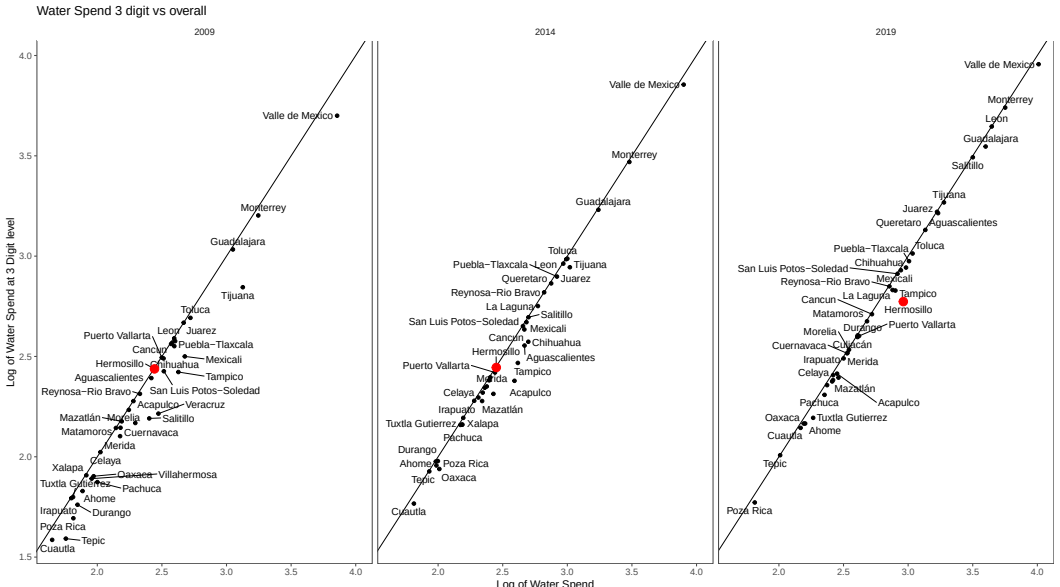
Hermosillo Water

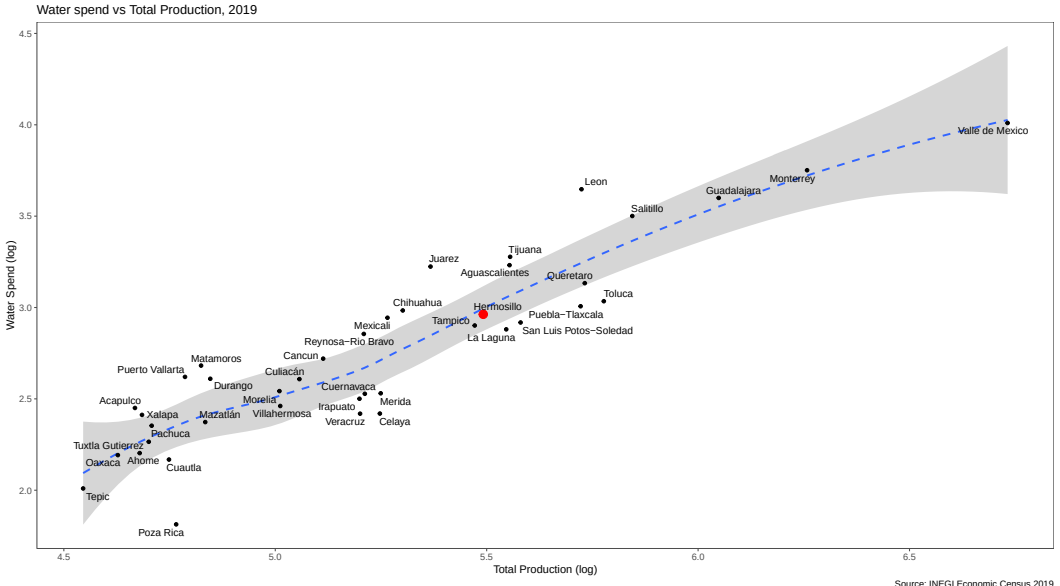
Taimur Shah

Censorship is an issue in the water spending variable, so we should take analysis at the codigo level with a grain of salt.



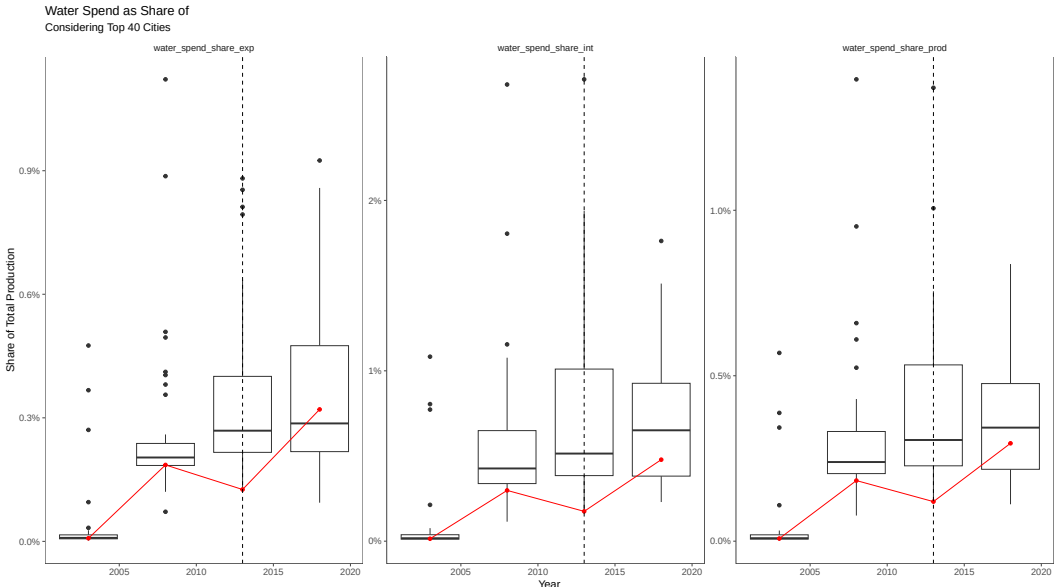
TODO: Check if censorship can be attributed to Agri or not?

In 2019, Hermosillo's economy was spending roughly the expected amount on water for its overall level of production.



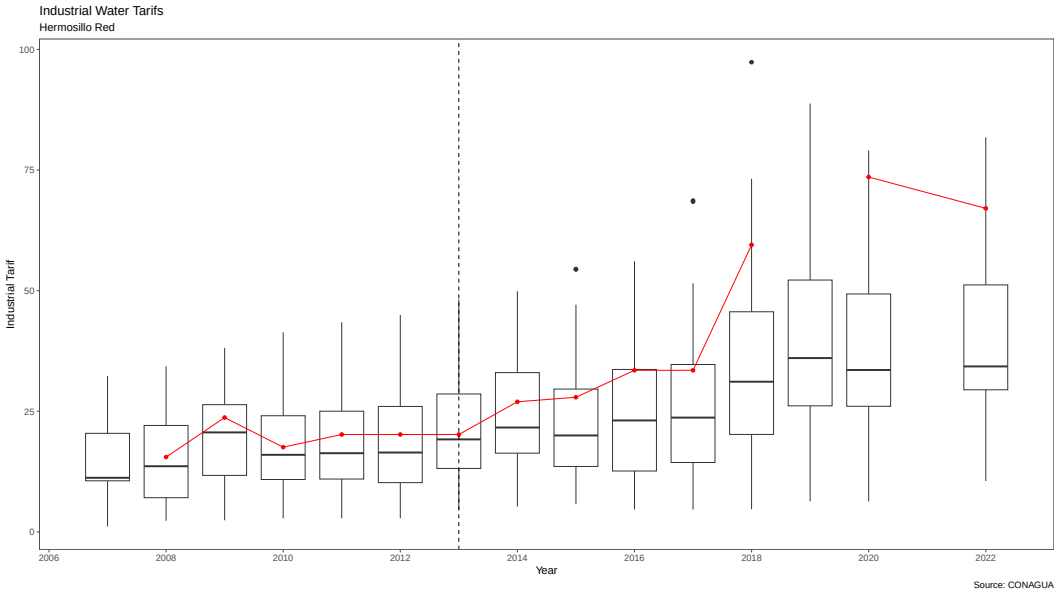
Source: INEGI Economic Census 2019

When looking at water spend as share of total expenditure, production or intermediate consumption, Hermosillo is not an outlier.



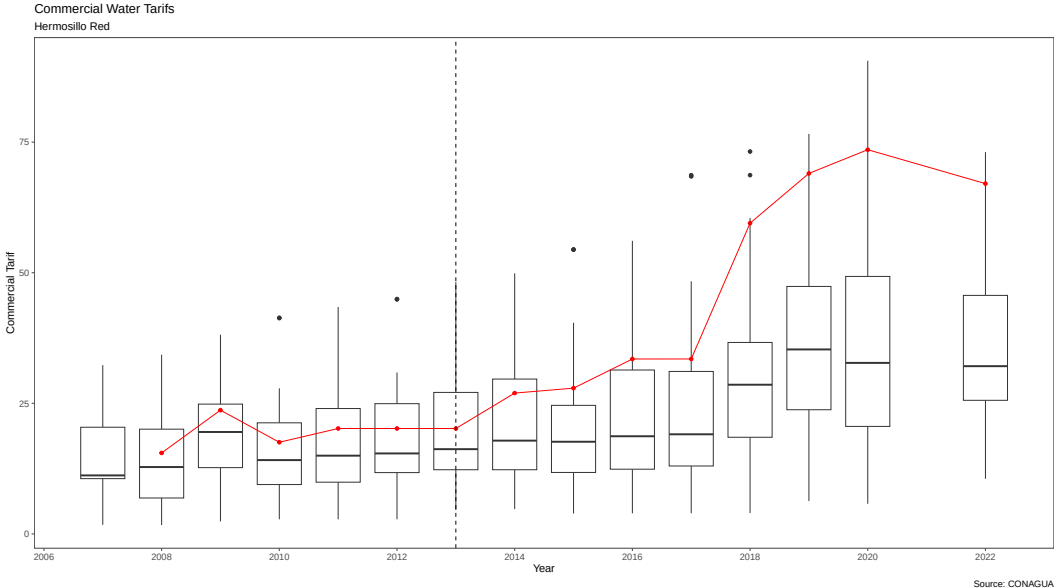
Prices

The price of Industrial water in Hermosillo is high

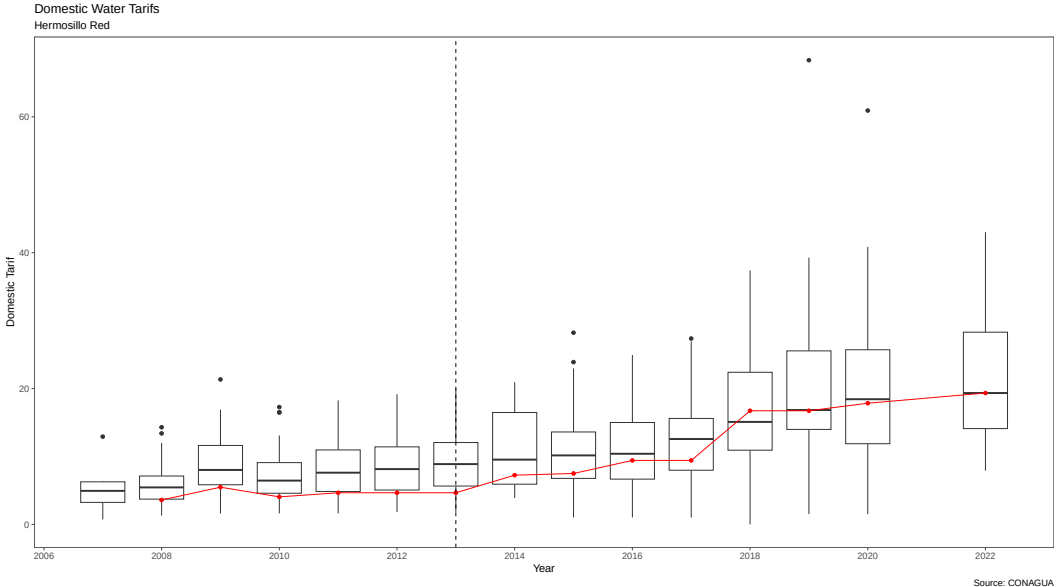


Source: CONAGUA

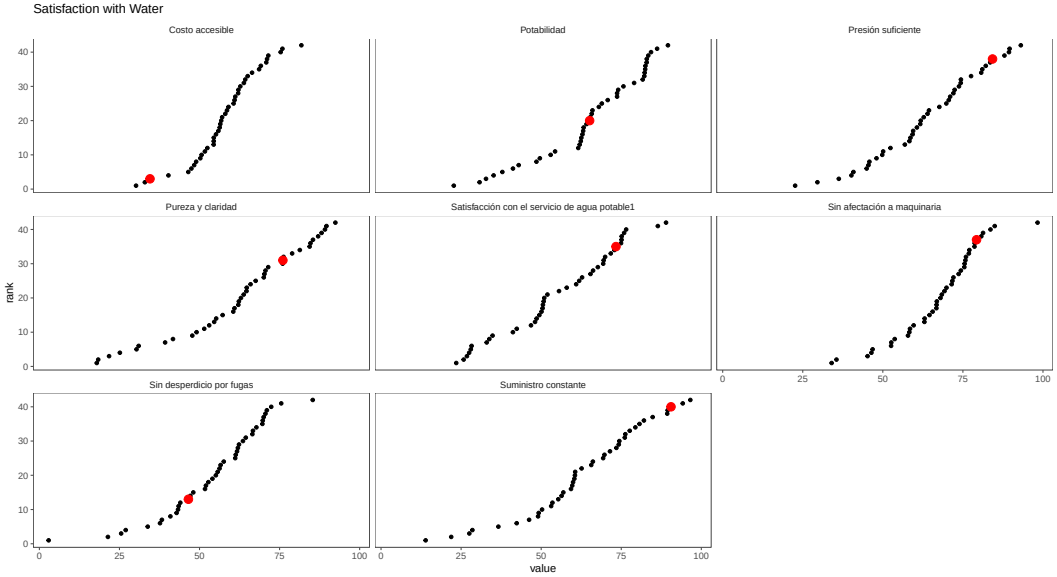
As it is for Commercial use.



