China's Macroeconomic Performance and Natural Monopolistic Products

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Abstract

This research explores about to extent to which the infrastructure natural monopolists have influenced the macroeconomic performance of China. Census data are collected from the National Bureau of Statistics of China to construct five testable hypotheses between macroeconomic performance and natural monopolistic pricing. The findings of this research reveal about the impacts of specific natural monopolistic product categories on Chinese macroeconomic performance, like electricity and other energy products.

Keywords

Natural Monopolistic Power; Infrastructure Products; Social Welfare; & Macroeconomic Performance.

1. Introduction

Monopolistic power is not fully controllable by government due to its inability to ascertain the marginal cost of varied monopolists (Mankiw, 2011). Worse still, natural monopoly is even uncontrollable on the ground that a regulated price is likely to make natural monopolist unprofitable to supply, which makes room for natural monopolist to charge a price overly above marginal cost and consequently undermine social welfare (Sloman, 2007). However, the negative externalities of natural monopolist are not confined to market level but also up to national level, which is evidenced by Cibinskiene, A(2010) who ever documented about the varied market failure induced by infrastructure natural monopolist at national level, including constrained innovation, reduced profitability, increased bankruptcy and capital flee.

To what extent the monopolistic power would exert effect has been controversial and assessed from multiple perspectives including monopolistic power of multinational conglomerates (Gelan, 2009), monopolistic impact on creativity (McKenzie, 2008), and consumers' perceptions toward monopolistic power (Jill, Gel and Bush, 2008). However, insufficient attentions have been paid to the Macroeconomic impact of monopolistic power. This paper will thus shed light on the relationship between macroeconomic performance and monopoly-typically microeconomic knowledge. Natural monopolist is taken as the breakthrough point based on the fact that most natural monopolistic products are necessities to most households within a nation as whole (Cibinskiene, 2010).

2. Hypotheses and Review

Where the macroeconomic performance is concerned, there are several product categories of monopolistic power may have profound impacts on macroeconomic performance. One of the typical natural monopolistic product is water which almost influence every aspect of national economy. If the price of water is too high, household may constrain their demand on water and thus negative relationship between NMP and household demand. However, someone may

argue the opposite because water is not luxury and household may not be so sensitive to the pricing of natural monopolistic products like water. In other words, there are might well be no relationships between water and its pricing. However, as water it's more of a necessity than a dispensable product, customers, particularly those living in poverty, are still sensitive to water prices. Therefore, the following hypothesis is proposed:

H1: NMP price is negatively related to Household Demand in China

Another important factor of national economy is business investment. Natural monopolistic products are including those more influential on business investment because water, electricity and gas are consumed to a larger volume in business investment than in personal consumption. Also, industrial consumers are more sensitive to NMP than household consumers due to their huge consumption. Nevertheless, some may argue the opposite that Business Investment are often made by companies with deep pockets and hence their insensitivity to prices. Moreover, business investment is more affected by other factors like economic prospect, so the impacts of NMP could be distorted. However, we still believe the impact could be self-evident when larger sample size is included. In some circumstances, certain industries are not so relevant to natural monopolistic products like electricity and gas or they may use alternatives like fruits and oil. However, we still believe that most industries are affected and hence our hypothesis as below:

H2: NMP price is negatively related to Business Investment in China

Economic growth can be driven by many factors including technology, workforce, natural resources, and institution. The higher the prices of natural monopolistic products, the higher cost for new technology to develop. In the same token, the higher the prices of natural monopolistic products, the harder it is for workforce to join the job market. Similarly, the higher the price of natural monopolistic products, the more difficult it is for government not to do rationing. Therefore, it is predictable that NMP price is negatively related to economic growth. However, the economic growth in China is more affected factors other than water, gas and electricity. Sometimes, unexpected events may happen to radically change economic performance. Those unexpected events could be catastrophic like Covid-19 which may distort the relationship between NMP price and economic growth. However, aside from those factors, NMP is presumably in negative relationship with economic growth.

H3: NMP price is negatively related to Economic Growth in China

R&D expenditure can be determined by many different factors. For example, the risk-aptitude of management is critical for R&D investment. The more risk-averse, the less likely it is for a company to invest into R&D. Also, a company may choose a safer way out which is to acquire new technologies via merger and acquisition. The more commitment to external merger and acquisition, the less commitment to internal R&D investment. Where NMP price is concerned, higher NMP price may put companies under higher risks of R&D expenditure. The higher NMP price has already taken away a portion of revenue that could be used as the safe backup for a company's commitment to internal R&D. Without the backup, a company will be at higher risk to invest into R&D and hence we propose a negative relationship between R&D expenditure and NMP prices.

