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ORIGINAL ARTICLE

Before Privatization There was Its Impact: Sugar Factories in Turkey

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Abstract
This paper estimates the effect of a sugar-factory privatization policy on sugar beet acreages in Turkey. It finds that sugar beet acreages decreased by more than 15% due to the 2018 privatization of several sugar factories. Farmers decreased their contracted acreages in the middle of 2018, after the privatization announcement but before the actual transfer of the institutions. Production continued to decrease in the following years for the farms that were in the "catchment area" of the privatized factory group. However, for the farms that were in the area of the factories in which privatization was subsequently canceled, the negative effect of the announcement vanished. The results show that privatization policies can significantly affect markets even before the transfer of the institutions to the private sector.

Keywords Privatization · Uncertainty · Anticipation effect · Sugar · Turkey

JEL Classification L33 · Q12 · Q13 · Q18

1 Introduction

Privatization policies involve the transfer of state institutions to the private sector. These policies have generated more than US $3.6 trillion in revenue for governments worldwide between 1988 and 2016 (Privatization Barometer, 2017). Economists regularly evaluate the impact of privatization policies on efficiency, productivity, profitability, earnings, and employment (Djankov & Murrell, 2002; Estrin & Pelletier, 2018; Estrin et al., 2009; Iwasaki & Mizobata, 2018; Megginson & Netter, 2001; Roland & Stiglitz, 2008).

In addition to the direct changes in institutional properties, privatization policies may influence prices and consumer and producer behaviors (Birdsall &

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Nellis, 2003; Hailu et al., 2012; La Porta & Lopez-de-Silanes, 1999). For example, the privatization of tobacco factories directly affects the farmers who sell their products to these factories. Accordingly, the implication of privatization on the agriculture sector has been an active area of research that covers a wide geographical focus, including China, Central and Eastern Europe, and Russia (Ghazalian & Fakih, 2017; Stupak, 2016; Wang et al., 2019).

Privatization policies may create uncertainty in the markets, because of the uncertainty as to how institutions will change after the process is completed (Dewatripont & Roland, 1995; Fernandez & Rodrik, 1991; Potter, 2018). However, few papers focus on the uncertainty that is created by privatization policies. Instead, most of the literature focuses on the "before and after" approach, which compares institutions and their related individuals before and after privatization. However, privatization takes time; and generally, there is a delay between the announcement of privatization and the transfer of the institutions (Martin & Parker, 1995). Because of this delay, there is also an additional period called "pre-privatization" that creates an "anticipation effect" (Dewenter & Malatesta, 2001; Megginson & Netter, 2001).

In February 2018, the Government of Turkey announced that it would privatize 14 of 25 state-owned sugar factories. Although the government announced the privatization policy at the beginning of 2018, the actual transfer of these factories to the private sector stretched until the end of the year. This announcement caused significant concerns among the farmers under contract with these factories. As farmers had to plant their sugar beets around April, they were not able to see the transfer of the factories before signing contracts with them.

In this paper, we estimate the effect of this privatization policy on farmers' land allocation decisions with a difference-in-differences approach. We use a village-level micro dataset for 2015–2020.

We find that sugar beet acreages decreased by more than 15% due to the 2018 privatization policy that was applied in Turkey. The effect of the policy emerged even before the actual transfer of the sugar factories to the private sector. Farmers decreased their contracted sugar beet acreages in the middle of 2018: after the announcement but before the transfer of the institutions. Production continued to decrease in the following years in the actually-privatized group. However, for the factories for which privatization was subsequently canceled, the negative effects of the announcement on sugar beet acreages vanished, and farmers began to negotiate contracts with these to-be-privatized factories that remained under state control.

The findings in this paper emphasize the importance of future uncertainty in formulating economic reform policies. Policymakers could minimize the unexpected results of transitioning state institutions to the private sector by considering the anticipation effect of privatization policies. Additionally, this paper could contribute to the topic of contract farming by showing how farmers might behave according to the institutional changes that are related to their contracting partner (Bellemare & Bloem, 2018; Ton et al., 2018). Finally, policies that are related to sugar and its production are heavily discussed in the policy arena (European Commission, 2017; OECD & FAO, 2019). The recent abolition of sugar production quotas in EU countries and the decreasing role of the state in Turkey will both significantly affect sugar markets.