However Domestic water prices are low to average.

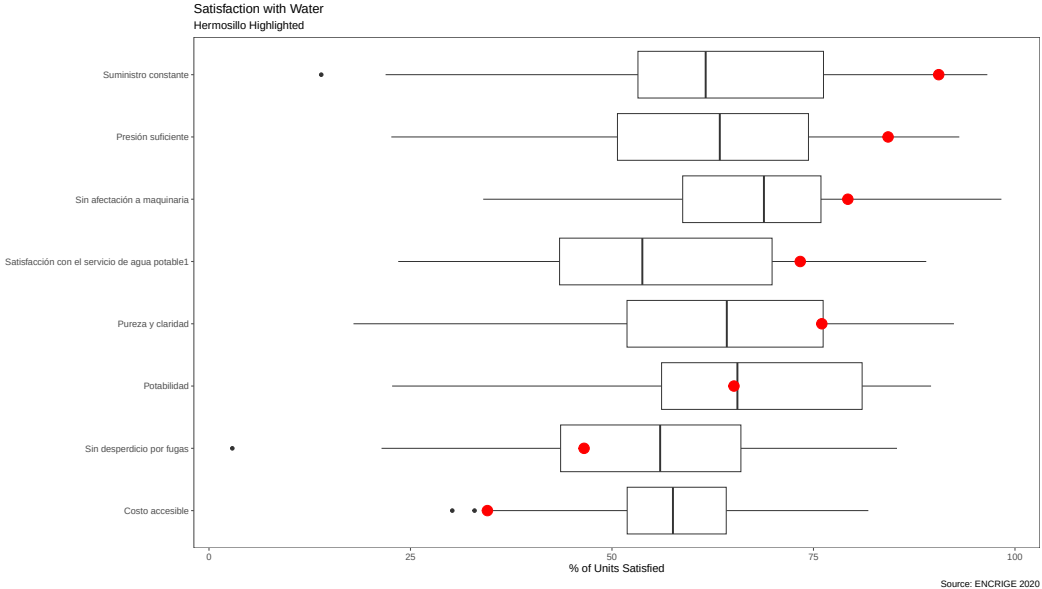


Relatively few complaints related to outages and availability.

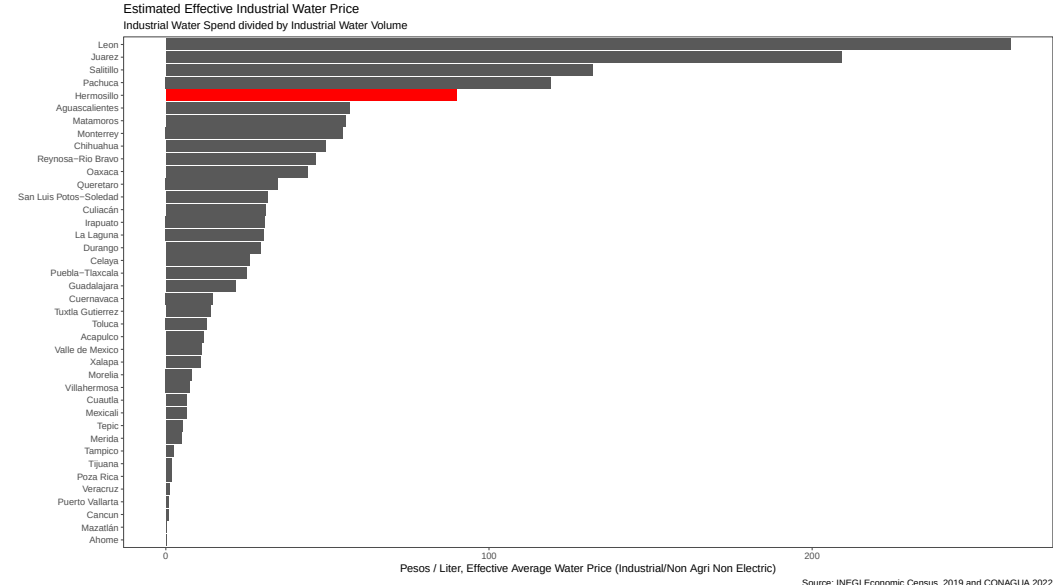


Source: ENCRIGE 2020

Water Satisfaction


Satisfaction with Water
Hermosillo Highlighted
Suministro constante
Presión suficiente
Sin afectación a maquinaria
Satisfacción con el servicio de agua potable1
Pureza y claridad
Potabilidad
Sin desperdicio por fugas
Costo accesible
0
25
50
75
100
% of Units Satisfied
Source: ENCRIGE 2020

By dividing water spend in 2019 with water volume in 2022, we can estimate the effective industrial water price.



Camels and Hippos

We define water intensity in two ways. First by determining which industries are sensitive to movement in water prices and second by determining which industries require large volumes of water.

- First is decided by the share of water spend in intermediate consumption, as in the previous report.
- Second by the total water spend per firm in the industry.

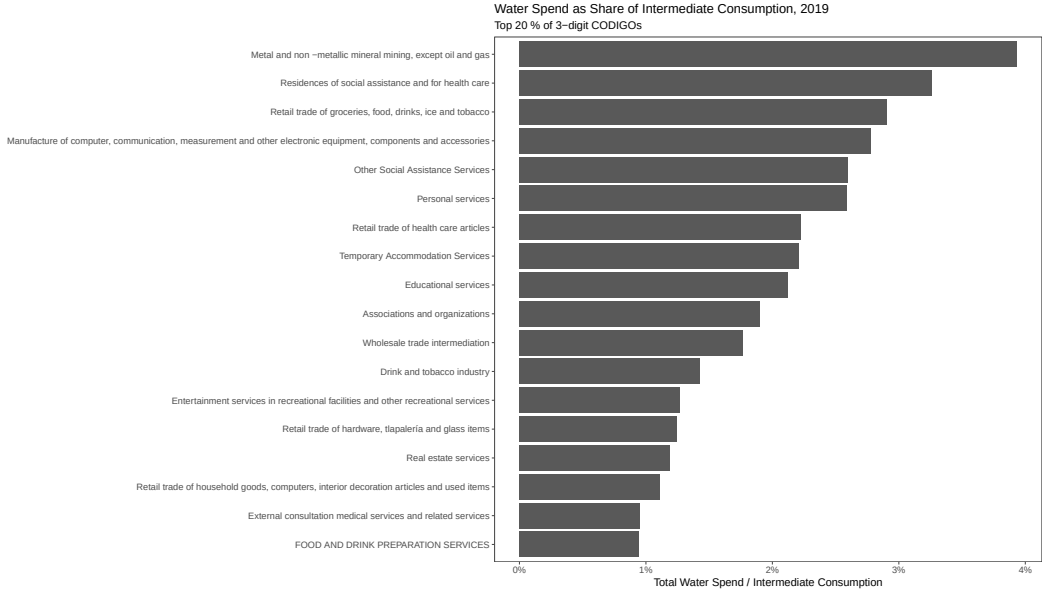
Will analyze these separately first, then look for ways to simplify the story.

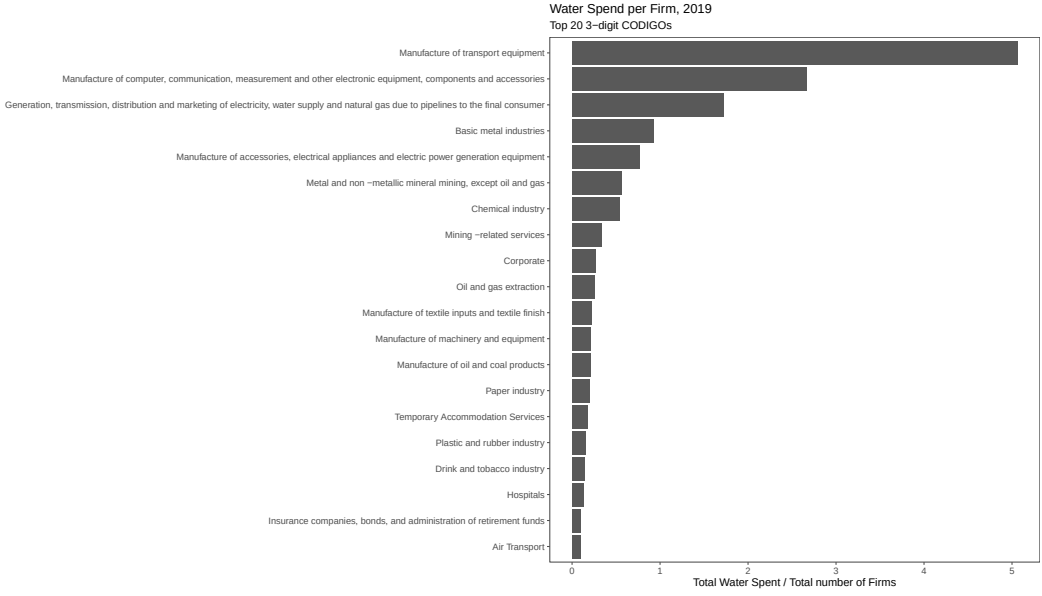
We have data per industry per municipality. On both price and quantity metrics, there is a wide range across municipalities. So there is a question of how one should characterize the properties of an industry. In the following slides, I show three methods and their results.

- Look at the industry characteristic at the national level (aggregate of all municipalities).
- Look at the median of the industry based on top 40 cities only
- Look at the median of the industry only from cities with rca > 1.

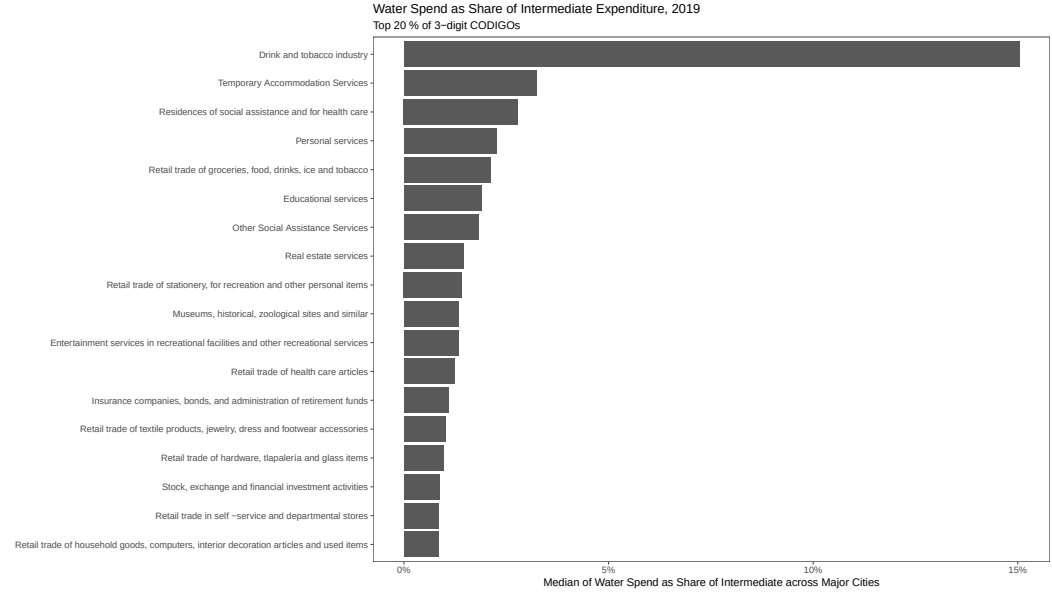
Conclusion: Method 3 makes most sense.

