

BNA/WP/06/1

The Effect of Oil Price Shocks on the Price of Gasoline in Curaçao

March 2006

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Abstract

The views expressed in this paper are those of the authors and do not necessarily represent those of the Bank van de Nederlandse Antillen.

This paper analyses the effects of the oil price shocks on gasoline prices in the non-oil-producing economy of Curaçao. The repeated international oil price increases combined with the domestic price structure of oil-related products impose a large and increasing cost on the domestic economy. This study shows that the current price-setting mechanism of Curaçao's oil derivatives provides the wrong price signal and distorts the market.

JEL Classification Number: Q4; H20.

Keywords: Oil prices, gasoline prices, correction factor mechanism, taxation on gasoline.

1. Introduction

Oil prices have risen significantly over the last several years. Crude oil prices¹ have increased on average from US \$25 per barrel in 2002 to US \$55 per barrel in 2005.² An increase in petroleum prices tends to have a contractionary impact on world demand and growth in the short term. Higher crude oil prices raise inflation, with the magnitude depending in part on the extent of labor market flexibility (wage-cost push inflation) and the ability of producers to pass on cost increases to consumers. Over time, the impact of rising oil prices on activity and inflation depends also on policy responses and supply side effects (IMF, 2005a). In a competitive market economy, the case for full and automatic pass-through of international oil price changes to domestic oil prices is strong on both economic and institutional grounds. Full pass-through allows for a correct price signal, which increases efficiency and does not expose the government to excessive fiscal volatility as a result of oil price fluctuations (Federico, Daniel, and Bingham, 2001). Since international oil prices are highly volatile, a full and automatic pass-through also would result in highly volatile domestic oil prices. To limit domestic oil price volatility on petroleum products, many developing countries engage in retail price smoothing. One rationale for price smoothing is that prices of oil products are an important economic variable in both the public and private sectors. Many (developing) countries also are significantly exposed to oil prices at the macroeconomic level and as a consequence, decisions on the degree of pass-through of changes in international oil prices have significant economic impact (Federico et al., 2001). In Curaçao, the government uses

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¹ Crude oil prices are here defined as the average West Texas Intermediate (WTI) price, the Date Brent (Brent) price and the Dubai Fateh (Dubai) price.

² Source: International Financial Statistics. Up till third quarter of 2005.

the correction factor mechanism to smooth the domestic price of oil products by fixing them on a quarterly basis.³

The purpose of this paper is to examine the impact of international oil price shocks on changes in the pricing of gasoline in Curaçao. The impact on the domestic economy also is analyzed.

This paper is organized as follows. Section 2 discusses the determinants of crude oil prices and their development over time. Section 3 provides an overview of the oil price structure of Curaçao and discusses the fuel taxation of selected countries. Section 4 analyzes the relationship between developments in international oil prices and gasoline prices in Curaçao. In addition, the impact of domestic gasoline prices on the economy is examined. In section 5, the results of a simulated reduction in the gasoline tax on the domestic price of gasoline are presented. Finally, the main conclusions of the paper are presented in section 6.

2. The international market for oil

2.1. Price formation in international oil markets

The international oil price is determined by the demand and supply of oil on the global market. On the supply side, the production capacity of oil-producing countries is the most important determinant. In the short run, the world supply of oil is affected by factors such as the extent of the spare oil production capacity and the occurrence of natural disasters and wars (Farrell, Kaha, and Visser, 2001). Furthermore, the policy conducted by the Organization of Petroleum Exporting Countries (OPEC) also greatly affects the world supply of oil (Kingma and Struyker, 2004). In the medium and long term, the world oil supply is influenced by unexploited reserves, the costs to exploit these reserves (i.e., investments and technological innovations) and the extent to which oil consumption exceeds the oil resource base (Farrell et al., 2001).

The demand for oil is related to the level of global GDP. In other words, increases in global GDP result in a greater demand for oil (Farrell et al., 2001). However, this relationship has changed over time because earlier oil price shocks have resulted in a substitution of other forms of energy for oil in production, a more efficient use of oil, and a shift in the composition of output towards less oil-intensive sectors. Oil dependency has declined mainly in OECD countries. As a consequence, a relatively larger proportion of world oil demand now comes from developing countries, which, therefore, are more vulnerable to oil shocks than developed countries (Farrell et al., 2001). Other factors that influence the demand for oil include the world population growth, changes in living conditions (i.e., the size of households, the use of certain machines and means of transportation), and environmental regulations (van der Linde, 2004).

