Comments on the OECD Study and the Hausman and Ros' Paper about the Lack of Market Competition in the Telecommunications Sector in Mexico*

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Abstract

This article examines the two reports on the Telecommunications sector in Mexico. The first study is the OECD report, while the second was written by Hausman and Ros and criticizes the former one. Comments are only technical and are made with academic purposes. Both studies construct methodologies that are carried out using aggregated data and assess the problem assuming a perfect competition model, when the structure of the market in this sector calls more for a monopolistic competition analysis.

Introduction

I comment each of the two reports on the lack of market competition in the Telecommunications sector in Mexico. The first study is the OECD report written for the Federal Telecommunications Commission of Mexico. The second was written by Hausman and Ros and criticizes the former one and was requested by America Movil. Comments are only technical and are made with academic purposes.

1 The OECD Report

See Stryszowska (2012).

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The goal of this study was to estimate the quantities and prices of the telecommunication services in Mexico that would have prevailed had the market conditions in this country been the same ones as in an average market among the OECD countries. With these counterfactual quantities and prices it is possible to obtain estimates of the differentials on consumer surplus between the actual market conditions and the counterfactual. The main assumptions are that Mexico is compared to a very particular set of countries, defined by the membership to the OECD and thus the results should be read with respect to this particular set. The second assumption is that Mexico's quantities and prices are compared to the ones from the average of the OECD. It is not being compared to an ideal of competitive market nor against any other criterion. In other words, the counterfactual the authors use is not based on any process of welfare maximization or any other theoretical benchmark.

The study is divided in three parts. Each one corresponds to each of the sectors in the telecommunication services. The first one is the land lines services. Here the data show that the price in Mexico in dollars and PPP-adjusted of the basket of services has always been above the average in the OECD except in 2009. However it has not been the country with the highest prices. In the three sectors, data on quantities and prices go from 1990 to 2009, annual data. In the second sector, cell phones lines, the price of the basket of services in Mexico has remained constant slightly above the OECD's average. In the third sector, cable and DSL, the price in Mexico has been the same as the OECD's and the maximum price has significantly dropped since 2007.

Stryszowska motivates her discussion based on the following observations. In the land lines sector, the number of lines per capita is one of the lowest in the OECD. Slightly different, the number of cell phone subscriptions per capita has increased at a constant rate but but it is the lowest among OECD countries. And finally, the number of subscriptions of broadband services per capita in Mexico has been the lowest in almost every year. In order to answer the question whether these differences are caused by the lack of competition in the industry we would need to carefully define the benchmark. This could be a market in which all the market shares are equal or a market in which the prices are equal to average costs[1] The

[1]Ideally, price should be equal to marginal costs, but in this industry fixed and sunk costs are very high.

author chose a benchmark defined by the average conditions among the OECD countries without Mexico. It would be worth discussing how far this benchmark is from the two points of reference above mentioned.

This is, a grosso modo, the study's methodology. For each country and for each year it is possible to observe equilibrium data for each of the three sectors. Each of those equilibrium points is a price-quantity pair, different for each country given a year, and different throughout time for a given country. This suggests using a system of equations to model the demand and supply. This is because each of the equilibrium points is the outcome of the interaction of consumers and telecommunication firms. In order for this system of equations to be well posed in the econometrics sense, each equation should have a ceteris paribus interpretation. To fix ideas consider the land lines sector. There, the two equations to estimate are of the form

$$Q_{it} = f(P_{it}, X_{it}^d, c_t^d) \tag{1}$$

$$P_{it} = g(X_{it}^s, c_t^s) \tag{2}$$

where P_{it} is the price in country i at year t, X_{it}^d is a vector of demand shifters, c_t^d is an unobservable constant that only changes with time but not by country. X_{it}^s is a vector of covariates that should only affect price, and c_t^s is an unobservable constant that can only change throughout time but not by country. It is important to mention that f depends on price and that if X_{it}^d contains demand shifters that make sense, f is a demand function. However, in the second equation, Q_{it} is not an argument of g. This implies that the function g is a constant with respect to the quantity level.

