ROAD FREIGHT MARKET IN BRAZIL: PRICE DETERMINANTS AND ASYMMETRIC TRANSMISSION

[Mônica Mª A. Teixeira, Federal Fluminense University, +55 21 982170511, mmateixeira@yahoo.com.br]
[Niágara Rodrigues, Federal Fluminense University, +55 21 980300665, niagararodrigues@gmail.com]
[Luciano Dias Losekann, Federal Fluminense University, +55 21 99602 3831, lucianolosekann@id.uff.br]

1. Introduction

The use of diesel oil is intensified in Brazil due to its continental dimensions and the reason that road transport is the main means of displacing cargo, carried out by transport companies and autonomous truck drivers. Thus, the pricing process for petroleum derivatives becomes relevant, as it directly impacts society's well-being.

In this perspective, it is worth highlighting the implementation, in October 2016, of the new fuel pricing strategy at Petrobras refineries, which had as its main outcome frequent increases in fuel prices, thus promoting the truck drivers' strike in May 2018. It is imperative emphasize the destructive effect of the combination of volatility and the upward price trend, as occurred in the months leading up to the strike. The frequency and fluctuations in diesel prices led to an imbalance in the road transport sector, which had a negative impact on production, distribution of goods and provision of services.

The excess of freight supply and the consecutive increases in the price of diesel, which in less than a week accumulated a 5,85% increase in the price traded by Petrobras at its refineries, led to the strike by truck drivers that lasted 11 days. After this strike, the Brazilian government adopted a set of measures, including the diesel price subsidy program and tax reductions to ensure a reduction of R$ 0,46 in the diesel price (Rodrigues and Losekann, 2018a). In addition, the federal government implemented Provisional Measure 832, which created a minimum price table for freight.

In view of the above, the present study aims to study the asymmetry process in the transmission of the final price of diesel to the price of grain road freight (corn and soy) in Brazil, in the period between january/2015 – april/2020. For this purpose, we investigate the presence of asymmetry in the transmission of road freight prices in the state of Mato Grosso, which will be used as a proxy for Brazil, as that state is the largest national soy producer (exports 80% of production) , and is the state with the highest freight cost (IMEA, 2010). In addition, the article calculated the cost of asymmetry to consumers using the Cumulative Response Function (CRF). That said, the present work is structured in four sections, in addition to this introduction and final considerations. In section 2, theoretical considerations were made about the types and causes of Asymmetry in Price Transmission (APT). In section 3, a discussion was carried out on the road freight market. In section 4, the database and the applied methodology. Finally, in section 5, the results obtained.

2. ASYMMETRY IN PRICE TRANSMISSION: types and causes

The transmission of prices along the production chain is a theme present in studies of various types of markets and products. In general, asymmetric price transmission (or asymmetric adjustment) is the phenomenon that explains the “price adjustment discrepancy in a given market between the reduction and increase in prices” (Silva et al., 2011). Peltzman (2000) emphasizes that for every three markets, in two of them, product prices rise faster than they fall, and this phenomenon is commonly found in the agricultural and food sectors. In addition, the presence of APT can be identified in the oil and fuel markets (Bacon, 1991; Silva et al., 2011).

According to Meyer and Von Cramon-Taubadel (2004), APT can be classified according to three distinct criteria: i) vertical or spatial; ii) of magnitude and speed; and iii) positive and negative. The vertical asymmetry can be seen by the different way in which the prices of a final market respond to an increase or decrease in prices in its inputs. While spatial asymmetry is identified by the difference between positive and negative adjustments of a given market in a region to shocks of the same market in a neighboring region (Rodrigues and Losekann, 2018b; Silva et al., 2011).

Magnitude asymmetry is determined as the divergence in magnitude of final price adjustments in response to an increase or decrease in wholesale prices. Speed asymmetry, on the other hand, concerns different response times for positive and negative price adjustments. Positive and negative asymmetry are due to magnitude and speed asymmetries. In the case of positive asymmetry, the retail price responds more intensely and faster to increases in the wholesale price than to reductions. While in the negative asymmetry, the retail price responds more intensely and faster to reductions in the wholesale price.

In this sense, it is worth noting that Bacon (1991) and Tappata (2009) made a parallel between positive APT and the phenomenon "rockets" and "feathers", since prices increase quickly and intensely (rocket) and fall slowly and in lesser intensity (feather). Bremmer and Kesselring (2016) compared the negative APT with the “rocks” and “balloons” phenomenon, since prices fall quickly (rock) and rise slowly (balloon).