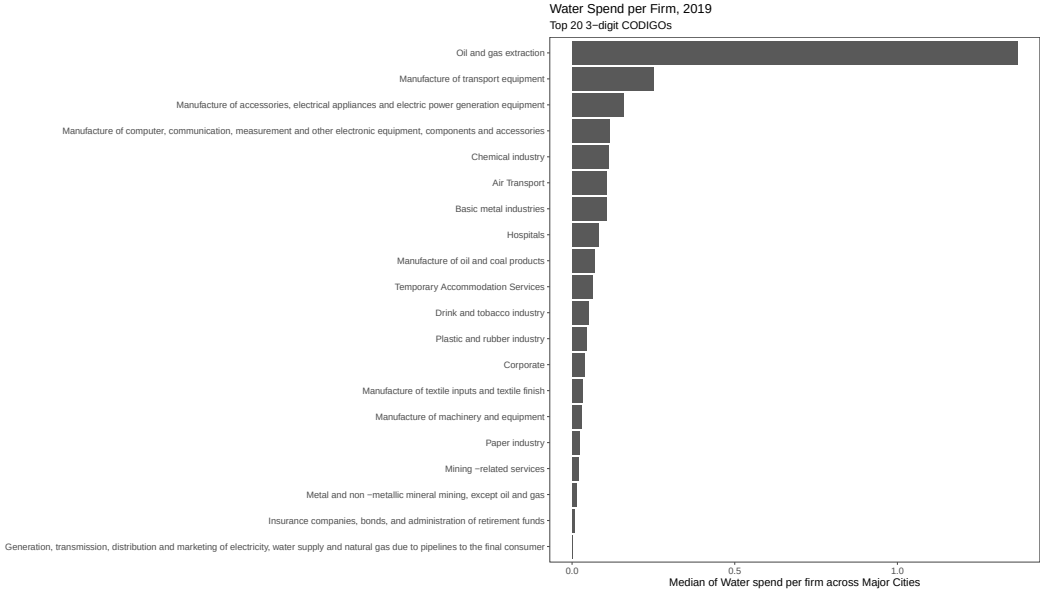
Method 1: aggregate to national level and then look at industry characteristics



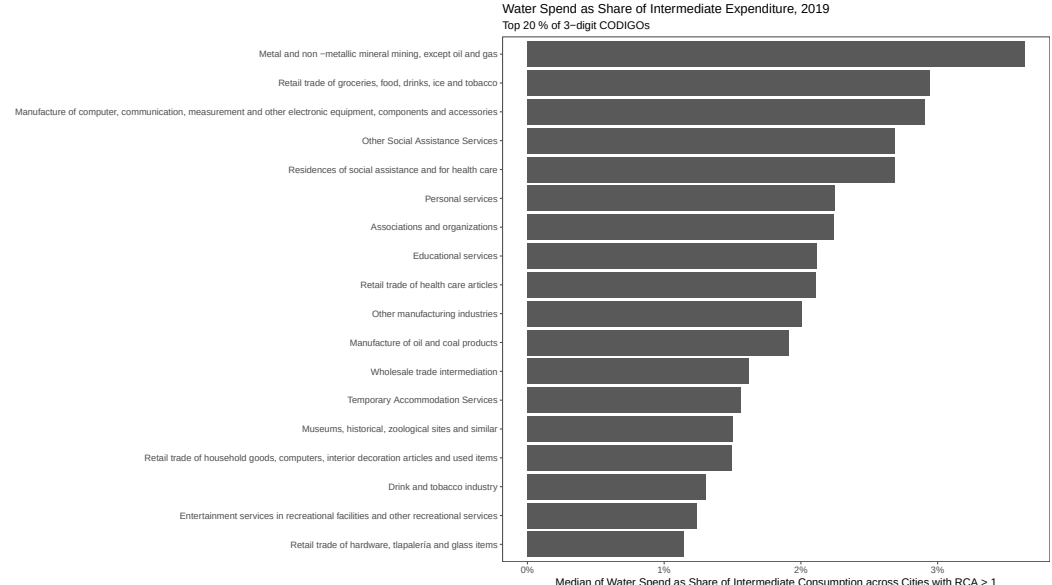

Water Spend per Firm, 2019
Top 20 3−digit CODIGOs
Manufacture of transport equipment
Manufacture of computer, communication, measurement and other electronic equipment, components and accessories
Generation, transmission, distribution and marketing of electricity, water supply and natural gas due to pipelines to the final consumer
Basic metal industries
Manufacture of accessories, electrical appliances and electric power generation equipment
Metal and non −metallic mineral mining, except oil and gas
Chemical industry
Mining −related services
Corporate
Oil and gas extraction
Manufacture of textile inputs and textile finish
Manufacture of machinery and equipment
Manufacture of oil and coal products
Paper industry
Temporary Accommodation Services
Plastic and rubber industry
Drink and tobacco industry
Hospitals
Insurance companies, bonds, and administration of retirement funds
Air Transport
0
1
2
3
4
5
Total Water Spent / Total number of Firms

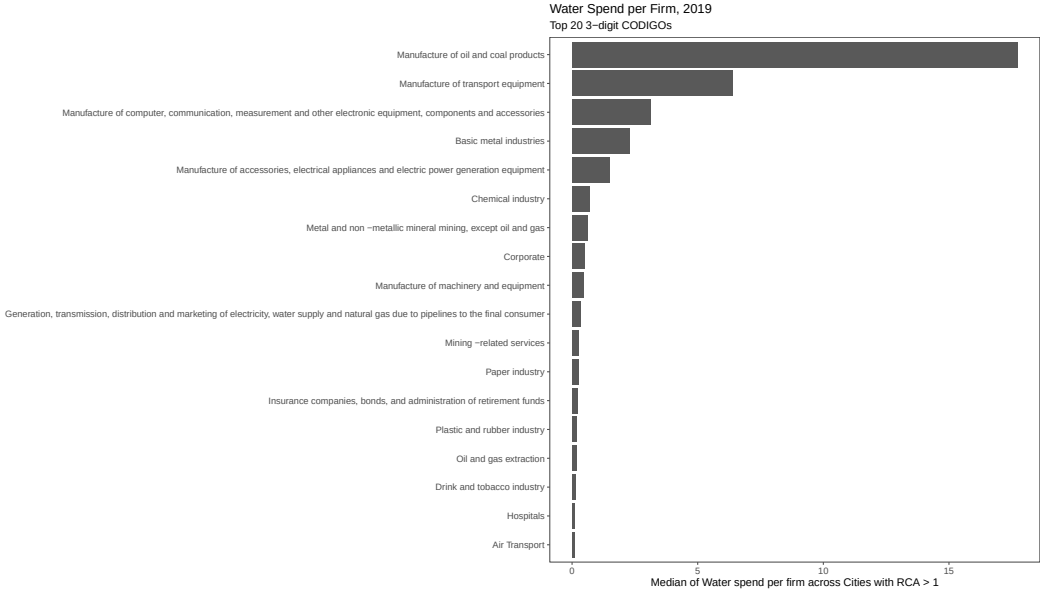
Method 2: select based on median industry characteristics from top 40 major cities



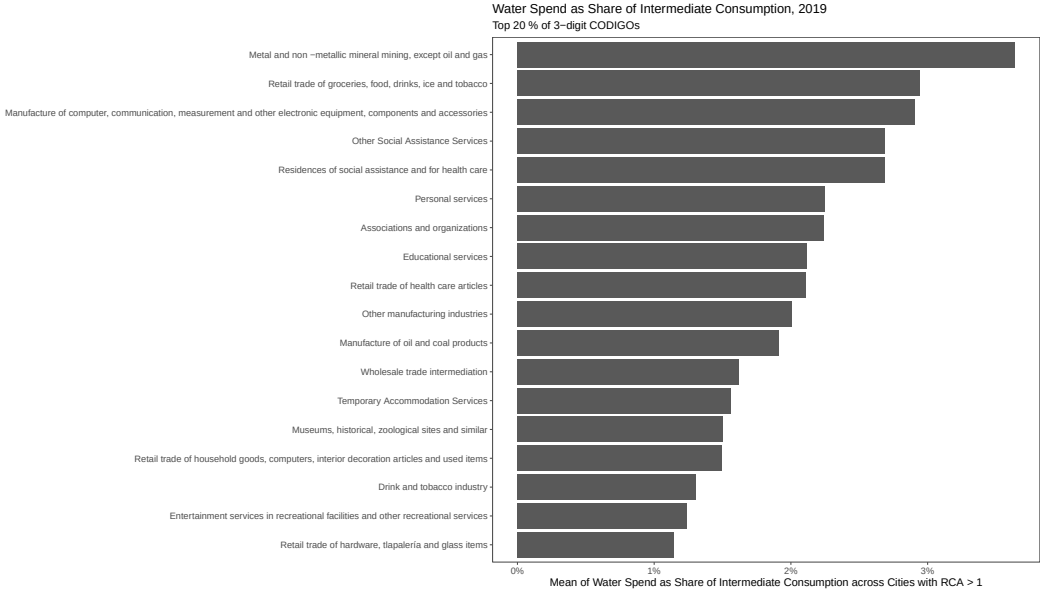

Water Spend per Firm, 2019
Top 20 3−digit CODIGOs
Oil and gas extraction
Manufacture of transport equipment
Manufacture of accessories, electrical appliances and electric power generation equipment
Manufacture of computer, communication, measurement and other electronic equipment, components and accessories
Chemical industry
Air Transport
Basic metal industries
Hospitals
Manufacture of oil and coal products
Temporary Accommodation Services
Drink and tobacco industry
Plastic and rubber industry
Corporate
Manufacture of textile inputs and textile finish
Manufacture of machinery and equipment
Paper industry
Mining −related services
Metal and non −metallic mineral mining, except oil and gas
Insurance companies, bonds, and administration of retirement funds
Generation, transmission, distribution and marketing of electricity, water supply and natural gas due to pipelines to the final consumer
0.0
0.5
1.0
Median of Water spend per firm across Major Cities

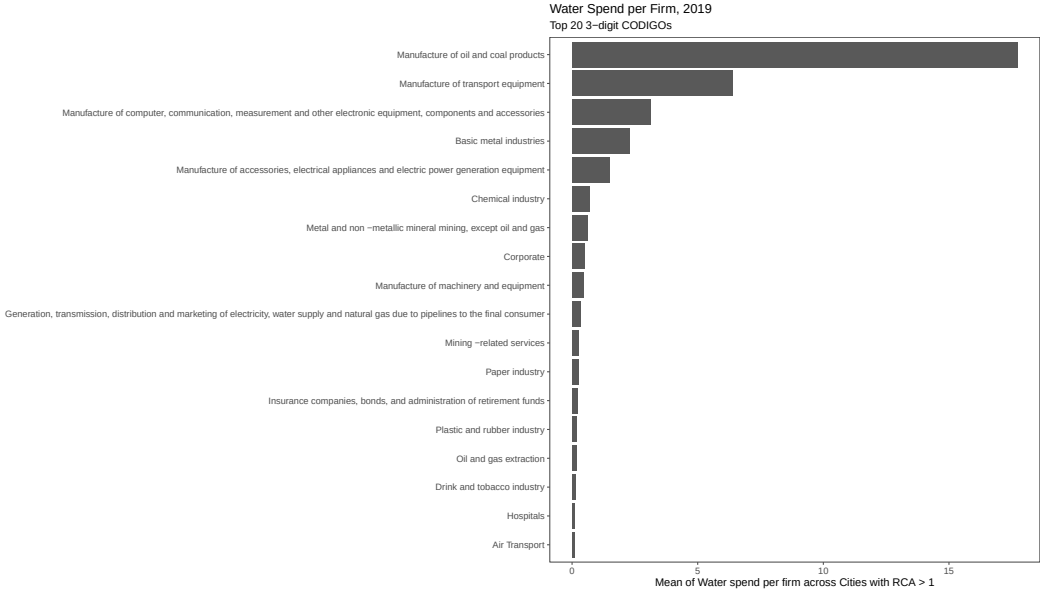
Method 3: select based on median industry characteristics from cities with RCA > 1 in industry.




Water Spend per Firm, 2019
Top 20 3−digit CODIGOs
Manufacture of oil and coal products
Manufacture of transport equipment
Manufacture of computer, communication, measurement and other electronic equipment, components and accessories
Basic metal industries
Manufacture of accessories, electrical appliances and electric power generation equipment
Chemical industry
Metal and non −metallic mineral mining, except oil and gas
Corporate
Manufacture of machinery and equipment
Generation, transmission, distribution and marketing of electricity, water supply and natural gas due to pipelines to the final consumer
Mining −related services
Paper industry
Insurance companies, bonds, and administration of retirement funds
Plastic and rubber industry
Oil and gas extraction
Drink and tobacco industry
Hospitals
Air Transport
0
5
10
15
Median of Water spend per firm across Cities with RCA > 1

The RCA > 1 measure is not sensitive to median / mean differences (i.e. metric is stable), and is stable when aggregated to the 'national' level as well.