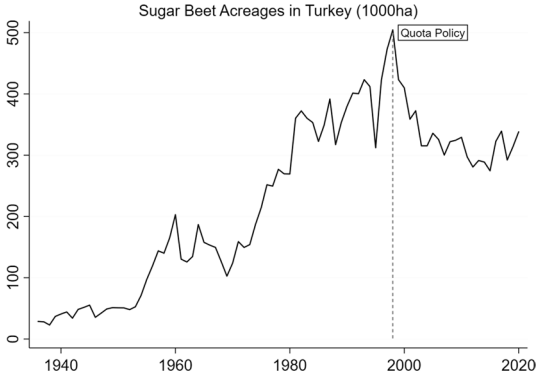


Fig. 1 Sugar beet acreages in Turkey. *Note* Fig. 1 shows the change in total sugar beet acreages in Turkey since the 1900s *Source*: SIS (1957, 1971, 1992), TursStat (2021, 2022b)

This paper proceeds as follows: Sect. 2 summarizes Turkey's sugar market and the privatization of sugar factories. Section 3 discusses the village-level micro dataset. Section 4 presents the empirical strategy. Section 5 shows the results of our study on the impact of privatization. Section 6 provides additional evidence, discussion, and policy implications. Finally, Sect. 7 concludes.

2 Sugar in Turkey

Sugar beets are the primary source of sugar in Turkey. Since the Republic of Turkey's foundation in 1923, the state has strictly controlled sugar beet farming and sugar markets. Figure 1 shows how sugar beet acreages have changed over time. The level of sugar beet acreages significantly increased until 1998. However, because of a massive shortage in the government's budget—partly due to the increasing level of sugar beet buying from farmers—a production quota policy was applied after 1998. After the quota policy, sugar beet acreages decreased by about 40% from their highest value in 1998 (Fig. 1).

Though sugar beets are produced in most regions of the country, they are mainly produced in Central Anatolia. There were approximately 100,000 sugar beet farmers in Turkey in 2018. Each year the government estimates the need for sugar production and thereby creates sugar quotas and distributes these quotas to sugar factories. These factories receive quotas based on their sugar processing capacity over the last 3 years. Factories are expected to produce at least 90% of their given quotas. In the event of excess production, which is quite rare since the contracts define the required production level, extra production could be deducted from the following year's production quotas or exported to foreign countries. Finally, in Turkey, sugar factories are classified into three groups: state, cooperative, and private.[1]

[1] In addition to the yearly average of 2.5 million tonnes of domestic sugar production in Turkey between 2015 and 2020, Turkey imports about 8% and exports about 4% of total production (Turkish Sugar, 2021).

After the distribution of sugar quotas, sugar factories contract with farmers in the surrounding villages.[2] They begin to negotiate contracts with the farmers at the beginning of the calendar year until May. For instance, for the 2018 season of sugar beet production, factories negotiated contracts with farmers between February and May.[3] Depending on their location, farmers plant sugar beets around April. Farmers also have the opportunity to change (or finalize) contracts at the planting time around April. Finally, farmers produce the specified amount of sugar beets as determined in their contracts. At the end of the production period, farmers sell their products to these factories at the prices that were specified in their contracts.[4]

2.1 Privatization of Sugar Factories

The privatization of sugar factories has been on the policy agenda in Turkey since 2000. This issue was brought to the agenda following a Letter of Intent that was given to the International Monetary Fund (IMF, 2000). In this letter, the government committed to the privatization of sugar factories by the end of 2002. However, the Council of State stopped the process in the following years. In almost all of the government's previous privatization attempts, the process was canceled by the judiciary.

In February 2018, the Privatization Board of Turkey announced that it would privatize 14 of 25 state-owned sugar factories. The announcement outlined the details of the bidding options. The last date to submit an offer was in April 2018. Even though the government aimed to complete the process as soon as possible, the institutional transfer of state factories to the private sector lasted until the end of the year. As a result of this privatization policy, 10 sugar factories were privatized. The privatization of three sugar factories was canceled, and one factory did not receive any offers from the private sector.

Figure 2 shows the distribution of sugar factories before and after privatization. With the 2018 privatization policy, the number of state factories decreased from 25 to 15, and the number of private sugar factories increased from three to 12. A farmer's cooperative bought one of the factories (Fig. 2A). After privatization, state factories' production rights (quotas) decreased by about 40%, and the private sector increased their quotas by around 250% (Fig. 2B). The privatization of sugar factories

[2] According to the author's conversation with a sugar factory manager, more than 80 km between the field and the factory would not be economical for the farmers in terms of transportation costs. Therefore, sugar factories are located within the same geographical regions as farmers, and each sugar factory negotiates contracts with the farmers in the surrounding villages. This type of geographic dependency can create monopsony power, which we will address below.

[3] We received an official document from Turkish Sugar, which is the main institution that governs the state's sugar factories and the industry's contracting periods. In 2018, depending on the factory and production location, the contracting process began in February and lasted until May. Therefore, at the time of planting, farmers knew whether their contracting partner would be a state or private factory at the end of the year.

[4] Farmers must fulfill 90% of the sugar beet production outlined in their contract. If less than 90% of production is met, with the exception of some extreme conditions (e.g., fire, earthquake, frost, flood), the difference between the production and the amount in the contract is recorded as a debt for the farmers.