In general, APT arises from factors related to imperfectly competitive markets. Among them, we can mention: i) the different profitability of a sector; ii) stock management and consumer behavior; iii) search costs; and iv) institutional issues, such as government interventions (subsidies and trade quotas), regulation and tax burden.

According to Bedrosian and Moschos (1988), the different profitability within the same sector contributes to the occurrence of APT. Thus, a profitable company is more likely to incur the risk of postponing a price decrease after a decline in input prices than a company with lower profitability, since the higher profit margins make it possible to take a greater risk in the definition of strategies prices. In addition, market power can result in vertical integration between the different levels of the chain, enabling greater risk-taking capacity by postponing price adjustments (Silva et al., 2011).

Another relevant aspect concerns consumer behavior and the dynamics of stocks at gas stations, because when the consumer has the perception that fuel prices will increase, he buys more fuel than usual. This increase in demand decreases stocks at gas stations, and retailers have to replenish stocks faster than planned, quickly assimilating wholesale price increases. When consumers realize that the price will drop, they return to normal consumption patterns. As a result, inventories last longer, and retailers have more time to purchase fuel from distributors at a lower price (Rodrigues and Losekann, 2018b).

In the case of search costs, the economic literature highlights that they act in a favorable way for companies. The strong coordination capacity of the fuel market makes price dispersion almost non-existent (Rodrigues and Losekann, 2018b). Thus, the consumer would have to spend a lot of time to look for stations that sell fuel at cheaper prices. Thus, when they find it, it is generally not worth it, because the amount of money they would save is a very small part of their income (UCHÔA, 2016). Furthermore, search costs would only be attractive to consumers if the price differential allowed them to save considerable money.

Other factors that can motivate the occurrence of asymmetric price transmissions are the institutional and regulatory aspects of a given market. As examples, we can mention the case of different ICMS rates practiced by the States and the mandatory addition of biodiesel to diesel. Thus, the greater the distance between distributors and biodiesel producers, the higher the transport costs will be, thus intensifying asymmetries (Rodrigues and Losekann, 2018b).

Finally, in Brazil there are two institutional factors that characterize the case of APT in the automotive fuel market, namely: mandatory mandates and tax structure. The first is the issue of biodiesel, which has a direct influence on the price of diesel oil. Due to a mandatory order, diesel oil, sold to final consumers, is composed of a portion of biodiesel, which currently stands at a percentage of 12%. In this way, biodiesel costs impact the price of diesel oil at the gas station. Therefore, the distance between the biodiesel plants and the distributors, where the mixture is carried out, includes a locational factor in the definition of the price of diesel oil. Otherwise, mandatory mandates generate APT due to the high cost of transport and the capillarity of the existing infrastructure. The second is the tax structure, which causes volatility in consumer fuel prices. This tax burden is composed of four taxes, one state, which is the ICMS (Tax on Circulation of Goods and Services), and three federal, which are the CIDE (Contribution for Intervention in the Economic Domain), the PIS/PASEP (Program for Social Integration/Program for the Formation of Public Servant Assets) and COFINS (Contribution to Social Security Financing). With regard to ICMS, it is worth noting that its rate differs by federative unit and it represents a significant portion of the tax collection of the states.

3. The Road Freight Market in Brazil

The truck drivers' strike triggered a crisis in the road transport sector, which was already facing a contraction in demand due to the slowdown in economic activity and suffering the negative effects of government incentives for financing trucks, which led to an increase in the fleet circulating, promoting an overcapacity in the market and a reduction in the contracting of road freight. Between 2010 and 2018, more than 956 thousand new trucks were licensed. The acquisition of new trucks increased the circulating fleet, which in 2017 totaled 2 million, an increase of 30% compared to the fleet registered in 2010 (ANFAVEA, 2018).

In this scenario, the federal government implemented Provisional Measure 832/2018, which established the National Minimum Price Policy for Road Cargo Transport. This Provisional Measure established the exemption from toll collection for the suspended axle, the reservation of 30% of the National Supply Company (Conab) freight for self-employed truck drivers and the creation of a minimum table for the price of road freight. The latter was intended to provide better conditions for carrying out freight and appropriate redistribution of the service offered in the national territory. In addition, to calculate the freight, the price of diesel, the value per kilometer traveled and types of cargo, and the tolls are considered (Caixeta Filho and Perá, 2018; Péra et al., 2018; Oliveira and Pereira, 2018).