Such a functional form is characteristic of a perfectly competitive market. However, the big picture question is how competitive the market is, so we would like the data to tell us the right functional form of the price equation, without imposing such a strong assumption a priori. Moreover, it is reasonable to think that such industry with high fixed and sunk costs

Besides, it is easier to find data on average costs than on marginal costs for this industry.

has a price equation closer to an average cost function, if we think that firm has to cover its costs. In conclusion, estimating a model of supply and demand for competitive markets in order to say something about market power does not seem to be the best choice. A more appropriate model would be to estimate each of the residual demands for each firm[2]. The functions f and g include time fixed effects, but it is not clear how that could capture market power either.

The consequences of assuming a non-dependence on quantity for g does not alter the area that corresponds to consumer surplus. This is because the triangle formed by the vertical axis, the straight line from the demand, and the horizontal line that passes through the equilibrium price do not change their position even if g was a function of the quantity. However, an implication is that the producer surplus is 0. Since the initial question is to quantify differentials in consumer surplus, it seems that the assumption on g is harmless.

The following is a case in which it would be crucial to quantify the change in producer surplus as well. Suppose there is a regulator that wants to maximize welfare, meaning the sum of consumer and producer surpluses, by choosing some pricing rules. The regulator also considers some constraints in her objective function due to some transfer policies to low-income households that might end up harmed by those pricing rules. Having a g function that does not depend on quantities could not be part of such maximization problem since for any equilibrium the producer surplus is zero. And also because it is impossible to include fixed or sunk costs, nor substitution patterns between mobile phones and land lines, or between mobiles and broadband since now there are services that allow for phone calls to mobile devices without owning a phone. How do the elasticities between those categories affect consumer surplus? This is an empirical question that surely varies across countries and also depends on the underlying theoretical model.

The functions f and g are assumed to be linear and are estimated using data from all the OECD countries except for Mexico. Equations (1) and (2) were specified using time fixed effects. The set of these constants is different in each equation. Their interpretation in (1)

[2]In the monopolistic competition model the supply curve does not exist because it is not a function, but a correspondence.

is that there are demand shifters that are the same for all the countries for a given year. Similarly for (2). One would be tempted to estimate country fixed effects too. This is not possible because Mexico is not included in the estimation, and when you try to obtain the counterfactual values for Mexico we would not know what value to use for Mexico. One way to solve this problem is what is done in (2) in which one of the covariates is the area of the country. It is reasonable to think that this quantity does not change over time, but its value is known for any country, including the one that was excluded from the regression. This is equivalent to including country fixed effects.

The estimation uses the 3-stages least squares estimator (3SLS) and the author is aware that the reported standard errors are not corrected for heteroskedasticity. It is possible this is a concern since there are no country fixed effects, the residuals include those idiosyncratic sources of variation, making each of the country-specific variances of residuals to be different. The main advantage of the 3SLS estimator is that it uses the correlation of the residuals from the different equations. In a traditional 3SLS, the endogenous variables are projected onto all the exogenous variables, included or not in that particular equation, these are the instruments. Then the predicted values for the endogenous variables are used in an OLS for each equation of the original specification of the system. The residuals of these regressions are then used to construct a variance-covariance matrix to finally estimate a SUR model. In this last step is where the correlation of the residuals across the different equations is taking into account. The problem is that residuals used to construct the variance-covariance matrix are not corrected for heteroskedasticity. This can be corrected, as it is not included in the software the author used, by implementing a method suggested in Wooldridge (2002). If the instruments in each equation are different, Wooldridge (2002) suggests a GMM-3SLS procedure.

The author reports different specification for f and g. The final specification to do welfare calculations is the one with the highest R^2 value. Then the predicted values were obtained by using only the covariates with coefficients that statistically significant[3]. When the number of

[3]Stryszowska (2012) p. 42 "The retained price equation includes only the dummies for which statistically significant effects were identified".

independent variables is large enough, as in the case of several fixed effects, it is convenient to consider the R^2-adjusted. This is because it contains an unbiased estimator for the variance, which penalizes the use of many regressors and therefore it is not necessarily increasing in the number of regressors, as it is the case for the usual R^2[4]. Once we choose a model this way, only using the covariates with statistically significant coefficients to predict values may bring problems. For example, after trying different specifications −with and without a constant term− we choose the model with the constant term because of its higher R^2-adjusted value. However, the constant is not statistically significant and we erroneously drop it and predict values without it. It is clear that the residuals of the predicted values with respect to the actual values will be very large since this model with a constant was chosen because it has a higher goodness-of-fit. Predicting values by omitting certain covariates that were used to choose the model is incorrect.