Oil supply and demand are highly inelastic in the short run; thus even a small shock can have a large effect on oil prices (IMF, 2005a). This inelasticity of demand and supply makes oil prices very volatile. Next to supply and demand, oil prices are also a result of a complex interaction of relatively thin spot markets, a more liquid forward market (Brent) and two

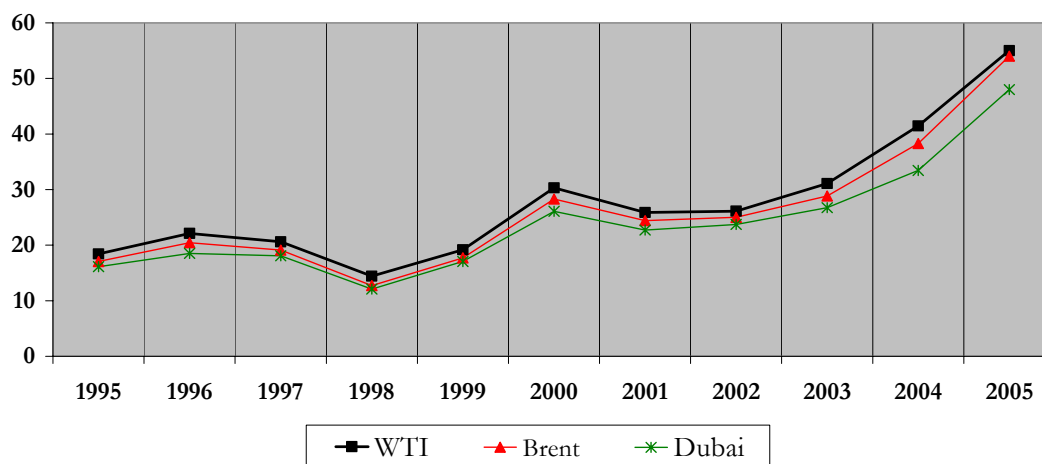
³ The Curaçao government regulates the prices of domestic oil products, such as gasoline, gas oil, kerosene, cooking gas, and fuel oil, with the aim of smoothing domestic price fluctuations.

very liquid futures markets (see Farrell et al., 2001, and OECD, 2004), for a detailed description of the functioning of the oil futures market.

2.2. Recent developments in global oil prices

Recently, the world has experienced a substantial increase in oil prices. Figure 1 shows the development in the yearly average price of three types of crude oil, i.e., the West Texas Intermediate (WTI), the Date Brent (Brent), and the Dubai Fateh (Dubai) for the period 1995 – 2005. As shown in this figure, the prices of these crude oils tend to move together according to the inequality: price of the WTI > price of the Brent > price of the Dubai. Their price differentials actually reflect differences in measure of gravity, sulfur content, and overall weight.

Figure 1. Yearly average crude oil price, 1995-2005*
(in \$ per barrel)



Source: International Financial Statistics, IMF

* Average of Q1 – Q3 2005

In the last two periods, 1998 – 2000 and 2003 – 2005, nominal oil prices rose considerably. In 2003, for example, the annual average price of the Brent per barrel was US\$ 29. By the end of 2005, the average Brent price reached US\$ 55 per barrel, equivalent to an increase of 91% in two years. The higher oil prices largely reflect higher demand for oil due to the economic expansion in North America, and in Asia (IMF, 2005a). Although the nominal crude oil prices were perceived as very high in 2005, in real terms they are still lower than the levels seen in the 1980s. Therefore, the impact of the current oil price shock is more moderate compared to previous shocks because real oil prices increased at a slower pace. Moreover, the oil intensity has fallen in most countries in the past two decades. Many advanced economies have made major improvements in energy efficiency and conservation. In addition, many emerging markets and developing countries have better macroeconomic policies and sounder financial conditions.

There are several reasons behind the recent jump in oil prices that started in the year 2002 (OECD, 2004, and IMF, 2005a). First, an unforeseen world economic growth occurred, due

to a strengthening economic recovery in North America and a fast growing demand in China. Second, excess capacity of the OPEC is at its lowest level since the early 1990s, which provides little cushion in the event of unexpected oil market disruptions. This limited spare capacity has been largely attributed to insufficient investment in new extraction capacity over recent years due to low average real oil prices and low profit margins in this sector. And third, geopolitical tensions, uncertainty stemming from acts of sabotage on oil facilities in the Middle East, and fears of disruption in other oil-producing countries have added an additional risk premium to the oil price, related to the possibility of a significant disruption in supply capabilities.