Water Spend as Share of Intermediate Consumption, 2019
Top 20 % of 3−digit CODIGOs
Metal and non −metallic mineral mining, except oil and gas
Retail trade of groceries, food, drinks, ice and tobacco
Manufacture of computer, communication, measurement and other electronic equipment, components and accessories
Other Social Assistance Services
Residences of social assistance and for health care
Personal services
Associations and organizations
Educational services
Retail trade of health care articles
Other manufacturing industries
Manufacture of oil and coal products
Wholesale trade intermediation
Temporary Accommodation Services
Museums, historical, zoological sites and similar
Retail trade of household goods, computers, interior decoration articles and used items
Drink and tobacco industry
Entertainment services in recreational facilities and other recreational services
Retail trade of hardware, tlapalería and glass items
0%
1%
2%
3%
Mean of Water Spend as Share of Intermediate Consumption across Cities with RCA > 1


Water Spend per Firm, 2019
Top 20 3−digit CODIGOs
Manufacture of oil and coal products
Manufacture of transport equipment
Manufacture of computer, communication, measurement and other electronic equipment, components and accessories
Basic metal industries
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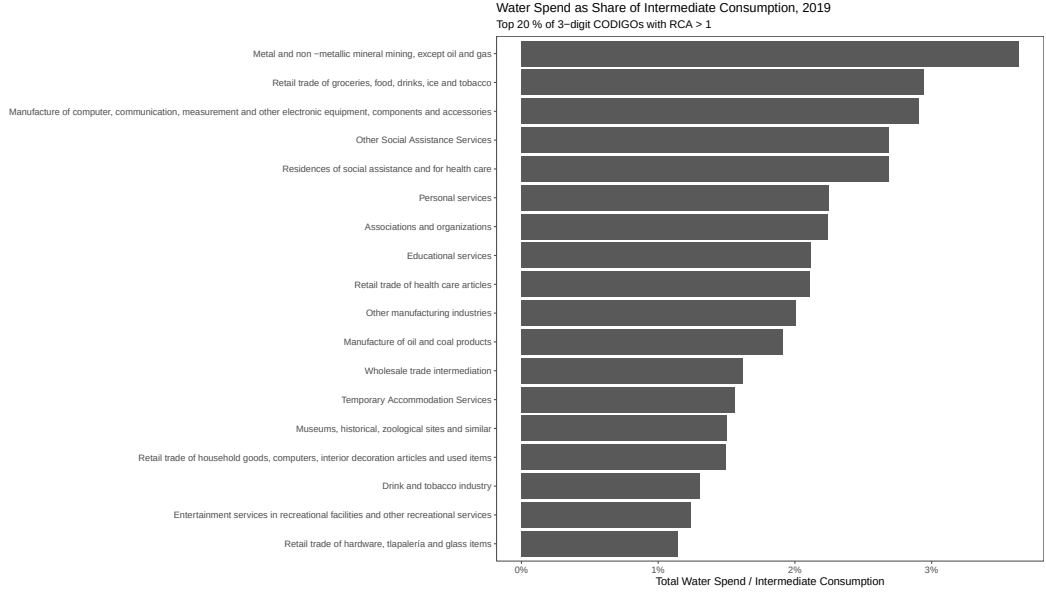
Chemical industry
Metal and non −metallic mineral mining, except oil and gas
Corporate
Manufacture of machinery and equipment
Generation, transmission, distribution and marketing of electricity, water supply and natural gas due to pipelines to the final consumer
Mining −related services
Paper industry
Insurance companies, bonds, and administration of retirement funds
Plastic and rubber industry
Oil and gas extraction
Drink and tobacco industry
Hospitals
Air Transport
0
5
10
15
Mean of Water spend per firm across Cities with RCA > 1


Water Spend as Share of Intermediate Consumption, 2019
Top 20 % of 3−digit CODIGOs with RCA > 1
Metal and non −metallic mineral mining, except oil and gas
Retail trade of groceries, food, drinks, ice and tobacco
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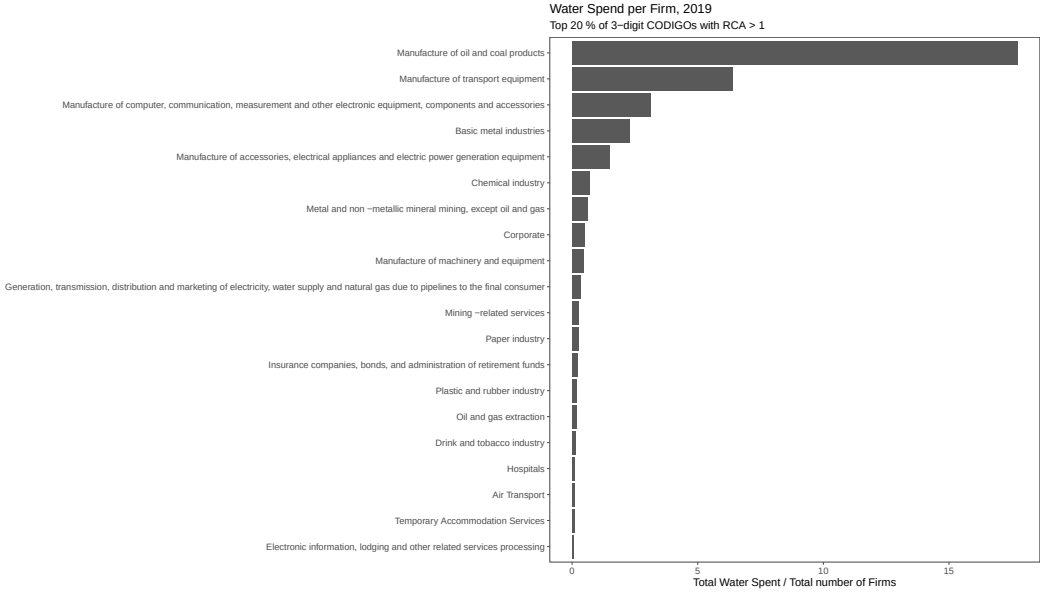
Other Social Assistance Services
Residences of social assistance and for health care
Personal services
Associations and organizations
Educational services
Retail trade of health care articles
Other manufacturing industries
Manufacture of oil and coal products
Wholesale trade intermediation
Temporary Accommodation Services
Museums, historical, zoological sites and similar
Retail trade of household goods, computers, interior decoration articles and used items
Drink and tobacco industry
Entertainment services in recreational facilities and other recreational services
Retail trade of hardware, tlapalería and glass items
0%
1%
2%
3%
Total Water Spend / Intermediate Consumption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Top 20 % of 3−digit CODIGOs with RCA > 1
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Metal and non −metallic mineral mining, except oil and gas
Corporate
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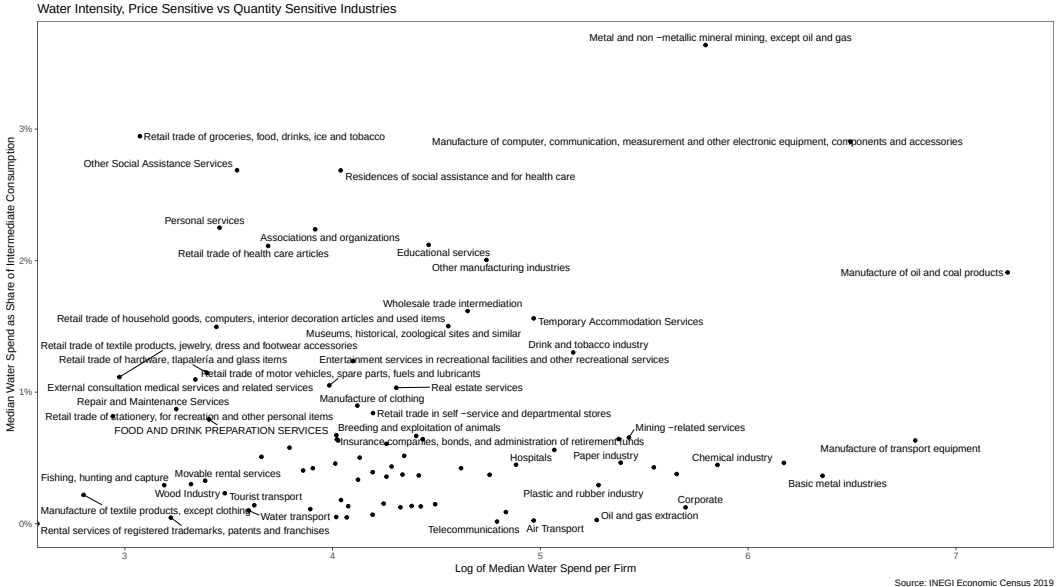
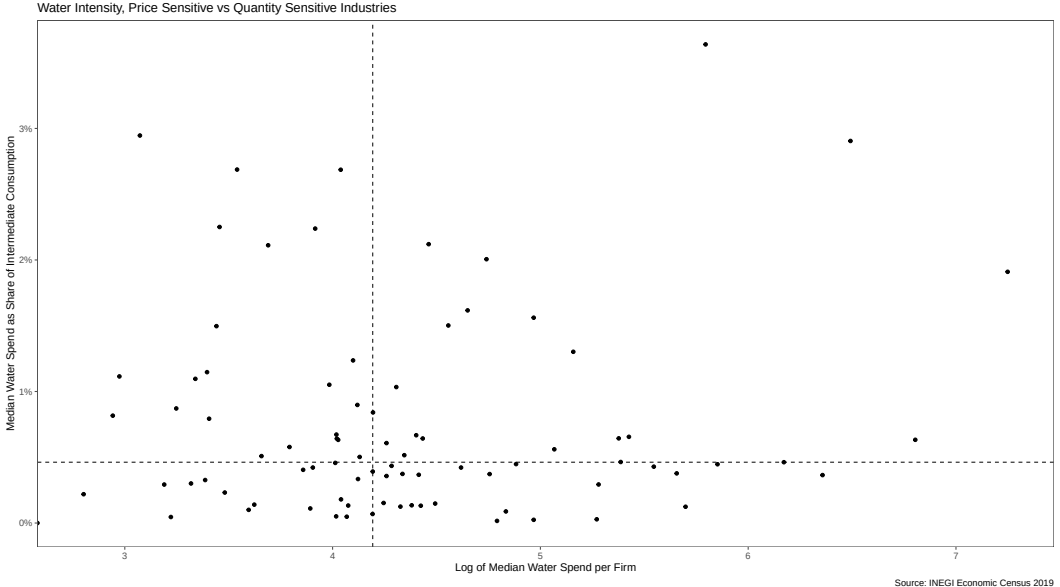
Generation, transmission, distribution and marketing of electricity, water supply and natural gas due to pipelines to the final consumer
Mining −related services
Paper industry
Insurance companies, bonds, and administration of retirement funds
Plastic and rubber industry
Oil and gas extraction
Drink and tobacco industry
Hospitals
Air Transport
Temporary Accommodation Services
Electronic information, lodging and other related services processing
0
5
10
15
Total Water Spent / Total number of Firms

Will conclude by using the median values of industries in places where RCA > 1.

Plotting the quantity vs price indicators against each other to see the tradeoff.

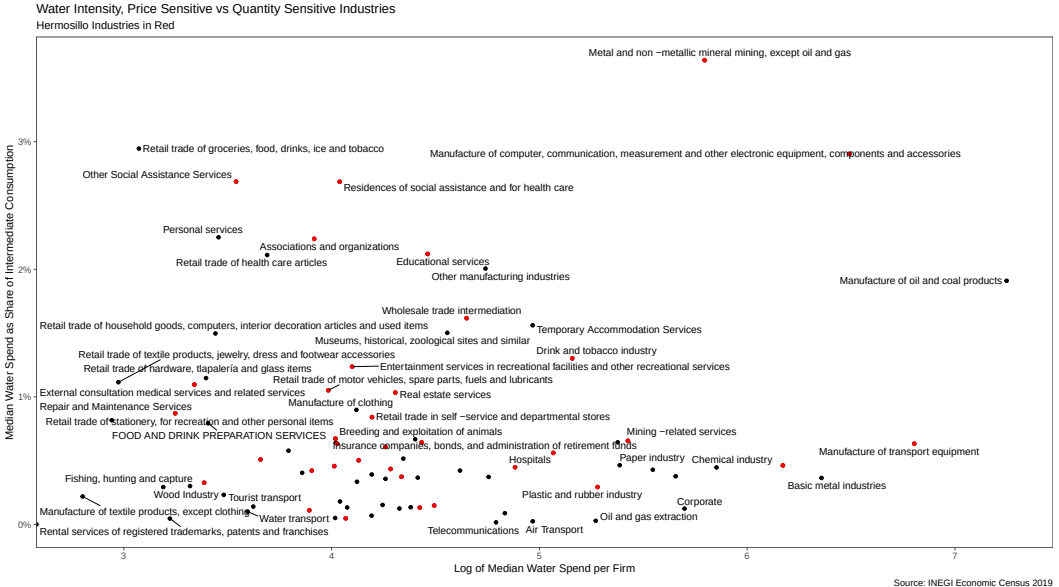


Source: INEGI Economic Census 2019



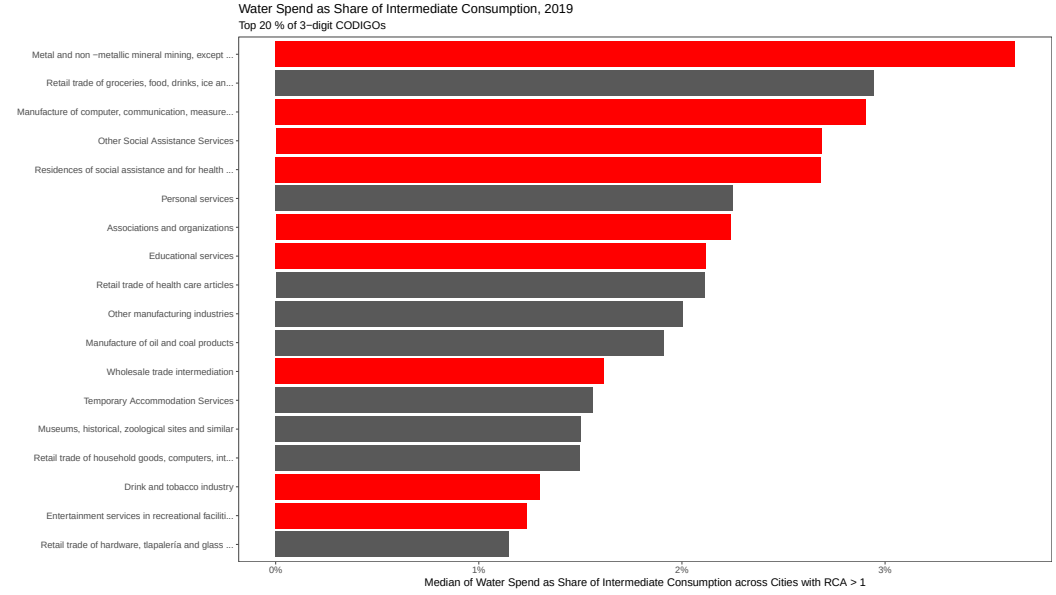
Source: INEGI Economic Census 2019

Hermosillo has presence in those sensitive to water prices and quantity.

