2 Municipality analysis

Next, we use the year 1990 and 2000 municipality-level datasets described above. While the municipality remains a very local geographic area, it allows us to study aggregate effects of certification beyond the ejido. Note that while analyses at the locality-level highlight changes in net migration, aggregate effects also depend on changes in gross migration patterns. Moreover, to the extent that ejido out-migrants choose to relocate within the same municipality, we can study the reallocation of individuals across occupations and across space, rather than the effects of population loss. Limitations are the loss in power due to moving the unit of observation farther away from the ejido itself, and the need for stronger identifying assumptions.

In our basic specification, we exploit only within-state variation across municipalities in certification intensity to identify impacts. Let m index municipalities, s index states, and t index time. Then we estimate:

$$\begin{aligned} y_{mst} &= \mu_m + \tilde{\eta}_{st} + \gamma Year2000_t \times PctEjidoMun90_{ms} \\ &\quad + \delta Year2000_t \times PctEarlyMun90_{ms} + \epsilon_{mst} \end{aligned} \tag{2}$$

where y_{mst} is an outcome of interest, such as population or wage earnings from manufacturing. The coefficients μ_m and η_{st} are municipality and state-by-year fixed effects, respectively, and ε_{mst} is a random error term. Robust standard errors are clustered at the municipality-level for estimation. The variables $PctEjidoMun90_{ms}$ and $PctEarlyMun90_{ms}$ are continuous variables capturing the percentage of the municipality population located in ejidos in 1990, and located in ejidos that were certified prior to the year 2000, respectively. The variable $Year2000_t$ is defined as above. This is a standard fixed effects regression where identification is coming from changes in outcomes correlated with changes in certification status between 1990 and 2000. Any time-invariant municipality characteristic that is correlated with the program rollout is accounted for by the municipality fixed effects μ_m. Any time trends that are common to municipalities of a given state are accounted for by the state-by-year fixed effects η_{st}. Finally, it may be that ejidos simply have a different time trend than other populations. Such ejido-specific time trends are accounted for by the coefficient β on the interaction term $Year2000_t \times PctEjidoMun90_{ms}$. The coefficient of interest is δ, which captures the effect of greater certification on y_{mst}. The identifying assumption is thus that any time-varying characteristic of municipalities that affects y_{mst} is uncorrelated with the speed of the rollout in that municipality. We provide support for the validity of this identification assumption in Section 5.

Equivalently, let $\Delta y_{ms} = y_{ms,2000} - y_{ms,1990}$. Then we can also recover γ and δ from the first-differenced regression:

$$\Delta y_{ms} \quad = \quad \eta_s + \gamma PctEjidoMun_{ms} + \delta PctEarlyMun_{ms} + e_{ms} \qquad (3)$$

where $\eta_s = \tilde{\eta}_{s,2000} - \tilde{\eta}_{s,1990}$ and $e_{ms} = \Delta\epsilon_{mst}$. Robust standard errors are used in the estimation.

Municipio population and urbanization

We first test whether certification leads to changes in population at the municipality-level. Given the outmigration observed in the locality analyses, a precise zero at this level would suggest that migrants leaving the ejido tend to stay within the borders of the municipality.

Table 5 presents the results. In fact, municipalities with relatively larger shares of their population in early-certified ejidos still tend to lose population, suggesting that ejido migrants do not stop at the municipality borders. Point estimates in Column 1 indicate that a 1-percentage point increase in the early-certified share of the population results in a loss of 0.2 percent of the population. In the average municipality, 5% of the population was certified between 1993 and 1999. This implies that the average municipality was about 1% smaller in 2000 than it would have been absent PROCEDE. Some portion of this will be directly attributable to out-migration by ejidatarios, avecindados, and posesionarios and their families. In addition, it may be that slower growth of ejidos leads to network effects that reduce population growth from non-ejido rural areas, such as through trade relationships.

Columns 2 and 3 focus on population changes within the urban and rural areas of the municipality. Consistent with intuition, we find more negative effects among rural populations than urban. The coefficient on urban populations is small and insignificant, whereas the point estimate for rural populations is significant and indicates an elasticity of -0.4. Scaled by the average early-certified share of the population, this implies that the rural population was about 2% smaller than it would have been in 2000 absent PROCEDE. Columns 4 and

5 focus on the population in those localities that could be definitively matched to ejidos. We expect a more negative impact among early-certified localities than among late-certified localities. While point estimates are consistent with this prediction, neither coefficient is statistically significant.[7] Finally, Column 6 tests whether PROCEDE increased urbanization at the municipality-level, either through net out-migration by rural populations, or through movement of rural populations into the city. The relevant point estimate is positive, but small and not significant.

Thus, the regressions in Table 5 suggest that while PROCEDE indeed had a strong impact on net migration from rural areas, the average municipality was not well-equipped to retain an increasingly mobile population. There is no evidence of urbanization. But results also suggest that economic effects may be heterogeneous across municipalities, as well as across population subgroups within municipalities.

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Municipio employment by income level

How does the distribution of income change as outmigration increases?

Columns 1-3 of Table 6 report log employment at the municipality-level within three income categories: persons earnings less than the minimum wage (LnLow); persons earnings up to five times the minimum wage (LnMid); and persons earning more than 5 times the minimum wage (LnHi). Columns 4-6 then report the corresponding percentages of the municipality population within each of the same categories (PctLow, PctMid, PctHi). The population includes all employed persons over 12 years of age who reported an income level.

In Column 1 we find no significant effect on the population at the lowest income level. Yet the middle and upper income levels both decline in Columns 2 and 3, either significantly or marginally significantly. Point estimates are large, suggesting that the higher income population is about 7% smaller than it would have been absent PROCEDE. These changes are also reflected in the percentages in the Columns 4-6, as we see that the share of employment at the highest income levels declines significantly. Because the higher income is a relatively small share of the population, however, change in the share of the population at the highest income levels is relatively small—the implied decline is only -0.14pp.

Thus, the regressions in Table 6 indicate that outmigration due to PROCEDE was relatively concentrated among higher income employees. The data are consistent with selective

[7] We might also expect impacts among early-certified localities to be at least as negative as impacts for the rural population. But because ejidos do not correspond precisely to localities, this prediction is ambiguous. This depends on the proportion of ejidatarios within the matched localities as compared to the proportion within the general rural population. In addition, matches between ejidos and localities were only identified in a smaller set of municipalities, and thus represent a different local average treatment effect.

outmigration by wealthier households; ultimately, however, we cannot distinguish between selective migration versus welfare changes among non-migrants.

Municipio sectoral employment and earnings

Does outmigration also imply job loss across all sectors of the municipality economy? Or do some sectors flourish while others decline?

Columns 1–3 of Table 7 report the effects of certification on aggregate employment within the primary, secondary, and tertiary sectors of the economy, respectively. Notably, none of the individual sectors exhibits significant aggregate effects in Columns 1–3. Point estimates are negative for agriculture and positive for the other sectors; elasticities are small, ranging from -0.08 in agriculture to 0.07 in services. These compare to an elasticity of -0.2 on population in Table 5. The smaller and insignificant point estimates here are consistent with a prediction that persons or households with more stable employment are less likely to migrate. However, notice the contrast with employment effects at the locality level in Table 2. The analysis there suggested that employed agricultural workers are more likely to leave the ejido than non-labor force participants; the analysis here suggests that those employed agricultural workers who leave the ejido tend to relocate within the municipality, while the non-labor force participants who leave the ejido are most likely to migrate beyond its borders. Finally, Columns 4–6 report the effects on aggregate income (i.e., total wage earnings or labor expenditure) within the same sectors. At this level of aggregation, there are no significant impacts.

Next, we consider whether PROCEDE led to significant changes in the relative importance of different sectors of the economy. Specifically, Table 8 examines the sectoral shares of aggregate employment and aggregate labor income. Scaled by the average level of early-certification, Columns 1 and 4 indicate that municipality economies became less agricultural in both their aggregate employment (-0.8pp) and income shares (-1.2pp). Each of the other two sectors gained about 0.5pp.

Thus, the regressions in Table 7 indicate that at the municipality-level, neither aggregate employment nor aggregate labor earnings by sector change significantly. Comparing with results in Table 5, this is consistent with the idea that persons and households with more stable employment are less likely to emigrate. On the other hand, there is consistent evidence that local economies become relatively less dependent on agriculture, and more dependent on manufacturing and services.

Municipio wages

Does outmigration lead to labor scarcity and wage increases among the remaining population? Or does it result primarily in a loss of local demand and wage declines?