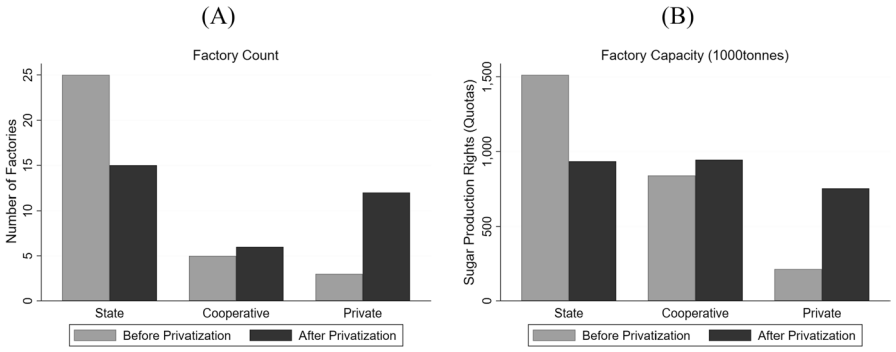


Fig. 2 Change in sugar factory shares with privatization. *Note* Fig. 2 shows the distribution of factories across state, cooperative, and private sectors before and after privatization. **A** shows the number of factories, and **B** shows the production rights (quotas), which are given according to a factory's capacities. The left-hand figure shows the situation at the beginning of 2018, and the right-hand figure shows the situation after the privatization policy. Source: Turkish Sugar (2019) and Official Gazette of the Republic of Turkey (No: 30495 and 30,677)

in 2018 has been one of the most significant changes in Turkey's sugar markets in the last century.

The announcement of the privatization of sugar factories in 2018 aroused significant concern within Turkey. Farmers' organizations and labor unions opposed privatization. In addition to these organizations, the collection of 1.69 million signatures against privatization shows that it was not just the farmers or laborers but also most sugar consumers who were against the privatization policy (TURK-IS, 2018).

The main concern related to the privatization policy was the closure of the newly privatized sugar factories after their transfer to the private sector. As occurred after previous privatization policies in Turkey, the private sector may choose not to operate these factories; instead, they may benefit from selling the land, which in many cases is quite valuable.

To prevent the closure of factories, the government declared that factories must be open for at least 5 years after their privatization; and in the event of closure, companies who bought the factories from the state should pay compensation. However, the mandatory 5-year production policy did not alleviate critics' concerns. In the previous privatization examples in Turkey, many factories were closed before the rule expired—even if there was a 5-year production rule. For instance, after the privatization of tobacco-related state enterprises in 2008, many of the factories were closed, and tobacco acreages decreased by more than 50% between 2008 and 2020 (TurkStat, 2022a).

Farmers are obliged to sell sugar beets to the factories with which they enter into contracts. Due to this monopsony, the possibility of the factories' closure significantly increased uncertainty among farmers. With the privatization announcement in February 2018, farmers learned that the state-owned factories with which they hold contracts would transfer to the private sector. Around April 2018, bidding ended for 13 of the 14 factories that would be privatized; and the privatization of three of the 14 factories was canceled. Therefore, at the time of planting, the farmers who were

under contract with these 13 factories knew that their contract partner would be part of the private sector at the end of the year. Consequently, in the middle of 2018, the uncertainty created by the announcement of the privatization policy affected farmers' sugar beet acreage decisions.

3 Data

In Turkey, sugar factories keep records of contracted sugar beet farmers and their related information. These factories share their records with the Sugar Department in the Ministry of Agriculture and Forestry. This department determines sugar quotas, distributes them to sugar factories, and inspects them.

We obtained a dataset from the Sugar Department. This dataset contains village-level observations. Due to the nature of sugar beets, factories contract with farmers in the surrounding villages. In almost all cases, there is only one factory that holds contracts with all of the farmers in a specific village.[5] Therefore, villages are unique geographical units in our dataset. This village dataset contains information on: production year; the names of provinces, districts, and villages; the level of sugar beet acreages, production, and yield; the prices that were paid by the factories; and last, the name of the factories. This dataset includes all of the villages with sugar beet farms and sugar factories in Turkey from 2015 to 2020.

We corrected many typos in the province, district, or factory name variables. We used TurkStat Producer Price Index (2003 = 100) to estimate the price variable in real terms. Consequently, our dataset contains 4251 unique villages. The total number of observations for 2015–2020 is 18,105. Since the factories or villages may opt in or out of the contract, the nature of the dataset is an unbalanced panel.

Table 1 shows descriptive statistics. We created two groups: treatment and control. The treatment group includes the state-owned factories that were listed in the privatization announcement at the beginning of 2018.[6] In the control group, we include other state factories (the ones not listed in the privatization announcement), cooperative, and private factories together. The sugar beet acreage variable shows the villages' total contracted sugar beet acreages.

Sugar beet prices are determined through negotiations between factories and farmers. The price is set at the time of contract, before the sugar beets are planted. The main factor affecting the pricing scheme is the polarization ratio—the amount

[5] We dropped the villages contract with more than factory in a given year (only 0.5% of the villages in total). In addition to these villages, 1.3% of the villages change the factories with which they form contracts over the years. We also dropped these villages in our dataset. We did an additional robustness check by keeping these villages, and the results were similar. These additional results are available upon request.