H4: NMP price is negatively related to R&D expenditure in China

Unemployment is commonplace but can be caused by via different mechanisms. Some jobless people are in the process the looking for the right job. However, higher NMP prices may hold them back to commit more time to do job haunting. Some unemployed people need further job training in order to be rightfully equipped for new jobs, higher NMP prices may make them harder to stay at home to do job training. However, for those unemployed who can get government insurance, NMP prices are trivial, and they are not very much affected. Some

jobless people might well be temporarily unemployed, so shorter timespan for job haunting may be induced by higher prices for NMP. In this case, a negative relationship can be expected. However, as higher prices always discourage household to work, a positive relationship is suggested here.

H5: NMP price is positively related to Unemployment in China

3. Methodology

To ascertain the natural monopolistic impact on macroeconomic performance, data will be downloaded from varied datasets of the Office for National Statistics advocated by the Chinese government. The collected data are regarding the price index of certain natural monopolistic industries including Electricity, Gas, Water and Transport and about some key macroeconomic indicators regarding consumption on Natural Monopoly Products (NMPs), business investment, economic growth, and R&D expenditure, and Unemployment. All data are collected on quarterly or yearly basis rather than on monthly basis so as to avoid the adverse effects by sticky price (Calvo, Guillermo A. 1983). Moreover, given the research is to investigate the impact of monopolistic power on macroeconomic performance for a whole country, no other sampling method but Census can be better justified (Blumberg et al, 2005) and the data are consequently collected from the Office for National Statistics where country-wide data are available.

SPSS Statistical software is applied here to verify the following hypotheses formulated based on the possible market failures caused by the price change of NMPs:

H1: NMP price is negatively related to Household Demand in China

H2: NMP price is negatively related to Business Investment in China

H3: NMP price is negatively related to Economic Growth in China

H4: NMP price is negatively related to R&D expenditure in China

H5: NMP price is positively related to Unemployment in China

Essentially, the research is to test the relationships between the price index of NMPs as independent variable and the macroeconomic indicators of China as dependent variable. As the five hypotheses are all cause-and-effect relationships, statistical techniques like Pearson Correlation, Linear Regression, and Standard Deviation are appropriate to see if those relationships hold up or in what direction they hold up (Blumberg et al, 2005).

4. Data Analyses

The following is an example done by me before. This research is in the context of British economy but is used here to illustrate how I am going to do the data analyses for my proposed doctoral research in the context of Chinese economy.

H1: NMP price is negatively related to household demand

Price/Demand relationship regarding British Household Consumption on Transport (1996 Q1~2011 Q2).
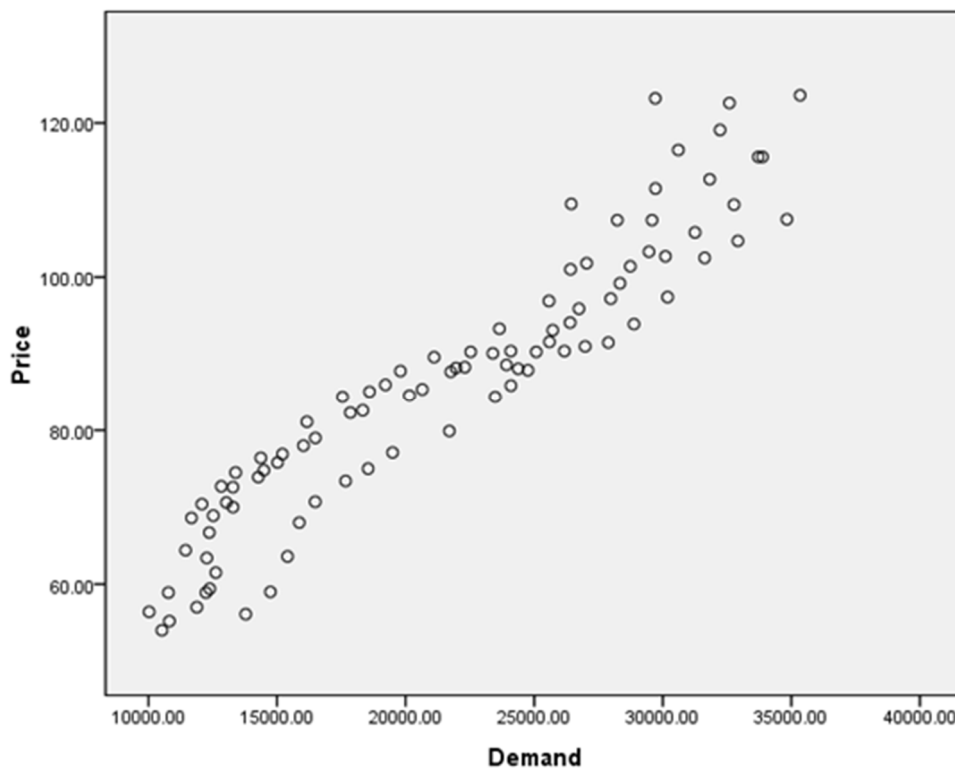
Fig 1. Price/Demand relationship regarding British Household Consumption on Transport
(1996 Q1~2011 Q2)