Table 9 regresses sectoral wages on PROCEDE exposure. There are no statistically significant impacts in any sector. Assuming labor is paid its marginal revenue product, there is no evidence of a change in labor revenue productivity.

4.3 Municipality subgroups

The diverse effect on population groups in Table 5 raise the possibility that outcomes may vary depending on the subgroup analyzed within the municipality. Thus, we repeat the municipality regressions for subgroups including urban, rural, male or female subpopulations.

Subgroup analysis of municipio sectoral employment and earnings

The regressions in Table 7 provided little evidence of impacts on aggregate employment or labor earnings. Table 10 considers whether impacts may have been concentrated among particular subpopulations, including urban, rural, male, or female subgroups.

Looking across the four subgroups, we find significant impacts on aggregate employment only within the rural subpopulations. Point estimates are negative across all sectors, and of the same order of magnitude, suggesting relatively consistent declines across all sectors. Both agricultural and service sector employment decline significantly, with elasticities of -0.4 and -0.7, respectively. The implied job losses are thus about -2% and -3.5 in these two sectors, respectively. The concentration of aggregate job losses within the rural sector is consistent with the significant declines in rural population compared to other groups in Table 5. There are also indications that women may be particularly affected. There is a marginally significant decline in aggregate female employment, and a significant decline in aggregate labor earnings by women.

Next, Table 11 considers the effects on sectoral shares by subgroup. Despite the aggregate employment losses in the rural sector, because these losses were relatively consistent across sectors, there is no significant change in employment or income shares. On the other hand, while the impacts on aggregate employment by sector were not individually significant in urban areas, point estimates varied widely. Thus we see significant declines in urban agricultural shares of employment, and increases in services. The point estimates imply that agricultural employment share declines by about 0.5pp, while the services shares increases by about 0.5pp. Male populations also saw significant changes in employment shares. Employment becomes significantly more concentrated in manufacturing (by 0.5pp), as do labor earnings (by 0.9pp). While employment shares do not change significantly for women, labor earnings also become significantly more concentrated in manufacturing (by 1.5pp).

Thus, Tables 10 and 11 show that aggregate employment losses were concentrated within rural populations. Yet, the clearest changes in the sectoral composition of employment occurred in urban areas, and among males. In particular, labor markets in urban areas became significantly less agricultural (-0.5pp) and more service-based (0.5pp). Male employment became significantly less agriculture-dependent (-0.6pp) and more manufacturing-based (0.5pp). Female labor earnings become significantly more manufacturing-based (1.5pp)

Subgroup analysis of municipio wages

Table 12 shows that across urban, rural, male, or female subgroups, there continue to be no significant impacts on overall or sectoral wages. Assuming labor is paid its marginal revenue product, there is no evidence of a change in labor revenue productivity in any sector.

4.4 Municipality manufacturing capitals

While the average municipality in Table 5 was not well-equipped to retain an increasingly mobile population, it seems likely that losses by the average municipality will be gains to another municipality. In this section, we allow for the possibility that migrating populations may converge on the largest municipality in a given state. In this case, outcomes within the largest municipality will depend not only on the early-certified share of the population that resides within its borders, but also on the total early-certified population throughout the state. Thus, we are interested in an interaction between a municipality's relative position within the state, and the total potential migrant population.

We focus on the municipality in each state with the largest manufacturing employment in 1990. For 26 of 32 states, the largest municipality in manufacturing is also the largest in services, and it is typically also the population capital. This municipality therefore represents access to all of the amenities, employment, and consumption options typically afforded by an urban environment. In focusing on the entire municipality rather than its principal city, we allow for the possibility that migrants move to rural areas in the periphery of cities, rather than to the cities themselves.

Our regression specification is an extension of (3):

$$\begin{aligned} \Delta y_{ms} &= \eta_s + \gamma PctEjidoMun_{ms} + \delta PctEarlyMun_{ms} + \beta I(MostMfgMun_{ms}) \\ &\quad + \psi I(MostMfgMun_{ms}) \times PctEarlyState_s + v_{ms} \end{aligned} \tag{4}$$

where $I(MostMfgMun_{ms})$ is an indicator equal to 1 if municipality m contains the most manufacturing employment in state s in 1990, and $I(MostMfgMun_{ms}) \times PctEarlyState_s$ is an indicator with the early-certified share of population at the state-level. The coefficient of interest is ψ. The v_{ms} term is a random error, clustered at the state-level.

Outcomes within the largest municipality are allowed to depend on the early-certified share of the population in the same way that outcomes do in all other municipalities. But we have relaxed the specification in (3) by allowing the largest municipality in each state to also have a systematically different time trend for reasons that may be outside of our model; this is captured by β. Finally, we allow for the possibility that populations tend to converge on a particular municipality using the interaction term $I(MostMfgMun_{ms}) \times PctEarlyState_s$.

Heterogeneity in municipio population and urbanization

Do the manufacturing capitals within states tend to gain or lose population in response to PROCEDE? Table 13 tests this using regression (4). Population outcomes are regressed on indicators for the most important municipality for manufacturing. The coefficients indicate that greater exposure to PROCEDE at the state-level in fact leads to net population growth within these municipalities.

Thus, the regressions in Table 13 support the hypothesis that rural populations tend to converge toward the important manufacturing and services municipalities within the state.

Heterogeneity in municipio sectoral employment and earnings

Given our finding that the manufacturing capitals tend to gain population, we now ask whether they also gain jobs and earnings, and if so, in which sectors.

Table 14 regresses log aggregate employment by sector against the indicator of municipality importance. On average, the normal trend is that employment grows more slowly in manufacturing capitals than in other areas of the state. But when the leading manufacturing municipalities are exposed to relatively greater PROCEDE populations at the state-level, log agricultural employment increases significantly. Results on aggregate labor expenditures are also significant. Log agricultural earnings, and log services earnings both grow significantly relative to trend. In Table 15, we also consider whether sectoral shares change significantly in the manufacturing capitals. But here we find no significant effects.

Thus, the results in Tables 14 and 15 support the hypothesis that as rural populations converge toward the important manufacturing and servicies municipalities, aggregate agricultural employment increases significantly. Agricultural earnings and services sector earnings also increase.

Heterogeneity in municipio wages

Finally, we ask whether wages tended to increase or decrease in response to increased immigration, and whether these effects were the same across sectors.

Table 16 regresses monthly average wage against our indicator of municipality importance. Strikingly, Column 1 indicates that on average in manufacturing capitals, wages tend to increase at the same time as the large immigration implied by Table 13.

One possible explanation for this result may be that the kind of immigration we observe does not lead to a substantial net increase in employment competition. For example, better off ejidatarios with a preference for urban amenities might sell their plots and migrate to land nearer to the city. This is not growth, as it merely relocates an agricultural job from one location to another within the same state. Depending on composition effects, this move may or may not affect the average agricultural wage, but it would not lead to significant employment competition for services and manufacturing jobs. On the other hand, consumption demand from this immigrant household could drive up local prices, in particular for non-tradeable goods.

This interpretation is consistent with the significant increase in agricultural employment observed in manufacturing capitals in Table 14. This hypothesis might also imply that we should observe a significant increase in service sector wages. But notice a prediction about sector-specific wage effects depends on imperfect substitutability of labor across sectors. If workers can easily move between sectors, then an increase in non-tradeables prices will drive up wages in all sectors, and we will not observe sector-specific effects. Thus, asking whether wage increases are concentrated in the service sector is a joint test of the hypotheses that the local demand effects of immigration outweigh employment competition, and that frictions exist which prevent easy movement of local workers between sectors.

Thus, Columns 2-4 of Table 16 examine changes in sector-specific wages in manufacturing capitals. Consistent with the above hypothesis, we find that only service sector wages increase significantly. Yet the story is not so precise as the simple hypothesis above. Although the point estimates on agricultural and manufacturing wages are not significant, both are positive, consistent with some level of substitutability across sectors. In fact, the point estimate on agricultural wages is almost as large as the point estimate in services. This may indicate greater substitutability between agricultural and services employment than between manufacturing and the other two sectors, or it may indicate composition effects in the agricultural sector due to higher-income immigrants. Under the interpretation that intersectoral labor mobility is low, these results suggest that natives in the services sector are most likely to benefit from immigration. Policies that increase intersectoral labor mobility would tend to make the local demand benefits more equally shared across natives.

Thus, Table 16 indicates that wages in manufacturing capitals increased significantly in response to immigration caused by PROCEDE. There are indications that wage increases were concentrated in services. In combination with the increase in agricultural employment seen in Table 14, these results offer an intruiging pattern of urbanization and effects of immigration.