Once those coefficients of the system of equations were found, we evaluate the functions f and g at the corresponding values of the average characteristics of the OECD members except for Mexico. This gives us a vector of prices and another for quantities. Each entry corresponds to the predicted value for each year. Then we can calculate consumer surplus as the area below the demand curve, to the right of the vertical axis and above of the horizontal line that passes through the predicted value of price. A similar calculation is done for the actual data points for Mexico and then we compare the two areas. For example, for the case of land lines, the difference between those areas has an average of 14 billion dollars per year[5], which represents 1% of Mexico's GDP. It is unclear however exactly what area is actually considered as the consumer surplus. In Figure 7[6], it seems that point given by the observed price-quantity pair for Mexico passes through the demand curve, but that would be a huge coincidence since that curve was estimated without using Mexico's data.

To measure the loss in consumer surplus in the cases of mobiles and broadband, the methodology was exactly the same as the one described above for land lines using a similar

[4]Another useful and interesting result is that the R^2-adjusted increases if and only if the t-stastistic for the a new included regressor is greater than 1 in absolute value.

[5]Stryszowska (2012), p. 48.

[6]Stryszowska (2012), p. 14

system of equations to (1) and (2). The covariates in each case are just slightly different. In the three cases the covariate price is included in the equation for quantity. But in the three cases, the quantity is not included in the equation for price. We cannot measure the interaction between those three sectors with this model, since it does not incorporate the strategic behavior of the firms and the price equation does not depend on costs, nor quantity.

2 The Hausman and Ros Report

See Hausman and Ros (2012).

Hausman and Ros' reply to the OECD's study can be summarized as follows. They find a set of countries −not necessarily members of the OECD− that have an average price of mobile services or land lines very close to the corresponding prices in Mexico at the beginning of the period considered, 2004-2011 for mobile services, and 2000-2010 for land lines. For this set of countries in particular this average is increasing over time, always been above the price in Mexico. This makes that the predicted values are always higher than the actual observed values for Mexico as explained below. They estimate two equations using all of the countries in that set plus Mexico. One equation estimates the demand elasticity and the other equation is a function of price that does not depend on costs nor on quantities, in the same way as in the OECD's study. The two equations are estimated separately, not as a system. With the estimated parameters in hand, they evaluate each of the two functions at each data point for Mexico, giving one predicted value for price and one predicted value for quantity for each year for Mexico. Since the predicated values for prices for Mexico are higher than the observed values in 2011, it implies that the difference in consumer surplus with respect to actual values is positive. This is in the opposite of the OECD report's conclusion. For years before 2007 it is expected that the difference is negative since the predicted value for prices are now lower than the observed ones. There is an open question, whether the discounted value of the sum of all of those differences for each year is positive or negative.

Hausman and Ros' main conclusion is that there has not been −in recent years− loss of consumer surplus in Mexico due to lack of market competition. The answer to the main

question crucially depends on the set of countries the comparison is made against and for which years. It seems that the three criteria used to define the set of 16 countries in the comparison set were i) that the results were robust to market prices converted into dollars using market exchange rates or PPP as in the OECD study, ii) that the GDP per capita and market penetration for Mexico were in the 95% confidence interval for the media of the other 16 countries, and iii) data availability[7]. To these explicit assumptions we should add as it is suggested by Figure 10 in Hausman and Ros (2012), that the set of countries was chosen so that their mean price is almost the same in the 2004-2006 period, but that in 2006-2011 this average is above the price in Mexico. The question is, how would this time series look like using only countries with characteristics very similar to Mexico's. This is crucial since it is this fact what makes the predicted values for Mexico to be higher than the actual values.