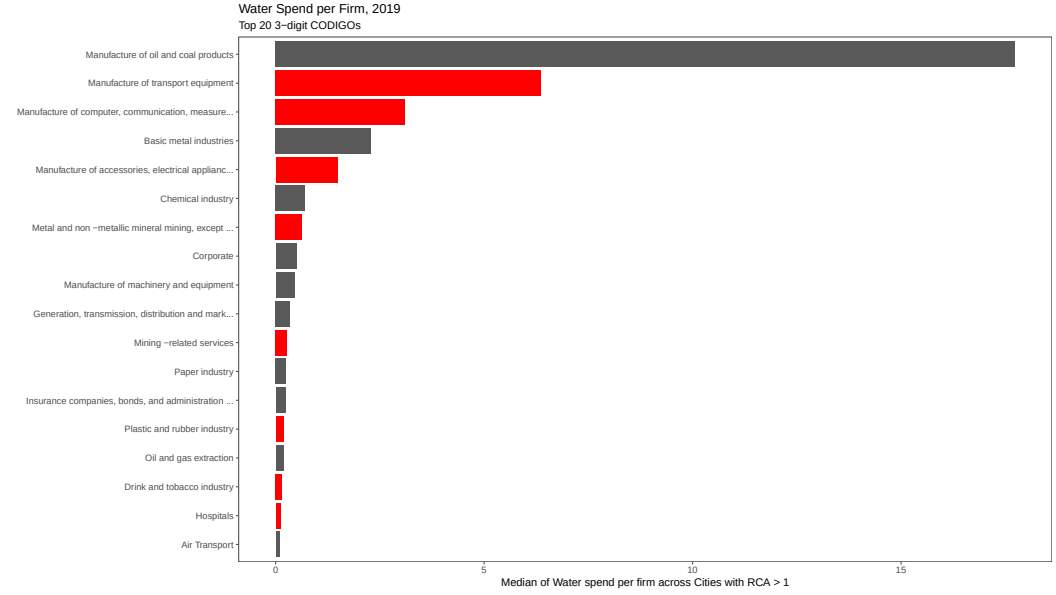


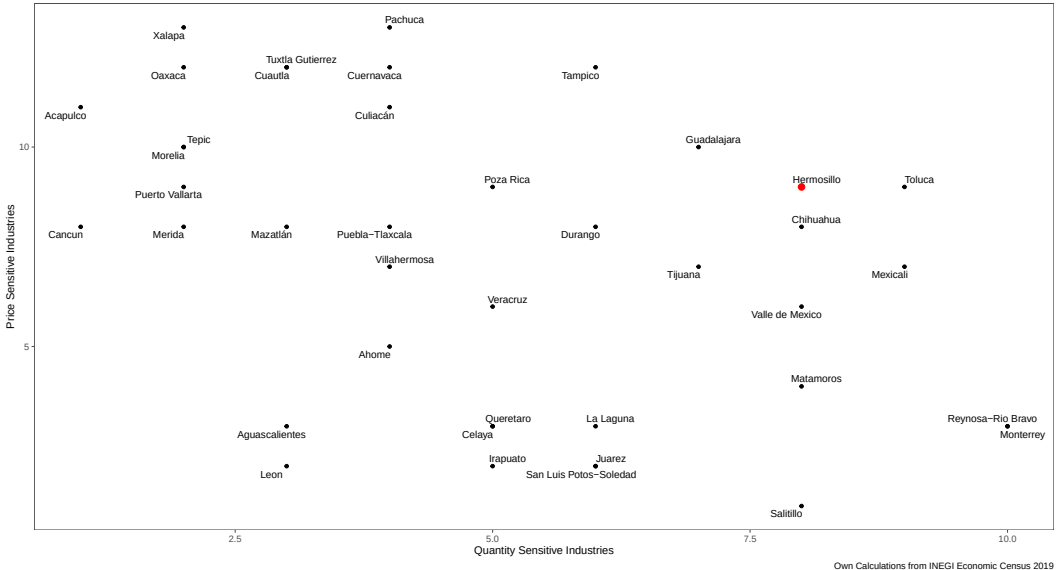
Source: INEGI Economic Census 2019

How many price-sensitive industries is Hermosillo present in?



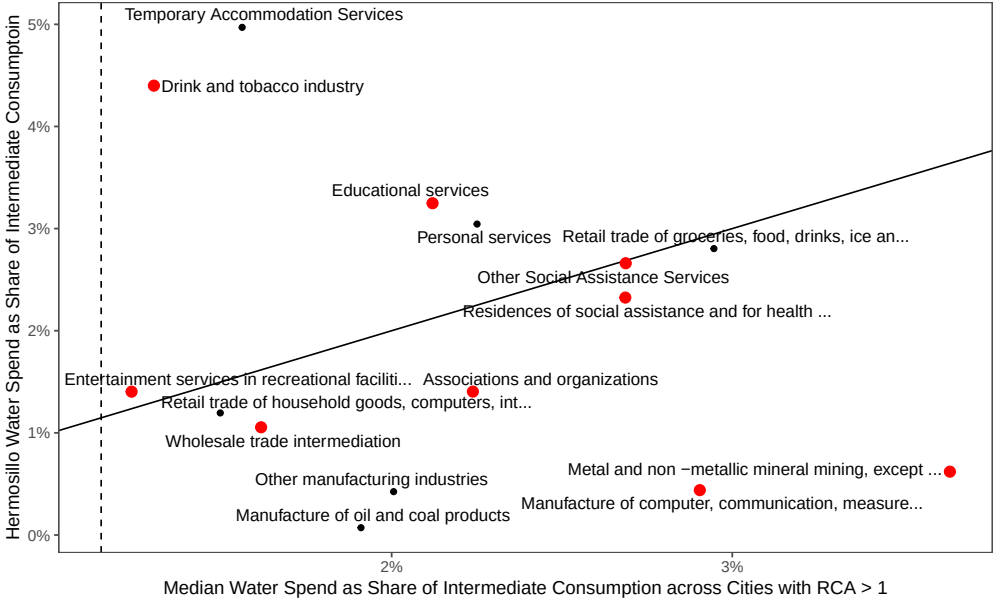
How many quantity-sensitive industries is Hermosillo present in?

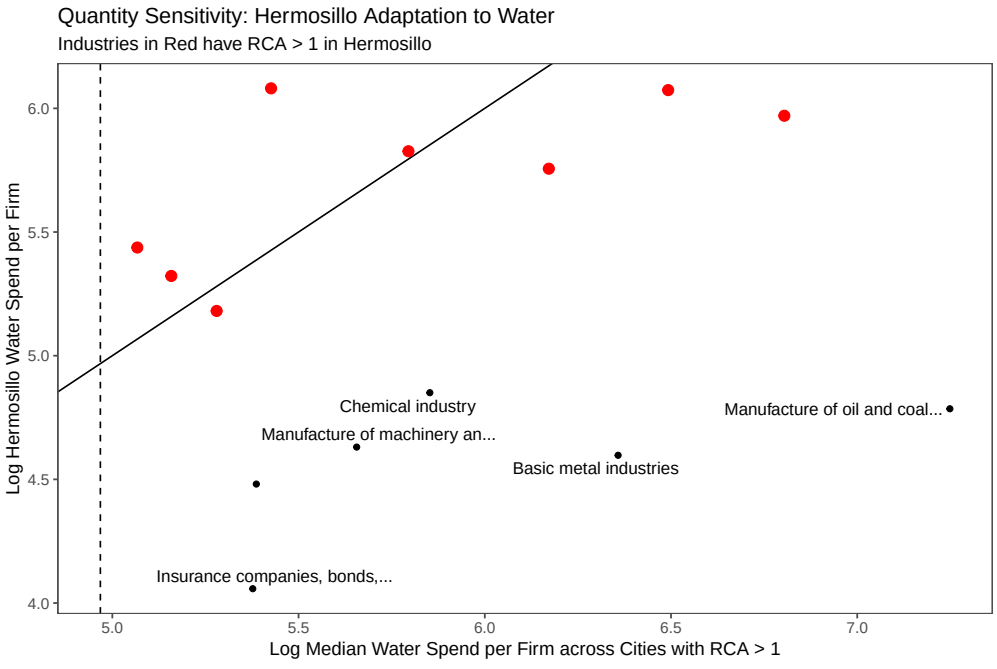



Number of Water Intensive Industries with RCA > 1
Pachuca
Xalapa
Tuxtla Gutierrez
Oaxaca
Cuautla
Cuernavaca
Tampico
Acapulco
Culiacán
Tepic
Morelia
Guadalajara
Poza Rica
Hermosillo
Toluca
Puerto Vallarta
Chihuahua
Cancun
Merida
Mazatlán
Puebla−Tlaxcala
Durango
Villahermosa
Tijuana
Mexicali
Veracruz
Valle de Mexico
Ahome
Matamoros
Queretaro
La Laguna
Reynosa−Rio Bravo
Aguascalientes
Celaya
Monterrey
Irapuato
Juarez
Leon
San Luis Potos−Soledad
Salitillo
10
5
2.5
5.0
7.5
10.0
Price Sensitive Industries
Quantity Sensitive Industries
Own Calculations from INEGI Economic Census 2019

So we can conclude that by both measures, Hermosillo is currently 'present' in a significant number of water-sensitive industries.

1. Have these industries grown over time?
2. Have these industries 'adapted' to the high water prices or low water quantities?


Price Sensitivity: Hermosillo Adaptation to Water
Industries in Red have RCA > 1 in Hermosillo
Temporary Accommodation Services
Drink and tobacco industry
Educational services
Personal services
Retail trade of groceries, food, drinks, ice an...
Other Social Assistance Services
Residences of social assistance and for health ...
Entertainment services in recreational faciliti...
Associations and organizations
Retail trade of household goods, computers, int...
Wholesale trade intermediation
Metal and non −metallic mineral mining, except ...
Other manufacturing industries
Manufacture of computer, communication, measure...
Manufacture of oil and coal products
5%
4%
3%
2%
1%
0%
2%
3%
Hermosillo Water Spend as Share of Intermediate Consumptoin
Median Water Spend as Share of Intermediate Consumption across Cities with RCA > 1

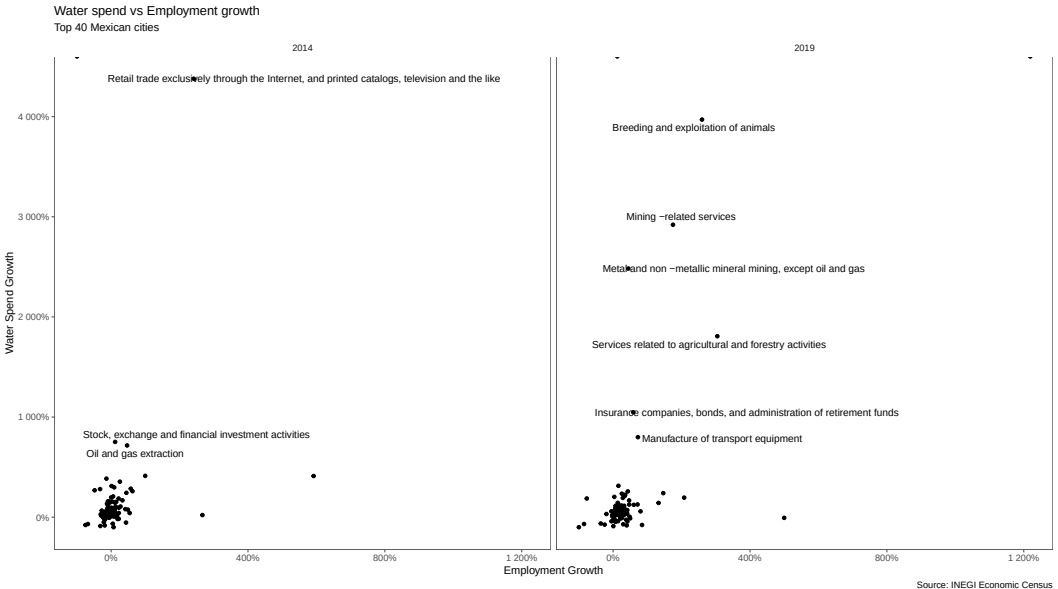

Quantity Sensitivity: Hermosillo Adaptation to Water
Industries in Red have RCA > 1 in Hermosillo
Log Hermosillo Water Spend per Firm
6.0
5.5
5.0
4.5
4.0
5.0
5.5
6.0
6.5
7.0
Log Median Water Spend per Firm across Cities with RCA > 1
Chemical industry
Manufacture of machinery an...
Basic metal industries
Manufacture of oil and coal...
Insurance companies, bonds,...

