Reforms in the production and distribution of electricity and its relationship to the manufacturing sector: the impact of replacing Luz y Fuerza del Centro by the Federal Electricity Commission

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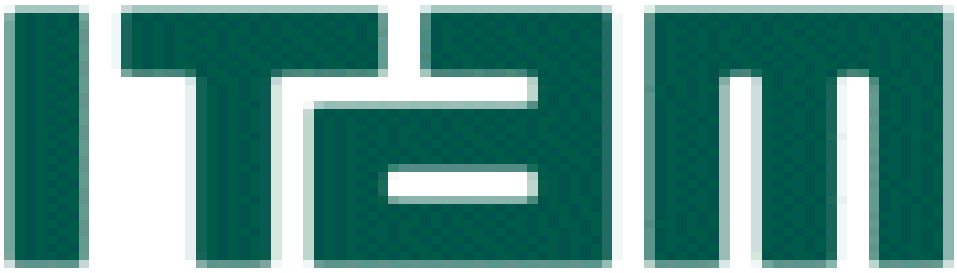

REFORMAS EN LA PRODUCCIÓN Y DISTRIBUCIÓN ELÉCTRICA Y SU RELACIÓN CON EL SECTOR MANUFACTURERO: EL IMPACTO DE LA SUSTITUCIÓN DE LUZ Y FUERZA DEL CENTRO POR LA COMISIÓN FEDERAL DE ELECTRICIDAD

TESIS

QUE PARA OBTENER EL TÍTULO DE
LICENCIADO EN ECONOMÍA
PRESENTA

ALEJANDRO MONTUFAR HELU JIMÉNEZ

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ALEJANDRO MONTUFAR HELU JIMÉNEZ

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FECHA

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FIRMA

Dedicada a:

Alfredo Montufar Helu, mi papá, mi jefe, mi patrón y mi amigo.
María Guadalupe Helu Medina, mi abuelita, la patrona y mi amiga.
Kensuke Teshima, mi asesor.

REFORMAS EN LA PRODUCCIÓN Y DISTRIBUCIÓN ELÉCTRICA Y SU RELACIÓN CON EL SECTOR MANUFACTURERO: EL IMPACTO DE LA SUSTITUCIÓN DE LUZ Y FUERZA DEL CENTRO POR LA COMISIÓN FEDERAL DE ELECTRICIDAD

Resumen

En la actualidad, la electricidad es más que un *"commodity"*[1] en virtud que es utilizada como un insumo para la producción de diversos bienes y servicios; puede ser provista por el gobierno o generada a través de una firma privada. En ese sentido, modificaciones en el mercado eléctrico implican efectos relevantes hacia la economía tanto a través de la demanda como de la oferta. Respecto a la oferta, las reformas en dicho sector pueden contribuir a modificar el nivel de producción de ciertas industrias y por ende, al Producto Interno Bruto (PIB) de una economía.

El trabajo de titulación en cuestión es un análisis de la electricidad como un insumo, es decir, un servicio brindado por el gobierno o una firma para producir otro servicio o bien. Dicho estudio se enfoca en el mercado mexicano y consiste en la medición del efecto en el sector manufacturero y sus subsectores respectivos de un aumento en la eficiencia de distribución de energía eléctrica en un ambiente de menor competencia.

Este trabajo está relacionado con la literatura del mercado de electricidad, sus reformas y su impacto. Desde hace tiempo, la investigación sobre la electricidad ha estado enfocada en el análisis de su demanda y su oferta, por lo que, dichos estudios son de naturaleza diversa. Primero, Levinshon y Petrin (2000) utilizan la electricidad como un proxi de la productividad. En segundo lugar, Estache y Rossi (2004), Dinkelman (2010), Walker y Benavides (2003), Pantanili y Benavides (2006) y Millan (2006) han estudiado la relación de la electricidad con el crecimiento y desarrollo económico. Después, las reformas del sector eléctrico de Estados Unidos han sido el objeto de diversos estudios (Joskow (1997), Joskow (2000) y Niederjohn (2003)). Asimismo, el comportamiento de los consumidores en el mercado mexicano ante variaciones de ingreso es un tema ya revisado (Samaniego y Berndt (1984)).

[1] Un *"commodity"* es aquel bien producido por diversas firmas y homogéneo.

Por último, se ha analizado su relación con el sector manufacturero, ya que, Berndt, Mori, Sawa and Wood (1991) evalúan los incrementos en los precios de la energía en los sectores manufactureros de Estados Unidos y Japón. Ellos concluyen que dichos choques tienen una contribución importante en el descenso de productividad en ambos sectores ocurrida en el periodo de 1958 -1981, debido, principalmente, al mecanismo de sustitución de utilización por medio del cual, las firmas ajustan la tasa de utilización de los elementos de capital en relación a su eficiencia energética, con el objetivo de mitigar el choque en costos.

Asimismo, de acuerdo con Barone y Cingano (2010), una regulación pro-competitiva respecto a la electricidad como insumo tiene un efecto positivo en el valor agregado, la productividad y el crecimiento de las exportaciones de aquellas industrias manufactureras de los países de alto ingreso[2]. En ese mismo sentido, Arnold, Javorcik y Matto (2011) concluyen que la liberalización en forma de privatización, apertura externa o un mayor número de firmas en los servicios de electricidad y gas tiene un efecto positivo en el desempeño del sector manufacturero. En base a lo anterior, la competencia tiene un efecto positivo en el sector manufacturero a través del canal de cantidad, calidad, confiabilidad, disponibilidad y transferencia de conocimiento (*know how*[3]); cabe mencionar que la competencia puede ser representada por una menor concentración de mercado, menores barreras de entrada o por controles de precios más flexibles[4]. Al

[2] Aquellos pertenecientes a la OCDE.

[3] El "*know how"* es aquel conocimiento que permite que una idea o concepto sea materializado, es decir, aquel conocimiento empírico que evita el alto costo de las primeras unidades de producción de cierto bien, del cual, generalmente, su proceso de producción está caracterizado por una estructura de "aprender haciendo", la cual, consiste en que los bienes de la primera línea de producción son relativamente costosos a los posteriores debido a los conocimientos prácticos adquiridos en el proceso productivo.

[4] Teshima (2010) prueba que la competencia en el sector manufacturero mexicano en términos de reducción de tarifas tiene como efecto un incremento en la eficiencia energética en términos de electricidad. Junto con Arnold, Javorcik y Matto, esto sugiere que la competencia tanto en la

respecto, la presente tesis es única debido a que analiza el impacto de una reforma eléctrica en el sector manufacturero que no consiste en mecanismos pro-competitivos.

En México a diferencia de varios países en desarrollo[5], el sector eléctrico es casi en su totalidad de propiedad estatal. La producción está compuesta tanto por el sector privado como el público mientras que la comercialización y distribución están a cargo solamente del gobierno. Aunque la privatización a través del mundo es cada vez más un proceso comúnmente adoptado, éste no ha sido implementado, porque, primero, la privatización tiene un estigma por parte de la población[6]; segundo, la generación de electricidad se considera un tema de seguridad nacional, y último y más importante, la Constitución Política de los Estados Unidos Mexicanos impone obstáculos para la privatización en dicho sector.

Sin embargo, en octubre de 2009 una reforma en dicho sector fue implementada para obtener mejoras en la eficiencia de tal mercado. La reforma consistió en un decreto por el cual una de las dos firmas públicas encargadas tanto de la producción como de la comercialización y distribución fue extinguida. Antes de esa fecha, la distribución y comercialización estaba a cargo de dos firmas de propiedad estatal, la Comisión Federal de Electricidad (CFE) y Luz y Fuerza del Centro (LFC). En contraste, la generación no sólo estaba a cargo de estas dos

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electricidad como en el sector manufacturero es importante en el desempeño en términos de eficiencia energética.

[5] Chile, Argentina, Colombia y Polonia tienen un sector eléctrico conformado en su mayoría de capital privado.

[6] El estigma se refiere a aquellos episodios históricos como por ejemplo, la crisis financiera de 1994 y el eventual rescate a la banca mexicana, a través, del Fondo Bancario de Protección al Ahorro (FOBAPROA), el cual, bajo la administración de Ernesto Zedillo, fue convertido en deuda pública en 1998 y que además, a la fecha, sigue siendo pagado a través de los impuestos de la población.

empresas sino que también de productores privados. Este evento representa más un cambio en la distribución y comercialización que en la generación de electricidad debido a que el 90 por ciento de la energía distribuida y comercializada por LFC era comprada a CFE. De acuerdo con las estadísticas de la Secretaria de Energía, la sustitución de LFC por CFE significó una mejora en la distribución de la electricidad porque el tiempo de interrupción de energía por usuario disminuyó en un rango de 67 a 19 minutos en aquellas áreas atendidas previamente por LFC y más aún, el tiempo promedio de conexión para nuevos usuarios fue reducido de 11.2 a 1.7 días y se habilitó el servicio a 45, 598 nuevos usuarios por mes, cantidad que representa 3 veces el número de usuarios que LFC habilitó en sus últimos 3 años de operación. Por lo tanto, el descenso en los 3 indicadores anteriores es evidencia de una mejora en la eficiencia de la distribución de energía eléctrica y por ende, de una mayor eficiencia de CFE sobre LFC.

En ese sentido, una mejor compañía en la producción, la distribución y comercialización de la electricidad induce a un efecto positivo en la producción de las industrias. Este efecto puede ser resultado de menores precios, una producción constante, menores interrupciones de energía y mejores estrategias de comercialización. No obstante, un efecto negativo puede tomar lugar en razón de los costos de ajuste[7] y la corrupción. La corrupción funciona en el sentido que

[7] Los costos de ajuste son generalmente definidos como los costos a corto plazo de la transición de un estado a otro. Más estrictamente, los costos de ajuste son los costos de la transferencia de recursos de un sector o firma a otro (a). Es útil establecer la distinción entre los costos de ajuste brutos y netos. Los costos brutos toman en cuenta los cambios positivos y negativos, incluidos los gastos derivados de la facturación de los recursos, mientras que los costes netos de ajuste se refieren al cambio en el nivel del uso de los recursos (mano de obra, capital) después de que ciertos efectos positivos y negativos se han compensado entre sí. Esencialmente, los recursos como tierra, trabajo y capital pueden convertirse en desempleados, obsoletos o pueden requerir reentrenamiento o reconfiguración. Una definición amplia de los costos de ajuste incluye los sufragados tanto por el sector privado y el sector público. El mayor impacto del cambio de políticas en el sector público es la pérdida de ingresos. (Conferencia de las Naciones Unidas sobre Comercio y Desarrollo, UNCTAD).

previamente a la sustitución de LFC por CFE, los consumidores en las áreas operadas por LFC pagaban una cantidad menor a aquella facturada o en su caso, no pagaban absolutamente nada, por lo que con CFE, en su papel de monopolio en la distribución y comercialización y en razón a su mayor eficiencia, el pago del recibo es mandatorio en dicha áreas, lo que significa un aumento en los costos de producción y por lo tanto, una disminución en ésta. Por otro lado, los costos de ajuste son costos de corto plazo debido a que su existencia es exclusiva al periodo de transición o adaptación de un proceso productivo, lo cual, evidentemente, afecta, al igual que la corrupción, negativamente a la producción.

Entonces, el decreto generó un evento que puede ser tomado como un experimento natural de un choque positivo en la eficiencia de la distribución eléctrica. Al respecto, el análisis se enfoca en el sector manufacturero debido a su naturaleza de producción, la cual, hace indispensable la utilización de la electricidad como insumo.

Además, el hecho que las áreas atendidas por LFC y CFE no consisten en las mismas localidades hace posible la formación de un *contra factual*[8]*.* El *contra factual* se construye a través de formar un grupo de tratamiento consistente en aquel conjunto de agentes económicos que sufrieron el evento y un grupo de control formado por el agregado de agentes que no fueron impactados por el choque pero que comparten diversas características con el grupo de tratamiento, lo cual, hace posible la evaluación del impacto del evento a través de una comparación.

En ese contexto, el grupo de tratamiento está compuesto por los estados de Hidalgo y el Estado de México así como por el Distrito Federal, mientras que para

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[8]Un *contra factual* es aquella situación que posibilita simular el comportamiento de ciertos agentes económicos en ausencia de cierto evento de interés con el fin de evaluar el efecto de éste último sobre diversas variables.

el grupo de control, se utilizan 3 conjuntos; el primero consiste en todos aquellos estados que no fueron parte del área operativa de LFC; el segundo, en aquellos que colindan con el grupo de tratamiento, y el tercero, en Jalisco y Nuevo León.

Lo anterior, posibilita la evaluación del efecto a través de un esquema econométrico y específicamente, el enfoque de diferencias en diferencias (*dif-in-dif)* con una regresión de Efectos Fijos. La especificación es la siguiente[9]:

$$Y_{f,e,s} = \beta_0 + \beta_1\ Tratamiento_e Después_f + \beta_2\ Int_s Después_f Tratamiento_e + \beta_3\ Autog_s\ Tratamiento_e\ Después_f + F_f + E_e + S_s + SF_{s,f} + \epsilon_{f,e,s}\ ,$$

donde *f* indica el periodo, *e* el estado y *s* el subsector; *"Y*" es la variable dependiente de interés ya sea el logaritmo del valor de producción o de la productividad laboral (la razón entre el valor de producción y el personal); *"Tratamiento"* es una variable dicotómica que indica si la observación corresponde al grupo de tratamiento, en cuyo caso, toma el valor de 1 y en otro caso, el valor de 0; *"Después"* es otra variable dicotómica que indica si la respectiva observación corresponde a un periodo posterior al evento, en cuyo caso toma el valor de 1 y en otro caso, el valor de 0; *"TratamientoDespués"* es una interacción entre las dos variables anteriores*; "Int"* es la Intensidad Eléctrica por subsector, es decir, un indicador (la razón entre el consumo de electricidad y el valor de producción) que controla por las diferencias entre los distintos subsectores en términos de consumo de electricidad; *"Autog"* es el indicador de Auto–generación por subsector (el cociente entre los permisos para autogeneración entre el número de firmas), el cual, controla por la producción privada de electricidad; *"F"*, *"E", "S", SF"* son vectores de efectos fijos del periodo (mes), estado, subsector y de la interacción entre el subsector y el periodo, respectivamente, y ϵ es el término de error.