[6] There were 14 state-owned factories that were listed in the privatization announcement. However, in our treatment group, we only include 13 of the 14 groups of villages that were under contract with these state-owned factories. Since the bidding on one of the factories (Kastamonu Sugar Factory) was canceled in April 2018, farmers under contract with this factory knew that their partner would continue to be a state-owned factory at the time of planting sugar beets.

of sugar in the beets—which is determined as 16% on average. More polarization ratio means higher prices. In the case of extreme climate conditions, factories may also give additional production incentives.

Our variable of interest is sugar beet acreages. We evaluate how privatization uncertainty may have changed contracted sugar beet acreages. As is shown in Column 9 of Table 1, there is a statistical difference in sugar beet acreages between the treatment and control groups. There is also a difference in the production variable, which comes from two sources: one is from acreages, the other is the difference in yields. Even though there is a statistical difference in yields, the magnitude is small. Lastly, there is no difference in the prices between groups.

4 Empirical Strategy

4.1 Conceptual Framework

4.1.1 Farmer

Assume that a farmer wants to maximize his/her profits through planting either sugar beets or another crop. These crops are produced annually, and there is no storage option. Therefore, each year the farmer must choose between one of these two crops or choose not to grow either of them. In this imperfect market, the farmer behaves under credit constraints (Duflo et al., 2011; Fink et al., 2020). There are at least two reasons for being credit constrained: One is that financial markets are imperfect in developing countries such as Turkey (Besley, 1995). The second reason is that these small farmers do not have enough collateral to obtain the required credit in time (Binswanger & Sillers, 1983; Wang et al., 2014).

4.1.2 Farmer and Sugar Factory

Farmers who choose to grow sugar beets negotiate sales contracts with sugar factories. Because sugar is manufactured according to government quotas, sugar factories impose similar quotas upon farmers who grow sugar beets in Turkey. Sugar beet farmers negotiate contracts with sugar factories close to their villages since transporting sugar beets over long distances is not economical for farmers and sugar factories (Ali, 2004). Yearly contracts between farmers and sugar factories determine the conditions of sugar beet farming. Farmers may obtain cash payments or inputs in advance from the sugar factories to produce sugar beets. Getting the required cash or inputs for production may alleviate farmers' credit constraints (Simmons et al., 2005; Ton et al., 2018). In addition, purchasing guarantees from the sugar factories decreases the level of uncertainty after the harvest (Bijman, 2008).

One of the critical features of the contracts between the farmers and the sugar factories is that sugar factories have monopsonistic power (Key & Runsten, 1999). If the institutional properties of the sugar factory change—for instance, the transfer of a state-owned sugar factory to the private sector through privatization – the farmer cannot negotiate contracts with other sugar factories. If the

Table 1 Descriptive statistics

	To be privatized factories (Treatment group)				All other factories (Control group)				T-test difference (9)
	Mean (1)	Std. Dev. (2)	Minimum (3)	Maximum (4)	Mean (5)	Std. Dev. (6)	Minimum (7)	Maximum (8)	
Sugar beet acreage (ha)	72.97 (2.63)	111.64	0.27	3041.80	109.12 (5.26)	232.53	0.20	6491.40	−36.15***
Sugar beet production (tonne)	4296.02 (165.77)	7148.06	1.00	210768.09	6823.41 (360.09)	15999.95	1.95	461509.00	−2527.40***
Sugar beet yield (tonne/ha)	56.21 (0.29)	16.43	1.67	184.40	57.29 (0.31)	17.13	0.28	191.81	−1.08**
Sugar beet price (TL/tonne)	351.30 (0.61)	39.16	135.76	525.67	352.13 (0.75)	47.11	157.52	566.23	−0.83
Number of villages	1942				2309				
Observation in groups	8090				10,015				
Observation in total									18,105
F-test of joint significance									14.923***

Table 1 shows the descriptive statistics for our village-level panel data. The period for this dataset is 2015–2020. To-be-privatized refers to the factories that the government announced would undergo privatization at the beginning of 2018. All other factories includes the state-owned factories that were not in the announcement, cooperative, and private factories. T-test values are the difference in the means across the treatment and control groups. Standard errors are in the parenthesis, clustered at the village level: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

farmer is not satisfied with the institutional changes, he/she may produce fewer sugar beets, and/or consider alternative crops or stop farming altogether.

4.1.3 Privatization Uncertainty

The main argument of this paper is that sugar beet farmers decreased their acreages due to the uncertainty that was created by the government's announcement of the privatization of sugar factories in 2018. There are several reasons for farmers' uncertainty: One reason is the possibility of factory closure after privatization. The historic mission of Turkey's sugar factories has been to support farmers in their regions and ensure self-sufficient sugar production in the country (Damlıbağ, 2018). Even though some sugar factories did not profit for a long time, the government kept them open to help support farmers. Therefore, farmers might worry about the closure of these factories since it may not be possible for the private sector to profit from operations.