5 Robustness checks

5.1 State analysis

Section 4.2 showed that PROCEDE induced population loss at the level of the average municipality, while section 4 suggested that results were heterogeneous across municipalities. Aggregating the analysis to the state-level may thus allow us to capture the full impacts of labor reallocation throughout the state. As in the municipality analysis, limitations include the loss in power due to moving the unit of observation even farther away from the ejido, and the need for stronger identifying assumptions.

At the state-level, we run fixed effects regressions based on equation (2), replacing the state-by-year time effects with a single time fixed effect. To improve robustness, we allow for heterogeneous time trends in rural areas. Due to the small number of clusters, our preferred inference relies on a wild bootstrap procedure based on Cameron, Gelbach, and Miller (2008).

Tables 17–20 report the results. In many respects, the results are similar to those in the municipality analysis. We briefly review the key results. First, population losses are no longer statistically significant. On the other hand, urbanization increases significantly, consistent with the analysis in section 4. Aggregate employment does not change significantly in any sector, but agricultural GDP declines. The agricultural shares of employment and GDP decline significantly, with reductions of about 3pp and 1pp, respectively, symptomizing a structural transformation away from agriculture. The services sector gains in share of employment. There are no significant changes in GDP per capita or per employee in any sector. The structural transformation is thus toward services as opposed to the expected effect on manufacturing, and it creates no welfare gains at the state level. Moving the analysis to the state-level thus largely corroborates the results of the municipality analyses.

5.2 Placebo tests

The main threat to identification in the above analyses is a correlation between the intensity of rollout of PROCEDE and the time path of economic changes in the municipality or state. The estimated program effect would be biased if PROCEDE were correlated with pre-program changes in given economic outcomes.

To investigate this, we use a standard regression of pre-program changes in economic variables of interest on PROCEDE exposure. That is, for example, we regress changes in (log) population from 1980-1990 on the early-certified share of the population using the same regression specifications as above. Our identifying assumption requires that there should not be any significant relationship during this period. Ideally, we would be able to run this placebo test for all economic variables studied. But the only economic variables available prior to 1990 are the population variables.

Tables 21-23 report the results. In both the municipality-level and state-level regressions, there is no significant trend in population associated with early certification for any subgroup of interest, corroborating the identifying assumptions.

6 Conclusion

Understanding the processes of migration, urbanization and structural transformation remains central to economic development. In this paper, we argue that rural reforms establishing secure property rights to agricultural land drive a particular pattern of structural and spatial transformation.

We considered a prior regime in which access to agricultural land was contingent on both the owner's presence and his continued active use of the land. Because migration required surrendering land with no opportunity for compensation, such policies severely restricted geographic labor mobility and led to an inefficient allocation of labor to agriculture. While previous work established that land reform granting security of property rights led to an important increase in outmigration (de Janvry et al. 2015), here we establish the economic and spatial consequences of this migration. We show that certification led higher-skilled agricultural labor to migrate away from their origin municipalities, and left behind economies with employment less concentrated in agriculture, and more in manufacturing and services. At the municipality level, this is structural transformation without growth, but it is also out-migration without blight, as there was no significant deterioration in wages among the remaining population.

Yet while the average municipality lost population, we showed that within states, the most important municipality for manufacturing employment typically saw gains in urban population and in agricultural employment. Average wages increased significantly, suggesting that in this context, immigrants brought with them growth and demand effects that outweighed any employment competition. This is notable in contrast to work studying the effects of rural-urban immigration following adverse rural income shocks; e.g., Kleemans and Magruder (2015) find that such immigration leads to declines in employment rates and lower wages. This points to an important difference in effects depending on the type of immigration. While we cannot distinguish formal and informal employment in our context, we are able to distinguish primary, secondary, and tertiary sectors. We found that wages only rose significantly in services. We argue that sector-specific wage effects speak to imperfect substitutability of labor—across sectors, and/or between immigrants and natives—as an empirically important element in the processes of structural transformation and internal migration. In an environment with imperfect substitutability of labor, native employees in the non-tradable sector were the most likely beneficiaries of increased local demand associated with immigration.

While the structural transformation is indeed central to the development process, it can have many different consequences according to the origin of the transformation. When the structural transformation originates in property rights reforms that release labor from agriculture, emitting territories can reduce their shares of labor in agriculture without welfare loss, while receiving territories can gain in demand for services, benefiting the local population.

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Tables

Locality analysis

Table 1: Effect of PROCEDE on locality-level population

	(1) Pop	(2) LnPop	(3) LnPop
I(Year='00)	-9.631***	-0.207***	
	(1.001)	(0.0105)	
I(Cert93-99)xI(Year='00)	-3.689***	-0.0404***	
	(1.148)	(0.0128)	
I(Year='90)			-0.209***
			(0.0125)
I(Cert93-99)xI(Year='90)			-0.00819
			(0.0148)
Mean Dep Var	99.11	4.271	4.416
Observations	34656	34656	24910
R-squared	0.0142	0.0355	0.0332

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by ejido. An observation is a locality-year. Dependent variable in column 1 is locality-level population, and log locality-level population in all others. Regressions in columns (1) and (2) based on 17,328 localities that were matched to ejidos, had population data in both the 1990 and 2000 censuses, and had a population of more than 20 in 1990. Regression in column (3) is based on 12,455 localities with available population data in 1980 and with a population larger than 20 in 1980. **Sources**: Population census data for 1990 and 2000 from INEGI. Locality-level PROCEDE classifications from de Janvry *et al.* (2015).

Table 2: Selective migration for employed, agricultural workers

	(1) LnPEA	(2) LnNPEA	(3) LnEmp	(4) LnEmp1	(5) LnEmp2	(6) LnEmp3
I(Year≥'00)	0.000349	-0.0265**	0.0319**	-0.0767***	0.258***	0.349***
	(0.0142)	(0.0116)	(0.0149)	(0.0164)	(0.0256)	(0.0200)
I(EarlyCert)xI(Year≥'00)	-0.0991***	-0.0144	-0.0997***	-0.136***	-0.000652	0.0158
	(0.0173)	(0.0142)	(0.0180)	(0.0195)	(0.0305)	(0.0240)
Mean Dep Var	2.925	3.382	2.900	2.579	1.196	1.056
R-squared	0.00403	0.00102	0.00211	0.0185	0.0335	0.0722
Observations	32861	33298	32760	32075	19362	19896
Municipalities	1499	1499	1499	1497	1437	1443
Ejidos	9489	9490	9486	9464	7892	8189
Localities	17246	17286	17229	17121	12604	12841

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by ejido. An observation is a locality-year. Dependent variables in columns are log persons economically active, log persons not economically active, log persons employed, and columns (4) through (6) contain log persons employed by sector. The sectors are primary (agriculture), secondary (construction, mining, manufacturing, electricity), and tertiary sectors (commerce, communication, transportation, services, public administration, defense). **Interpreted as selection, population declines are driven by out-migration of employed agricultural workers.** All regressions control for ejido fixed effects. **Sources**: Population census data for 1990 and 2000 from INEGI. Locality-level PROCEDE classifications from de Janvry *et al*. (2015).

Table 3: Out-migration due to PROCEDE significantly changed local employment structure

	(1) PctPEA	(2) PctEmp	(3) PctEmp1	(4) PctEmp2	(5) PctEmp3
I(Year≥'00)	0.791*	3.493***	-6.612***	3.919***	5.088***
	(0.434)	(0.286)	(0.590)	(0.353)	(0.267)
I(EarlyCert)xI(Year≥'00)	-1.896***	-0.589*	-2.966***	0.997**	0.458
	(0.508)	(0.331)	(0.680)	(0.425)	(0.324)
Mean Dep Var	39.41	97.34	74.42	12.59	9.899
R-squared	0.00230	0.0359	0.0608	0.0328	0.0644
Observations	33328	32860	32759	32759	32759
Municipalities	1499	1499	1499	1499	1499
Ejidos	9491	9489	9486	9486	9486
Localities	17288	17245	17228	17228	17228

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by ejido. An observation is a locality-year. Dependent variables in columns are percentage of the population economically active, percentage of the economically active population that is employed, and columns (3) through (5) contain the percentage of employed persons by sector. The sectors are primary (agriculture), secondary (construction, mining, manufacturing, electricity), and tertiary sectors (commerce, communication, transportation, services, public administration, defense). **Out-migration due to PROCEDE significantly changed local employment structure. Necessarily, out-migration by agricultural workers led to communities that were relatively less agrarian and more industrial.** All regressions control for ejido fixed effects. **Sources**: Population census data for 1990 and 2000 from INEGI. Locality-level PROCEDE classifications from de Janvry *et al.* (2015).