[9] Asimismo, se utilizaron especificaciones adicionales, las cuales, están disponibles en el (i) del Apéndice.

En ese sentido, el hecho que el evento sea exógeno a las decisiones de las firmas hace posible que el enfoque *dif-in-dif* minimice los sesgos posibles en los resultados. El resultado principal consiste en un efecto negativo en el valor de producción del sector manufacturero[10]; sin embargo, el impacto negativo en el valor de producción es más pequeño mientras el subsector respectivo consume un mayor nivel de electricidad; incluso, el efecto puede volverse positivo si el consumo de electricidad es lo suficientemente alto. No obstante, este impacto positivo implicado por el consumo de electricidad disminuye mientras el subsector genera en mayor proporción su propia energía eléctrica.

Efecto Total (%)			
Valor del Indicador	**(1)**	**(2)**	**(3)**
Min IE- Max AG	- 66.73	- 74.46	-100
Media IE – Media AG	**- 10.27**	**- 10**	**- 5**
Max IE – Min AG	-46.77	-7.36	86.64
El valor de producción como la variable dependiente. El título de cada columna indica el grupo de control. (1) corresponde a los estados que no fueron parte del área operativa de LFC, (2) a los estados que colindan con el grupo de tratamiento y (3) a Jalisco y Nuevo León. IE se refiera a la Intensidad Eléctrica y AG a la Auto – Generación.			

Tabla 1. Efecto total.

El resultado principal es un efecto negativo en el sector manufacturero que, en promedio, consiste en una disminución tan mínima como el 5 por ciento o tan máxima como el 10.27 por ciento en el valor de producción; tal disminución, en términos monetarios, a precios constantes 2008, representa un costo cuyo mínimo se encuentra en $ 1 095 millones de pesos mientras que su máximo en $ 1 575 millones de pesos.

[10] Los resultados correspondientes a las especificaciones adicionales son presentados en el (ii) del Apéndice. Además, los resultados relativos a la productividad laboral no son presentados debido a que carecen de significancia estadística.

Por lo tanto, la sustitución de LFC por CFE no generó un efecto positivo neto en el valor de producción debido a la existencia de los costos de ajuste, los cuales, generalmente, son definidos como los costos de la transferencia de recursos de un sector o firma a otro (a). Los costos de transferencia surgen, esencialmente, debido a que los recursos económicos como tierra, trabajo y capital pueden convertirse en desempleados, obsoletos o pueden requerir rentrenamiento o reconfiguración. Claramente, ante la extinción de LFC, la CFE tuvo que implementar una estrategia de restructuración y aprendizaje en relación a la zona centro del país en virtud de las discrepancias entre el capital tanto humano como físico de cada empresa y de su desconocimiento en relación a la infraestructura eléctrica de dicha zona. Evidentemente, la expansión del área operativa de CFE le generó costos, lo cual, mitigó los beneficios que implica un sector eléctrico más eficiente; no obstante, los beneficios de largo plazo son considerados positivos debido a que los costos de ajuste son temporales, es decir, sólo se presentan en la etapa de restructuración o implementación. Al respecto, en base a los coeficientes de interés, se observa un efecto positivo en el valor de producción conforme la industria es más intensiva en el consumo de electricidad, lo que puede ser interpretado como que los costos de ajuste en el corto plazo, efectivamente, están mitigando los beneficios.

En conclusión, el análisis realizado muestra robustez en cuanto a la negatividad del efecto en el sector manufacturero, sin embargo, éste presenta ciertas limitaciones. La primera es relativa a las tarifas de electricidad debido a que el control utilizado consistió en un promedio tarifario[11], lo cual, es inadecuado en razón que las tarifas son función de la magnitud del consumo; en México, las tarifas son progresivas, lo que significa que para aquellas empresas de gran tamaño, éstas, en comparación a las empresas relativamente pequeñas, son mayores más que proporcionalmente. Al respecto, el control tarifario fue implementado a través de un promedio ya que la información del valor de producción no estaba disponible de manera desagregada por firma ni por

[11] En diversas especificaciones del (ii) del Apéndice se controló por las tarifas.

subsector. La segunda limitación consistió en la incapacidad de identificar la calificación de los trabajadores, es decir, la imposibilidad de dividir el universo de empresas entre intensivas en mano de obra calificada y no intensivas. Lo anterior, en razón que la electricidad puede ser un insumo sustituto o complemento; en el caso de una empresa intensiva en mano de obra calificada, la electricidad es complemento del trabajo mientras que en una empresa relativamente no calificada, dicho insumo es un sustituto. Evidentemente, dependiendo del perfil de la empresa, el efecto en la producción es distinto. La tercera consiste en que la especificación no identifica el efecto recesivo de la Gran Crisis financiera del 2007, lo cual, genera una subestimación en el componente positivo del efecto del evento de interés. Por último, el intervalo de las observaciones no permite identificar de manera adecuada el beneficio debido a que el rango de tiempo no es lo suficientemente largo; cabe mencionar que al ser el intervalo corto, por definición, los costos de ajuste son los que prevalecen en el efecto neto.

Introduction

Currently, electricity is more than just a commodity[12], is also an input for the production of several goods and services; it can be supplied by the government or generated by a private firm. Therefore, changes in electricity market can affect the economy not only through the demand but also thru the supply. Reforms in this sector can generate a significant effect on the production and therefore on the Gross Domestic Product (GDP) of a country.

The present paper is an analysis of electricity on the Mexican context as an input provided by the government; the approach consists in evaluating the effect on the manufacturing sector of an improvement in efficiency on electricity production and distribution. Noteworthy, the improvement is consequence of an anti-competitive event; although, it does not represent a pro-competitive source in terms of quality and reliability in electricity distribution and production, it indeed embodies a positive shock.

This paper is related to the literature on electricity market, its reforms and its impact. Formerly, investigation on electricity is in line with its effects on the demand and supply. Previous studies about electricity are diverse. First, Levinsohn and Petrin (2000) studied electricity as a proxy for productivity to estimate production functions. Also, its connection with economic development has been widely revised by Estache and Rossi (2004), Dinkelman, (2010), Walker and Benavides (2003), Pantanili and Benavides (2006) and Millan (2006). Furthermore, the reform process of the United States electricity sector has been discussed in terms of costs and benefits (Joskow (1997), Joskow (2000) and Niederjohn (2003)); moreover, consumption of electricity in the Mexican market has been analyzed in terms of income variations and segmented in different type of consumers (Samaniego and Berndt (1984)).

[12] A commodity is a homogenous good usually produced and/or sold by many different companies.

Finally, electricity has been previously linked with the manufacturing sector. Berndt, Mori, Sawa and Wood (1991) assessed the impact of electricity price shocks on the productivity of the manufacturing sector of United States and Japan, in the period of 1958-81. They concluded that energy price shocks have a negative effect on productivity due to the adjustment mechanism by which firms adjust the utilization rate of the capital vintages in order to mitigate the shock in costs.

Moreover, a less anticompetitive regulation respect to electricity as a service has a positive effect on value added, productivity and exports growth of high-income countries' manufacturing industries[13] (Barone and Cingano (2010)) and, similarly, liberalization (i.e. privatization, foreign supplier and less concentration) in services sectors as electricity and gas has, as well, a positive impact on the performance of the manufacturing sector (Arnold, Javorcik and Matto (2011)). Therefore, competition in the electricity sector has a positive effect on the manufacturing sector through quality, quantity, reliability, availability and knowledge transfer. A greater level of competition can be represented by reduction of entry barriers, fewer monopolies, less integration, less price and fees restriction and lower control in firm's structure[14].

Based on the foregoing, this paper is unique since it analyzes the relationship of electricity with the manufacturing sector through an anti-competitive event.

In Mexico, in contrast to several developing countries[15], the electricity sector is almost state-owned. Production is composed by private and public firms while

[13] The country members of OECD.

[14] And Teshima (2010) proved that competition in the Mexican manufacturing sector in terms of reduction of tariffs has an effect of increasing energy efficiency in terms of electricity. Together with Arnold, Javorcik and Matto (2011), this suggests competition of both electricity and manufacturing sector is important in performance in terms of energy efficiency.

[15] Chile, Argentina, Colombia and Poland have an electricity sector formed by private capital by more than half.

commercialization and distribution are only governmental activities. Although privatization throughout the world is increasingly a more commonly adopted process, it has not been implemented because first, it is seemed as a "bad" thing by the Mexican population due to painful historic episodes of privatization[16]; second, it is considered a matter of national security and finally, and most important, the Constitution sets legal obstacles for implementation.

Even though privatization has not been possible, in October 2009 a reform on the electricity sector was implemented to achieve improvements on market efficiency. The reform consisted in a decree by which one of both electricity state-owned firms was extinguished.

Before October 2009, distribution and commercialization of electricity was in charge of two state-owned firms: *Comision Federal de Electricidad* (CFE) and *Luz y Fuerza del Centro* (LFC). In contrast, generation has not been only in charge of these two public firms but also by private producers. Noteworthy, 90 per cent of electricity distributed and commercialized by LFC was bought to CFE, thus, the event represents an impact more focused to electricity distribution and commercialization than to generation.

According to the government, the substitution of LFC by CFE meant an improvement on electricity distribution since the interruption time per user decreased in a range of 67 to 19 minutes in the areas attended previously by LFC, the average time for connection for new users was reduced from 11.2 days to 1.7 days and 45, 598 new users were attended per month. The CFE new users per month are 3 times greater than LFC connected in its last 3 years of operation. The

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[16]A costly historical episode is represented by the financial crisis of 1994 and the eventual rescue of the banking by the FOBAPROA, the Banking Fund for Savings Protection, that was a fund converted into public debt in 1998 under the administration of president, Ernesto Zedillo and moreover, is still been paid by citizens through general taxes.

decline in the first two indicators and the new users are evidence of an improvement in efficiency on electricity distribution.

Noticeably, the reform is an event which implies an impact on the production because, nowadays, a high portion of firms use electricity to produce goods or services. It can affect in two ways; first, a better company in producing, distributing and commercializing electricity induces a positive effect on the production through lower prices, sufficient production, lower energy interruptions and better commercialization strategies and, secondly, a negative effect can take place due to the presence of corruption or adjustment costs [17]. Corruption functions that previously to the extinction of LFC, consumers in the areas operated by it were paying a quantity less than the bill or not paying at all their electricity consumption, consequently, when CFE became a monopoly in electricity distribution and commercialization and because of its higher efficiency, the bill became mandatory, meaning a raise on production costs, hence, a lower production. Besides, as the adjustment costs are short-term costs due to their existence is exclusive to the production process' transition or adaptation period, it affect negatively the production.

Specifically, the event is the substitution of LFC by CFE, which impacts the manufacturing sector production. In order to evaluate the impact, an econometric analysis is carried out; it is possible because the decree can be interpreted as a

[17] Adjustment costs are generally defined as the short term costs of transition from one state to another. More narrowly, adjustment costs are the costs of transferring resources from one sector to another. It is useful to draw the distinction between gross and net adjustment costs. The gross costs take account of positive and negative changes, including costs arising from the turnover in resources, whereas net adjustment costs refer to the change in level of resource (labor, capital) use after some of the positive and negative effects have offset one another. Essentially, resources such as land, labor and capital may become unemployed, obsolete or may require retraining or reconfiguring. A comprehensive definition of adjustment costs includes those borne by both the private and the public sector. The major impact of policy change on the public sector is loss of revenue. (United Nations Conference on Trade and Development, UNCTAD)

natural experiment consisting in a positive shock in the efficiency of electricity distribution and production.

The fact areas previously attended by LFC are different from those of CFE makes possible to form a *counter factual*[18] *.* The latter through constructing a treatment group, namely, a set of economic agents that suffer the event, and also by the formation of a control group i.e. a set of agents not impacted by the shock but who share several characteristics with the treatment group; thus, making possible the valuation of the event impact. The treatment group is composed of the states Hidalgo and Estado de Mexico and Mexico City, while for the control group, 3 sets are used; the first consists in all the states that were not part of the LFC operational area, the second is those adjoining the treatment group, and the third, Jalisco and Nuevo Leon. Specifically, the difference in difference (*dif-in-dif*) approach is adopted with a Fixed-Effects (FE) regression.

The main result is a negative average effect on manufacturing sector, which consists in a minimum decline of 5 per cent or maximum decline of 10 per cent, both in terms of value production; in monetized figures, it represents a cost as minimum as $ 1 095 million pesos or as maximum as $ 1 574 million pesos. In general, the negative impact on value production is smaller as industry consumes more electricity; even, it can become positive if consumption of electricity is high enough. Furthermore, positive effect on production implied by consumption of electricity is smaller as industry generates in a higher proportion its own electricity. Noteworthy, the event is exogenous in terms of firms' decision making implying a minimization in the potential biases of the results.

[18]A *counterfactual* is a conditional (or "if-then") statement indicating what would be the case if its antecedent were true (although it is not true). In an economic sense, generally, a *counter factual* is used to evaluate a policy or event through a situation in which is possible to simulate the consequences in the economic agents' actions in an artificial context without the presence of the event.