The structure of the road freight market is determined by the suppliers and demanders of transport services. Cargo owners (shippers) demand services from three modes of transport: i) fleet carriers (they are transport companies that have their own fleet); ii) carriers with aggregates (these are companies that have their own fleet and hire autonomous truck drivers); and iii) brokers (they are companies that do not have their own fleet and hire autonomous truck drivers, in this case, such drivers depend on carriers to have access to the demand for freight) (Péra et al., 2018).

It should be noted that the formation of the price of road freight is defined by the balance between supply and demand of transport services, and not through the transport cost structure (fixed cost, variable cost and operational productivity). Thus, the freight market for products that have low added value, such as grains, tends towards a market that operates in perfect competition due to its characteristics, namely: homogeneous product, free entry and exit of agents in the freight market and large number of providers and demand for transport services.

The specialized literature (Corrêa-Júnior, 2001; Caixeta Filho and Perá, 2018; Péra et al., 2018; Oliveira and Pereira, 2018) points out that the formation of freight prices is a complex task, as they involve other factors besides costs related to the activity. Thus, the aforementioned authors list some variables that influence the behavior of the freight price, as follows: distance covered, specificity and quantity of transported cargo, seasonality of demand for transport, competition and complementarity of other modes of transport, possibility of cargo return, losses and damages, tolls and inspections, cargo delivery time and geographic aspects.

Although there are several factors that can influence the formation of the price of road freight, the price of diesel is the most expressive cost, representing 35% of the cost of freight transport (CNT, 2019). In this way, it directly impacts the production chains. In addition, the higher the diesel price, the higher the cost of diesel consumption, and consequently, the higher the price of road freight.

It is worth emphasizing that this transfer occurs differently between transport companies and autonomous truck drivers. Since such companies establish formal contracts, the increase in the price of diesel is automatically passed on to the freight price. In turn, autonomous truck drivers are not able to pass on the diesel price adjustment to the cargo owners, as they do not have a formal contract, thus, they end up assimilating the cost increase in their structure. In addition, the price of freight practiced in the market is very sensitive to the increase in fuel prices, as this significantly increases competition and decreases the profit margin of the activity.

4. Methods

4.1. Data base

This work aims to study the asymmetric process of the final price of diesel for the price of road freight for grains (corn and soy) in Brazil, in the period covering the years 2015-2020. The state of Mato Grosso will be used as proxy for Brazil, as this state has the largest amount of information available on the variables that will be analyzed. According to IMEA (2010), Mato Grosso is the region that leads the national production of soy (exports 80% of production), is one of the main agricultural producers in the country, and is the state with the highest freight cost. The data sources consulted were the National Agency of Petroleum, Natural Gas and Biofuels (ANP, 2020) and the Mato Grosso Institute of Agricultural Economics (IMEA).

Data relating to the average price of diesel at resale were obtained through the Historical Series of the Survey of Prices and Margins for Fuel Sales, collected and published by the ANP. Data referring to the average freight price in Mato Grosso were obtained through direct contact with the IMEA. In addition, weekly price series from the first week of 2015 to the last week of April 2020 were used for the state of Mato Grosso.

4.2. Description of 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:

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

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

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).

4.3. Cost of Asymmetry to Consumers

The cost of asymmetry to consumers is measured by calculating the differences between the positive and negative Cumulative Response Functions (CRF). Thus, for this exercise, the stage of transmission from the diesel price to the price of road freight is considered.

The CRF is defined as the estimated and accumulated variation in the price of the product in period $t + j$ after a 1% variation in the price of the input in period t. Since a cost shock in period t results in a price adjustment in period $t + j$, this will be the sum of the estimated parameters with the error correction term during the J periods in which the shock takes to dissipate. This shock, when negative, will be accounted for in the CRF^-. Similarly, a positive cost shock is accounted for in the CRF^+ (Balmaceda and Soruco, 2008). Thus, the cost to the consumer is represented by:

$$\Delta\, Consumer\ Cost = \sum_{j=0}^{J} CRF_{t+j}^+ - CRF_{t+j}^- \quad (4)$$

Where:

$$CRF_{t+j}^+ = CRF_{t+j-1}^+ + \hat{\beta}_{t+j-1}^+ + \sum_{i=1}^{I} \hat{\theta}_i^+ \ \Delta P_{t+j-i}^{f+} + \lambda^+ (CRF_{t+j-1}^+ - \hat{\beta})$$

and

$$CRF_{t+j}^- = CRF_{t+j-1}^- + \hat{\beta}_{t+j-1}^- + \sum_{i=1}^{I} \hat{\theta}_i^- \ \Delta P_{t+j-i}^{f-} + \lambda^- \left(CRF_{t+j-1}^- - \hat{\beta}\right)$$