One of the reasons for the private sector to purchase these unprofitable sugar factories is that some of the factories' assets are more valuable than running the factory itself. Since these sugar factories were established long ago, their assets (especially land) are located in provincial centers. Therefore, after privatization, it may be possible to close many of these factories and profit from selling the land. In Turkey, farmers have experienced similar cases of privatization: for example, the privatization of tobacco factories: After privatization, many tobacco factories were closed, and the land was sold for other purposes, such as to build shopping malls (Tait, 2010).

Potential factory closure is not the only source of privatization uncertainty. As was mentioned above, the level of agricultural support is high in Turkey (OECD, 2021), and sugar factories are an important tool in the agricultural policy area. If state-owned sugar factories are privatized, farmers believe that private sugar factories may provide lower or late payments (Gow & Swinnen, 1998; Swinnen & Vandeplas, 2007). Since farmers do not have other options for selling their products, privatization uncertainty may significantly affect their income and output levels (Baron, 1970; Sandmo, 1971).

Last, private sugar factories may more strictly apply the contract terms than did the state-owned sugar factories. A farmer's income is significantly affected by the sugar level or the amount of mud in sugar beets when calculating the price of the crops. Private factories may more strictly apply the contract terms to manage factories' profitably, and thus, mistrust between factories and farmers may arise (Andersson et al., 2015; Key & Runsten, 1999; Ruml & Qaim, 2021). Consequently, farmers that worry about their income may quit farming sugar beets after the privatization of sugar factories.

In sum, privatization uncertainty affects farmers' decision to plant sugar beets. The main topics related to this issue are the possibility of the closure of sugar factories after privatization and the monopsonistic power of sugar factories, which may result in lower prices, late payments, or applying more strict contract terms.

4.2 Identification

We aim to estimate the impact of the privatization policy on sugar beet acreages in Turkey. In February 2018, the government announced that it would privatize more than half of the state's sugar factories. Around April 2018, farmers had to decide whether to sow sugar beets and enter into contracts with these soon-to-be privatized factories. Because of the natural constraints on sugar beet farming, which means that seeds must be planted around this time, farmers could not wait for the transfers to be completed; they had to decide under uncertain conditions.

Sugar factories select their contracted farmers according to their proximity to the factory, since it would not be economical to transport the sugar beets more than a certain distance (around 80 km between the sugar beet fields and the factory). Therefore, farmers' villages that were in the "catchment area" of a factory were identified as either the treatment group (for the to-be-privatized factories) or in the control group (the remaining sugar factories).

Comparing sugar beet acreages at the village level across different factory types may not be ideal. The acreages in the villages under contract with the factories listed in the privatization announcement in 2018 could be systematically different from those under contract with other state, cooperative, and private factories. However, in principle, panel data could control these differences.

In our village-level dataset, we have all of the relevant information on the villages and their contracted factories for 2015–2020. This dataset includes all the sugar factories in Turkey, including those that were privatized and other state, cooperative, and private factories. Therefore, our empirical strategy could utilize the difference-in-differences approach by identifying the villages under contract with to-be privatized factories as the treatment group and the villages under contract with all other factories as the control group. Our village-level difference-in-differences approach is similar to the ones in Galiani et al. (2005) and Giorcelli and Moser (2020) and could be represented as the following two-way fixed-effect model:

$$y_{vt} = \gamma_v + \tau_t + \beta D_{vt} + \alpha X_{vt} + \varepsilon_{vt} \tag{1}$$

where y_{vt} is the natural logarithm of sugar beet acreage for village v in year t; γ_v is the village fixed effect; τ_t is the year fixed effect; and D_{vt} is our variable of interest (the difference-in-differences variable). D_{vt} is 1 if the village v is under contract with a factory that was listed in the privatization announcement in 2018, 0 otherwise. Even though as a general notation D_{vt} includes t as a subscript, our treatment is not a time-varying policy. This is specific to the year 2018 and is the same for all villages; therefore, the treatment situation is a simpler version than the state-of-the-art discussion of difference-in-differences literature (Cunningham, 2021; de Chaisemartin & D'Haultfœuille, 2020; Goodman-Bacon, 2021).

This D_{vt} variable was created through the interaction between the treatment group variables and the year variables. We created several different D_{vt} that are context-dependent: For instance, in one specification, we multiplied the treatment and the post variable, which includes the 3 years after the privatization announcement, to show the institutional effect in addition to the announcement effect of the policy. In

another context, we separately estimate the years effect by interacting the treatment status with the three separate annual dummy variables after the policy announcement. In addition to these specifications, we also separately estimated the impact of the privatized factories and the other state factories that were listed in the privatization announcement but in which case their privatization was canceled. We give the details of this distinction in the results section.