Therefore, the substitution of LFC by CFE did not generate a positive net impact due to adjustment costs which consist in the costs of transferring resources from one sector to another. Essentially, it appears when resources such as land, labor and capital may become unemployed, obsolete or may require retraining or reconfiguring. Clearly, CFE had to implement a restructuring and learning strategy focused to the center of the country due to the discrepancies between the human and physical capital of both companies and its ignorance regarding the electricity infrastructure of the area. Noticeably, the enlargement of the operational area of CFE generated costs, which mitigated the benefits that imply a more efficient electricity sector. However, the long-term benefits are considered positive because, generally, adjustment costs are only presented in the restructuring or implementation phase. In this regard, based on the coefficients of interest, there is a positive effect on the value production as the industry is more intensive in its electricity consumption, which can be interpreted as the adjustment costs in the short term, indeed, are mitigating the benefits.

In conclusion, the analysis is robust regarding the effect on the manufacturing sector; however, it has certain limitations. The first is tariffs; it were controlled by an average but that's inadequate due to its progressiveness, which means that for those large companies, tariffs compared to relatively small firms are higher more than proportionately. In this regard, the average tariff was implemented because disaggregated information by firm wasn't available. The second limitation was the inability to identify qualification of workers, namely, the impossibility of dividing the universe of firms between skilled-labor intensive and non-intensive. This is important because electricity can be a substitute or complement for labor; in case of a skilled-labor intensive firm, electricity is a complement while in a relatively unskilled firm, it is a substitute. Obviously, depending on the firm profile, the effect on production differs. Third, the specification doesn't identify the negative impact of the 2007 Great Crisis which generates a subestimation in the positive component of the event effect. Finally, the time range of the analysis wasn't long enough to

measure adequately the benefits; noteworthy, with a short interval, by definition, adjustment costs prevail on the net effect.

Background information

Since 1992, the Mexican electricity sector has been formed by private and public participation. Specifically, distribution and commercialization has been only state-owned, meanwhile production has been in charge of both sectors with a market participation of public one of two thirds. Regarding commercialization and distribution, it had been performed by two public enterprises: the *Comision Federal de Electricidad* (CFE) and *Luz y Fuerza del Centro* (LFC). Nevertheless, after October 2009, that process was characterized by a monopoly structure due to a presidential decree by which LFC was extinguished.

The *Secretaria de Energia* (SENER) is the Mexican Ministry of Energy and its purpose is to establish and to conduct the energetic policy of the country respect to hydrocarbons, minerals and electricity. As part of its substantive functions, SENER supervises parastatal entities of the energy sector. At the beginning of its presidential period, Felipe Calderon established the *Plan Nacional de Desarrollo 2007 -2012* (National Plan of Development 2007-2012) in which a higher electricity supply quality was considered an objective. This plan established, in turn, the *Programa Sectorial de Energia 2007-2012* (Sectorial Energy Program 2007-2012), which its main aim was to achieve an efficient operation of public organisms that integrated the energy sector (noteworthy, at the time of the program implementation, CFE and LFC were in operation). As a consequence of the program, in August 2009, SENER elaborated a study and a diagnostic of the sector, focused specially on LFC performance.

Regarding the analysis, LFC was one of both state firms in charge of distribution, commercialization and production of electricity in Mexico. Its area of attention represented 1.04 per cent of the total surface of the country, integrating sixteen delegations of the Distrito Federal (Mexico City), eighty two municipalities of Estado de Mexico, forty five municipalities of Hidalgo, two municipalities of Morelos

and three of Puebla. Besides, the firm provided energy for almost six millions users. Furthermore:

1. More than 90 per cent of the energy received by LFC was bought to CFE meaning that the former was, mainly, a distributing and commercializing firm, thus, not a producer of electricity.
2. In 2008, LFC sales represented 17 per cent of the electricity sector and its consumers, 19 per cent of the national user registry.
3. 2003 LFC costs were 1.7 times the value of it sales; moreover, its costs represented more than twice its sales by 2008.
4. LFC production process was characterized by a labor surplus. This was explained because, first, some workers made activities not specific to the electricity industry; secondly, due to an inexistence of multi-functionality in workers (v.g. a car driver was incapable of changing a tire in case of breakdown); next, because some transitory workers became part of the fixed payroll without requirement and, finally, the labor union stresses of higher labor recruitment were fulfilled even though there were no vacancies.
5. In addition, LFC labor lending was excessive and illogic. Par example, LFC authorized travel allowance even for activities executed in the same city.
6. LFC Labor liability was $ 200 thousand million pesos of which $ 80 thousand million pesos corresponded to active workers; therefore, the remaining sum was for retired workers. Besides, LFC did not have a fund to bank up this labor liability. Moreover, the 2008 integrated monthly annuity corresponding to retired workers was 2.7 times than the integrated monthly wage of active workers. Further, the ratio of wages and annuities over sales products was almost 45 per cent, greater than CFE where it was less than 15 per cent.
7. Regarding the electricity losses percentage, LFC had a loss equivalent almost 3 times larger than CFE. Specifically, LFC losses represented 32.5 per cent of the energy that was bought and produced to sale. The estimated value of the loss ascended just about to $ 25 thousand million pesos per

year, equivalent to 52 per cent of the total incomes by sales. Noteworthy, virtually no electricity firm in the world has that losses percentage.

8. CFE worker productivity was larger than LFC; users attended per LFC worker in terms of electricity distribution and commercialization were 292, while, for CFE, it were 610. Furthermore, a CFE worker registered approximately 1000 electricity lectures per day, while a LFC worker registered only 180.
9. In June 2009, LFC interruption time per user by year without external encumbrances as weather shocks was 108 minutes, meanwhile, for CFE, it was 57 minutes.

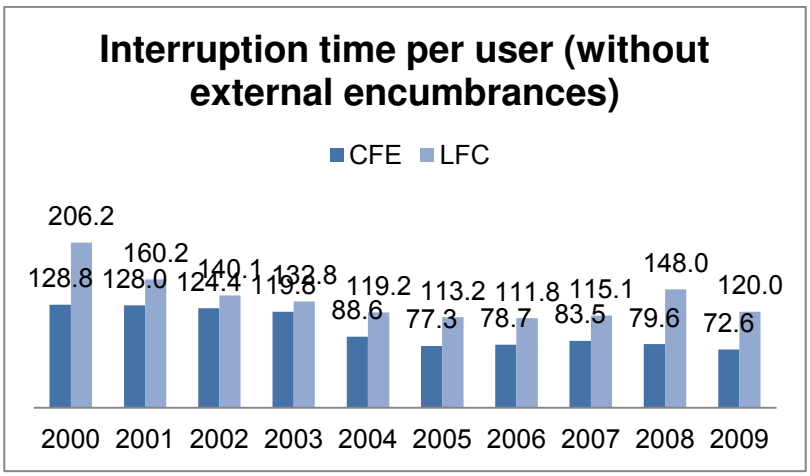

Figure 1.Interruption time per user (without external encumbrances as natural shocks). Source: own elaboration with data of SENER.

10. LFC unitary labor cost was increasing while for CFE it was relatively constant.

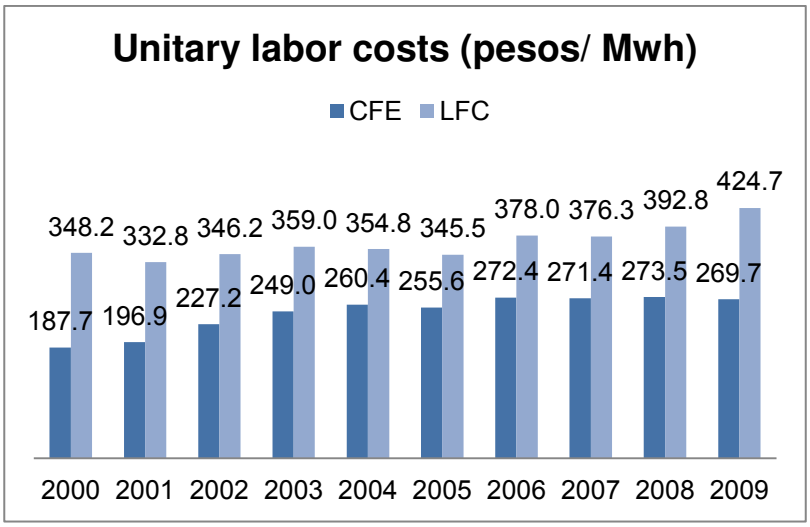

Figure 2.Unitary labor costs (pesos/ Megawatts hour).Source: own elaboration with data of SENER.

11. LFC construction time of transmission lines was 3 times greater than CFE. Moreover, regarding substations, the LFC cost was larger than twice that CFE.
12. From 2001 to 2008, LFC governmental transfers increased in more than 3 times. Specifically, 2008 transfers consisted in $ 42 thousand millions pesos.
13. For the connection time for new users:

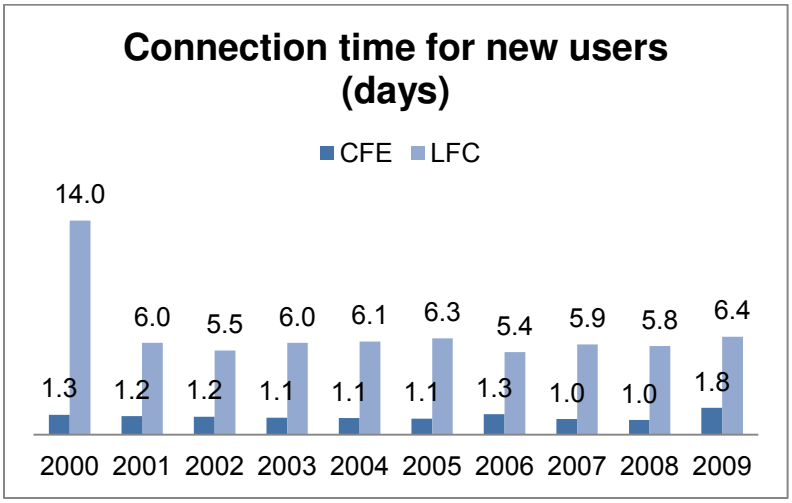

Figure 3.Connection time for new users in days. Source: own elaboration with data of SENER.

Thereon, government recognized LFC had been having a bad performance and hence, an inhibitor to the economy[19]. Specifically, the high connection time represented non-attended requests for almost 900 Mwh, 2.5 per cent of the highest country demand. The estimated value of the unsupplied potency was an amount greater than $ 8 thousand million pesos, per year, 1 per cent of GDP. Furthermore, it inhibited approximately 187 thousand hardships. Therefore, the president published on October 11th 2009 the **Decree by which the decentralized organism Luz y Fuerza del Centro is extinguished**.

Further, according to the *ex-ante* governmental evaluation, the project would involve the following benefits:

1. – A saving of $ 184 thousand million pesos due to the ending of LFC governmental transfer. Noteworthy, it was estimated for the following three years since the date of the decree publication.

2.– A saving in 2010 payroll of $ 10 800 million pesos and $ 9 thousand million pesos for 2009. Moreover, an operation costs saving of $ 12 thousand million pesos after one year of extinction, accomplished by an improved operation capacity and an upgraded execution of works; also, an additional saving of $ 543 thousand million pesos, for the next 20 years.

3.– Regarding the service quality, the average time for connection for new users was reduced from 11.2 days to 1.7 days, 45 598 new users per month were attended which represented 3 times that LFC connected in its 3 last years of operation and the energy interruption time per user had an improvement from 67 minutes to 19 minutes, from October 2009 to August 2010.

4.– The non-attended requests were fulfilled nearly in its totality; 90 per cent were finished only in 2010.

5.– Finally, the infrastructure was improved: 12 big works left behind by LFC were finished, 13 projects are in construction progress, 3 new substations were built, several improvements were carried out in the already existing substations, 3 000

[19] Clearly, electricity has a positive impact on both, economic development and growth.

transformers were installed, 8 882 poles were replaced and it was given maintenance to 2 888 kilometers of transmission and distribution lines.

Besides, according to several business organizations belonging to the LFC operational area (*COPARMEX, CONCANACO, AIEM* and *CONCAMIN*), the main LFC problem was the electricity interruption that affected directly its production.

Literature Review

Electricity literature is diverse; it is related to the electricity market, its reforms and its impact. First, electricity consumption of Mexican market has been analyzed in terms of income variations and segmented into different type of consumers by Samaniego and Berndt (1984). They found that positive shocks in income increases both types of consumers, those recently connected with the service and those that had already the service.

Further, the reform process of United States electricity sector has been discussed in terms of costs and benefits (Joskow (1997); Joskow (2000) and Niederjohn (2003)). According to Joskow, a competitive market in the generation sector can be efficient; nevertheless, it is difficult to replicate the efficiency of a centralized firm with vertical integration of generation and transmission due to the inefficiencies of the *double marginalization*[20]*.* Likewise, the investment is not as efficient as it would be in a vertical integration situation because it is induced to be independent in each stage of the electricity market. Besides, he concluded that the restructuring of the sector is due to distributional reasons since the reform is adopted in order to avoid the sunk costs characteristics of the investment process and the commitments with the labor unions. Finally, Joskow suggested that the restructuring cost could be lowered through an adequate regulatory reform rather than the in-a-rush one implemented due to the interest groups petitions. Furthermore, Niederjohn (2003) pointed out that in the electricity sector, although the regulatory reforms are associated with a lower employment level, the weekly and premium earnings corresponding to the employees had an increase. Additionally, he showed that the electricity sector's unionization rate lowered. Moreover, he stressed that the

[20] The double marginalization consists in a situation where a firm with market power buys an input from another firm that also has market power. The producer of the input will price above marginal cost when it sells the input to the other firm, who will then price above marginal cost again when they sell the final product that uses the input. This means the input is being market up above marginal cost twice: once by the producer of the input, and once again by the firm that uses the input to make its final product.

electricity market is the first deregulated industry that shows lower employment with higher earnings per employee. Finally, Niederjohn concluded that the positive results are caused by a cutting-cost policy through employment declines and not by reducing earnings actions.