Table 4: Selective migration for the more educated and better-off

	(1) MargIdx	(2) Illit	(3) NoSch	(4) Dirt	(5) NoSewr	(6) NoElec
I(Year≥'00)	-0.401***	-2.864***	-2.303***	-11.54***	-10.95***	-32.48***
	(0.0105)	(0.178)	(0.189)	(0.416)	(0.508)	(0.771)
I(EarlyCert)xI(Year≥'00)	0.0205*	1.192***	0.829***	-0.833*	-2.882***	1.933**
	(0.0123)	(0.196)	(0.216)	(0.495)	(0.601)	(0.927)
Mean Dep Var	0.451	14.86	15.21	57.77	87.20	54.82
R-squared	0.183	0.0325	0.0185	0.125	0.159	0.283
Observations	32847	33334	33334	33334	33334	33334
Municipalities	1499	1499	1499	1499	1499	1499
Ejidos	9489	9491	9491	9491	9491	9491
Localities	17243	17288	17288	17289	17289	17289

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by ejido. An observation is a locality-year. Dependent variables in columns are the: marginality index, illiteracy rate, and population shares that have no school education, live in homes with dirt floors, do not have sewage connections, and do not have electricity. **Interpreted as selection, the increased marginality, illiteracy, and declines in education suggest that the more educated and better-off in the community are most likely to migrate**. All regressions control for ejido fixed effects. **Sources**: Population census data for 1990 and 2000 from INEGI. Locality-level PROCEDE classifications from de Janvry *et al*. (2015).

Municipality analysis

Table 5: Municipio populations decline

	(1) Δ LnPop	(2) Δ LnUrb	(3) Δ LnRur	(4) Δ LnEarly	(5) Δ LnLate	(6) Δ PctUrb
I(Year='00)						
x PctEjido90	-0.00209***	-0.00344***	-0.000805	-0.000273	-0.00102	-0.0540***
	(0.000385)	(0.000744)	(0.00107)	(0.00245)	(0.00201)	(0.0205)
x PctEarly90	-0.00190***	-0.000623	-0.00408**	-0.00106	0.000182	0.0396
	(0.000577)	(0.001000)	(0.00171)	(0.00278)	(0.00440)	(0.0274)
R-squared	0.220	0.156	0.169	0.120	0.129	0.0947
Observations	2378	2378	2225	1374	1043	2378
Mean Dep Var	0.0915	0.106	0.159	-0.0813	-0.0780	0.570
Mean PctRur90	43.80	43.80	46.81	49.37	52.82	43.80
Mean PctEjido90	9.604	9.604	9.598	9.964	10.71	9.604
Mean PctEarly90	4.872	4.872	4.976	6.550	4.660	4.872

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Robust standard errors. An observation is a municipality. Dependent variables in columns are differences from 1990 to 2000 in: log population, log urban population, log rural population, log population in early-certified ejidos, log population in late-certified ejidos, and the urban share of the population. Ejido and early-certified population shares are calculated as a percentage of the total municipality population. All specifications control for heterogeneous time trends associated with ejido populations (shown), and state-specific trends (not shown). **Sources**: Population census data for 1990 and 2000 from INEGI. Data on ejido certification from RAN.

Table 6: Municipio higher income populations decline

	(1) Δ LnLow	(2) Δ LnMid	(3) Δ LnHi	(4) Δ PctLow	(5) Δ PctMid	(6) Δ PctHi
I(Year='00)						
x PctEjido90	-0.000713	0.000428	0.00791	-0.00933	0.0325	-0.0232***
	(0.000910)	(0.00155)	(0.00766)	(0.0273)	(0.0262)	(0.00507)
x PctEarly90	0.00125	-0.00543**	-0.0145*	0.0786	-0.0488	-0.0298***
	(0.00136)	(0.00254)	(0.00878)	(0.0505)	(0.0490)	(0.00971)
R-squared	0.296	0.111	0.0655	0.112	0.0941	0.304
Observations	2376	2376	2275	2377	2377	2377
Mean Dep Var	0.149	0.428	0.452	-4.466	3.267	1.198
Mean PctRur90	43.83	43.83	44.57	43.82	43.82	43.82
Mean PctEjido90	9.595	9.603	9.165	9.608	9.608	9.608
Mean PctEarly90	4.858	4.876	4.796	4.874	4.874	4.874

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Robust standard errors. An observation is a municipality. Dependent variables in columns 1 to 3 are differences from 1990 to 2000 in log population 12+ years, employed, and with incomes that are: up to minimum wage; from 1 to 5 times the minimum wage; over 5 times the minimum wage. Dependent variables in columns 4 to 6 are differences from 1990 to 2000 in percentages of the population 12+ years, according to the same three categories. Ejido and early-certified population shares are calculated as a percentage of the total municipality population. All specifications control for heterogeneous time trends associated with ejido populations (shown), and state-specific trends (not shown). **Sources**: Population census data for 1990 and 2000 from INEGI; income data for 1990 and 2000 from IPUMS and INEGI. Data on ejido certification from RAN.

Table 7: Municipio aggregate employment and earnings do not change significantly

	(1) Δ LnEmp1	(2) Δ LnEmp2	(3) Δ LnEmp3	(4) Δ LnInc1	(5) Δ LnInc2	(6) Δ LnInc3
I(Year='00)						
x PctEjido90	0.000375	0.00420**	0.000466	-0.000515	0.00233	0.000719
	(0.000831)	(0.00191)	(0.00146)	(0.00336)	(0.00258)	(0.00288)
x PctEarly90	-0.000817	0.000523	0.000702	-0.00493	0.00550	0.00310
	(0.00131)	(0.00278)	(0.00183)	(0.00574)	(0.00448)	(0.00416)
R-squared	0.234	0.0946	0.123	0.0422	0.0450	0.0258
Observations	2210	2210	2210	2210	2210	2210
Mean Dep Var	-0.0373	0.548	0.660	-5.891	-5.079	-4.860
Mean PctRur90	44.64	44.64	44.64	44.64	44.64	44.64
Mean PctEjido90	9.157	9.157	9.157	9.157	9.157	9.157
Mean PctEarly90	4.875	4.875	4.875	4.875	4.875	4.875

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Robust standard errors. An observation is a municipality. Dependent variables are differences from 1990 to 2000 in: columns (1) through (3) are log employment in each sector, while columns (4) through (6) contain log aggregate income. The sectors are primary (agriculture), secondary (construction, mining, manufacturing, electricity), and tertiary sectors (commerce, communication, transportation, services, public administration, defense). Ejido and early-certified population shares are calculated as a percentage of the total municipality population. All specifications control for heterogeneous time trends associated with ejido populations (shown), and state-specific trends (not shown). **Sources**: Population census data for 1990 and 2000 from INEGI; income data for 1990 and 2000 from IPUMS and INEGI. Data on ejido certification from RAN.

Table 8: Municipio economies become relatively less agricultural

	(1) Δ PctEmp1	(2) Δ PctEmp2	(3) Δ PctEmp3	(4) Δ PctInc1	(5) Δ PctInc2	(6) Δ PctInc3
I(Year='00)						
x PctEjido90	-0.0647**	0.0868***	-0.0236	-0.147**	0.141***	0.00619
	(0.0290)	(0.0208)	(0.0187)	(0.0616)	(0.0513)	(0.0612)
x PctEarly90	-0.164***	0.0835**	0.0893***	-0.249**	0.115*	0.134
	(0.0444)	(0.0334)	(0.0278)	(0.101)	(0.0679)	(0.104)
R-squared	0.131	0.149	0.144	0.0504	0.0616	0.0236
Observations	2210	2210	2210	2210	2210	2210
Mean Dep Var	-11.38	3.726	8.516	-15.24	2.482	12.76
Mean PctRur90	44.64	44.64	44.64	44.64	44.64	44.64
Mean PctEjido90	9.157	9.157	9.157	9.157	9.157	9.157
Mean PctEarly90	4.875	4.875	4.875	4.875	4.875	4.875

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Robust standard errors. An observation is a municipality. Dependent variables are differences from 1990 to 2000 in: columns (1) through (3) are the percentages of employed persons in each sector, while columns (4) through (6) contain percentages of aggregate income. The sectors are primary (agriculture), secondary (construction, mining, manufacturing, electricity), and tertiary sectors (commerce, communication, transportation, services, public administration, defense). Ejido and early-certified population shares are calculated as a percentage of the total municipality population. All specifications control for heterogeneous time trends associated with ejido populations (shown), and state-specific trends (not shown). **Sources**: Population census data for 1990 and 2000 from INEGI; income data for 1990 and 2000 from IPUMS and INEGI. Data on ejido certification from RAN.