Finally, the coefficient of D_{vt} is expected to show the causal effect of the privatization policy if the appropriate assumptions are made. The main assumption is that the change in sugar beet acreages in the control group is the counterfactual to the change in the villages that were under contract with the factories that were listed in the privatization announcement in 2018. This model explicitly estimates how the villages under contract with the to-be-privatized factories changed their sugar acreages compared to the other villages under contract with other factories, including other state, cooperative, and private factories. X_{vt} is the set of other variables that may affect sugar beet acreages at the village level; and ϵ_{vt} is the error term. Following the discussion in Bertrand et al. (2004), we clustered standard errors at the village level.

4.3 Identification Assumption: Parallel Trends

The difference-in-differences approach is useful when the appropriate policy design and datasets are available. However, to make a causal inference from that approach, one of the main assumptions is that the variables of interest should move in parallel before the policy implementation (Angrist & Pischke, 2015). This otherwise-parallel movement should change with the new policy. In this paper, our variable of interest is sugar beet acreages. We expect sugar beet acreages in the treatment and control groups to move in parallel before 2018, and the pattern should change in 2018 due to the uncertainty of privatization.

We show the change in sugar beet acreages in Fig. 3, which is a simple bivariate comparison between the treatment and control groups. We used two axes to consider the size differences between factory groups: The left axis is for the treatment group factories; and the right axis is for the control group factories. Sugar beet acreages increased in Turkey between 2015 and 2017 and decreased in 2018. This situation is consistent across all factory groups. However, the parallel movement between the factory groups changes in the year 2018 in contrast to the dotted line that shows the assumed counterfactual. The decrease in sugar beet acreages in the treatment group is larger than in the control group.

5 Impact of Privatization Uncertainty

In this section, we estimate the impact of privatization uncertainty on sugar beet acreages. We used five different specifications and created several difference-in-differences variables. In Column 1 of Table 2, we recorded the interaction between the treatment group variable (*to-be-privatized*) with the post variable, which is one if

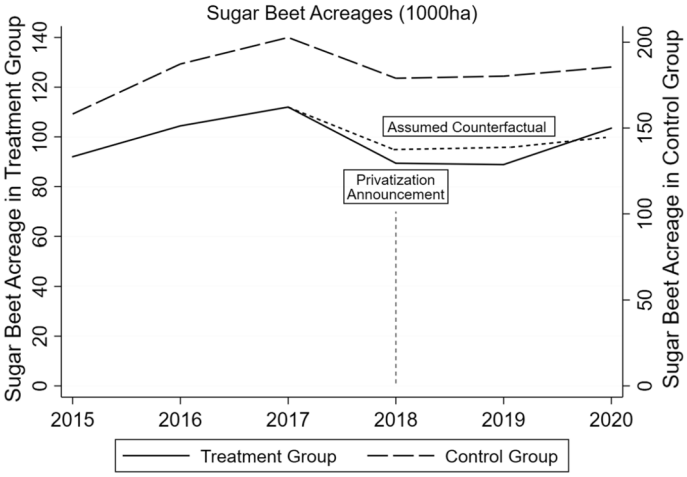


Fig. 3 Parallel trend of sugar beet acreages in treatment and control groups. *Note* Fig. 3 shows how total sugar beet acreages change in the treatment and control groups. The treatment group is the factories listed in the privatization announcement at the beginning of 2018, and the control group is other state, cooperative, and private factories. The left axis is for the treatment group, and the right is for the control group. The assumed counterfactual is the assumed slope of the line for treatment groups if there would not have been any privatization announcement

the year variable is greater than or equal to 2018. *To-be-privatized* × *Post* shows that the factories in the privatization announcement decreased their sugar beet acreages by more than 15% compared to the other factories. Therefore, we find that the privatization announcement and the transfer of these state factories to the private sector negatively affected the production of the farmers under contract with these sugar factories.

In Column 2 of Table 2, in addition to the factories that were listed in the privatization announcement, we also consider the other state-owned factories. The privatization of the state's sugar factories in Turkey had been on the policy agenda since the early 2000s. Therefore, although some state factories were not part of the privatization process in 2018, the farmers who were under contract with the other state-owned factories may have also believed that their factories would be privatized and closed in the future. However, according to the coefficient of *not-to-be-privatized* × *Post* variable in Column 2, farmers under contract with other state-owned factories increased their sugar beet acreages more than farmers under contract with other factories. Related to this issue, after the privatization period, farmers under contract with cooperative factories also decreased their contracted sugar beet acreages (Column 3 of Table 2).

Another significant finding is that even before the transfer of these institutions, the uncertainty of the privatization process may also have negatively affected farmers' behavior. For instance, in 2018, when farmers decided to negotiate contracts with these to-be-privatized factories, the factories were still state-owned factories, although farmers knew that they would be privatized. In Column 4 of Table 2, we separately estimate the year effects on the treatment group. We find that privatization had a negative

effect in all of these years (2018, 2019, 2020). In 2018, even though the transfer to the private sector had not yet taken place, some farmers choose not to negotiate contracts with these to-be-privatized state factories or committed to smaller acreages in their contracts. In the following years, farmers' uncertainty continued, and these factories decreased their contracted sugar beet acreages.