In a similar manner to the OECD study, Hausman y Ros estimate the difference in consumer surplus separately for land lines and mobile services. They do not estimate a model for broadband services due to data unavailability[8]. The way to calculate the consumer surplus is a bit different from the OECD study. Here the demand curve exhibits constant elasticity because it is a log-log model. The equation for mobile services projects the market penetration onto GDP per capita, a proxy for price, and country fixed effects, no constant. The proxy is the firm's revenue per minute, thus it has a higher value than the actual price. As this proxy has units dollars/minute, to find the consumer surplus we would need to multiply it by the amount of minutes per call. Since that is not in the data but the market penetration (which has no units), the authors decided to report the fraction that the change in consumer surplus represents with respect to the −unobservable− firm's revenue. This is done this way so that the expression to evaluate only depends on prices and elasticity but not on quantities[9]. Clearly, there is an endogeneity problem in the proxy for price. The authors used as instrument the average of prices in other countries[10] since they are correlated with the

[7] "We then relied upon available price data to select our sample of peer countries", Hausman and Ros (2012) p. 15.

[8] Hausman and Ros (2012) footnote p. 12

[9] See equation (4) in Hausman and Ros (2012).

[10] This type of instruments has been widely used in the empirical industrial organization literature, for example Hausman and Taylor (1981) and Berry (1994)

price in the country of interest −technology costs are similar around the world, technologies tend to be the same, etc.−, but they are not correlated with idiosyncratic country shocks such as regulatory structures.

The choice of estimating a model with unobservable fixed effects and not with random effects depends on what we assume about the problem. The difference is that in the fixed effects model we assume there is a correlation between the unobservable constants and the observable covariates, but there is no need to specify the functional form governing this correlation. In the random effects model, it is assumed that such correlation is equal to zero. It is plausible that if the GDP per capita covariate is correlated with other unobservable characteristics of the country such as income inequality, penetration of computers at home, etc. This is what suggests using the fixed effects framework[11]. It would also be interesting to consider the results in a model with country and time fixed effects altogether. The motivation for that is that there exist demand shocks that affect every country at the same time, such as new telecommunication technologies that are quickly available around the world such as smartphones, increasing demand for mobile services. Clearly the degrees of freedom decreases but it could be that a large part of the variation in the dependent variable is due to global shocks.

The second equation −the price equation− is a projection of firm's revenue per minute onto GDP per capita, the number of competitors in the market, the average of prices from other countries, a constant, and country fixed effects. Including the number of competitors in the market might bring endogeneity problems. But maybe by including fixed effects solves this problem at least partially. It is not clear why we should include the average of prices from other countries, that would be more appropriate as an instrument as in the case of the first equation. Figure 11 in Hausman and Ros (2012) shows the predicted values for Mexico. We could think of this graph as a test for the goodness-of-fit of the model. If we restrict ourselves to this, the trend is well predicted but no the specific values. In fact we can see that the values are biased upward for the second part. These are the results that are used

[11] An interesting result on fixed effects is the one due to Mundlak (1978) and Chamberlain (1982). Assuming certain functional form for the correlation between the unobservable effects and the covariates, if estimated as a random effects model we obtain the fixed effects estimator.

with a counterfactual interpretation.

A similar exercise is repeated for the land lines. They also find that Mexico has observed prices below the predicted ones. Here it is not included the number of competitors as in the case of mobile services nor time fixed effects.

In a similar manner to the OECD study, the price equation from Hausman and Ros does not depend on costs, despite the fact they themselves consider these to be a fundamental part of this industry[12]. As in the OECD study it is difficult to know what their counterfactual corresponds to in terms of a theoretical benchmark of market competition. The only advantage is that in here the set of countries was chosen in some way to be similar to Mexico, not just based on the membership to the OECD.

Conclusions

The two reports could easily be reconciled if they were evaluated on the same set of countries and over the same period. Despite the methodologies are different, the qualitative results should not differ by much. Both studies use aggregate data, which motivates the use of a demand and supply model, but this would correspond more to a competitive market situation, not to the monopolistic competition framework which seems to be more appropriate for this industry. If the basic question is to find evidence against or in favor of the lack of existence of market power, the answer would depend on deviations of prices from marginal costs. It is also an open question the outcome of a comparison against a counterfactual originated from the maximization of a welfare function and not against the counterfactual given by the average of other countries' characteristics.

References

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[12] "[] the price equation [in the OECD study] contains no cost variable. This omission is an important mistake, as cost is the major economic driver of mobile prices", Hausman and Ros (2012) p. 7. See also Hausman and Sidak (2007).

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