Table 9: Municipio wages do not change significantly

	(1) Δ LnWage	(2) Δ LnWage1	(3) Δ LnWage2	(4) Δ LnWage3
I(Year='00)				
x PctEjido90	0.0000899	-0.000890	-0.00187	0.000254
	(0.00193)	(0.00319)	(0.00226)	(0.00266)
x PctEarly90	0.000884	-0.00411	0.00498	0.00240
	(0.00286)	(0.00561)	(0.00335)	(0.00368)
R-squared	0.0433	0.0426	0.0334	0.0348
Observations	2210	2210	2210	2210
Mean Dep Var	-5.573	-5.854	-5.626	-5.521
Mean PctRur90	44.64	44.64	44.64	44.64
Mean PctEjido90	9.157	9.157	9.157	9.157
Mean PctEarly90	4.875	4.875	4.875	4.875

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Robust standard errors. An observation is a municipality. Dependent variables are differences from 1990 to 2000 in: log earnings per employee, and log earnings per employee in the primary (agriculture), secondary (construction, mining, manufacturing, electricity), and tertiary sectors (commerce, communication, transportation, services, public administration, defense). Ejido and early-certified population shares are calculated as a percentage of the total municipality population. All specifications control for heterogeneous time trends associated with ejido populations (shown), and state-specific trends (not shown). **Sources**: Population census data for 1990 and 2000 from INEGI; income data for 1990 and 2000 from IPUMS and INEGI. Data on ejido certification from RAN.

Heterogeneity by subgroup

Table 10: Municipio sectoral aggregates, by subgroup

	(1) Δ LnEmp1	(2) Δ LnEmp2	(3) Δ LnEmp3	(4) Δ LnInc1	(5) Δ LnInc2	(6) Δ LnInc3
I(Year='00)			*Rural areas*			
x PctEjido90	0.000921	0.00418	0.000717	0.000240	0.00279	0.00317
	(0.00135)	(0.00292)	(0.00212)	(0.00354)	(0.00349)	(0.00307)
x PctEarlyCert90	-0.00433**	-0.00335	-0.00699**	-0.0122*	-0.000527	-0.00612
	(0.00200)	(0.00447)	(0.00301)	(0.00669)	(0.00664)	(0.00500)
Observations	2059	2022	2034	2044	1972	1982
R-squared	0.233	0.0790	0.119	0.0642	0.0571	0.0531
I(Year='00)			*Urban areas*			
x PctEjido90	0.000149	0.00426**	-0.000663	-0.00541	-0.000680	-0.00142
	(0.00124)	(0.00183)	(0.00159)	(0.00681)	(0.00446)	(0.00469)
x PctEarlyCert90	-0.00143	-0.000134	-0.000687	-0.00555	0.00313	0.000326
	(0.00187)	(0.00326)	(0.00266)	(0.00808)	(0.00600)	(0.00596)
Observations	2210	2199	2209	1409	1408	1411
R-squared	0.0892	0.0851	0.0842	0.0575	0.0845	0.0472
I(Year='00)			*Male populations*			
x PctEjido90	-0.000810	0.00160	0.00133	-0.00104	-0.00112	0.00353
	(0.00100)	(0.00251)	(0.00184)	(0.00339)	(0.00302)	(0.00357)
x PctEarlyCert90	-0.00169	0.00225	-0.000683	-0.00646	0.00529	0.00237
	(0.00147)	(0.00325)	(0.00283)	(0.00581)	(0.00447)	(0.00552)
Observations	2210	2194	2196	2210	2191	2192
R-squared	0.127	0.0523	0.0687	0.0411	0.0363	0.0325
I(Year='00)			*Female populations*			
x PctEjido90	0.00478	-0.00553	0.00175	0.00783	-0.00528	0.00392
	(0.00515)	(0.00421)	(0.00304)	(0.0105)	(0.00591)	(0.00486)
x PctEarlyCert90	-0.0141*	0.00374	-0.00113	-0.0318**	0.00394	-0.00370
	(0.00811)	(0.00656)	(0.00370)	(0.0155)	(0.0106)	(0.00634)
Observations	1644	1773	2135	1383	1742	2117
R-squared	0.175	0.0648	0.0680	0.0719	0.0655	0.0194

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Robust standard errors. See Table 7 for additional notes.

Table 11: Municipio sectoral shares, by subgroup

	(1) Δ PctEmp1	(2) Δ PctEmp2	(3) Δ PctEmp3	(4) Δ PctInc1	(5) Δ PctInc2	(6) Δ PctInc3
I(Year='00)			*Rural areas*			
x PctEjido90	-0.0253	0.0574	-0.0464**	-0.107*	0.112*	-0.00484
	(0.0414)	(0.0368)	(0.0228)	(0.0644)	(0.0588)	(0.0660)
x PctEarlyCert90	-0.0120	0.0170	0.000791	-0.140	0.0815	0.0589
	(0.0655)	(0.0518)	(0.0319)	(0.109)	(0.0870)	(0.116)
Observations	2064	2064	2064	1928	1928	1928
R-squared	0.111	0.0941	0.107	0.0354	0.0577	0.0197
I(Year='00)			*Urban areas*			
x PctEjido90	-0.0777**	0.0849***	-0.0149	-0.228	0.142*	0.0856
	(0.0335)	(0.0220)	(0.0279)	(0.143)	(0.0810)	(0.123)
x PctEarlyCert90	-0.107**	0.0343	0.0947**	-0.284*	0.133	0.151
	(0.0521)	(0.0362)	(0.0380)	(0.162)	(0.115)	(0.148)
Observations	2210	2210	2210	1405	1405	1405
R-squared	0.0800	0.137	0.0748	0.0814	0.0876	0.0520
I(Year='00)			*Male populations*			
x PctEjido90	-0.0661*	0.0616**	0.00446	-0.104	0.0620	0.0422
	(0.0380)	(0.0274)	(0.0199)	(0.0685)	(0.0632)	(0.0579)
x PctEarlyCert90	-0.127**	0.0913**	0.0354	-0.375***	0.192**	0.183**
	(0.0563)	(0.0434)	(0.0324)	(0.0970)	(0.0871)	(0.0866)
Observations	2210	2210	2210	2175	2175	2175
R-squared	0.0743	0.0819	0.0827	0.0453	0.0534	0.0295
I(Year='00)			*Female populations*			
x PctEjido90	0.00567	-0.00828	0.00262	-0.150	-0.138	0.287
	(0.0751)	(0.0691)	(0.0798)	(0.154)	(0.107)	(0.188)
x PctEarlyCert90	0.126	0.0819	-0.208*	-0.211	0.319**	-0.108
	(0.117)	(0.0966)	(0.119)	(0.194)	(0.150)	(0.242)
Observations	2176	2176	2176	1215	1215	1215
R-squared	0.0897	0.0510	0.0701	0.0524	0.0716	0.0742

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Robust standard errors. See Table 8 for additional notes.

Table 12: Municipio sectoral wages, by subgroup

	(1) Δ LnWage	(2) Δ LnWage1	(3) Δ LnWage2	(4) Δ LnWage3
I(Year='00)		*Rural areas*		
x PctEjido90	0.00262	0.000317	-0.000583	0.00368
	(0.00206)	(0.00322)	(0.00246)	(0.00276)
x PctEarlyCert90	-0.00127	-0.00607	0.00297	-0.000129
	(0.00322)	(0.00588)	(0.00391)	(0.00396)
Observations	2144	2128	2073	2075
R-squared	0.0525	0.0503	0.0386	0.0445
I(Year='00)		*Urban areas*		
x PctEjido90	-0.00322	-0.00310	-0.00731**	-0.00420
	(0.00382)	(0.00648)	(0.00340)	(0.00382)
x PctEarlyCert90	0.00101	-0.00587	0.00587	0.00388
	(0.00469)	(0.00760)	(0.00459)	(0.00511)
Observations	1412	1409	1408	1411
R-squared	0.0600	0.0548	0.0611	0.0560
I(Year='00)		*Male populations*		
x PctEjido90	0.000157	-0.000229	-0.00262	0.00231
	(0.00207)	(0.00321)	(0.00219)	(0.00345)
x PctEarlyCert90	0.00593	-0.00477	0.00351	0.00365
	(0.00579)	(0.00573)	(0.00356)	(0.00488)
Observations	2210	2210	2191	2192
R-squared	0.0364	0.0370	0.0246	0.0302
I(Year='00)		*Female populations*		
x PctEjido90	-0.00207	-0.00195	-0.000919	0.00157
	(0.00315)	(0.00901)	(0.00440)	(0.00395)
x PctEarlyCert90	-0.000395	-0.0119	0.00222	-0.00222
	(0.00481)	(0.0130)	(0.00745)	(0.00503)
Observations	2164	1383	1742	2117
R-squared	0.0456	0.0593	0.0606	0.0278

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$
Notes: Robust standard errors. See Table 9 for additional notes.