The impact accumulated after t periods is the sum of the impact accumulated up to the previous period (CRF_{t+j-1}^+), of the contemporary cost impact $\left(\hat{\beta}_{t+j-1}^+\right)$, the dynamic effect of past changes in the price of the product $\left(\sum_{i=1}^{I} \hat{\theta}_i^+ \ \Delta P_{t+j-i}^{f+}\right)$ and the effect of being off the long-term equilibrium trajectory $(\lambda^+(CRF_{t+j-1}^+ - \hat{\beta}))$. Similarly, the same reasoning applies to the negative cumulative response function (Cânedo-Pinheiro, 2012).

5. Results

5.1. Diesel Price Transmission to the Price of Road Freight

Table 1 shows the result of the Error Correction Model (ECM). In general, the coefficients showed the expected signs according to economic theory. As all variables were decomposed into positive and negative values, all signs of the estimated coefficients were expected to be positive. Thus, positive input price shocks generate positive output price shocks and, similarly, negative cost shocks lead to reductions.

Table 1: Error Correction Model Results

Variable	**Brazil** **Jan/2015-Apr/2020**
$\Delta P^{f\,+}_{t-1}$	0,2868419*** (0,920153)
$\Delta P^{f\,-}_{t-1}$	0,2411668** (0,99778)
$\Delta P^{f\,+}_{t-2}$	0,2642718*** (0,938091)
$\Delta P^{f\,-}_{t-2}$	-0,0072177 (0,989666)
$\Delta P^{d\,+}$	0,410509* (0,2356137)
$\Delta P^{d\,-}$	0,2449501 (0,02630408)
$\Delta P^{d\,+}_{t-1}$	0,2542046 (0,2430327)
$\Delta P^{d\,-}_{t-1}$	-0,2008729 (0,2703214)
$\Delta P^{d\,+}_{t-2}$	-0,1958908 (0,2584662)
$\Delta P^{d\,-}_{t-2}$	-0,2986633 (0,2592662)
$\Delta P^{d\,+}_{t-3}$	0,4330102* (0,2519433)
$\Delta P^{d\,-}_{t-3}$	-0,310524 (0,2613386)
ECM^{+}_{t-1}	-0,1335464*** (0,0423236)
ECM^{-}_{t-1}	-0,424217 (0,315228)
Constante	-0,0017617 (0,0036239)
Observations	272
R^2	0,2185
Durbin-Watson (DW)	1,99
Standard errors in parentheses. *** p-value < 0,01; ** p-value < 0,05; * p-value < 0,10.	

Source: Authors' elaboration with the work's database.

First, stationarity tests, Augmented Dickey-Fuller (ADF), and Johansen cointegration tests were performed. As already foreseen, all series are stationary in first difference (considering a significance level of 5%) and cointegrated, thus allowing the use of the error correction mechanism. Finally, a vector autoregressive (VAR) model was estimated, considering the variables in natural logarithms, in order to obtain the optimal amounts of lags to be included in the model, through the analysis of the Akaike criteria.

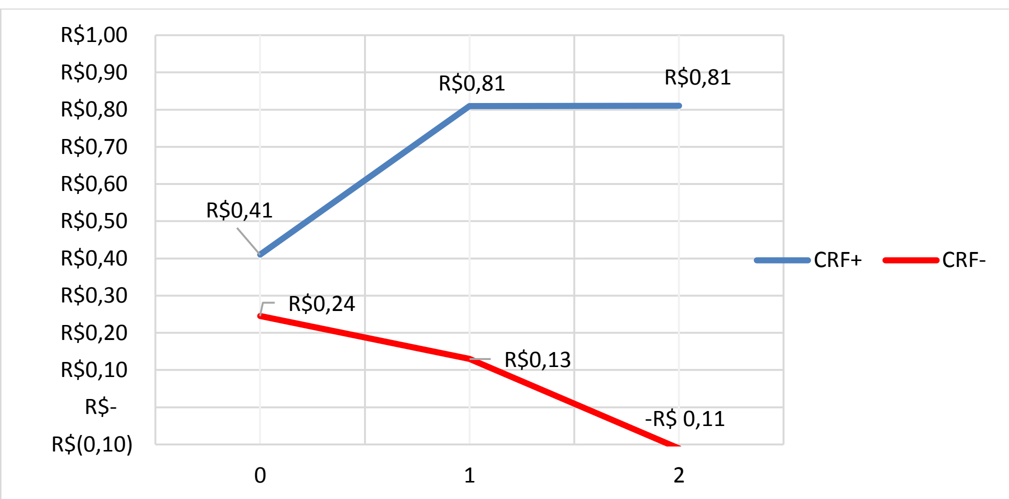
The next step was to estimate the four models verified in equation (1). After estimating the coefficients, the idea was to carry out two hypothesis tests to identify whether the positive and negative readjustments were passed on at the same magnitude and speed from the diesel price to the freight price, as in equations (2) and (3). However, it was not necessary to perform the hypothesis test, as the regression results showed that the positive variables are statistically significant (at a 10% significance level), but one of the comparison variables of each of the tests was statistically equal to zero. However, it is noteworthy that the results are asymmetric, as there are differences, one of the variables is different from zero and the other is equal to zero.