Price/Demand relationship regarding British Household Consumption on Electricity, Gas &
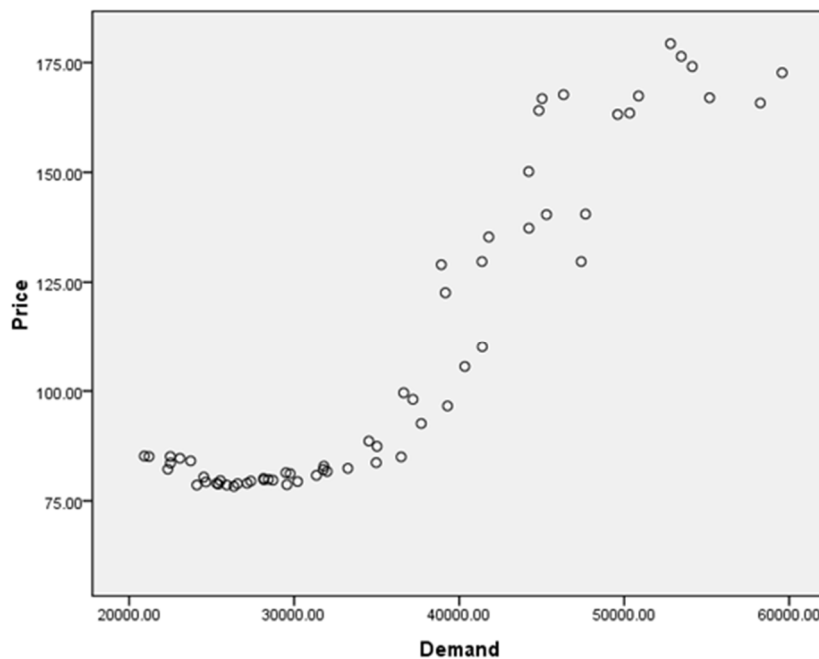Other Fuels (1996 Q1~2011 Q2).

Fig 2. Price/Demand relationship regarding British Household Consumption on Electricity,
Gas & Other Fuels (1996 Q1~2011 Q2)

Both scattered graphs demonstrate positive relationships between NMPs price and NMPs consumption. However, this cannot discredit the classic law that the higher the price, the less the demand. The above graphs may simply reflect the inflation on price and spending, so deflated data are necessary to make the above graphs more revealing but regretfully unavailable from the Office of National Statistics. Nevertheless, the positive relationship reflected from the graphs at least proved that the pricing of NMPs are not significantly reducing consumer surplus of household since 1996.

H2: NMP price is negatively related to business investment

Pearson Correlation Analysis between the Price of Electricity, Gas & Other Fuels and Investment in Manufacturing Industry (1997 Q1 ~ 2011 Q3).

Table 1. Pearson Correlation Analysis between the Price of Electricity, Gas & Other Fuels and Investment in Manufacturing Industry (1997 Q1 ~ 2011 Q3)

Correlations

		EnergyPrice	Investment
EnergyPrice	Pearson Correlation	1	-.401[**]
	Sig. (2-tailed)		.002
	N	59	59
Investment	Pearson Correlation	-.401[**]	1
	Sig. (2-tailed)	.002	
	N	59	59

[**]. Correlation is significant at the 0.01 level (2-tailed).

Result shows there is modest correlation between the price of Energy-related NMPs and Business Investment, and the correlation is significant at 0.002 level. It's no surprise to observe that Business Investment is restricted somehow by the cost of NMPs for most of them are necessities for industries as well as for household.

H3: NMP price is negatively related to Economic Growth

Regression Analysis between the Price of Electricity, Gas & Water and GDP (1997 Q2 ~ 2011 Q3)

Table 2. Regression Analysis between the Price of Electricity, Gas & Water and GDP (1997 Q2 ~ 2011 Q3) (a)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.646[a]	.418	.385	.59541

a. Predictors: (Constant), Gas_Price, Water_Price, Electricity_Price

(b)

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.737	3	4.579	12.916	.000[a]
	Residual	19.144	54	.355		
	Total	32.880	57			

a. Predictors: (Constant), Gas_Price, Water_Price, Electricity_Price

b. Dependent Variable: GDP

(c)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.895	1.194		.749	.457
	Electricity_Price	-.039	.025	-1.582	-1.582	.119
	Water_Price	.041	.016	1.085	2.501	.015
	Gas_Price	.000	.018	-.053	-.050	.960

a. Dependent Variable: GDP

Regression analysis shows the following relationship:

GDP Growth = - 1.528×Electricity + 1.085×Water - 0.05×Gas+1.194

Both electricity and gas price are negatively related to GDP while electricity price is more important than gas in its relationship to GDP. On contrast, water price is much less important than both gas and electricity price and even positively related to economic growth. Again, this does not overthrow the law of demand due to the lack of taking inflation into account, but it confirms the dispensable impact of water price.