Besides, electricity has been often related with economic development since it affects quality of life of consumers and producers (Walker and Benavides (2003), Pantanili and Benavides (2006) and Millan (2006)). In that sense, Dinkelman (2010) showed that in South Africa, electrification significantly raised female employment and appeared to increase the work hours for both genders while reducing female wages and increasing male ones. As conclusion, the former raise in employment is materialized because household electrification diminishes the time that women destine to home production and also by enabling microenterprises. In addition, it affected, as well, the migration behavior. Moreover, in the Latin America context, Estache and Rossi (2004) analyzed the impact of the choice of ownership and regulatory regime on firms' productivity and retail prices. They conclude that the regulatory regime matters since private firms perform better than public ones; nevertheless, there is no a clear pattern of differences in prices according to the regime. Finally, they concluded that in a privatization retail prices fell in general and specifically in Latin America, the decrease did not match with the productivity gains, implying that the consumers benefited in some amount.

Further, electricity has been used as a proxy for productivity with the objective of solving the simultaneity problem which represents the correlation between the inputs level and the productive process specific for the firm in the estimation of the production function (Levinsohn and Petrin (2000)).

Besides, in high-income countries with relative less-anticompetitive regulation, fewer regulations consisting in incentives to an anti-competitiveness environment in the electricity and gas sector, skilled-worker sector, telecommunications and transport sector, have a positive effect on value added, productivity and exports

growth of the manufacturing industries that use less-regulated services more intensively. Additionally, less anti-competitive regulation in the electricity and professional sector has an important positive effect on the economy. The channel through which the effect takes place is that competition means less entry barriers, fewer monopolies, less integration, less price restriction and less control in the firm's structure (Barone and Cingano (2010)). Furthermore, liberalization (i.e. privatization, foreign suppliers and more competition) in services inputs as electricity and gas has a positive effect in the performance of the manufacturing sector. Regarding the 3 previous types of liberalization, the most important in terms of its impact is the presence of foreign suppliers. Additionally, the channel by which this effect happens could be a higher quality and reliability of the service, an increase in quantity, higher diversity of services and the *"know how"*[21] transfers (Arnold, Javorcik and Matto (2011)).[22]

Finally, Berndt, Mori, Sawa and Wood (1991) examine the utilization responses [23] to energy price shocks on United States and Japan manufacturing sectors. They

[21] The *"know how"* is that knowledge by which an idea or concept can be materialized. This empirical knowledge is of great importance because it avoids the high cost of the first units of production of certain good that are characterized of production process with structure of *"learning by doing"*, which, consists in the idea that the first goods in the production process are relatively costly while the following ones are relatively cheaper due to the practical knowledge acquired in the production.

[22] And Teshima (2010) proved that competition in the Mexican manufacturing sector as reduction of tariffs has an effect of increasing the energy efficiency in terms of electricity. The authors' interpretation is that the latter result is due to the general technology improvement caused by the same competition shock. Specifically, Teshima found that an increase in competition has as a consequence, a higher Research & Development (R&D) investment and amount of processes; therefore, this energy efficiency improvement in terms of electricity could be achieved by the new technology brought by the R&D processes.

[23] The utilization responses refers to the adjustment mechanism by which firms are able to adjust utilization rates for capital vintages embodying different energy efficiencies, thereby partially mitigating the effects of the unexpected energy price changes.

employed data for the period 1958-81 of input and output factor accounts for the manufacturing sector of both countries in order to assess the potential importance of the utilization adjustment mechanism in aggregate capital stock and multifactor productivity measurement. The authors concluded that the adjustment effects were significant in accounting for the productivity decrease in both manufacturing industries.

Identification Strategy

LFC extinction can be interpreted as a natural experiment consisting in a positive shock in the electricity distribution efficiency. The event is the substitution of LFC by CFE, which impacts the manufacturing production. Noteworthy, the event is exogenous in terms of firms' decision making implying a minimization in the potential biases of the results.

The fact areas previously attended by LFC are different from those of CFE makes possible the formation of a *counter factual*. The latter through the construction of a treatment group, namely, a set of economic agents that suffered the event, and also, the formation of a control group (i.e. a set of agents that were not impacted by the shock but share several characteristics with the treatment group); thus, making possible the valuation of the event impact.

Given this situation, the *dif-in-dif* econometric approach is adopted. The treatment group will consist of the areas previously attended by LFC, namely, the states of Hidalgo and Mexico and the Distrito Federal. Noteworthy, certain localities of Puebla were in LFC operational area, however, this state is not considered in the treatment group because the area consisted only of two small municipalities.

On the other hand, three different sets are used for the formation of the control group due to the essential assumption of the *dif-in-dif* approach which consists in a similar trend between both groups in order to make possible the existence of a *counter factual.* The first control group is integrated by those states that were not attended by LFC; the second by those states that adjoin with the treatment group, and the third in the states that have a similar size market.

The first control group is formed in such overall manner due to the contemporary geopolitical division of the world, which, generally, consists in states – countries; thus, making possible to link certain regions or states to an institution with general

socioeconomic and political characteristics. Therefore, the treatment and the first control group are in a similar trend due to being part of the same country.

Image 1 .Mexico. First control group. Source: own elaboration with data of INEGI.

The second control group consists of the states that are adjacent to the treatment group, namely, the states of Puebla, Queretaro, San Luis Potosi, Veracruz, Tlaxcala, Michoacan and Guerrero.

Image 2. Mexico. Second control group. Source: own elaboration with data of INEGI.

It is formed in such way because some states share not only general characteristics but also specific characteristics as markets and inhabitants. According to the National Institute of Statistics and Geography (INEGI), the states Hidalgo and Estado de Mexico and Mexico City compose a Metropolitan Area (MA)[24] named Mexican Valley Metropolitan Area (MVMA).

Image3. Metropolitan Area of Mexican Valley. Source: Wikipedia.

Moreover, currently, economic and social integration has been greater in such way that new forms of organization between cities have emerged. The *Megalopolis*[25] or city-region defined by sociologist Saskia Sassen in 1991 is one of these forms. According to this concept, Hidalgo, Estado de Mexico, Querétaro, Puebla, Tlaxcala and Morelos, in conjunction with Mexico City, integrate the Mexico City *Megalopolis* (MCM); thus, the MCM makes possible that these states form the second control group.

[24] The general concept of a metropolitan area is that of a core area containing a large population nucleus, together with adjacent communities that have a high degree of economic and social integration with that core.

[25] A *Megalopolis* is a set of metropolitan areas which their increasing economic and urban growth leads to the contact of their influence areas.

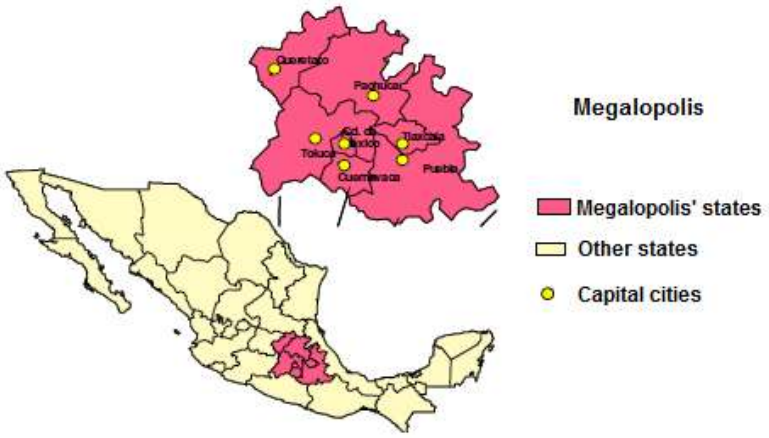

Image 4. Megalopolis of Mexico City. Source: Gobierno del Estado de Hidalgo.

Finally, the third control group consists in Jalisco and Nuevo Leon.

Image 5. Mexico. Third control group. Source: own elaboration with data of INEGI.

It is because such states jointly with Estado de Mexico and Mexico City contribute the most to the GDP.

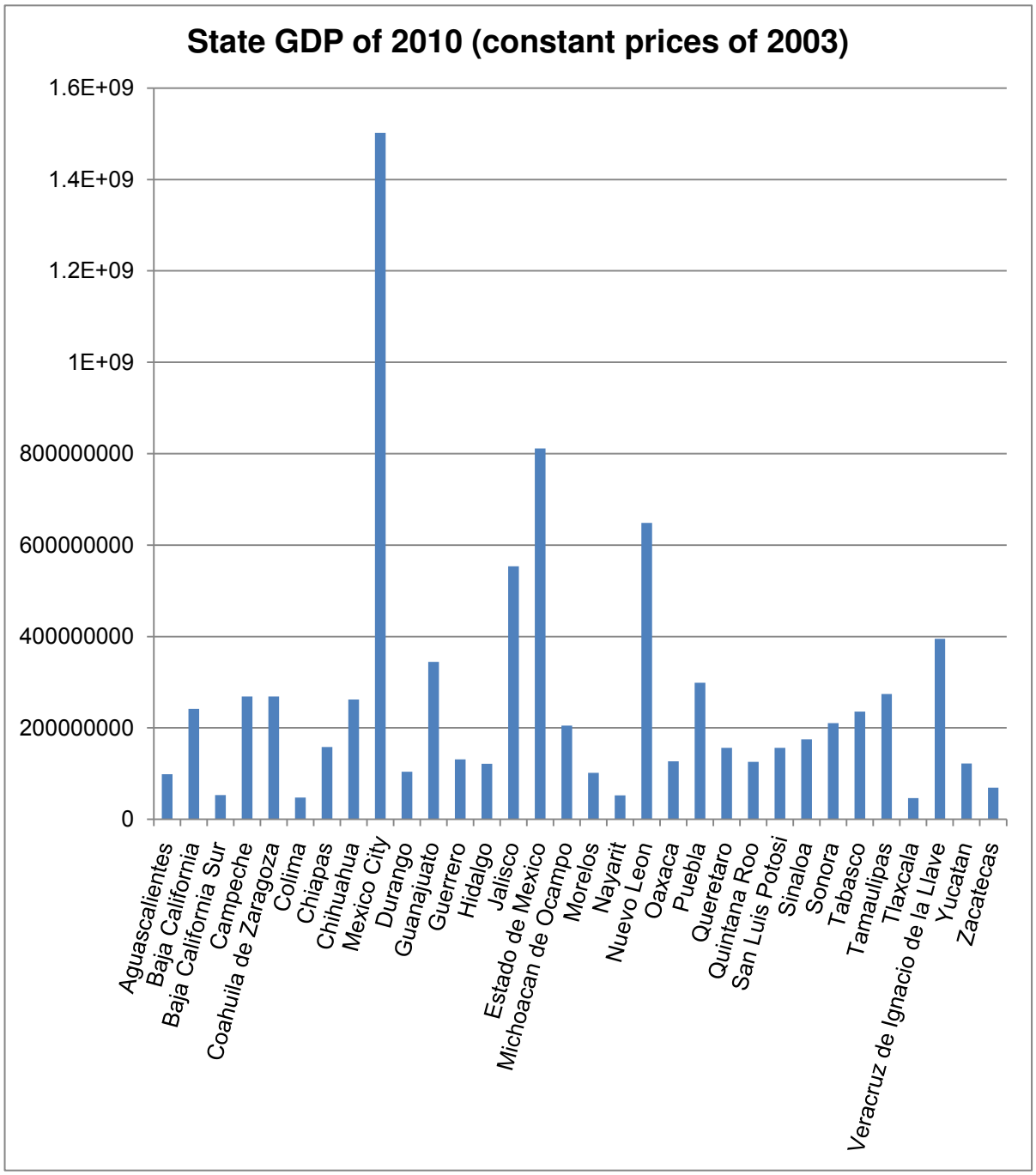

Figure 4. State GDP of Mexico in 2010 (constant prices of 2003). Source: own elaboration with data of BIE (INEGI).

Data

The data consist of the manufacturing sector's value production, which is extracted from the Economic Information Bank (BIE) from INEGI. In Mexico, the manufacturing sector is divided into industries, which, each one is identified by a code and corresponds to a certain productive activity.

Code	Description
311	Food industry
312	Beverage industry and snuff
313	Manufacture of textile materials and finishing textiles
314	Manufacture of textile materials, clothing except
315	Manufacture of clothing
316	Tanning and finishing leather and manufacture of leather, artificial skin and materials
321	Wood industry
322	Paper industry
323	Printing and allied industries
324	Manufacture of petroleum products and coal
325	Chemical industry
326	Plastic industry and rubber
327	Manufacturing based non-metallic minerals
331	Basic metal industries
332	Metal products manufacturing
333	Manufacture of machinery and equipment
334	Manufacture of computer equipment, communication, measurement and other electrical equipment, components and accessories
335	Manufacture of electrical generation power accessories, equipment and devices
336	Manufacture of transportation equipment
337	Manufacture of furniture, mattresses and blinds
339	Other industries

Code and description of the industries of the manufacturing sector.

Table 1. Manufacturing industries. Source: own elaboration with data of BIE from INEGI.

The value production is in thousands of pesos, per month, by state, by industry and covers the period from January 2007 to August 2011 (i.e. 55 months). However, such information is not available all over the country but only in 17 states and Mexico City. These states are Aguascalientes, Baja California, Chihuahua, Coahuila, Durango, Guanajuato, Jalisco, Michoacan, Nuevo Leon, Puebla, Queretaro, San Luis Potosi, Sonora, Tamaulipas, Veracruz, Hidalgo and Estado de Mexico. Therefore, two control groups and the treatment group are reduced compared to the states that originally integrated them. In this regard, the treatment group will be composed of Hidalgo, Estado de Mexico and Mexico City; the control group consisting of those areas attended by CFE will consist of the aforementioned states, except for those who constitute the universe of the treatment group, and the control group adjacent to the treatment group will be form by the states of Michoacán, Queretaro, Puebla, Veracruz and San Luis Potosi.