Finally, 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.

5.2. Impact of Asymmetry on Consumers

To perform the exercise, two 1% shocks were simulated, one positive and the other negative, on diesel prices so that the impacts on the price of road freight over time were measured, according to Equation (4). Graph 1 shows the impact suffered by consumers in the analyzed period. Graph 2 shows consumer cost in the analyzed period.

Graph 1: Impact of Asymmetry on Consumers (Jan/2015-Apr/2020)



Source: Authors' elaboration. Note: t in weeks.

Graph 2: Consumer Cost (Jan/2015-Apr/2020)

Source: Authors' elaboration. Note: t in weeks.

The curve CRF^{+} (blue curve) shows a positive shock. The curve CRF^{-} (red curve) shows a negative shock. The difference between the two curves results in the cost to the consumer (black curve). The curve that shows the cost to the consumer measures the magnitude and speed of asymmetries in two weeks. If the curves CRF^{+} and CRF^{-} converge, the fit tends to be symmetric and therefore the asymmetry of cost to the consumer reduces.

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. Analyzing another way, if the diesel price increases 1% in t_0, the price of road freight increases 0,41% in t_0, and 0,81% in t_1 and t_2. As it never completes 1,00, the price of road freight rises less and slowly, like a balloon up to t_2, that is, until the second week.

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. Analyzing another way, if the price of diesel falls by 1% in t_0, the price of road freight falls by 0,24% in t_0, 0,13% in t_1 and -0,11% in t_2. In this case, there is a very strong indication of the feather effect, because when the price of diesel decreases, the price of road freight decreases. 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;

Therefore, 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.

Finally, The balloon effect is the difficulty of passing on positive readjustments completely and instantaneously because there are many competitors in the road freight market (excess supply). As there are many suppliers in the road freight market, truck drivers have difficulties in transferring the increase in diesel prices to the price of road freight. If the truck driver transfers the entire diesel price increase to road freight, he will lose customers to competitors. Thus, the balloon effect motivated the 2018 truck drivers' strike.

6. Conclusions

In general, the findings of this work are in line with the results found in the economic literature. Increases in the price of diesel have a significant impact on the price of road freight.

The usual result in the fuel market is rocket and feather effects. The interesting point of the article is to identify the different patterns that are the balloon and feather effects, and how the balloon effect may have motivated the dissatisfaction and the truck drivers' strike in 2018. In addition, the excess supply of road freight is determinant in the effect balloon.

Thus, it is difficult to identify and measure all costs related to transport activities, so passing on the increase in input prices to the value of freight is not an easy task. In view of this, it is complex to clearly and objectively accommodate all the variables that determine the price of road freight, together with their particularities, in a table of minimum prices for road freight, while such table, in addition to generating distortions in the freight market end up not solving the source of the problem, which is the excess capacity of road freight transport. Furthermore, the analysis is important to assist in the construction of specific public policies for the sector that aim to reduce the cost of transport and the consequent increase in competitiveness.

Finally, to solve the problem of truck drivers, the government must adopt specific public policies, reduce the excess supply of trucks, which is the main problem in the road freight market, and adopt a flexible tax to accommodate fuel price volatility. Accommodating volatility, you end up accommodating the readjustments, and mitigating the readjustments, you end up also mitigating the balloon and feather effects.

References

ANP (2020). National Agency for Petroleum, Natural Gas and Biofuels. Historical Series of Fuel Prices.Available in: http://www.anp.gov.br/dados-abertos-anp. Accessed in: may 2020.