Municipality manufacturing capitals

Table 13: Municipio populations, heterogeneity by manufacturing capital

	(1) Δ LnPop	(2) Δ LnUrb	(3) Δ LnRur	(4) Δ PctUrb
I(Year='00)				
x PctEjido90	-0.00201***	-0.00338***	-0.000625	-0.0549***
	(0.000275)	(0.000535)	(0.000739)	(0.00913)
x PctEarly90	-0.00175*	-0.000514	-0.00371*	0.0381***
	(0.00103)	(0.000754)	(0.00182)	(0.0129)
x I(MostMfg90)	0.0244	-0.00706	-0.224	-1.020
	(0.0456)	(0.0504)	(0.394)	(1.129)
I(Year='00) x StatePctEarly90				
x I(MostMfg90)	0.0312**	0.0296**	0.148	-0.107
	(0.0126)	(0.0129)	(0.127)	(0.337)
R-squared	0.226	0.158	0.177	0.0952
Observations	2378	2378	2225	2378
Clusters	32	32	32	32
Mean Dep Var	0.0915	0.106	0.159	0.570
Mean PctRur90	43.80	43.80	46.81	43.80
Mean PctEjido90	9.604	9.604	9.598	9.604
Mean PctEarly90	4.872	4.872	4.976	4.872

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by state. Tests of heterogeneity with respect to an indicator variable identifying the single municipality with the largest employment in a given sector, interacted with the early-certified share of the population at the state-level. See Table 5 for additional notes.

Table 14: Municipio sectoral aggregates, heterogeneity by manufacturing capital

	(1) Δ LnEmp1	(2) Δ LnEmp2	(3) Δ LnEmp3	(4) Δ LnInc1	(5) Δ LnInc2	(6) Δ LnInc3
I(Year='00)						
x PctEjido90	0.000338	0.00415***	0.000401	-0.000392	0.00237	0.000714
	(0.00120)	(0.00109)	(0.00169)	(0.00158)	(0.00172)	(0.00181)
x PctEarly90	-0.000846	0.000464	0.000606	-0.00466	0.00559	0.00314
	(0.00166)	(0.00276)	(0.00202)	(0.00644)	(0.00565)	(0.00434)
x I(MostMfg90)	-0.245***	-0.179**	-0.163**	-0.216	-0.114	-0.261***
	(0.0643)	(0.0854)	(0.0669)	(0.178)	(0.105)	(0.0912)
I(Year='00) x StatePctEarly90						
x I(MostMfg90)	0.0605**	0.0368	0.0254	0.111**	0.0489	0.0772***
	(0.0235)	(0.0260)	(0.0197)	(0.0413)	(0.0314)	(0.0254)
R-squared	0.237	0.0951	0.125	0.0430	0.0452	0.0263
Observations	2210	2210	2210	2210	2210	2210
Clusters	32	32	32	32	32	32
Mean Dep Var	-0.0373	0.548	0.660	-5.891	-5.079	-4.860
Mean PctRur90	44.64	44.64	44.64	44.64	44.64	44.64
Mean PctEjido90	9.157	9.157	9.157	9.157	9.157	9.157
Mean PctEarly90	4.875	4.875	4.875	4.875	4.875	4.875

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by state. Tests of heterogeneity with respect to an indicator variable identifying the single municipality with the largest employment in a given sector, interacted with the early-certified share of the population at the state-level. See Table 7 for additional notes.

Table 15: Municipio sectoral shares, heterogeneity by manufacturing capital

	(1) Δ PctEmp1	(2) Δ PctEmp2	(3) Δ PctEmp3	(4) Δ PctInc1	(5) Δ PctInc2	(6) Δ PctInc3
I(Year='00)						
x PctEjido90	-0.0585	0.0834***	-0.0268	-0.139***	0.139***	0.000699
	(0.0366)	(0.0233)	(0.0199)	(0.0347)	(0.0263)	(0.0408)
x PctEarly90	-0.153***	0.0778**	0.0840***	-0.236***	0.110	0.125*
	(0.0505)	(0.0358)	(0.0239)	(0.0828)	(0.0699)	(0.0680)
x I(MostMfg90)	7.968***	-4.836***	-4.313***	10.34***	-1.635	-8.703***
	(1.901)	(1.661)	(1.024)	(2.165)	(1.854)	(2.461)
I(Year='00) x StatePctEarly90						
x I(MostMfg90)	-0.121	0.201	0.125	-0.102	-0.496	0.598
	(0.657)	(0.542)	(0.299)	(0.555)	(0.687)	(0.693)
R-squared	0.141	0.154	0.152	0.0549	0.0623	0.0263
Observations	2210	2210	2210	2210	2210	2210
Clusters	32	32	32	32	32	32
Mean Dep Var	-11.38	3.726	8.516	-15.24	2.482	12.76
Mean PctRur90	44.64	44.64	44.64	44.64	44.64	44.64
Mean PctEjido90	9.157	9.157	9.157	9.157	9.157	9.157
Mean PctEarly90	4.875	4.875	4.875	4.875	4.875	4.875

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by state. Tests of heterogeneity with respect to an indicator variable identifying the single municipality with the largest employment in a given sector, interacted with the early-certified share of the population at the state-level. See Table 8 for additional notes.

Table 16: Municipio sectoral wages, heterogeneity by manufacturing capital

	(1) Δ LnWage	(2) Δ LnWage1	(3) Δ LnWage2	(4) Δ LnWage3
I(Year='00)				
x PctEjido90	0.000168	-0.000730	-0.00178	0.000313
	(0.00109)	(0.00143)	(0.00153)	(0.00165)
x PctEarly90	0.00104	-0.00381	0.00513	0.00253
	(0.00378)	(0.00599)	(0.00356)	(0.00364)
x I(MostMfg90)	-0.0359	0.0291	0.0646	-0.0981*
	(0.0481)	(0.174)	(0.0581)	(0.0526)
I(Year='00) x StatePctEarly90				
x I(MostMfg90)	0.0398***	0.0506	0.0121	0.0518***
	(0.0117)	(0.0387)	(0.0153)	(0.0176)
R-squared	0.0438	0.0433	0.0337	0.0352
Observations	2210	2210	2210	2210
Clusters	32	32	32	32
Mean Dep Var	-5.573	-5.854	-5.626	-5.521
Mean PctRur90	44.64	44.64	44.64	44.64
Mean PctEjido90	9.157	9.157	9.157	9.157
Mean PctEarly90	4.875	4.875	4.875	4.875

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by state. Tests of heterogeneity with respect to an indicator variable identifying the single municipality with the largest employment in a given sector, interacted with the early-certified share of the population at the state-level. See Table 9 for additional notes.

State-level analysis

Table 17: State-level urbanization increases

	(1) LnPop	(2) LnUrb	(3) LnRur	(4) LnEarly	(5) LnLate	(6) PctUrb
	Analytical standard errors in parentheses					
I(Year='00)	0.461***	0.501***	0.384***	0.0261	-0.0253	5.223***
	(0.0502)	(0.0512)	(0.120)	(0.160)	(0.127)	(0.849)
I(Year='00)xPctRur90	-0.00429	-0.00254	-0.00583	-0.00223	0.00377	0.0264
	(0.00271)	(0.00292)	(0.00434)	(0.00525)	(0.00532)	(0.0572)
I(Year='00)xPctEjido90	0.0134	0.00412	0.0386	0.0219	-0.0127	-0.614
	(0.0160)	(0.0173)	(0.0259)	(0.0285)	(0.0291)	(0.366)
I(Year='00)xPctEarlyCert90	-0.0253	-0.00665	-0.0499*	-0.00478	0.0135	1.203***
	(0.0164)	(0.0174)	(0.0290)	(0.0508)	(0.0525)	(0.317)
	Wild bootstrap p-values in brackets					
I(Year='00)	0.461***	0.501***	0.384**	0.0261	-0.0253	5.223***
	[0.002]	[0.002]	[0.020]	[0.933]	[0.827]	[0.002]
I(Year='00)xPctRur90	-0.00429*	-0.00254	-0.00583	-0.00223	0.00377	0.0264
	[0.080]	[0.466]	[0.216]	[0.679]	[0.486]	[0.689]
I(Year='00)xPctEjido90	0.0134	0.00412	0.0386	0.0219	-0.0127	-0.614
	[0.456]	[0.849]	[0.136]	[0.515]	[0.629]	[0.154]
I(Year='00)xPctEarlyCert90	-0.0253	-0.00665	-0.0499	-0.00478	0.0135	1.203***
	[0.176]	[0.749]	[0.168]	[0.931]	[0.855]	[0.008]
R-squared	0.585	0.575	0.429	0.0244	0.0249	0.452
Observations	93	93	93	93	93	93
Mean Dep Var	14.36	13.97	12.91	10.07	8.957	69.10
Mean PctRural90	27.32	27.32	27.32	27.32	27.32	27.32
Mean PctEjido90	4.954	4.954	4.954	4.954	4.954	4.954
Mean PctEarlyCert90	3.099	3.099	3.099	3.099	3.099	3.099