No clear pattern emerges with respect to adaptation, either on the total amount of water spent per firm, or the share of expenditures.

Lets see if the water intensive industries are growing in Hermosillo. We will look at growth from 2009 - 2014 and 2014-2019.

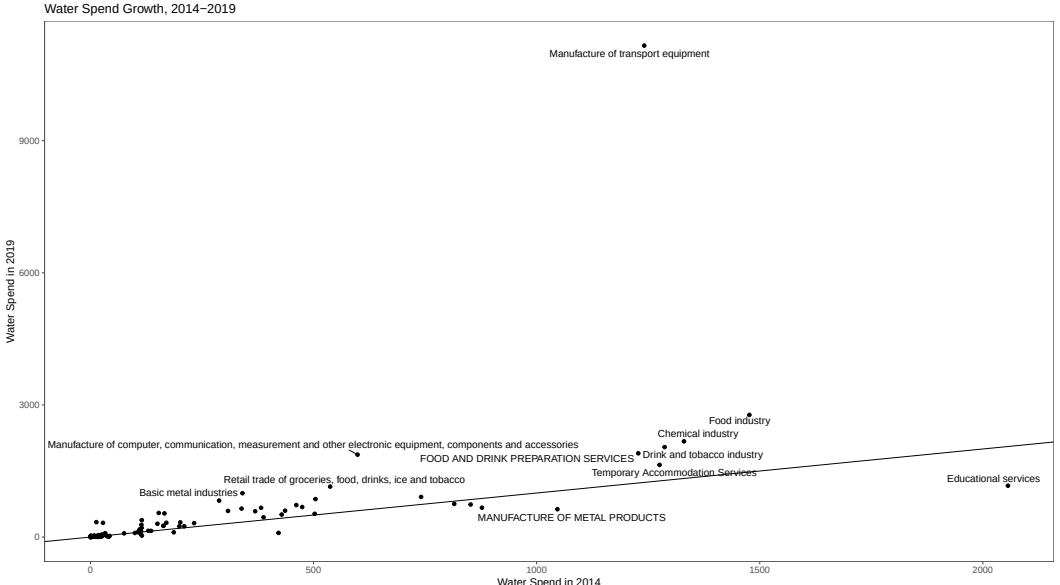
But it should be noted that when looking at growth, we are comparing across surveys, and the censorship and data quality problems may be more pronounced.

For example, some strange patterns here.

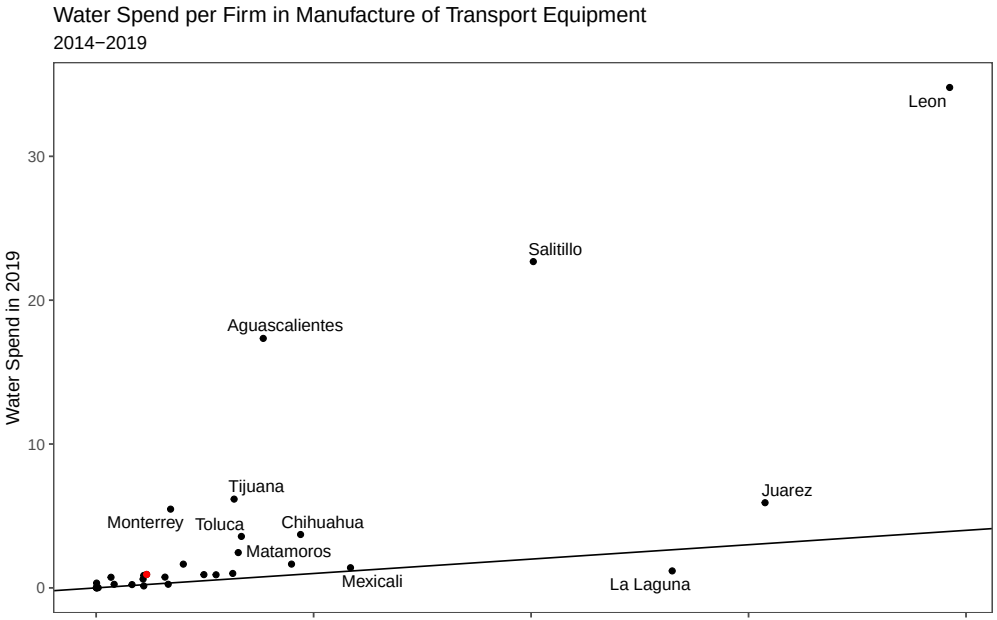


Source: INEGI Economic Census

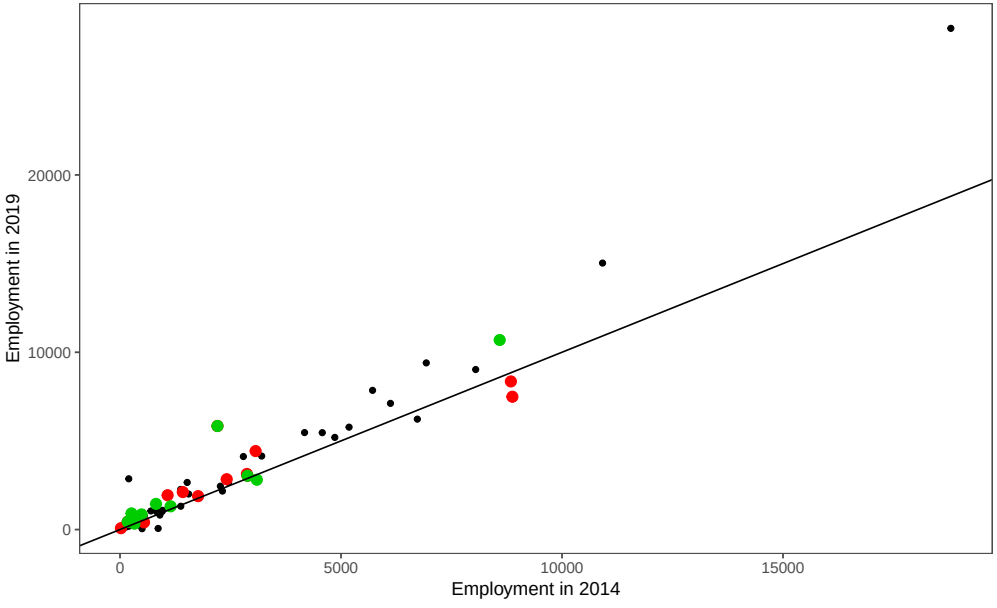
In particular, Manufacture of transport equipment stands out in terms of water spend growth.



Driven by massive increases in Leon, Salitillo, Monterrey and Aguascalientes.

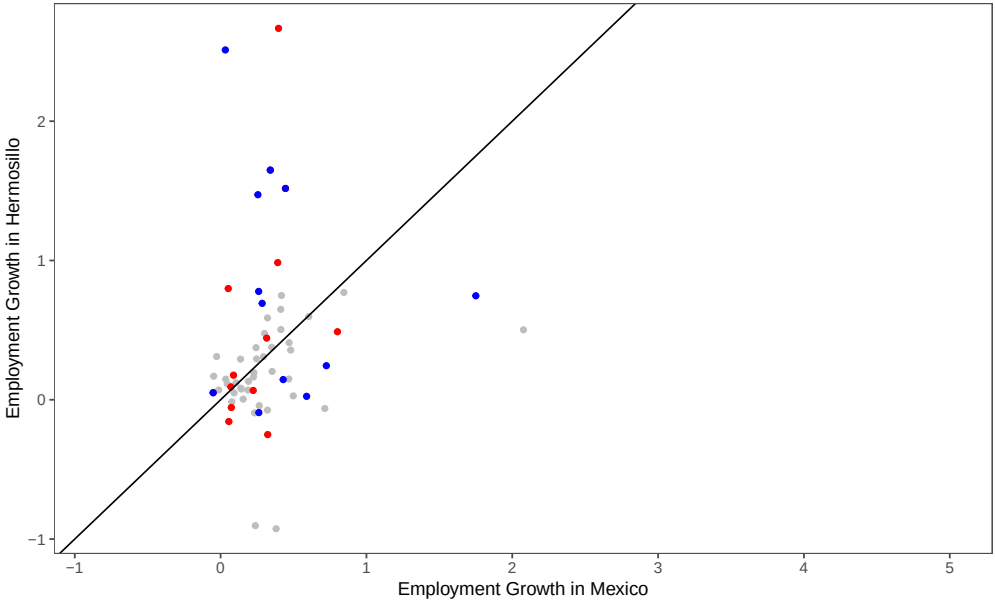


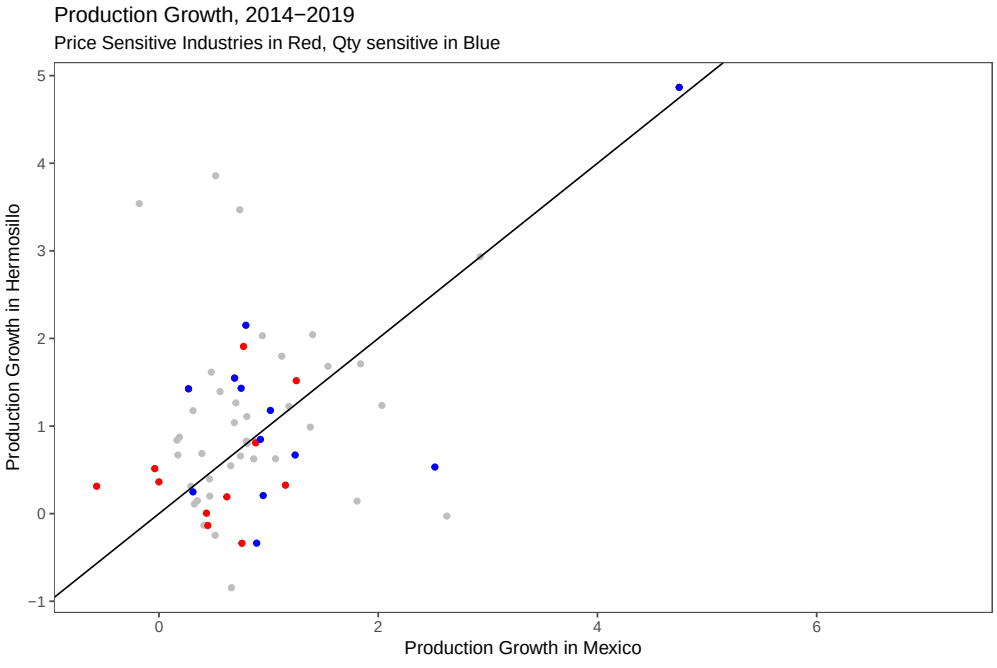
Back to the topic: have water intensive industries grown in Hermosillo?


Employment Growth in Hermosillo
Price Sensitive Industries in Red, Qty sensitive in Green
Employment in 2019
20000
10000
0
0
5000
10000
15000
Employment in 2014