H4: NMP price is negatively related to R&D expenditure

Pearson Correlation between Yearly Business R&D Expenditure and Yearly Electricity Price (1996~2010)

Table 3. Pearson Correlation between Yearly Business R&D Expenditure and Yearly Electricity Price (1996~2010)

Correlations

		R_D_Yearly	Electricity_Price_Yearly
R_D_Yearly	Pearson Correlation	1	.938[**]
	Sig. (2-tailed)		.000
	N	30	17
Electricity_Price_Yearly	Pearson Correlation	.938[**]	1
	Sig. (2-tailed)	.000	
	N	17	17

**. Correlation is significant at the 0.01 level (2-tailed).

Now that electricity is the most important determinant of economic growth in comparison with gas and water, electricity price is thus selected to see how it's related to the driving-force of economic growth-R&D expenditure. The strong correlation represented from the above table may not be self-proved due to the lack of deflated data as mentioned previously. However, the strong correlation value – 0.938 and valid significance – 0.000 may imply that the higher expenses of electricity will force business to come up with innovative ways to improve efficiency.

H5: NMP price is positively related to unemployment

Regression Analysis between the Price of Electricity, Gas & Water and Unemployment (1997 Q2 ~ 2011 Q3)

Table 4. Regression Analysis between the Price of Electricity, Gas & Water and Unemployment (1997 Q2 ~ 2011 Q3) (a)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.795[a]	.632	.612	224.19679

a. Predictors: (Constant), Electricity_Price, Water_Price, Gas_Price

(b)

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4669645.417	3	1556548.472	30.967	.000[a]
	Residual	2714266.928	54	50264.202		
	Total	7383912.345	57			

a. Predictors: (Constant), Electricity_Price, Water_Price, Gas_Price

b. Dependent Variable: Unemployment

(c)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1514.223	449.640		3.368	.001
	Water_Price	-13.383	6.205	-.744	-2.157	.035
	Gas_Price	7.139	6.604	.914	1.081	.285
	Electricity_Price	6.854	9.316	.584	.736	.465

a. Dependent Variable: Unemployment

Both gas and electricity price contribute positively to the unemployment rate of Britain while water price do the opposite. However, gas and electricity price are not significantly in positive relationship with unemployment, so the monopolistic power of gas and electricity are not strong to the extent to reduce employment significantly. Water price is necessities and is normally inexpensive comparing with gas and electricity, so its positive relationship with employment may simply because of the higher demand on water during economic boom.

5. Discussion

This research sets up to ascertain the impacts of different natural monopolistic product categories on economic performance. The data of this research confirmed prior research that certain natural monopolistic product classes including electricity and gas are very impactful on economic performance. Energy consumption in China are not so well controlled to prevent its negative consequences. The implication of this findings are that the consumption of energy in China needs to be strictly regulated and controlled and national pricing of electricity and gas need to be more transparent to avoid unnecessary waste.

The reason for the profound impacts of electricity and gas pricing could be multifold: for one, it could be the price level is not good-value-for-money. In this case, the national power should be more cautious about setting price overly high; for another, it may because the use of electricity and gas have too much side effects. Pollution induced by energy abuse caused great negative externality and makes cost of energy use overly expensive. No mater whatever is the curse, government needs to think out of box to control prices of energy pricing. Otherwise, investment will be adversely affected.

Another surprising findings of this research is that the pricing of many other categories of natural monopolistic product are not so influential on economic performance. The reason for it may because the prices of the product categories are reasonably set, so not much influences induced by those product categories. Alternatively, it may because those product categories are not relevant as input goods, so they do not directly affect economic performance as a result.

6. Conclusion

Natural Monopolistic power in China is under reasonable control and rarely engenders negative macroeconomic consequence. No clear evidence is found that the household consumption and employment are reduced by natural monopolistic power and the Chinese infrastructure monopolists are charging reasonable prices over the past years. However, Energy NMPs Pricing are influential on business investment, and electricity price is especially important in determining R&D expenditure and economic growth. Therefore, reducing energy cost including electricity and gas is proved to be beneficial for a country's innovation, investment dynamics and economic growth.

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