Additionally, the aforementioned industries are not present in all states, namely, certain states have a greater or lesser number of industries. For example, Estado de Mexico has all the industries while Hidalgo and Mexico City doesn't. Hidalgo does not have, among others, the textiles, wood and beverage industries and Mexico City, the oil and coal industry.

Besides, the analysis uses an indicator for labor productivity, which, is the ratio of the value production over the number of workers in each industry. Likewise the value production, the number of workers is data obtained from the BIE.

Furthermore, the ratio per industry of the electricity consumption over the value production is intended to be the electricity intensity. The electricity consumption is data from 2009 and its denomination is in pesos; it is obtained from the INEGI's 2009 Economic Census. Noteworthy, the indicator is not constructed for the industry 339 due to the electricity consumption of that industry isn't available.

Code	Description	Electricity Intensity
311	Food industry	0.0118
312	Beverage industry and snuff	0.0095
313	Manufacture of textile materials and finishing textiles	0.0604
314	Manufacture of textile materials, clothing except	0.0329
315	Manufacture of clothing	0.0151
316	Tanning and finishing leather and manufacture of leather, artificial skin and materials	0.0150
321	Wood industry	0.0199
322	Paper industry	0.0408
323	Printing and allied industries	0.0202
324	Manufacture of petroleum products and coal	0.0010
325	Chemical industry	0.0106
326	Plastic industry and rubber	0.0355
327	Manufacturing based non-metallic minerals	0.0495
331	Basic metal industries	0.0340
332	Metal products manufacturing	0.0204
333	Manufacture of machinery and equipment	0.0130
334	Manufacture of computer equipment, communication, measurement and other electrical equipment, components and accessories	0.0242
335	Manufacture of electrical generation power accessories, equipment and devices	0.0207
336	Manufacture of transportation equipment	0.0109
337	Manufacture of furniture, mattresses and blinds	0.0150
339	Other industries	
	Mean	0.0235
	Standard Deviation	0.0141
	Max	0.0604
	Min	0.0010
The Electricity Intensity is the ratio of the electricity consumption over the production value.		

Table 2. Electricity Intensity.

The ratio by industry of exports over sales is used to show the proportion of exports that correspond to sales. The data is obtained, as well, from the BIE and it's from 2007.

Code	Description	Exports – Sales Ratio
311	Food industry	0.057
312	Beverage industry and snuff	0.125
313	Manufacture of textile materials and finishing textiles	0.191
314	Manufacture of textile materials, clothing except	0.223
315	Manufacture of clothing	0.082
316	Tanning and finishing leather and manufacture of leather, artificial skin and materials	0.246
321	Wood industry	0.165
322	Paper industry	0.069
323	Printing and allied industries	0.027
324	Manufacture of petroleum products and coal	0.014
325	Chemical industry	0.178
326	Plastic industry and rubber	0.164
327	Manufacturing based non-metallic minerals	0.133
331	Basic metal industries	0.368
332	Metal products manufacturing	0.184
333	Manufacture of machinery and equipment	0.595
334	Manufacture of computer equipment, communication, measurement and other electrical equipment, components and accessories	0.661
335	Manufacture of electrical generation power accessories, equipment and devices	0.377
336	Manufacture of transportation equipment	0.722
337	Manufacture of furniture, mattresses and blinds	0.087
339	Other industries	0.222
	Mean	0.235
	Standard Deviation	0.206
	Max	0.722
	Min	0.014
The Exports - Sales Ratio is the ratio of exports over sales.		

Table 3. Exports – Sales Ratio.

Additionally, the ratio per industry of the current electricity self-generation permits issued by the Energy Regulatory Commission (CRE) over the 2007 industry size is used to construct a Self- generating indicator. Data on permits is obtained from the CRE's statistics while the number of firms per industry is from the BIE.

Code	Description	Self - Generating Indicator
311	Food industry	0.0671
312	Beverage industry and snuff	0.0683
313	Manufacture of textile materials and finishing textiles	0.0298
314	Manufacture of textile materials, clothing except	0
315	Manufacture of clothing	0.0019
316	Tanning and finishing leather and manufacture of leather, artificial skin and materials	0
321	Wood industry	0.0039
322	Paper industry	0.0830
323	Printing and allied industries	0
324	Manufacture of petroleum products and coal	0.1667
325	Chemical industry	0.0752
326	Plastic industry and rubber	0.0084
327	Manufacturing based non-metallic minerals	0.0049
331	Basic metal industries	0.0354
332	Metal products manufacturing	0.0091
333	Manufacture of machinery and equipment	0.0031
334	Manufacture of computer equipment, communication, measurement and other electrical equipment, components and accessories	0.0161
335	Manufacture of electrical generation power accessories, equipment and devices	0.0867
336	Manufacture of transportation equipment	0.0422
337	Manufacture of furniture, mattresses and blinds	0.0047
339	Other industries	
	Mean	0.0316
	Standard Deviation	0.0342
	Max	0.1667
	Min	0

The Self –Generating Indicator is the ratio of the number of permissions for electricity generation over the number of firms in the industry.

Table 4. Self – Generating Indicator.

Finally, the industrial electricity average tariff is used; it is obtained from the Energy Information System of SENER. The data is a monthly series which covers the same period as the value production.

The summary statistics for the value production and the labor productivity are:

Means before the event				
	Treatment	Control (1)	Control (2)	Control (3)
Value Production (thousand pesos)	1278379	896490***	898724***	1315163
	(49577)	(20639)	(39197)	(44120)
Labor Production (thousand pesos/ personal)	111	130***	150***	125**
	(2.5)	(3.0)	(3.0)	(5.8)

*Mean of Value Production and labor productivity (ratio of Value Production over the personal) and in parenthesis the standard deviation of the mean, by control group. Control (1) is the Non- LFC states, Control (2) is the Neighboring States and Control (3) is Jalisco and Nuevo Leon. * p<0.10, ** p<0.05, *** p<0.01 with the T-test between control and treatment group.*

Table 5. Means before the event.

State	Value production (thousand pesos)					Industries
	Mean	S.D. Mean	Max	Min	N	N
Aguascalientes	1083067	82894	6941813	809	605	11
Baja California	327590	17511	2502294	1010	791	15
Coahuila	1894944	132783	18500000	29875	699	13
Chihuahua	250993	10901	1263399	2046	806	15
DF	1157194	59103	10500000	10740	1045	19
Durango	278639	25303	2201143	1623	495	9
Guanajuato	1058917	52351	8653097	6087	880	16
Hidalgo	302533	13206	1199874	7356	660	12
Jalisco	954049	43197	8301064	21957	1100	20
Estado de Mexico	2086573	78526	11000000	29705	1100	20
Michoacan	441614	32658	4381934	1253	550	10
Nuevo Leon	1880204	58760	8894597	20871	1045	19
Puebla	1050545	79909	13500000	8837	825	15
Queretaro	802243	25143	2944479	14062	715	13
San Luis Potosi	746039	30772	3515863	23974	660	12
Sonora	862432	65386	8432415	2177	605	11
Tamaulipas	697406	74089	8703653	1725	655	12
Veracruz	1681615	120635	15100000	6546	550	10
Mexico	1037900	16118	18500000	809	13786	21
Total observations					13786	

Mean, standard deviation of the mean, maximum and minimum of the value production. Also, number of industries in each state.

Table 6. Summary statistics of the value production.

State	Labor productivity (thousand pesos / personal)					Industries
	Mean	S.D. Mean	Max	Min	N	N
Aguascalientes	339.7	13.8	4051.9	1.9	605	11
Baja California	57.0	2.0	560.8	0.3	791	15
Coahuila	134.6	5.0	907.4	2.3	699	13
Chihuahua	53.0	1.93	300.1	0.1	806	15
DF	106.4	3.3	700.0	17.0	1045	19
Durango	75.8	3.4	419.5	0.2	495	9
Guanajuato	148.2	5.0	1252.3	6.2	880	16
Hidalgo	109.6	4.3	440.4	4.2	660	12
Jalisco	97.3	2.9	282.4	16.9	1100	20
Estado de Mexico	132.1	4.0	571.0	22.2	1100	20
Michoacan	157.4	6.7	1037.4	8.6	550	10
Nuevo Leon	167.3	5.2	1827.3	3.8	1045	19
Puebla	142.2	5.0	403.4	3.2	825	15
Queretaro	149.7	5.6	504.9	2.7	715	13
San Luis Potosi	159.6	6.2	620.7	20.3	660	12
Sonora	145.7	5.9	1528.6	1.3	605	11
Tamaulipas	126.7	5.0	1430.6	0.1	655	12
Veracruz	188.	8.0	873.9	8.7	550	10
Mexico	135.0	1.1	4051.9	0.1	13786	21
Total observations					13786	

Mean, standard deviation of the mean, maximum and minimum value of labor productivity (ratio of value production over the personal). Also, number of industries in each state.

Table 7. Summary statistics of the labor productivity.

State	Personal				
	Mean	S.D. Mean	Max	Min	N
Aguascalientes	3746	188	16093	67	605
Baja California	12423	533	82886	961	825
Coahuila	12369	716	93197	940	715
Chihuahua	15638	898	108564	350	825
DF	9823	323	41830	535	1045
Durango	3658	131	14130	755	495
Guanajuato	7982	359	42175	247	880
Hidalgo	3300	130	11510	307	660
Jalisco	9562	350	45070	661	1100
Estado de Mexico	14525	380	50188	786	1100
Michoacan	2025	85	8693	144	550
Nuevo Leon	14089	357	46961	736	1045
Puebla	6777	297	36198	156	825
Queretaro	5747	190	26516	1691	715
San Luis Potosi	4920	186	22726	648	660
Sonora	5625	337	37652	240	605
Tamaulipas	10185	530	48301	376	660
Veracruz	5531	293	23798	236	550
Mexico	8946	108	108564	67	13860
Total observations					13860

Mean, standard deviation of the mean, maximum and minimum value of the personal by state.

Table 8. Summary statistics of the personal.

Specification

The specification of the model consists in a Fixed Effects regression with the approach *dif-in-dif*[26]*:*

$$Y_{m,s,i} = \beta_0 + \beta_1\ Treatment_s\ After_m + \beta_2\ Int_i After_m Treatment_s + \beta_3\ Selfg_i Treatment_s\ After_m + M_m + S_S + I_i + IM_{i,m} + e_{m,s,i},$$

where *m* indicates the period, *s* the state and *i* the industry; *"Y*" is the dependent variable of interest, either, the logarithm of the value production or the logarithm of the labor productivity; *"Treatment"* is a dummy variable that indicates if the observations corresponds to the treatment group, in which case, takes the value of 1 and in other case, the value of 0; *"After"* is another dummy variable that indicates if the respective observation took place after the event , in which case, it takes the value of 1 and in other case, the value of 0; *"TreatmentAfter"* is an interaction term of the two previous variables; *"Int"* is the Electricity Intensity, which controls for the differences between the industries in terms of the intensity in electricity consumption; *"Selfg"* is the Self- Generating Indicator which controls for electricity self-generation, characteristic that is present in several industries; *"M"*, *"S", "I", "IM"* are vectors of Fixed Effects in terms of the period (month), the state, the industry and the interaction between the industry and the period, respectively, and *e* is the error term.

Regarding the coefficients, "β_0" indicates the proportion of the dependent variable that does not correspond as a consequence of any of the characteristic for which the regression is controlling and the coefficients "$\beta_1 + \beta_2 + \beta_3$", altogether, indicate the total effect of the event on the dependent variable.

[26] Several additional regressions were run; the specifications are available in (i) of the appendix.

Results

In *Table 9,* the results of the specification[27] can be observed but in order to interpret the total effect on the manufacturing sector, *Table 10* is needed since the total effect has to be evaluated in a certain value of the Electricity Indicator and the Self- Generating Indicator. *Table 10* incorporates the value of the indicators and its summary statistics in terms of the mean, the maximum and the minimum value of their observations.

Regression results			
	(1)	**(2)**	**(3)**
TreatmentAfter	-0.4***	0.2*	-0.4***
	(0.1)	(0.1)	(0.1)
IntAfterTreatment	13.9***	-4.5	21.6***
	(2.7)	(3.0)	(3.4)
SelfgAfterTreatment	-1.9**	-5.6***	-3.4***
	(1.0)	(1.2)	(1.0)
N	13786	6105	4950
*The logarithm of the value production as dependent variable. The title of each column indicates the control group. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*			

Table 9.Regression results.

In general, according to *Table 9* the negative impact on the value production is smaller as the industry consumes more electricity; even, it can become positive if the electricity consumption is high enough. Furthermore, the positive effect on the production implied by the electricity consumption is smaller as the industry generates in a higher proportion its own electricity.

[27] The results are only focused on the value production due to the absence of statistical significance in the case of the labor productivity. Also, the results of all the other additional regressions are included in (ii) of the Appendix since the results are similar.

Values of Indicators			
	(1)	**(2)**	**(3)**
Electricity Intensity			
Minimum	0.0010	0.0010	0.0010
Mean	0.0235	0.0247	0.0233
Maximum	0.0604	0.0604	0.0604
Self- Generating Indicator			
Minimum	0.0000	0.0000	0.0000
Mean	0.0316	0.0333	0.0332
Maximum	0.1667	0.1667	0.1667
The title of each column indicates the control group. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon.			

Table 10. Values of Indicators.