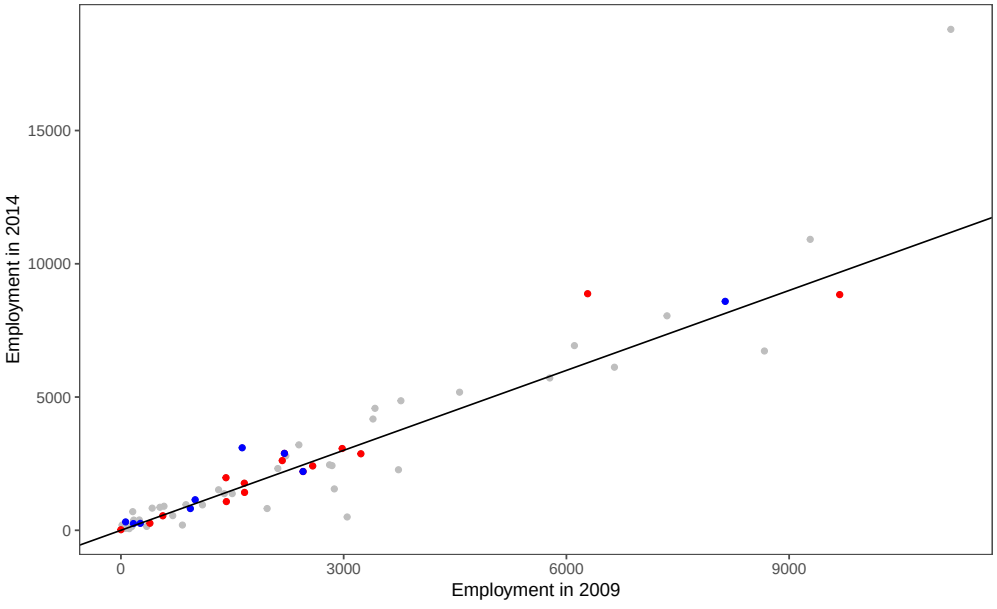
Employment Growth, 2014−2019

Price Sensitive Industries in Red, Qty sensitive in Blue



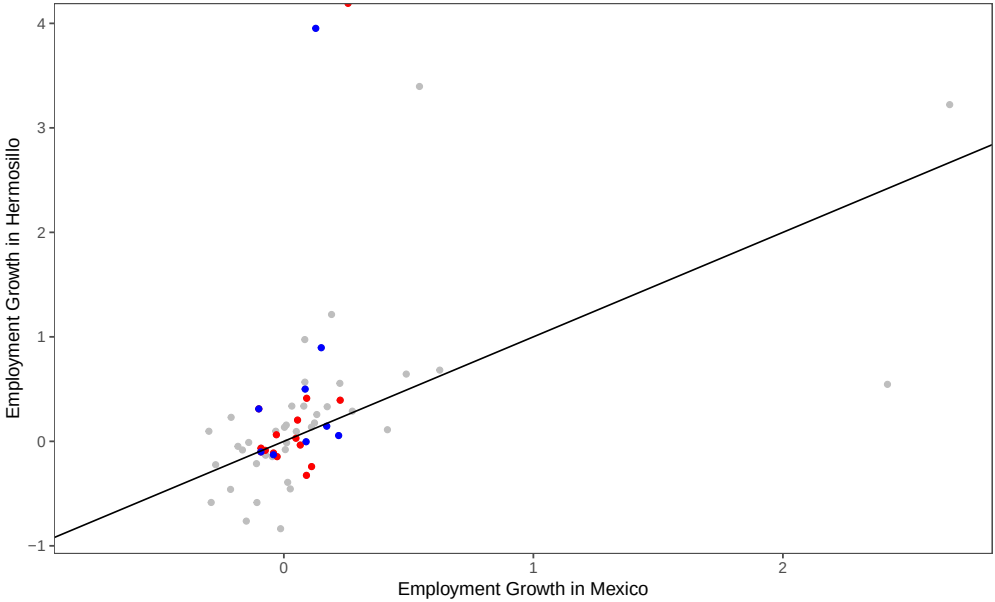

Production Growth, 2014−2019
Price Sensitive Industries in Red, Qty sensitive in Blue
Production Growth in Hermosillo
Production Growth in Mexico
5
4
3
2
1
0
−1
0
2
4
6

Now looking at the growth from 2009-2014.


Employment Growth in Hermosillo
Price Sensitive Industries in Red, Qty sensitive in Blue
Employment in 2014
15000
10000
5000
0
0
3000
6000
9000
Employment in 2009