Some of the factories' privatization processes were canceled, which allows us to evaluate an interesting aspect of the privatization policy. In Column 5 of Table 2, we create two separate treatment groups and interact them with years. In the *actually-privatized* group, we consider the 10 factories that were privatized at the end of 2018. In the *canceled-privatized* group, we consider the three remaining state factories for which the privatization process was canceled. These factories were not transferred to the private sector.

As emphasized in this paper, the privatization announcement created uncertainty for the farmers under contract with state-owned factories in 2018. In Column 5, *actually-privatized* × *2018* and *canceled-privatized* × *2018* variables show that the villages under contract with these two groups significantly decreased their contracted sugar beet acreages by 12% and 19%, respectively. The negative effect continued for the actually-privatized group, whose sugar beet acreages decreased in 2019 and 2020. However, in the canceled-privatized group, the decrease becomes statistically insignificant in the following years, as is seen in the coefficients of *canceled-privatized* × *2019* and *canceled-privatized* × *2020* variables.

Consequently, the privatization policy created uncertainty among farmers, and sugar beet acreages decreased by more than 15% due to this policy. However, when the state remains the owner of the factory (as in the case of the canceled factories), farmers return to their normal behavior and negotiate contracts with these factories.

6 Discussion and Policy Implications

In this study, we consider privatization as a process and show that privatization may exhibit an anticipation effect due to uncertainty—even without the transfer of institutions. We focus on farmers who had to decide between the announcement of privatization and the transfer of institutions and estimate how the uncertainty of the privatization process affected farmer's decisions related to land allocation.

The findings of this study are consistent with the literature. Uncertainty is a critical factor that affects human behavior (Gilboa, 2009). Economic reform may create significant uncertainty in the markets (Dewatripont & Roland, 1995; Fernandez & Rodrik, 1991). Therefore, the uncertainty that is created by economic reform policies could affect human behavior (Potter, 2018). The following sub-sections provide additional empirical and anecdotal evidence and discuss the economic and political implications of our findings.

Table 2 The impact of privatization uncertainty on sugar beet acreages

	Dependent variable: logarithm of sugar beet acreage				
	(1)	(2)	(3)	(4)	(5)
To-be-privatized × post	−0.170*** (0.023)	−0.128*** (0.026)	−0.216*** (0.028)		
Not-to-be-privatized × post		0.088*** (0.029)			
Cooperative ×pPost			−0.114*** (0.030)		
Already-private × post			0.046 (0.051)		
To-be-privatized × 2018				−0.151*** (0.022)	
To-be-privatized × 2019				−0.206*** (0.030)	
To-be-privatized × 2020				−0.155*** (0.033)	
Actually-privatized × 2018					−0.123*** (0.026)
Actually-privatized × 2019					−0.270*** (0.037)
Actually-privatized × 2020					−0.199*** (0.039)
Canceled-privatized × 2018					−0.216*** (0.031)
Canceled-privatized × 2019					−0.064* (0.036)
Canceled-privatized × 2020					−0.063 (0.041)
Village fixed effects	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓
Number of clusters	4307	4307	4307	4307	4307
Observations	18,105	18,105	18,105	18,105	18,105

Table 2 shows the impact of privatization uncertainty on sugar beet acreages. To-be-privatized refers to the villages under contract with the factories that the government announced would be privatized at the beginning of 2018. Not-to-be-privatized is the other state factories that were not listed in the announcement of the privatization policy. Cooperative and already-private factories are the remaining factory groups. Actually-privatized factories are the factories privatized at the end of 2018. Canceled-privatized refers to the remaining three factories in which the privatization process was canceled. In all specifications, we control village and year fixed effects. Standard errors are in parentheses and clustered at the village level: ***$p<0.01$, **$p<0.05$, *$p<0.1$

6.1 Economic Value of the Impact of Privatization Uncertainty

One thing that we want to emphasize is the economic value of the impact of privatization uncertainty. We find that Turkey's sugar beet acreages decreased by more than 15% due to privatization uncertainty. This value is equal to approximately 18,000 hectares of sugar beet acreages, which translates into more than one million tons of sugar beets that were lost in 2018. If we take the polarization ratio (sugar ratio in a sugar beets) as 16%, then this decrease in sugar beet production is equivalent to about 170,000 tons of sugar. That amount of sugar is equal to the annual raw sugar consumption of approximately 18 million people in Turkey. Therefore, we conclude that the impact of privatization uncertainty was high in economic terms.