In *Table 11*, the total effects can be interpreted. For example, taking the control group as the one formed by all the states that were not previously attended by LFC, an industry with the lowest electricity intensity and the greatest Self-generation Indicator had a negative effect on its value production of a reduction of 66.73 per cent while an industry with the greatest electricity intensity and the lowest electricity self-generation had a positive effect of an increase of 46.76 per cent on its value production; moreover, the effect for an industry with the average in both, the intensity in consumption of electricity and the self – generation, had a negative effect of a reduction of 10.26 per cent in its value production. Independently the control group, the effect on the average industry is negative as it can be seen in the table below.

Total effect			
Value of Indicator (%)	**(1)**	**(2)**	**(3)**
Min EI- Max SG	- 66.7	- 74.5	-100.0
Mean EI – Mean SG	**- 10.3**	**- 10.0**	**- 5.0**
Max EI – Min SG	-46.8	-7.4	86.6
The logarithm of the production value as dependent variable. The title of each column indicates the control group. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. EI refers to the Electricity Intensity Indicator and SG to the Self- Generating Indicator.			

Table 11. Total effect.

At last, in order to monetize the event average effect, the table below is constructed:

Monetized total effect (current prices 2008)			
	(1)	**(2)**	**(3)**
Value production (million pesos)	$ 17333	$ 17163	$ 21909
Effect	$ 1575	$ 1716	$ 1095
The title of each column indicates the control group. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. The effect is valued on the mean (i.e. the averages of the Electricity Indicator, the Self-Generating Indicator and the value production are used).			

Table 12. Monetized total effect.

Therefore, the cost can be as minimum of $ 1 095 million pesos or as maximum as $ 1 575 million pesos, depending which control group is chosen.

Concerns

The typical concern in the *dif-in-dif* approach is the assumption of a same trend between the control and treatment group. In order to satisfy this assumption, the analysis was done with three different control groups, as it was said in the above sections.

Another possible concern for this study is the construction of the indicators: the Self-Generating Indicator, the Exports-Sales Ratio and the Electricity Intensity. First, the Export – Sales ratio is constructed with 2007 data in order to control for what has been happening in the export sector[28] (i.e. in 2008 and 2009 a huge reduction in exports took place); also, because, generally, an index for the normal years should be used. Later, the Self-Generating Indicator consists in the ratio of the permissions for electricity self-generation over the industry size; the permissions are not available by year but the data consists in all the current permissions up to 2012 and the size is from 2007 in order to control for the financial crisis. Finally, the Electricity Intensity is the ratio of the industries' electricity consumption over their value production, both 2009 data; the year choice is arbitrary because the pattern of consumption of each industry remains similar trough time as it can be seen in the graphs below:

[28] Teshima, Giri and Seira (2012) show that bigger exporters were disproportionate hurt in the 2007 crisis.

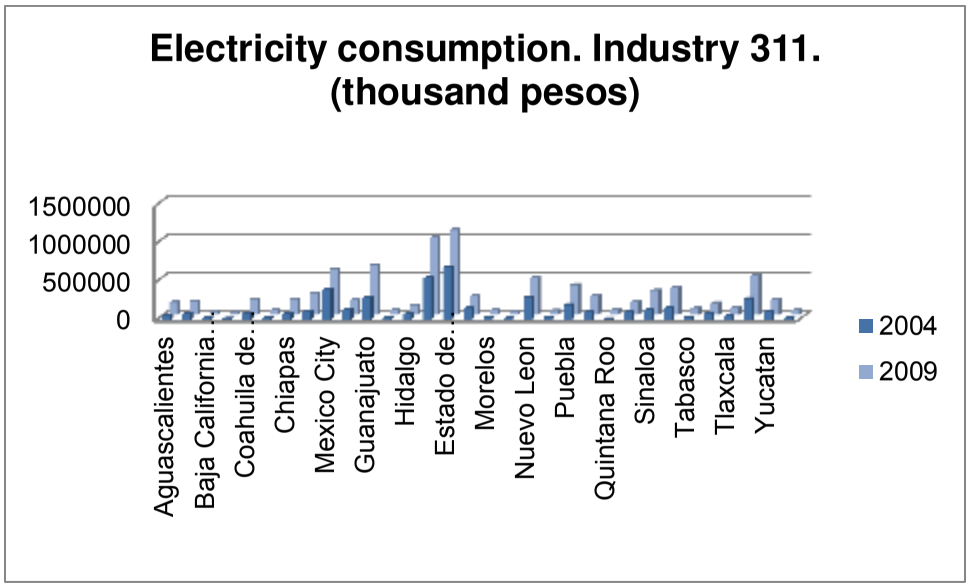

Figure 5.Electricity consumption of industry 311 by state in 2004 and 2009.

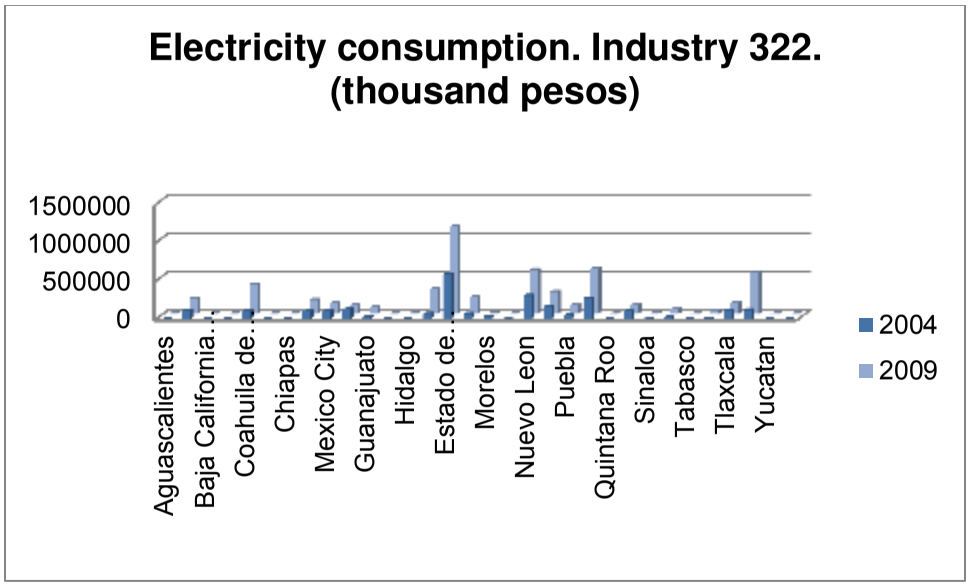

Figure 6.Electricity consumption of industry 322 by state in 2004 and 2009.

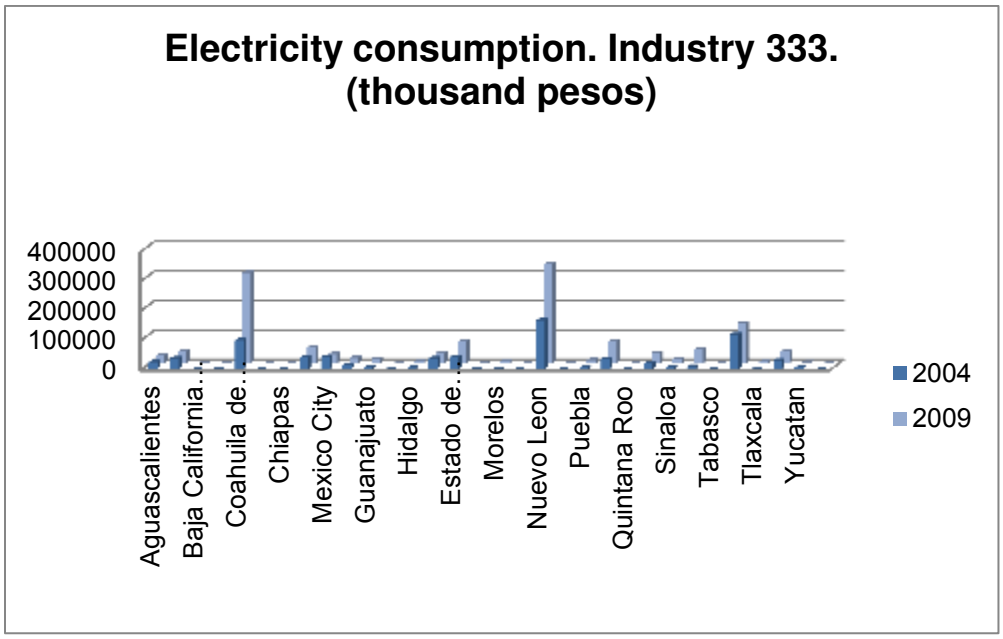

Figure 7.Electricity consumption of industry 333 by state in 2004 and 2009.

As it can be observed in the graphs, the pattern of the electricity consumption of the industries, indeed, remains the same through time. The states that were relatively more intensive in the consumption in 2004, kept the same relatively intensity in 2009. The same happened with those states with relative lower electricity intensity.

Conclusion

Therefore, the substitution of LFC by CFE did not generate a positive net impact due to adjustment costs which consist in the costs of transferring resources from one sector to another. Essentially, it appears when resources such as land, labor and capital may become unemployed, obsolete or may require retraining or reconfiguring. Clearly, CFE had to implement a restructuring and learning strategy focused to the center of the country due to the discrepancies between the human and physical capital of both companies and its ignorance regarding the electricity infrastructure of the area. Noticeably, the enlargement of the operational area of CFE generated costs, which mitigated the benefits that imply a more efficient electricity sector. However, the long-term benefits are considered positive because, generally, adjustment costs are only presented in the restructuring or implementation phase. In this regard, based on the coefficients of interest, there is a positive effect on the value production as the industry is more intensive in its electricity consumption, which can be interpreted as the adjustment costs in the short term, indeed, are mitigating the benefits.

In conclusion, the analysis is robust regarding the effect on the manufacturing sector; however, it has certain limitations. The first is tariffs; it were controlled by an average but that's inadequate due to its progressiveness, which means that for those large companies, tariffs compared to relatively small firms are higher more than proportionately. In this regard, the average tariff was implemented because disaggregated information by firm wasn't available. The second limitation was the inability to identify qualification of workers, namely, the impossibility of dividing the universe of firms between skilled-labor intensive and non-intensive. This is important because electricity can be a substitute or complement for labor; in case of a skilled-labor intensive firm, electricity is a complement while in a relatively unskilled firm, it is a substitute. Obviously, depending on the firm profile, the effect on production differs. Third, the specification doesn't identify the negative impact of the 2007 Great Crisis which generates a subestimation in the positive component

of the event effect. Finally, the time range of the analysis wasn't long enough to measure adequately the benefits; noteworthy, with a short interval, by definition, adjustment costs prevail on the net effect.

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Appendix

(i) The additional regressions are:

- $\boldsymbol{Y_{m,s,i,}} = \beta_0 + \beta_1\ Treatment_s + \beta_2\ After_m + \beta_3 Treatment_s\ After_m + \beta_4\ Tarrif_m + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i,}} = \beta_0 + \beta_1 Treatment_s\ After_m + M_m + S_S + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + M_m + S_S + I_i + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + M_m + S_S + I_i + IM_{i,m} + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + M_m + S_S + I_i + IS_{i,s} + \epsilon_{m,s,i}$

- $\boldsymbol{Y_{m,s,i,}} = \beta_0 + \beta_1\ Treatment_s + \beta_2\ After_m + \beta_3 Treatment_s\ After_m + \beta_4\ ExpRatioi + \beta_5\ ExpRatio_i\ After_m + \beta_6\ Tarrif_m + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i,}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ ExpRatio_i + \beta_3 ExpRatio_i\ After_m + M_m + S_S + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ ExpRatio_i\ After_m + M_m + S_S + I_i + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ ExpRatio_i\ After_m + M_m + S_S + I_i + IS_{i,s} + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + M_m + S_S + I_i + IM_{i,m} + \epsilon_{m,s,i}$

- $\boldsymbol{Y_{m,s,i,}} = \beta_0 + \beta_1\ Treatment_s + \beta_2\ After_m + \beta_3 Treatment_s\ After_m + \beta_4\ Int_i + \beta_5\ Int_i\ After_m + \beta_6\ Int_i After_m Treatment_s + \beta_7\ Tarrif_m + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i,}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i + \beta_3\ Int_i\ After_m + \beta_4 Int_i\ After_m\ Treatment_s + M_m + S_S \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + M_m + S_S + I_i + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1\ Int_i\ After_m + \beta_2 Int_i\ After_m\ Treatment_s + M_m + S_S + I_i + SM_{s,m} + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + M_m + S_S + I_i + IS_{i,s} + \epsilon_{m,s,i}$

$$Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m\ Treatment_s + M_m + S_S + I_i + IM_{i,m} + \epsilon_{m,s,i}$$

- $$Y_{m,s,i,} = \beta_0 + \beta_1\ Treatment_s + \beta_2\ After_m + \beta_3 Treatment_s\ After_m + \beta_4\ Int_i + \beta_5\ Int_i\ After_m + \beta_6\ Int_i Afte_{rm} Treatment_s + \beta_7\ ExpRatio_i + \beta_8\ ExpRatio_i\ After_m + \beta_9\ Tarrif_m + \epsilon_{m,s,i}$$

  $$Y_{m,s,i,} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i + \beta_3\ Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + \beta_4\ ExpRatio_i + \beta_5\ ExpRatio_i\ After_m + M_m + S_S + \epsilon_{m,s,i}$$

  $$Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + \beta_4\ ExpRatio_i\ After_m + M_m + S_S + I_i + \epsilon_{m,s,i}$$

  $$Y_{m,s,i} = \beta_0 + \beta_1 Int_i\ After_m + \beta_2\ Int_i\ After_m\ Treatment_s + \beta_3\ ExpRatio_i\ After_m + M_m + S_S + I_i + SM_{s,m} + \epsilon_{m,s,i}$$

  $$Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + \beta_4\ ExpRatio_i\ After_m + M_m + S_S + I_i + IS_{i,s} + \epsilon_{m,s,i}$$

  $$Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m\ Treatment_s + M_m + S_S + I_i + IM_{i,m} + \epsilon_{m,s,i}$$