BACON, R. W. (1991). Rockets and feathers: the asymmetric speed of adjustment of UK retail gasoline prices to cost changes. Energy Economics, 13, issue 3, pp. 211-218.

BEDROSSIAN, A, MOSCHOS, D. (1988). Industrial structure, concentration and speed of price adjustment. The Journal of Industrial Economics, Oxford, v. 36, n.4, pp 459-475.

BORENSTEIN, S.; CAMERON, A. C.; GILBERT, R. (1997). Do gasoline prices respond asymmetrically to crude oil price changes? The Quarterly Journal of Economics, v. 112, pp. 305-309.

BRASIL. National Land Transportation Agency. Resolution No. 5.820, of May 30, 2018. Publishes a table with binding minimum prices, referring to the kilometer traveled in freight, per loaded axle, established by the Minimum Prices Policy for Road Cargo Transport, pursuant to the Provisional Measure n. 832, of May 27, 2018.Available in:: http://portal.antt.gov.br/index.php/content/view/53723/Resolucao_n__5820.html. Accessed in: jun. 2020.

BREMMER, D. S.; KESSELRING, R. G. (2016). The relationship between US retail gasoline and crude oild prices during the Great Recession: “rockets and feathers” or “ballons and rocks”? Energy Economics, v. 55, pp. 200-210.

CAIXETA FILHO, J. V.; Perá, T. G. (2018). About the Tabulation of Road Freight. Technical Note Esalq. Esalq-Log, USP. Available in: www.researchgate.net. Accessed in: jun. 2020.

CANÊDO-PINHEIRO, M. (2012). Asymmetry in the transmission of fuel prices: the case of diesel oil in Brazil. Brazilian Journal of Economics.Rio de Janeiro, v. 66, n. 4, pp. 557-578.

CNT – National Transport Confederation (2019). Press release: How to lower pressure when transporting cargo.Available in: https://cnt.org.br/agencia-cnt/cnt-transporte-cargas-preco-diesel. Accessed in: jun. 2020.

IMEA – Mato-Grossense Institute of Agricultural Economics (2010). Agribusiness in Brazil and Mato Grosso. Available in: http://www.imea.com.br/. Accessed in:jun.2020.

MEYER, J., VON CRAMON-TAUBADEL, S. (2004). Asymmetric price transmission: a survey. Journal of Agricultural Economics, Oxford, v. 55, n. 3, pp. 581-611.

OLIVEIRA, C., Pereira, M. P. (2018). Is it a Bino trap? An analysis of the impacts of measures taken after the stoppage of truck drivers on the income of drivers and truck owners in Brazil. Available in: www.researchgate.net. Accessed in: jun. 2020.

PELTZMAN, S. (2000). Prices rise faster than they fall. Journal of Political Economy. Chicago, v. 108, n. 3, pp. 466-502.

PÉRA, T.G.; ROCHA, F.V.; SILVA NETO, S.; CAIXETA-FILHO, J.V. Analysis of the impacts of Provisional Measure No. 832 of 2018 (Minimum Price Policy for Road Freight Transport) on Brazilian Agribusiness Logistics. Series: Agribusiness Logistics – Challenges and Opportunities, v.3. Agroindustrial Logistics Research and Extension Group (ESALQ-LOG). Jun/2018, Piracicaba, SP.

POLEMIS, M. L.; FOTIS, P. N. (2014). The taxation effect on gasoline price asymmetry nexus: evidences from the both sides of Atlantic. Energy Policy, 73, pp. 225-233.

RODRIGUES, N.; LOSEKANN, L. Demystifying the diesel crisis. Infopetro Newsletter, Year 18, n. 2, p. 27-34, 2018a.
______________________. (2018b). Asymmetry in price transmission along the gasoline marketing chain in Brazil. In: XICBPE Brazilian Congress on Energy Planning, Cuiabá.

SILVA, A. S.; VASCONCELOS, C. R. F.; VASCONCELOS, S. P.; MATTOS, R. (2011). Asymmetric price transmission: the case of the retail gasoline market in Brazilian municipalities. In: National Economics Meeting, 39, Foz do Iguaçu.

TAPPATA, M. (2009). Rockets and feathers: understanding asymmetric pricing. The RAND Journal of Economics, v.40, n. 4, pp. 673-6.

UCHÔA, C. F. A. (2016). Market power and asymmetric transmission in gasoline prices in Salvador/BA. Northeast Economic Magazine, v. 47, p. 137-151.