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors and wild bootstrap p-values clustered by state. An observation is a state-year. Dependent variables in columns are log population, log urban population, log rural population, log population in early-certified ejidos, log population in late-certified ejidos, and the urban share of the population. Ejido and early-certified population shares are calculated as a percentage of the total state population. All specifications control for year-fixed effects and heterogeneous time trends associated with rural and ejido populations (shown), and municipality and state-fixed effects (not shown). For each presented variable, clustered wild bootstrap p-values are based on Cameron, Gelbach, and Miller (2008) with 1000 replications and Rademacher weights. **Sources**: Population census data for 1990 and 2000 from INEGI. Data on ejido certification from RAN.

Table 18: State-level agricultural output declines

	(1) LnEmp1	(2) LnEmp2	(3) LnEmp3	(4) LnGDP1	(5) LnGDP2	(6) LnGDP3
	Analytical standard errors in parentheses					
I(Year='00)	-0.0457	0.477***	0.513***	0.139**	0.508***	0.341***
	(0.0999)	(0.0585)	(0.0450)	(0.0611)	(0.0581)	(0.0293)
I(Year='00)xPctRur90	-0.00164	-0.00513***	0.000487	0.00130	-0.00111	-0.00234**
	(0.00350)	(0.00166)	(0.00196)	(0.00233)	(0.00289)	(0.00102)
I(Year='00)xPctEjido90	0.0411*	0.0339***	0.0112	0.00455	-0.0354**	-0.0134**
	(0.0205)	(0.00846)	(0.0122)	(0.0123)	(0.0162)	(0.00606)
I(Year='00)xPctEarlyCert90	-0.0543	-0.0152	-0.00492	-0.0355**	0.00771	0.00419
	(0.0328)	(0.0142)	(0.0167)	(0.0131)	(0.0134)	(0.00810)
	Wild bootstrap p-values in brackets					
I(Year='00)	-0.0457	0.477***	0.513***	0.139*	0.508***	0.341***
	[0.669]	[0.002]	[0.002]	[0.078]	[0.002]	[0.002]
I(Year='00)xPctRur90	-0.00164	-0.00513**	0.000487	0.00130	-0.00111	-0.00234*
	[0.641]	[0.016]	[0.799]	[0.655]	[0.711]	[0.064]
I(Year='00)xPctEjido90	0.0411	0.0339**	0.0112	0.00455	-0.0354*	-0.0134*
	[0.110]	[0.012]	[0.392]	[0.715]	[0.080]	[0.098]
I(Year='00)xPctEarlyCert90	-0.0543	-0.0152	-0.00492	-0.0355**	0.00771	0.00419
	[0.290]	[0.276]	[0.811]	[0.016]	[0.545]	[0.663]
R-squared	0.203	0.946	0.965	0.362	0.859	0.930
Observations	62	62	62	62	62	62
Mean Dep Var	11.65	11.94	12.54	14.43	15.63	16.57
Mean PctRural90	27.32	27.32	27.32	27.32	27.32	27.32
Mean PctEjido90	4.954	4.954	4.954	4.954	4.954	4.954
Mean PctEarlyCert90	3.099	3.099	3.099	3.099	3.099	3.099

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors and wild bootstrap p-values clustered by state. An observation is a state-year. Dependent variables in columns (1) through (3) are log employment in each sector, while columns (4) through (6) contain log GDP. The sectors are primary (agriculture), secondary (construction, mining, manufacturing, electricity), and tertiary sectors (commerce, communication, transportation, services, public administration, defense). Ejido and early-certified population shares are calculated as a percentage of the total state population. The state-level GDP values are based on data for 1993 and 2000, while the population values are available for census years 1990 and 2000. All specifications control for year-fixed effects and heterogeneous time trends associated with rural and ejido populations (shown), and state-fixed effects (not shown). For each presented variable, clustered wild bootstrap p-values are based on Cameron, Gelbach, and Miller (2008) with 1000 replications and Rademacher weights. **Sources**: Population census data for 1990 and 2000, and national accounts data for 1993 and 2000, from INEGI. Data on ejido certification from RAN.

Table 19: State economies become relatively less agricultural

	(1) PctEmp1	(2) PctEmp2	(3) PctEmp3	(4) PctGDP1	(5) PctGDP2	(6) PctGDP3
	Analytical standard errors in parentheses					
I(Year='00)	-2.075**	-0.301	1.912	-1.244**	3.797***	-2.554***
	(0.878)	(1.677)	(1.557)	(0.476)	(0.860)	(0.659)
I(Year='00)xPctRur90	-0.118***	-0.0256	0.158***	0.00909	0.0156	-0.0246
	(0.0371)	(0.0393)	(0.0364)	(0.0194)	(0.0480)	(0.0357)
I(Year='00)xPctEjido90	-0.0383	0.318*	-0.0968	0.213*	-0.498*	0.286
	(0.240)	(0.180)	(0.186)	(0.105)	(0.278)	(0.206)
I(Year='00)xPctEarlyCert90	-1.041***	0.330	0.633*	-0.354***	0.189	0.165
	(0.373)	(0.312)	(0.325)	(0.125)	(0.209)	(0.173)
	Wild bootstrap p-values in brackets					
I(Year='00)	-2.075*	-0.301	1.912	-1.244**	3.797***	-2.554***
	[0.056]	[0.877]	[0.264]	[0.014]	[0.006]	[0.006]
I(Year='00)xPctRur90	-0.118***	-0.0256	0.158***	0.00909	0.0156	-0.0246
	[0.002]	[0.549]	[0.008]	[0.705]	[0.783]	[0.484]
I(Year='00)xPctEjido90	-0.0383	0.318	-0.0968	0.213*	-0.498	0.286
	[0.845]	[0.170]	[0.615]	[0.082]	[0.120]	[0.220]
I(Year='00)xPctEarlyCert90	-1.041**	0.330	0.633	-0.354**	0.189	0.165
	[0.050]	[0.366]	[0.122]	[0.016]	[0.330]	[0.330]
R-squared	0.975	0.378	0.913	0.535	0.579	0.444
Observations	62	62	62	62	62	62
Mean Dep Var	22.78	26.84	47.33	9.296	26.79	63.92
Mean PctRural90	27.32	27.32	27.32	27.32	27.32	27.32
Mean PctEjido90	4.954	4.954	4.954	4.954	4.954	4.954
Mean PctEarlyCert90	3.099	3.099	3.099	3.099	3.099	3.099

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors and wild bootstrap p-values clustered by state. An observation is a state-year. Dependent variables in columns (1) through (3) are the percentages of employed persons in each sector, while columns (4) through (6) contain percentages of GDP. The sectors are primary (agriculture), secondary (construction, mining, manufacturing, electricity), and tertiary sectors (commerce, communication, transportation, services, public administration, defense). Ejido and early-certified population shares are calculated as a percentage of the total state population. The state-level GDP values are based on data for 1993 and 2000, while the population values are available for census years 1990 and 2000. All specifications control for year-fixed effects and heterogeneous time trends associated with rural and ejido populations (shown), and state-fixed effects (not shown). For each presented variable, clustered wild bootstrap p-values are based on Cameron, Gelbach, and Miller (2008) with 1000 replications and Rademacher weights. **Sources**: Population census data for 1990 and 2000, and national accounts data for 1993 and 2000, from INEGI. Data on ejido certification from RAN.

