ROAD FREIGHT MARKET IN BRAZIL: PRICE DETERMINANTS AND ASYMMETRIC TRANSMISSION

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Overview

In Brazil, diesel use is intensified due to its continental dimensions and because the road freight is the main mean of people and goods transportation (done, mainly, by shipping companies and self-employed truck drivers). Therefore, the pricing process of diesel becomes relevant, since its direct impact on society´s well-being.

In this perspective, it is important to stress the implementation, in October 2016, Petrobras new fuel pricing strategy in the refineries, which had the main outcome frequent price increases, leading to the truck drivers strike in October 2018. It is crucial to emphasize that the policy failed when prices were volatile and showed an increasing tendency. The frequency and the diesel price oscillation promoted an imbalance in the road transportation services, which negatively impacted production, distribution of goods and provision of services. After 11 days of the truck drivers strike, the brazilian government agreed to the requests with a set of measures, among them the table of minimum prices for the road freight.

In the road cargo transportation sector, which is reponsible for more than 60% of the goods flow in the country, the cost of diesel represents around 30% to 40% of the total cost in long distance cargo. This sector, faced difficulties due to the slowdown of the economic activity and the incentives given by the government to the financing of trucks, which led to an increase of a circulating fleet, promoting oversupply of freight in the market (ANFAVEA, 2018).

Based on the above considerations, the presente article has the goal to study the transmission process of fuel station diesel prices to the price of grains (soy and corn) road freight in Brazil, during 2015 to 2020. It is intended to test the hypotheses of the asymmetry presence, in other words, if the price variation of the fuel station diesel is transmitted asymmetrically to the road freight price. And if the asymmetry follows the pattern "rock effect and balloon effect" (BREMMER e KESSELRING, 2016). When the diesel price falls at the pump of the fuel station, the freight price falls quickly (rock), and when the diesel price increases in the pump, the freight price goes up slowly (balloon).

For this purpose, the presence of asymmetry in the price transmission of road freight in the state of Mato Grosso is investigated, which will be used as *proxy* to Brazil. According to IMEA (2010), Mato Grosso is the biggest soy producer in Brazil (it exports 80% of the production), and it is the state with the biggest freight cost. It is important to point that, the freight price of grains in Mato Grosso did not follow the diesel prices in 2016 and 2017, and the evolution of freight prices was lower to the diesel prices in a long period (IMEA, 2018). Besides that, according to ANP (2020), the state has the fourth most expensive price of diesel in Brazil, costing R$ 3,99 (avarage price from September to December in 2019).

Methods

In order to investigate the long-term relationships and short-term dynamics between diesel price and freight price in Brazil, the econometric model known as the Error Correction Model (ECM) was applied in its extended specification for the case of asymmetric adjustment (Meyer and Von Cramon-Taubadel, 2004), as follows:

$$\Delta P_t^f = \alpha + \sum_{j=0}^{j+} \gamma_j^+ \Delta P_{t-j}^{d+} + \sum_{j=0}^{j-} \gamma_j^- \Delta P_{t-j}^{d-} + \sum_{k=1}^{k+} \lambda_K^+ \Delta P_{t-k}^{f+} + \sum_{k=1}^{k-} \lambda_K^- \Delta P_{t-k}^{f-} + \theta^+ \hat{\mu}_{t-1}^+ + \theta^- \hat{\mu}_{t-1}^- + \varepsilon_t \quad (1)$$

Where Δ indicates the first difference operator and ε_t the error term. This expression includes the first differences in the diesel price variables (P^d) and road freight price (P^f) decomposed into positive and negative values: $\Delta P_{t-j}^{d+} = P_{t-j}^d - P_{t-j-1}^d > 0$, and zero otherwise; $\Delta P_{t-j}^{d-} = P_{t-j}^d - P_{t-j-1}^d < 0$, and zero otherwise; $\Delta P_{t-k}^{f+} = P_{t-k}^f - P_{t-k-1}^f > 0$, and zero otherwise; $\Delta P_{t-k}^{f-} = P_{t-k}^f - P_{t-k-1}^f < 0$, and zero otherwise. The same happens with the error correction term: $\hat{\mu}_t^+$ will be equal to $\hat{\mu}_t$ if $\hat{\mu}_t > 0$; and zero if $\hat{\mu}_t \leq 0$, while $\hat{\mu}_t^-$ will be equal to $\hat{\mu}_t$ if $\hat{\mu}_t > 0$; and zero if $\hat{\mu}_t \leq 0$.

From equation (1) arise the hypotheses that will be tested through an F test:

$$H_0: \gamma_j^+ = \gamma_j^- \qquad (2)$$

$$H_0: \theta^+ = \theta^- \qquad (3)$$

Finally, equation (2) shows the null hypothesis, which is the magnitude symmetry. It is observed that, if the coefficients of positive and negative adjustments of diesel are statistically equal, there will be no asymmetry. From another perspective, equation (3) describes the null hypothesis, which is speed symmetry. Thus, the ECM coefficients are related to the speed at which positive and negative price adjustments reach equilibrium in the long run (Polemis and Fotis, 2014). Finally, the Cumulative Response Functions (CRF) will be estimated to measure the cost of asymmetry and be able to classify it.

Results

The result of the hypothesis test is that one variable is significant and the other is statistically equal to zero, that is, it has asymmetry. Therefore, we reject the null hypothesis of both speed and magnitude and find asymmetry. Thus, the CRF is estimated to measure the cost of asymmetry and be able to classify it.

The curve CRF^+ measures the impact of a positive shock of 1%. If the diesel price increases by 1% in t_0, the road freight price increases by 0,41%. In this case, the existence of the balloon effect is evident. This balloon effect lasts until the moment when the CRF curve that shows the cost to the consumer is less than 1,00, that is, in t_2. The curve CRF^- measures the impact of a negative shock of 1%. In t_0, if the diesel price decreases 1%, the road freight price decreases 0,24%. In this case, there is a very strong indication of the feather effect. This feather effect lasts until the moment when the CRF curve that shows the cost to the consumer is less than 1,00, that is, in t_2.

Lastly, until period t_2, that is, until the second week, the balloon effect and the feather effect occur. It is important to note that, if the price of diesel increases, we have a balloon effect, and thus, truck drivers lose. If the price of diesel goes down, we have the feather effect, and truck drivers make up for their losses. In addition, the feather effect indicates a way to cancel the losses for truck drivers resulting from the balloon effect.

Conclusions

Finally, it is concluded that it is difficult to identify and measure all the costs related to the tranport activities, for this reason pass along the price increase of inputs to the road freight price is not an easy task. Because of this, it also becomes complex and a big challenge to accomodate in a clear and objective way all the variables which determine the freight price, because of their characteristics, in a minimum price table of the road freight, whereas such table besides making distortions in the freight market ends up not solving the problem source, which is the excess of cargo freight capacity. Furthermore, the analysis is important to help in the creation of specific public politics to the sector which aim at transport cost reduction and the resulting increase of competitiveness.

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