- $$Y_{m,s,i,} = \beta_0 + \beta_1\ Treatment_s + \beta_2\ After_m + \beta_3 Treatment_s\ After_m + \beta_4\ Selfg_i + \beta_5 Selfg_i After_m + \beta_6 Selfg_i\ After_m\ Treatment_s + \beta_7\ Tarrif_m + \epsilon_{m,s,i}$$

  $$Y_{m,s,i,} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Selfg_i + \beta_3\ Selfg_i\ After_m + \beta_4 Selfg_i\ After_m\ Treatment_s + M_m + S_S \epsilon_{m,s,i}$$

  $$Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Selfg_i\ After_m + \beta_3\ Selfg_i\ After_m\ Treatment_s + M_m + S_S + I_i + \epsilon_{m,s,i}$$

  $$Y_{m,s,i} = \beta_0 + \beta_2 Selfg_i\ After_m + \beta_3\ Selfg_i\ After_m\ Treatment_s + M_m + S_S + I_i + SM_{s,m} + \epsilon_{m,s,i}$$

  $$Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Selfg_i\ After_m + \beta_3\ Selfg_i\ After_m\ Treatment_s + M_m + S_S + I_i + IS_{i,s} + \epsilon_{m,s,i}$$

  $$Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Selfg_i\ After_m + \beta_3\ Selfg_i\ After_m\ Treatment_s + M_m + S_S + I_i + IM_{i,m} + \epsilon_{m,s,i}$$

- $Y_{m,s,i,} = \beta_0 + \beta_1\ Treatment_s + \beta_2\ After_m + \beta_3 Treatment_s\ After_m + \beta_4 Selfg_i + \beta_5 Selfg_i\ After_m + \beta_6 Selfg_i After_m\ Treatment_s + \beta_7\ ExpRatio_i + \beta_8\ ExpRatio_i\ After_m + \beta_9\ Tarrif_m + \epsilon_{m,s,i}$

  $Y_{m,s,i,} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Selfg_i + \beta_3\ Selfg_i\ After_m + \beta_3\ Selfg_i\ After_m\ Treatment_s + \beta_4\ ExpRatio_i + \beta_5\ ExpRatio_i\ After_m + M_m + S_S + \epsilon_{m,s,i}$

  $Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Selfg_i\ After_m + \beta_3\ Selfg_i\ After_m\ Treatment_s + \beta_4\ ExpRatio_i\ After_m + M_m + S_S + I_i + \epsilon_{m,s,i}$

  $Y_{m,s,i} = \beta_0 + \beta_1 Selfg_i\ After_m + \beta_2\ Selfg_i\ After_m\ Treatment_s + \beta_3\ ExpRatio_i\ After_m + M_m + S_S + I_i + SM_{s,m} + \epsilon_{m,s,i}$

  $Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2 Selfg_i\ After_m + \beta_3\ Selfg_i\ After_m\ Treatment_s + \beta_4\ ExpRatio_i\ After_m + M_m + S_S + I_i + IS_{i,s} + \epsilon_{m,s,i}$

  $Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Selfg_i\ After_m\ Treatment_s + M_m + S_S + I_i + IM_{i,m} + \epsilon_{m,s,i}$

- $Y_{m,s,i,} = \beta_0 + \beta_1\ Treatment_s + \beta_2\ After_m + \beta_3 Treatment_s\ After_m + \beta_4\ Int_i + \beta_5\ Int_i\ After_m + \beta_6\ Int_i After_m Treatment_s + \beta_7 Selfg_i + \beta_8 Selfg_i\ After_m + \beta_9 Selfg_i After_m\ Treatment_s + \beta_{10}\ Tarrif_m + \epsilon_{m,s,i}$

  $Y_{m,s,i,} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i + \beta_3\ Int_i\ After_m + \beta_4 Int_i\ After_m\ Treatment_s + \beta_5 Selfg_i + \beta_6 Selfg_i\ After_m + \beta_7 Selfg_i After_m\ Treatment_s + M_m + S_S \epsilon_{m,s,i}$

  $Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + \beta_4 Selfg_i\ After_m + \beta_5 Selfg_i After_m\ Treatment_s + M_m + S_S + I_i + \epsilon_{m,s,i}$

  $Y_{m,s,i} = \beta_0 + \beta_1\ Int_i\ After_m + \beta_2 Int_i\ After_m\ Treatment_s + \beta_3 Selfg_i\ After_m + \beta_4 Selfg_i After_m\ Treatment_s + M_m + S_S + I_i + SM_{s,m} + \epsilon_{m,s,i}$

  $Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + \beta_4 Selfg_i\ After_m + \beta_5 Selfg_i After_m\ Treatment_s + M_m + S_S + I_i + IS_{i,s} + \epsilon_{m,s,i}$

  $Y_{m,s,i} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m\ Treatment_s + \beta_3 Selfg_i After_m\ Treatment_s + M_m + S_S + I_i + IM_{i,m} + \epsilon_{m,s,i}$

- $\boldsymbol{Y_{m,s,i,}} = \beta_0 + \beta_1\ Treatment_s + \beta_2\ After_m + \beta_3 Treatment_s\ After_m + \beta_4\ Int_i + \beta_5\ Int_i\ After_m + \beta_6\ Int_i After_m Treatment_s + \beta_7 Selfg_i + \beta_8 Selfg_i\ After_m + \beta_9 Selfg_i After_m\ Treatment_s + \beta_{10}\ ExpRatio_i + \beta_{11}\ ExpRatio_i\ After_m + \beta_{10}\ Tarrif_m + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i,}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i + \beta_3\ Int_i\ After_m + \beta_4 Int_i\ After_m\ Treatment_s + \beta_5 Selfg_i + \beta_6 Selfg_i\ After_m + \beta_7 Selfg_i After_m\ Treatment_s + \beta_8\ ExpRatio_i + \beta_9\ ExpRatio_i\ After_m + M_m + S_S + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + \beta_4 Selfg_i\ After_m + \beta_5 Selfg_i After_m\ Treatment_s + \beta_6\ ExpRatio_i\ After_m + M_m + S_S + I_i + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1\ Int_i\ After_m + \beta_2 Int_i\ After_m\ Treatment_s + \beta_3 Selfg_i\ After_m + \beta_4 Selfg_i After_m\ Treatment_s + \beta_5\ ExpRatio_i + \beta_6\ ExpRatio_i\ After_m + \beta_7\ ExpRatio_i\ After_m + M_m + S_S + I_i + SM_{s,m} + \epsilon_{m,s,i}$

  $\boldsymbol{Y_{m,s,i}} = \beta_0 + \beta_1 Treatment_s\ After_m + \beta_2\ Int_i\ After_m + \beta_3\ Int_i\ After_m\ Treatment_s + \beta_4 Selfg_i\ After_m + \beta_5 Selfg_i After_m\ Treatment_s + \beta_6\ ExpRatio_i + \beta_7\ ExpRatio_i\ After_m + \beta_8\ ExpRatio_i\ After_m + M_m + S_S + I_i + IS_{i,s} + \epsilon_{m,s,i}$

	OLS			Monthly and state FE			Monthly, state and industry FE			Monthly, state, industry and industry-state FE			Monthly, state, industry and industry-monthly FE		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Treatment	0.660***	0.370***	-0.111*												
	(0.0451)	(0.053)	(0.0594)												
After	0.101***	0.0899	0.0624												
	(0.0422)	(0.0632)	(0.0791)												
Treatment After	-0.101	-0.089	-0.0556	-0.0968	-0.089	-0.0556	-0.0923**	-0.0890*	-0.0558	-0.0696***	-0.089***	-0.0556***	-0.0916*	-0.100*	-0.0539***
	(0.0723)	(0.0843)	(0.095)	(0.0649)	(0.078)	(0.0904)	(0.0461)	(0.047)	(0.0508)	(0.0091)	(0.0116)	(0.0101)	(0.0487)	(0.0541)	(0.0566)
Tariff	0 .00256	0.00243	0.00197												
	(0.00163)	(0.00217)	(0.00245)												
N	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950

*The logarithm of the production value as dependent variable. The title of each column indicates the control group and the type of regression. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*

Table 13.Regression results.

	OLS			Monthly and state FE			Monthly, state and industry FE			Monthly, state, industry and industry-state FE			Monthly, state, industry and industry-monthly FE		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Treatment	0.652***	0.360***	-0.112*												
	(0.0460)	(0.0527)	(0.0601)												
After	0.0802	0.179**	0.102												
	(0.0555)	(0.0739)	(0.0897)												
Treatment After	-0.102	-0.0851	-0.0551	-0.0971	-0.0851	-0.0551	-0.0929**	-0.0851*	-0.0551	-0.069***	-0.851***	-0.0551***	-0.0916*	-0.100*	-0.0539*
	(0.0739)	(0.0844)	(0.0950)	(0.0665)	(0.0784)	(0.0905)	(0.0462)	(0.0474)	(0.0511)	(0.0092)	(0.0114)	(0.0101)	(0.0487)	(0.0541)	(0.0566)
ExpRatio	1.313***	0.618***	0.0772	1.300***	0.462***	0.134									
	(0.0990)	(0.128)	(0.146)	(0.0906)	(0.120)	(0.126)									
ExpRatio After	0.0871	-0.258	-0.0626	0.0778	-0.258	-0.0626	0.0843	-0.258*	-0.0626	0.058*	-0.258***	-0.0626*			
	(0.163)	(0.217)	(0.231)	(0.149)	(0.200)	(0.207)	(0.104)	(0.136)	(0.137)	(0.0321)	(0.0388)	(0.0353)			
Tariff	0 .00256	0.00243	0.00197												
	(0.00163)	(0.00217)	(0.00245)												
N	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950

*The logarithm of the production value as dependent variable. The title of each column indicates the control group and the type of regression. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*

Table 14. Regression results.

	OLS			Monthly and state FE			Monthly, state and industry FE			Monthly, state, industry and state-month FE			Monthly, state, industry and industry-state FE			Monthly, state, industry and industry-monthly FE		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Treatment	0.67***	0.37***	-0.095															
	(0.045)	(0.053)	(0.06)															
After	0.20***	0.19***	0.36***															
	(0.072)	(0.11)	(0.12)															
Treatment After	-0.40***	-0.33**	-0.56***	-0.51***	-0.39***	-0.62***	-0.45***	-0.037	-0.59***				-0.11***	-0.062**	-0.80***	-0.45***	-0.044	-0.61***
	(0.12)	(0.14)	(0.15)	(0.11)	(0.13)	(0.14)	(0.076)	(0.081)	(0.084)				(0.018)	(0.025)	(0.019)	(0.08)	(0.094)	(0.092)
Int	-7.23***	-4.93***	-7.17***	-6.99***	-1.89	-3.77**												
	(1.12)	(1.44)	(1.71)	(1.05)	(1.38)	(1.63)												
Int After	-4.39**	-3.78	-13.64***	-4.82***	-4.99*	-15.21***	-4.60***	1.81	-14.57***	-2.66**	1.87	-12.392***	-1.51***	-1.35**	-0.83*			
	(1.20)	(2.86)	(3.99)	(1.83)	(2.70)	(3.66)	(1.38)	(2.02)	(2.48)	(1.35)	(2.04)	(2.45)	(0.31)	(0.56)	(0.46)			
Int After Treatment	12.69***	9.78***	21.88***	17.15***	12.34***	24.44***	14.99***	-2.07	23.39***	6.44***	-2.23	19.93***	1.77***	-1.08	1.09*	14.76***	-2.24	24.04***
	(3.04)	(3.55)	(4.41)	(2.99)	(3.40)	(4.11)	(2.53)	(2.73)	(2.97)	(2.02)	(2.61)	(2.80)	(0.52)	(6.93)	(0.62)	(2.65)	(3.03)	(3.25)
Tariff	0.0025	0.0024	0.0020															
	(0.0016)	(0.0022)	(0.0024)															
N	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950

*The logarithm of the production value as dependent variable. The title of each column indicates the control group and the type of regression. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*

Table 15.Regression results.