Table 20: State-level sectoral productivities do not change significantly

	(1) LnGDPpc	(2) LnGDP1pe	(3) LnGDP2pe	(4) LnGDP3pe
	Analytical standard errors in parentheses			
I(Year='00)	0.0667*	0.184	0.0313	-0.172***
	(0.0386)	(0.127)	(0.0488)	(0.0598)
I(Year='00)xPctRur90	0.00169	0.00293	0.00402	-0.00283
	(0.00204)	(0.00424)	(0.00312)	(0.00213)
I(Year='00)xPctEjido90	-0.0239**	-0.0365	-0.0693***	-0.0246**
	(0.0113)	(0.0249)	(0.0179)	(0.0119)
I(Year='00)xPctEarlyCert90	0.0148	0.0188	0.0230	0.00911
	(0.00951)	(0.0404)	(0.0164)	(0.0155)
	Wild bootstrap p-values in brackets			
I(Year='00)	0.0667	0.184	0.0313	-0.172**
	[0.114]	[0.210]	[0.519]	[0.020]
I(Year='00)xPctRur90	0.00169	0.00293	0.00402	-0.00283
	[0.422]	[0.547]	[0.256]	[0.290]
I(Year='00)xPctEjido90	-0.0239*	-0.0365	-0.0693***	-0.0246*
	[0.088]	[0.216]	[0.006]	[0.058]
I(Year='00)xPctEarlyCert90	0.0148	0.0188	0.0230	0.00911
	[0.192]	[0.623]	[0.226]	[0.641]
R-squared	0.253	0.336	0.638	0.898
Observations	62	62	62	62
Mean Dep Var	2.535	2.778	3.690	4.030
Mean PctRural90	27.32	27.32	27.32	27.32
Mean PctEjido90	4.954	4.954	4.954	4.954
Mean PctEarlyCert90	3.099	3.099	3.099	3.099

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors and wild bootstrap p-values clustered by state. An observation is a state-year. Dependent variables in columns are: log GDP per capita, and log GDP per employee in the primary (agriculture), secondary (construction, mining, manufacturing, electricity), and tertiary sectors (commerce, communication, transportation, services, public administration, defense). Ejido and early-certified population shares are calculated as a percentage of the total state population. The state-level GDP values are based on data for 1993 and 2000, while the population values are available for census years 1990 and 2000. All specifications control for year-fixed effects and heterogeneous time trends associated with rural and ejido populations (shown), and state-fixed effects (not shown). For each presented variable, clustered wild bootstrap p-values are based on Cameron, Gelbach, and Miller (2008) with 1000 replications. **Sources**: Population census data for 1990 and 2000, and national accounts data for 1993 and 2000, from INEGI. Data on ejido certification from RAN.

Placebo tests

Table 21: Municipio results supported by PLACEBO test prior to certification

	(1) Δ LnPop	(2) Δ LnUrb	(3) Δ LnRur	(4) Δ LnEarly	(5) Δ LnLate	(6) Δ PctUrb
I(Year='90)						
x PctEjido90	-0.00410***	-0.00568***	-0.00367***	-0.00372	-0.0000815	-0.104***
	(0.000670)	(0.00120)	(0.00129)	(0.00270)	(0.00311)	(0.0366)
x PctEarly90	-0.00136	-0.00102	0.000332	0.00276	-0.00357	-0.0404
	(0.00126)	(0.00167)	(0.00210)	(0.00326)	(0.00635)	(0.0688)
R-squared	0.162	0.100	0.145	0.153	0.133	0.103
Observations	2371	2368	2145	1192	870	2371
Mean Dep Var	0.169	0.226	0.181	0.204	0.225	2.767
Mean PctRur90	43.79	43.79	48.08	50.82	54.13	43.79
Mean PctEjido90	9.587	9.584	9.538	10.06	10.87	9.587
Mean PctEarly90	4.874	4.874	4.951	6.612	4.771	4.874

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Robust standard errors. An observation is a municipality. Dependent variables in columns are differences from 1980 to 1990 in log population, log urban population, log rural population, log population in early-certified ejidos, log population in late-certified ejidos, and the urban share of the population. Ejido and early-certified population shares are calculated as a percentage of the total municipality population. **Prior to certification, there is no significant trend in population associated with early certification for any population variable of interest.** All specifications control for heterogeneous time trends associated with ejido populations (shown), and state-specific trends (not shown). **Sources**: Population census data for 1980 and 1990 from INEGI. Data on ejido certification from RAN.

Table 22: State-level results supported by PLACEBO test prior to certification

	(1) LnPop	(2) LnUrb	(3) LnRur	(4) LnEarly	(5) LnLate	(6) PctUrb
	Analytical standard errors in parentheses					
I(Year='90)	-0.0206	0.0229	-0.0283	0.154**	0.198***	3.759***
	(0.0154)	(0.0246)	(0.0231)	(0.0637)	(0.0671)	(1.337)
I(Year='90)xPctRur90	0.00125**	0.00151*	0.00243***	-0.000342	-0.000249	-0.0135
	(0.000588)	(0.000811)	(0.000834)	(0.00226)	(0.00166)	(0.0396)
I(Year='90)xPctEjido90	0.00545	0.00208	0.00243	0.00536	0.00192	-0.196
	(0.00426)	(0.00360)	(0.00837)	(0.0139)	(0.0104)	(0.238)
I(Year='90)xPctEarlyCert90	-0.00709	-0.00815*	-0.00952	-0.00208	-0.00584	-0.166
	(0.00564)	(0.00414)	(0.0110)	(0.0285)	(0.0211)	(0.289)
	Wild bootstrap p-values in brackets					
I(Year='90)	-0.0206	0.0229	-0.0283	0.154**	0.198***	3.759***
	[0.180]	[0.382]	[0.244]	[0.014]	[0.008]	[0.008]
I(Year='90)xPctRur90	0.00125*	0.00151	0.00243***	-0.000342	-0.000249	-0.0135
	[0.064]	[0.110]	[0.008]	[0.859]	[0.915]	[0.757]
I(Year='90)xPctEjido90	0.00545	0.00208	0.00243	0.00536	0.00192	-0.196
	[0.296]	[0.585]	[0.827]	[0.733]	[0.865]	[0.432]
I(Year='90)xPctEarlyCert90	-0.00709	-0.00815	-0.00952	-0.00208	-0.00584	-0.166
	[0.316]	[0.146]	[0.414]	[0.979]	[0.775]	[0.657]
R-squared	0.00477	0.00899	0.00940	0.131	0.166	0.0426
Observations	93	93	93	93	93	93
Mean Dep Var	14.36	13.97	12.91	10.07	8.957	69.10
Mean PctRural90	27.32	27.32	27.32	27.32	27.32	27.32
Mean PctEjido90	4.954	4.954	4.954	4.954	4.954	4.954
Mean PctEarlyCert90	3.099	3.099	3.099	3.099	3.099	3.099

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors and wild bootstrap p-values clustered by state. An observation is a state-year. Dependent variables in columns are log population, log urban population, log rural population, log non-ejido population, log population in late-certified ejidos, and the urban share of the population. Ejido and early-certified population shares are calculated as a percentage of the total state population. **Prior to certification, there is no significant trend in population associated with early certification for any population variable of interest.** All specifications control for year-fixed effects and heterogeneous time trends associated with rural and ejido populations (shown), and municipality and state-fixed effects (not shown). For each presented variable, clustered wild bootstrap p-values are based on Cameron, Gelbach, and Miller (2008) with 1000 replications and Rademacher weights. **Sources**: Population census data for 1990 and 2000 from INEGI. Data on ejido certification from RAN.

Table 23: Municipio heterogeneity results supported by PLACEBO test prior to certification

	(1) Δ LnPop	(2) Δ LnUrb	(3) Δ LnRur	(4) Δ PctUrb
I(Year='90)				
x PctEjido90	-0.00405***	-0.00563***	-0.00365**	-0.103**
	(0.000481)	(0.000719)	(0.00141)	(0.0388)
x PctEarly90	-0.00128	-0.000936	0.000372	-0.0394
	(0.00130)	(0.00176)	(0.00158)	(0.0432)
x I(MostMfg90)	0.0458	-0.0111	0.0778	0.782
	(0.0582)	(0.0770)	(0.107)	(2.611)
I(Year='90) x StatePctEarly90				
x I(MostMfg90)	0.00831	0.0252	-0.0126	0.0306
	(0.0274)	(0.0246)	(0.0282)	(0.661)
R-squared	0.163	0.101	0.145	0.103
Observations	2371	2368	2145	2371
Clusters	32	32	31	32
Mean Dep Var	0.169	0.226	0.181	2.767
Mean PctRur90	43.79	43.79	48.08	43.79
Mean PctEjido90	9.587	9.584	9.538	9.587
Mean PctEarly90	4.874	4.874	4.951	4.874

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Notes: Standard errors clustered by state. See Table 21 for additional notes.