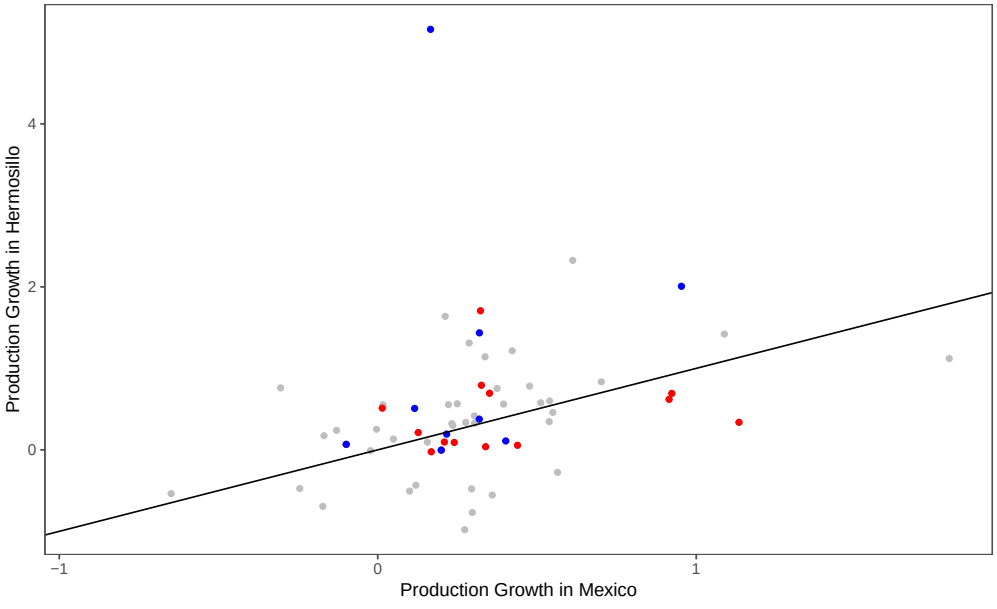
Employment Growth, 2009−2014

Price Sensitive Industries in Red, Qty sensitive in Blue



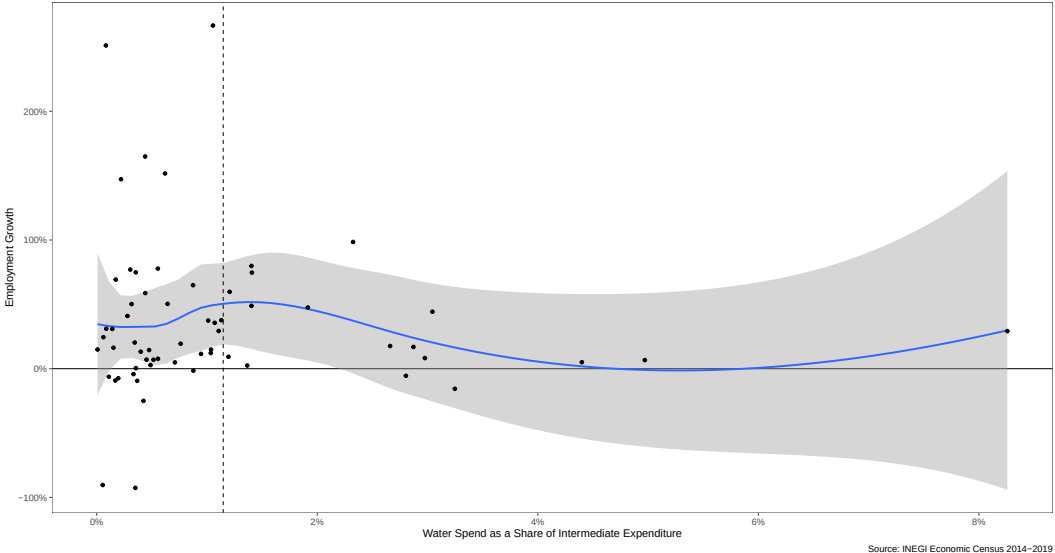
Production Growth, 2009−2014

Price Sensitive Industries in Red, Qty sensitive in Blue



Water Price Sensitivity vs Employment Growth 2014−2019

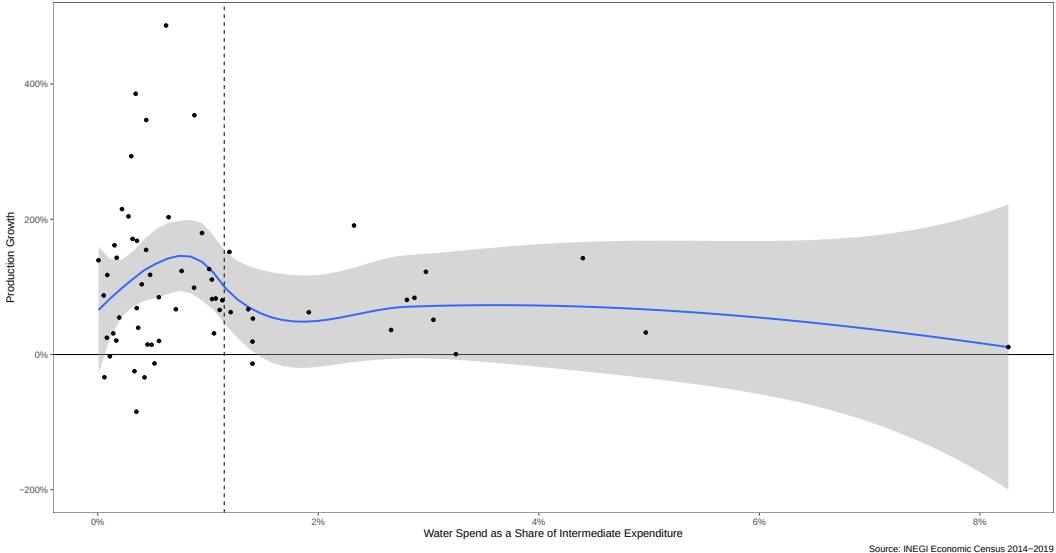
Hermosillo



Source: INEGI Economic Census 2014−2019

Water Price Sensitivity vs Production Growth 2014−2019

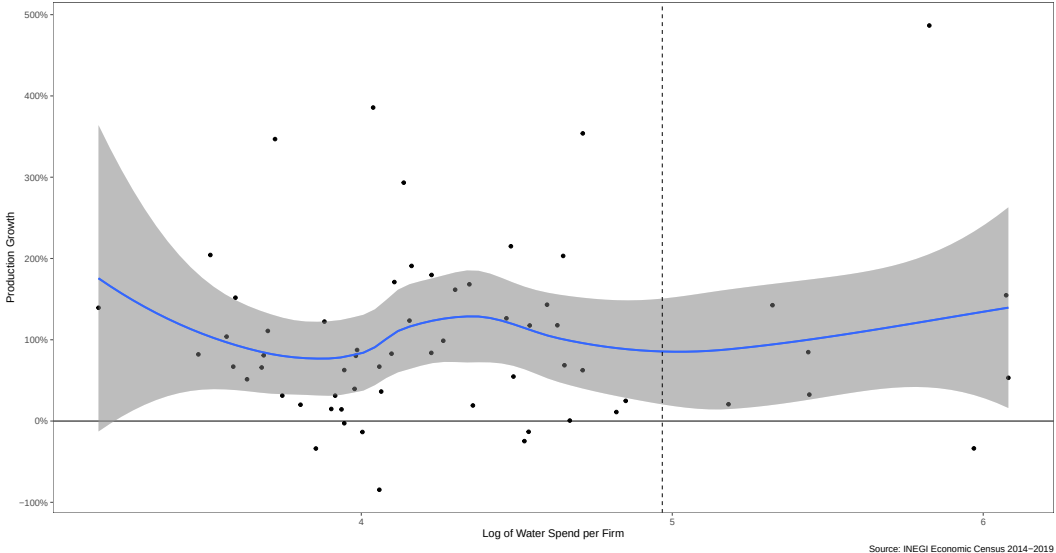
Hermosillo



Source: INEGI Economic Census 2014−2019

Water Quantity Sensitivity vs Production Growth 2014−2019

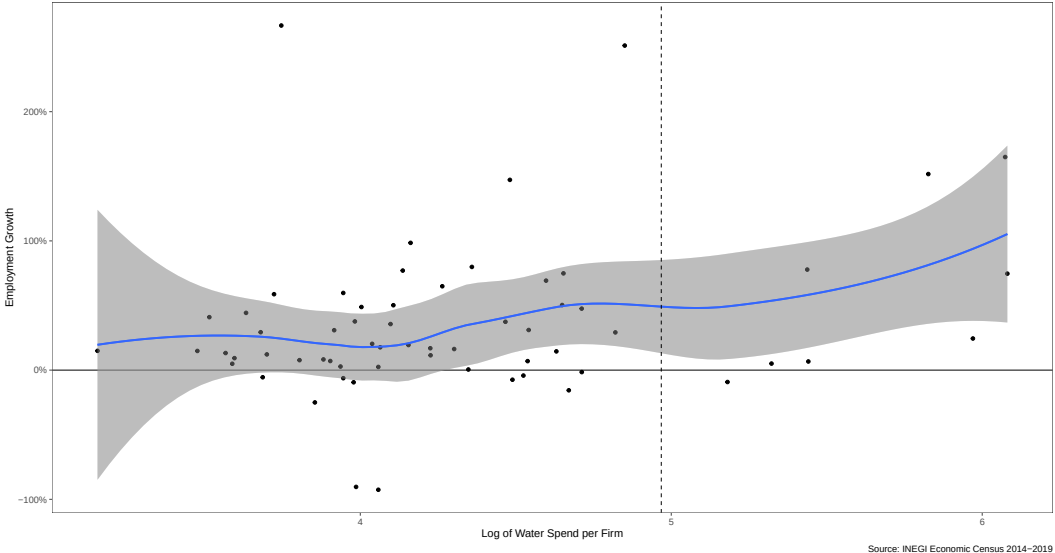
Hermosillo



Source: INEGI Economic Census 2014−2019

Water Quantity Sensitivity vs Employment Growth 2014−2019

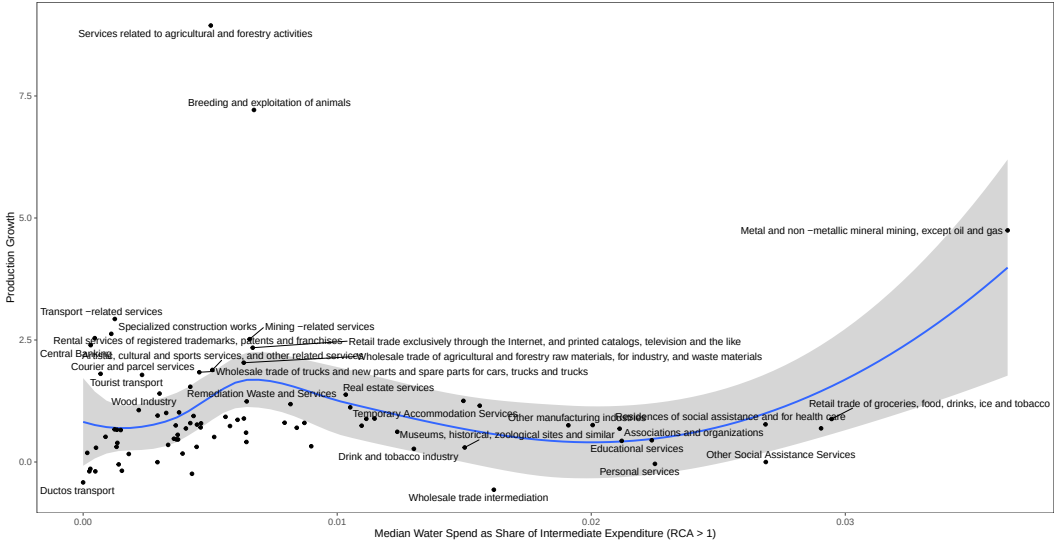
Hermosillo



Source: INEGI Economic Census 2014−2019

Price Sensitive Industries and Growth

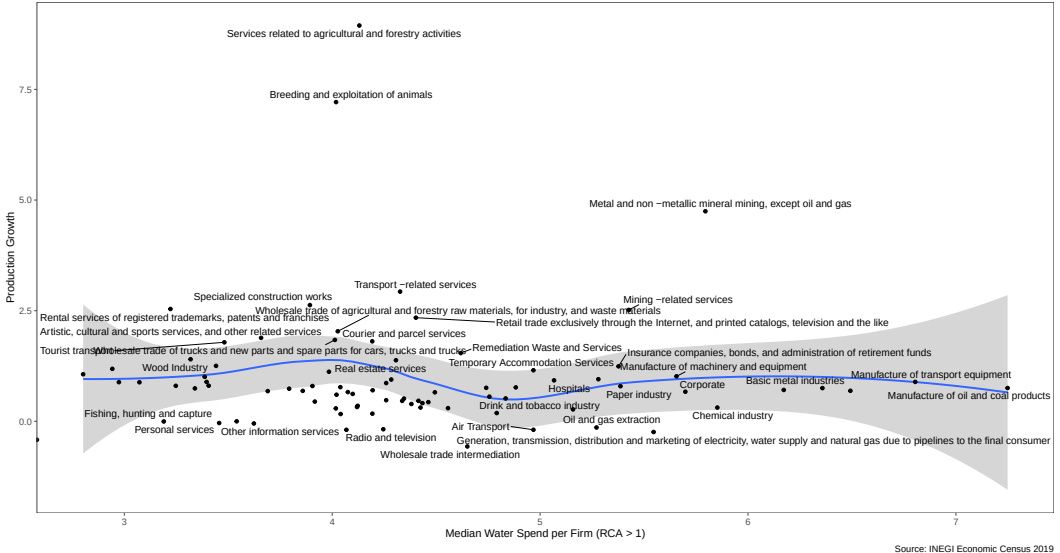
Mexico



Source: INEGI Economic Census 2019

Qty Sensitive Industries and Growth

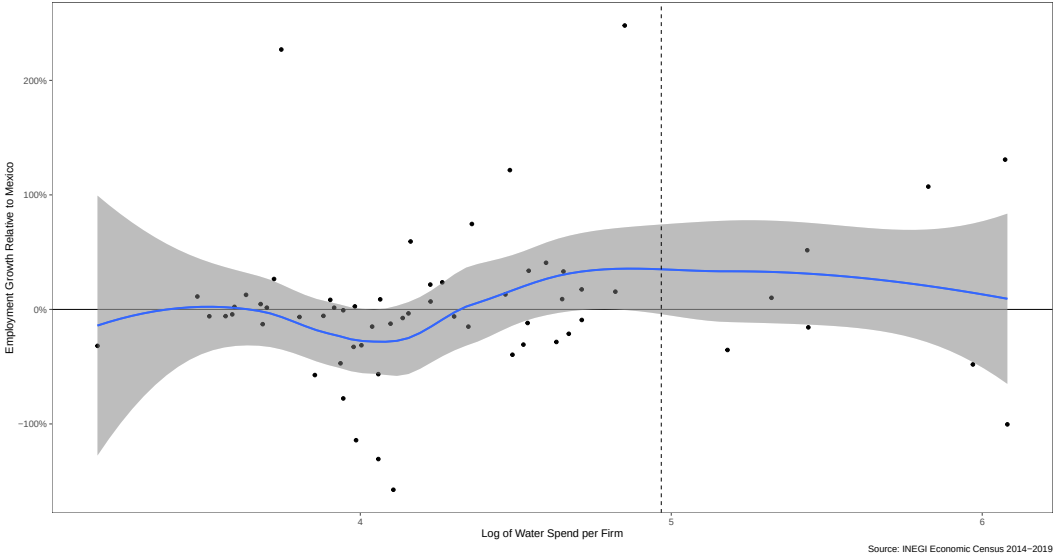
Mexico



Source: INEGI Economic Census 2019

Water Quantity Sensitivity vs Employment Growth 2014−2019

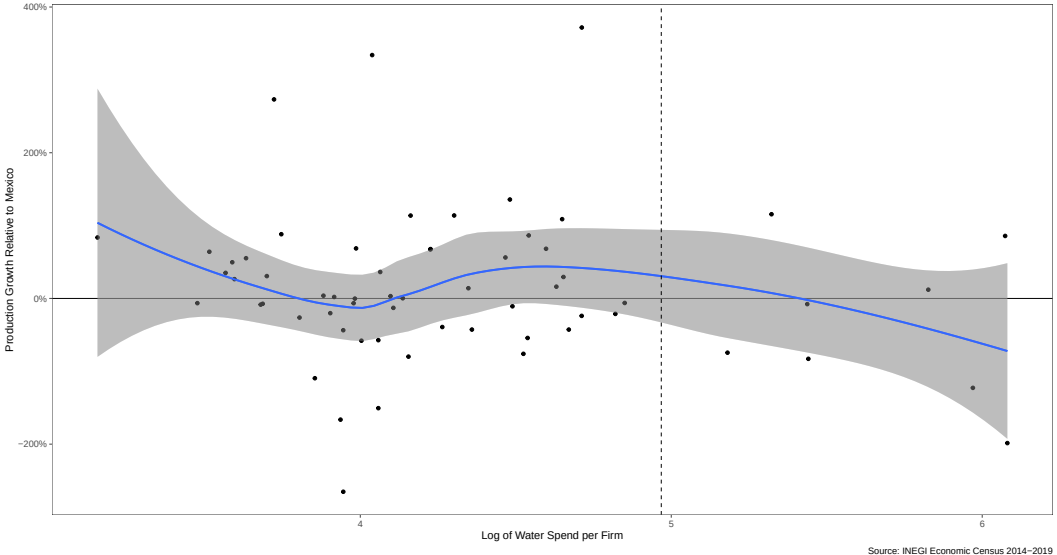
Hermosillo



Source: INEGI Economic Census 2014−2019

Water Price Sensitivity vs Employment Growth 2014−2019

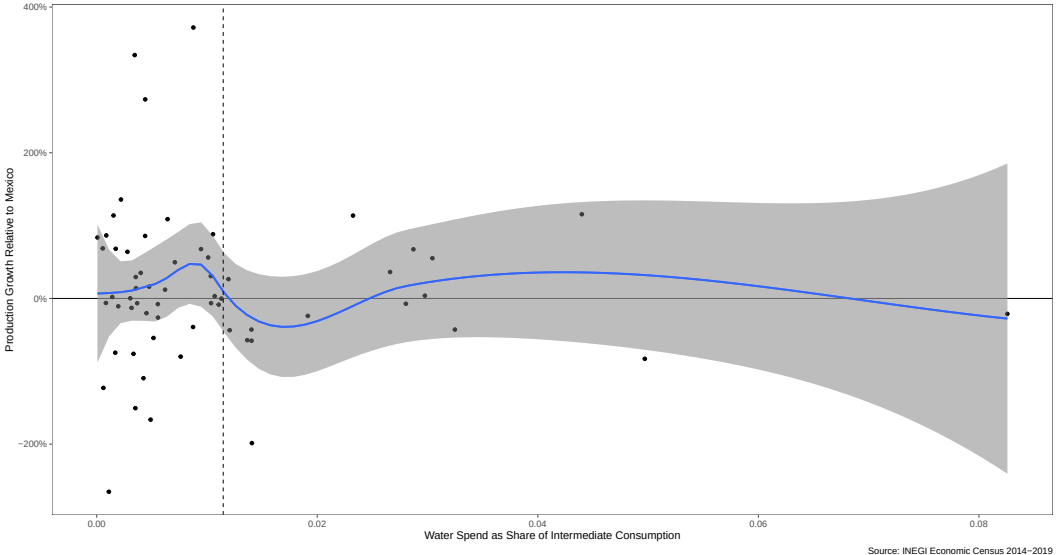
Hermosillo



Source: INEGI Economic Census 2014−2019

Water Price Sensitivity vs Employment Growth 2014–2019

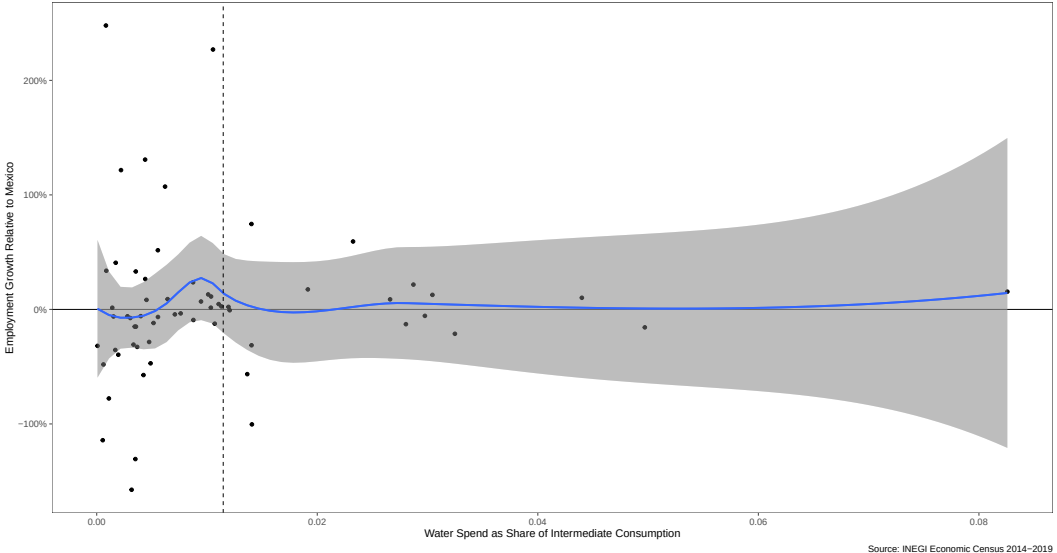
Hermosillo



Source: INEGI Economic Census 2014–2019

Water Price Sensitivity vs Employment Growth 2014–2019

Hermosillo



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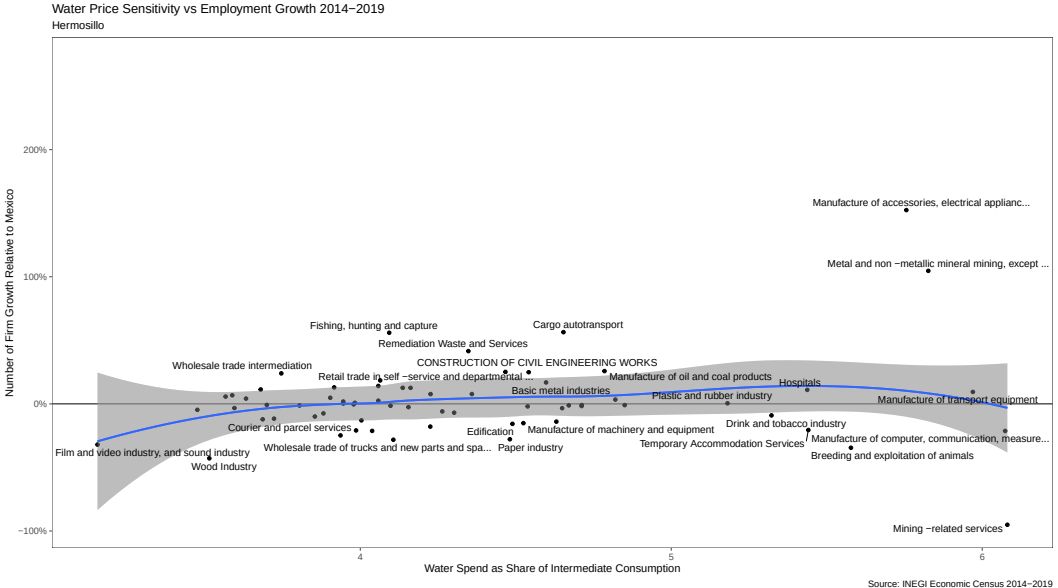

Source: INEGI Economic Census 2014−2019