	OLS			Monthly and state FE			Monthly, state and industry FE			Monthly, state, industry and state-month FE			Monthly, state, industry and industry-state FE			Monthly, state, industry and industry-monthly FE		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Treatment	0.66***	0.36**	-0.0956															
	(0.046)	(0.052)	(0.0599)															
After	0.18**	0.26***	0.37***															
	(0.089)	(0.13)	(0.14)															
Treatment After	-0.38***	-0.32**	-0.56***	-0.49***	-0.39***	-0.62***	-0.45***	-0.037	-0.59***				-0.11***	-0.063	-0.078***	-0.45***	-0.044	-0.61***
	(0.12)	(0.14)	(0.15)	(0.11)	(0.13)	(0.14)	(0.0758)	(0.081)	(0.085)				(0.018)	(0.025)	(0.019)	(0.08)	(0.094)	(0.092)
Int	-3.81***	-3.43**	-7.14***	-3.47***	-0.67	-3.59*												
	(1.18)	(1.52)	(1.75)	(1.11)	(1.46)	(1.68)												
Int After	-3.96*	-4.37	-13.68***	-4.43**	-5.63*	-15.33***	-4.42***	1.09	-14.60***	-2.46***	1.14	-12.43***	-1.38**	0.59	-0.88*			
	(2.08)	(2.93)	(4.02)	(1.90)	(2.79)	(3.70)	(1.408)	(2.00)	(2.51)	(1.39)	(2.04)	(2.48)	(0.30)	(0.56)	(0.46)			
Int After Treatment	11.83***	9.55***	21.86***	16.37***	12.20***	24.55***	14.96***	-1.95	23.36***	6.41***	-2.09	19.91***	1.74***	-0.89	1.00	14.76***	-2.24	24.04***
	(3.14)	(3.56)	(4.41)	(2.86)	(3.40)	(4.12)	(2.535)	(2.72)	(2.96)	(2.02)	(2.60)	(2.79)	(0.52)	(0.69)	(0.61)	(2.65)	(3.03)	(3.25)
ExpRatio	1.27***	0.57***	0.018	1.26***	0.45***	0.11												
	(0.10)	(0.13)	(0.14)	(0.094)	(0.13)	(0.13)												
ExpRatio After	0.065	-0.27	-0.030	0.061	-.268	-0.025	0.064	-0.25*	-0.027	0.071	-0.250*	-0.029	0.045	-0.25***	-0.063			
	(0.17)	(0.223)	(0.23)	(0.15)	(0.21)	(0.21)	(0.11)	(0.14)	(0.14)	(0.11)	(0.14)	(0.14)	(0.032)	(0.039)	(0.035)			
Tariff	0 .0025	0.0024	0.0020															
	(0.0016)	(0.0022)	(.0024)															
N	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950

*The logarithm of the production value as dependent variable. The title of each column indicates the control group and the type of regression. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*

Table 16. Regression results.

	OLS			Monthly and state FE			Monthly, state and industry FE			Monthly, state, industry and state-month FE			Monthly, state, industry and industry-state FE			Monthly, state, industry and industry-monthly FE		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Treatment	0.66***	0.45***	-0.039															
	(0.041)	(0.047)	(0.053)															
After	0.0084	-0.081	0.057															
	(0.048)	(0.074)	(0.087)															
Treatment After	0.069	0.17*	-0.085	0.045	0.21**	-0.052	0.0028	0.069	0.12*				-0.056***	-0.064***	-0.048***	0.0028	0.071	0.12*
	(0.081)	(0.095)	(0.11)	(0.076)	(0.089)	(0.10)	(0.056)	(0.059)	(0.062)				(0.013)	(0.016)	(0.014)	(0.060)	(0.069)	(0.069)
PermRa	21.89***	22.30***	18.27***	20.32***	21.83***	17.76***												
	(0.58)	(0.81)	(0.83)	(0.56)	(0.85)	(0.82)												
PermRa After	3.07***	4.89***	0.16	2.70***	5.49***	0.64	2.24***	3.26***	3.02***	2.31***	3.34***	2.90***	1.00***	1.19***	0.69***			
	(0.98)	(1.33)	(1.63)	(0.94)	(1.30)	(1.55)	(0.64)	(0.84)	(0.90)	(0.64)	(0.85)	(0.91)	(0.14)	(0.26)	(0.17)			
PermRa After Treatment	-5.57***	-7.80***	0.96	-4.65***	-8.94***	-0.050	-3.02***	-4.66***	-5.084***	-3.23***	-4.72***	-4.95***	-0.43***	-0.66**	-0.15***	-3.00***	-5.25***	-5.31***
	(1.68)	(1.81)	(2.04)	(1.73)	(1.84)	(2.03)	(0.91)	(0.98)	(0.95)	(0.85)	(1.00)	(0.95)	(0.21)	(0.31)	(0.23)	(1.00)	(1.21)	(1.00)
Tariff	0.0026*	0.0024	0.0020															
	(0.0015)	(0.0019)	(0.0022)															
N	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950

*The logarithm of the production value as dependent variable. The title of each column indicates the control group and the type of regression. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*

Table 17. Regression results.

	OLS			Monthly and state FE			Monthly, state and industry FE			Monthly, state, industry and state-month FE			Monthly, state, industry and industry-state FE			Monthly, state, industry and industry-monthly FE		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Treatment	0.65***	0.43***	-0.0409															
	(0.042)	(0.047)	(0.0525)															
After	-0.023	-0.018	0.067															
	(0.057)	(0.088)	(0.099)															
Treatment After	0.058	0.17*	-0.082	0.0344	0.214**	-0.0475	0.00172	0.0723	0.117*				-0.057***	0.060***	-0.048***	0.0028	0.071	0.12*
	(0.083)	(0.095)	(0.11)	(0.0772)	(0.0885)	(0.100)	(0.0566)	(0.0591)	(0.0615)				(0.013)	(0.016)	(0.014)	(0.060)	(0.069)	(0.069)
PermRa	22.77***	23.01***	18.77***	21.18***	22.44***	18.30***												
	(0.564)	(0.80)	(0.81)	(0.544)	(0.830)	(0.803)												
PermRa After	3.12***	4.69***	0.17	2.738***	5.306***	0.656	2.298***	3.105***	2.991***	2.37***	3.17***	2.88***	1.00***	1.04***	0.65			
	(0.95)	(1.31)	(1.60)	(0.910)	(1.288)	(1.509)	(0.646)	(0.864)	(0.897)	(0.64)	(0.88)	(0.90)	(0.14)	(0.27)	(0.17)			
PermRa After Treatment	-5.24***	-7.73***	0.86	-4.352***	-8.919***	-0.164	-3.005***	-4.668***	-5.080***	-3.22***	-4.71***	-4.95***	-4.14***	-0.68***	-0.145	-3.00***	-5.25***	-5.31***
	(1.63)	(1.78)	(2.01)	(1.679)	(1.816)	(2.002)	(0.912)	(0.983)	(0.952)	(0.93)	(1.00)	(2.00)	(0.21)	(0.30)	(0.23)	(1.00)	(1.21)	(1.00)
ExpRatio	1.65***	1.07***	0.63***	1.610***	0.908***	0.670***												
	(0.088)	(0.12)	(0.12)	(0.0794)	(0.104)	(0.111)												
ExpRatio After	0.13	-0.25	-0.048	0.116	-0.249	-0.0453	0.106	-0.247*	-0.0372	0.111	-0.24*	-0.0345	0.072**	-0.25	-0.0453			
	(0.15)	(0.20)	(0.21)	(0.130)	(0.173)	(0.184)	(0.105)	(0.140)	(0.137)	(0.107)	(0.14)	(0.139)	(0.032)	(0.039)	(0.036)			
Tariff	0.0026*	0.0024	0.0020															
	(0.0015)*	(0.0019)	(0.0022)															
N	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950

*The logarithm of the production value as dependent variable. The title of each column indicates the control group and the type of regression. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*

Table 18. Regression results.

	OLS			Monthly and state FE			Monthly, state and industry FE			Monthly, state, industry and state-month FE			Monthly, state, industry and industry-state FE			Monthly, state, industry and industry-monthly FE		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Treatment	0.66***	0.45***	-0.049															
	(0.041)	(0.047)	(0.054)															
After	0.066	-0.83	0.23															
	(0.080)	(0.12)	(0.14)															
Treatment After	-0.15	0.081	-0.38**	-0.30***	0.081	-0.39***	-0.37***	0.20**	-0.43***				-0.097***	-0.016	-0.065***	-0.37***	0.20*	-0.44***
	(0.12)	(0.15)	(0.16)	(0.10)	(0.13)	(0.15)	(0.089)	(0.090)	(0.10)				(0.022)	(0.030)	(0.024)	(0.10)	(0.10)	(0.11)
Int	4.26***	6.65***	5.95***	4.11***	9.69***	9.14***												
	(1.165)	(1.41)	(1.70)	(1.09)	(1.31)	(1.59)												
Int After	-2.49	-0.072	-6.94	-2.81	-0.75	-8.03**	-3.57**	3.72*	-12.77***	-1.97**	3.696*	-12.73***	-1.04***	2.13***	-0.69			
	(2.139)	(2.88)	(4.34)	(1.95)	(2.67)	(3.97)	(1.44)	(1.98)	(2.60)	(1.40)	(2.042)	(2.617)	(0.34)	(0.57)	(0.50)			
Int After Treatment	8.28***	3.74	11.31**	12.89***	5.28	13.12***	14.00***	-4.53*	20.97***	7.38***	-4.417	21.12***	1.57***	-1.60**	0.62***	13.87***	-4.53	21.63***
	(3.02)	(3.49)	(4.67)	(2.84)	(3.29)	(4.32)	(2.60)	(2.71)	(3.10)	(2.640)	(2.763)	(3.136)	(0.55)	(0.72)	(0.65)	(2.72)	(2.99)	(3.44)
PermRa	22.26***	22.93***	18.82***	20.68***	22.74***	18.59***												
	(0.59)	(0.80)	(0.81)	(0.56)	(0.82)	(0.78)												
PermRa After	2.89***	5.00***	-0.49	2.46**	5.58***	-0.077	1.92***	3.67***	1.72*	1.955***	3.796***	1.702*	0.87***	1.43***	-0.68***			
	(1.02)	(1.38)	(1.62)	(0.97)	(1.33)	(1.52)	(0.67)	(0.82)	(0.93)	(0.675)	(0.843)	(0.950)	(0.15)	(0.28)	(0.18)			
PermRa After Treatment	-4.95***	-7.73***	1.87	-3.68**	-8.86***	0.93	-1.88**	-5.11***	-3.16***	-1.939**	-5.263***	-3.222***	-0.29	-0.86***	-0.102	-1.87**	-5.64***	-3.39***
	(1.65)	(1.81)	(2.00)	(1.65)	(1.80)	(1.95)	(0.92)	(0.96)	(0.97)	(0.929)	(0.988)	(0.993)	(0.22)	(0.32)	(0.239)	(0.98)	(1.18)	(1.03)
Tariff	0.0026*	0.0024	0.0020															
	(0.0015)	(0.0019)	(0.0022)															
N	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950

*The logarithm of the production value as dependent variable. The title of each column indicates the control group and the type of regression. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*

Table 19. Regression results.

	OLS			Monthly and state FE			Monthly, state and industry FE			Monthly, state, industry and state-month FE			Monthly, state, industry and industry-state FE		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Treatment	0.65***	0.44***	-0.055												
	(0.042)	(0.046)	(0.053)												
After	0.014	0.016	0.25*												
	(0.088)	(0.13)	(0.14)												
Treatment After	-0.13	0.11	-0.38**	-0.27***	0.11	-0.39***	-0.37***	0.20**	-0.43***				-0.097***	-0.02	-0.064***
	(0.12)	(0.14)	(0.16)	(0.11)	(0.12)	(0.14)	(0.090)	(0.090)	(0.10)				(0.022)	(0.031)	(0.024)
Int	9.85***	10.53***	7.69***	9.63***	13.29***	11.10***									
	(1.17)	(1.45)	(1.75)	(1.11)	(1.37)	(1.65)									
Int After	-1.40	-0.38	-7.29*	-2.043	-1.08	-8.42**	-3.24**	2.95	-12.81***	-1.61	2.30	-10.97***	-0.83**	1.31**	-0.18
	(2.11)	(2.83)	(4.33)	(1.94)	(2.65)	(3.96)	(1.48)	(1.98)	(2.65)	(1.45)	(2.01)	(2.58)	(0.32)	(0.59)	(0.50)
Int After Treatment	6.99**	2.85	11.73**	11.66***	4.43	13.62***	13.96***	-4.40	20.97***	7.34***	-3.10	18.24***	-1.52***	-1.40*	0.60
	(3.060)	(3.45)	(4.65)	(2.88)	(3.25)	(4.28)	(2.61)	(2.70)	(3.10)	(2.03)	(2.58)	(2.85)	(0.55)	(3.45)	(0.65)
PermRa	23.70***	24.12***	19.55***	22.11***	23.85***	19.40***									
	(0.58)	(0.78)	(0.79)	(0.54)	(0.80)	(0.75)									
PermRa After	3.02***	4.84***	-0.478	2.60***	5.44***	-0.053	2.00***	3.44***	1.701*	2.46***	3.35***	2.086**	0.92***	1.20***	0.63***
	(0.99	(1.36)	(1.58)	(0.92)	(1.32)	(1.46)	(0.68)	(0.85)	(0.94)	(0.67)	(0.86)	(0.93)	(0.147)	(0.29)	(0.18)
PermRa After Treatment	-4.77***	-7.85***	1.75	-3.56**	-9.02***	0.79	-1.88**	-5.09***	-3.16***	-3.72**	-4.86***	-3.92***	-0.29	-0.83***	-0.094
	(1.59)	(1.77)	(1.96)	(1.58)	(1.76)	(1.90)	(0.92)	(0.96)	(0.97)	(0.83)	(0.97)	(0.99)	(0.22)	(0.32)	(0.24)
ExpRatio	1.79***	1.24***	0.72***	1.75***	1.13***	0.80***									
	(0.091)	(0.120)	(0.13)	(0.083)	(0.11)	(0.12)									
ExpRatio After	0.130	-0.240	-0.037	0.12	-0.24	-0.033	0.099	-0.23	-0.017	0.11	-0.22	-0.015	0.064*	-0.23***	-0.043
	(0.150)	(0.20)	(0.21)	(0.14)	(0.18)	(0.19)	(0.11)	(0.14)	(0.14)	(0.11)	(0.15)	(0.14)	(0.032)	(0.040)	(0.035)
Tariff	0.0026	0.0024	0.0020												
	(0.0015)	(0.0019)	(0.0022)												
N	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950	13786	6105	4950

*The logarithm of the production value as dependent variable. The title of each column indicates the control group and the type of regression. (1) is the Non-LFC states, (2) the Neighboring States and (3) Jalisco and Nuevo Leon. Standard errors in parenthesis and are robust if needed. * p<0.10, ** p<0.05, *** p<0.01*

Table 20. Regression results.