6.2 Anecdotal Evidence

In addition to the results of our empirical analysis on the impact of privatization uncertainty, one piece of critical anecdotal evidence came from the farmers themselves. Hüseyin Akay, the Chairman of Kayseri Sugar Beet Cooperative, which is one of the largest cooperatives in Turkey, said the following during a television program:

> *"Unfortunately, there was a bit of chaos in the privatization process in Turkey… the timing was not right…* ***The farmers could not know what kind of future they would face, and therefore, they slightly avoided production****… As you know, we bought Turhal Sugar Factory [one of the privatized factories]… although 800,000 tons of production was promised by the farmers, only 600,000 tons of production occurred… This definitely comes from the confusion in farmers' minds. Of course, there will be no such problem in the following period for our region." (emphasis added)*

The main findings in this paper are consistent with Chairman Akay's statement. In the following years (2019 and 2020), however, the newly privatized factories continued to experience a significant production loss compared to other sugar factories.

6.3 After Privatization

Following the announcement of the privatization policy (2018), only 10 of the listed factories were actually privatized; the privatization of three of the factories was canceled; and one of factories did not receive any offers from the private sector. Since the sale prices of these canceled factories were significant, half of the government's anticipated profits from the privatization policy were not received at the end of the year.

After privatization, none of the privatized factories were closed—probably due to the mandatory 5-year production policy after purchase. Turkey's sugar beet acreages also significantly increased after privatization (as is seen in Fig. 3). However, only six of the ten privatized factories were able to increase their contracted acreages; the

remaining four privatized factories decreased their contracted acreages between 2018 and 2020. Even though sugar beet acreages increased after privatization, according to the Sugar Sector Report, the number of sugar beet farmers decreased by 20% (Turkish Sugar, 2022). Finally, possibly due to the effects of the Covid-19 pandemic, sugar production decreased by 20% in 2021 compared to the previous year. Because of the effects of inflation, sugar, sugar beet farming, and privatization policies continue to be discussed among the public and in the policy arena.

6.4 Policy Implications

The privatization of sugar factories in Turkey has national and international policy implications. State-owned sugar factories have been the main tool for intervening in Turkey's sugar markets since the foundation of the Republic in 1923. However, with the implementation of the privatization policy in 2018, the role of the state in sugar markets decreased in the following years. Additionally, the Privatization Board of Turkey has announced that the privatization of the other state-owned sugar factories would be completed by 2023. Consequently, all state sugar factories are expected to be transferred to the private sector in the following years.

Farmers' trust in the state versus the private sector is one of the main determinants that create uncertainty around privatization policies. In Turkey's case, if the state would be able to keep the factories open after privatization, or if the private sector could run the factories without diverting their assets to other uses, then farmers would not worry about the future of their contract partner. However, farmers' limited trust or mistrust could decrease production or completely remove farmers from the market channels (Ruml & Qaim, 2021; Schipmann & Qaim, 2011).

In relation to international trade, interestingly, the timing of the privatization of sugar factories in Turkey coincides with the removal of the sugar quotas that lasted nearly 50 years in the European Union (EU). The EU is one of Turkey's most important trading partners in agricultural products (Engelbert et al., 2014). Therefore, it would be expected that trade with the EU could compensate for the sugar supply deficiency that was caused by privatization uncertainty in Turkey. However, this depends on how long the uncertainty in Turkey's sugar markets would last. If the privatized factories remain open, sugar production might not decrease in Turkey.

The topic discussed in this paper is related not just to the sugar or agricultural markets. Privatization and similar economic reform policies are applied worldwide, and their impacts are measured. As shown in this paper, the impact of an economic reform policy is sensitive to the measurement of time. The impact could have emerged even before the policy application—in our case, before the transfer of the institutions to the private sector. A critical point for policymakers is that trust or enough information related to the reform should be given to the markets. Reducing uncertainty would keep the damage to a minimum.

7 Conclusion

At the beginning of 2018, Turkey's sugar markets faced one of the most significant changes in the last century. The government announced that it would privatize 14 of 25 state-owned sugar factories. Even though the privatization announcement was made at the beginning of 2018, the actual transfer of the institutions stretched until the end of the year. This privatization announcement created uncertainty in the market—especially for the farmers under contract with these factories. Due to the natural constraints of sugar beet production, farmers could not wait until the end of the year to negotiate their contracts. Their reactions to this uncertainty were manifested through changing their sugar beet acreages in April 2018.

In this paper, the uncertainty created before the transfer of institutions and after the period of privatization were evaluated, and the impact on farmer's land allocation behavior was estimated. The main finding in this paper is that sugar beet acreages decreased by more than 15% due to the announcement of the privatization policy.

It is apparent that privatization policies significantly affect institutions by transferring them to the private sector. However, as shown in this paper, even before the transfer of institutions, uncertainty about their future may significantly affect individuals' behavior. Consequently, it is crucial that the policymakers who implement privatization—or any other related economic reform policies—consider future uncertainty and its impacts on the individuals who have a close relationship with these institutions.

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Declarations

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