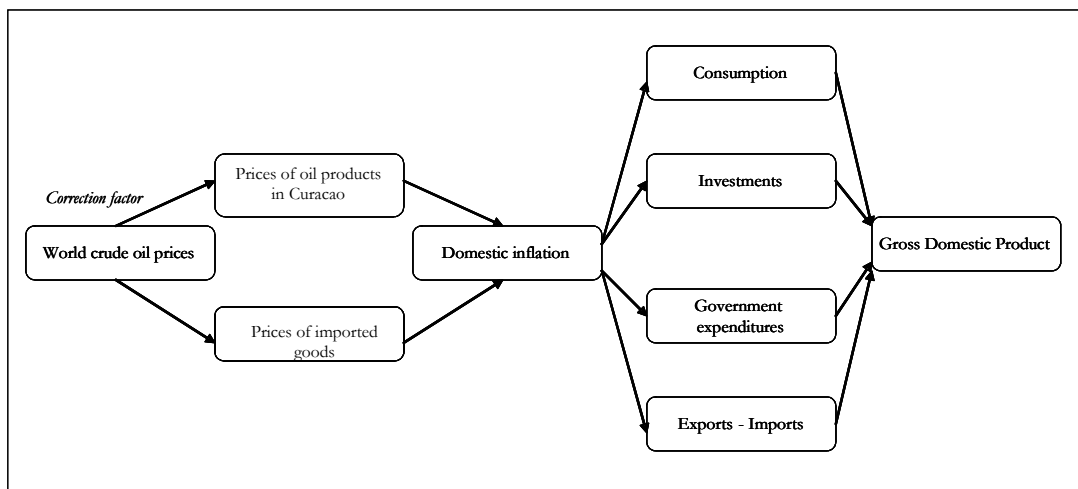
2.3. The outlook for oil supply and oil prices

Despite a more efficient use of oil in production processes, both the OECD (2004) and the IMF (2005a) expect that oil will maintain its importance as fuel in North America. This continuing demand, combined with strong growth in demand for oil from rapidly growing energy-intensive countries (notably China and India), will produce an upward structural shift in the demand for oil relative to global GDP growth. Against this background, the futures market predicts that for the period up to 2010, oil prices will remain high, though gradually decreasing. This situation will keep the oil market broadly in balance with incremental oil demand being met mostly by higher non-OPEC production. However, the prospects for higher spare capacity are unfavorable. Therefore, the oil market will likely remain tight and vulnerable to shocks, and large unexpected price changes will continue to occur (IMF, 2005a).

3. Pricing of oil products in Curaçao

Oil price changes can affect the economy through a variety of channels. As mentioned in the introduction, international oil price changes affect a country's rate of inflation. International oil prices can affect Curaçao's domestic inflation in two ways (Figure 2).

Figure 2. Impact of World Oil Prices on Domestic Inflation



First, a change in international oil prices will have an impact on the domestic prices of petroleum products, which affect domestic inflation. Second, a change in world oil prices

will also affect prices of other goods and services imported to Curaçao, thereby increasing domestic inflation. Domestic inflation in turn affects the level of key macro-economic variables, i.e., the consumption level, the level of investments, the government's consumption, and the trade balance, thereby influencing domestic economic activity. Due to the correction factor mechanism, international oil price changes do not automatically pass-through to domestic retail prices in Curaçao. It is important to consider the functioning of this price-setting mechanism of oil-related products, when analyzing the impact of international oil price changes on the domestic economy.

3.1. Price-setting mechanism for oil derivatives in Curaçao

Curaçao, as a small and non-oil-producing economy, has no influence on the world price of crude oil or its derivatives. International oil prices are perceived as highly volatile and uncertain. In the case of full and automatic pass-through, domestic oil prices in Curaçao would also be highly volatile and uncertain. Since consumers of oil (both households and firms) may be risk-averse and face high adjustment costs, they prefer price stability. Households prefer price stability because it does not affect their real incomes, and as a result, their consumption patterns. Firms prefer stable oil prices because they do not lead to volatile costs, which could require adjustments in production and/or investment plans (Federico et al., 2001). Since there are no consumer risk-management instruments for oil, such as credit markets, self-insurance, and hedging, oil consumers cannot smooth their consumption path adequately.⁴ The government in Curaçao regulates the prices of domestic oil products, such as gasoline, gas oil, kerosene, and cooking gas, with the aim of smoothing domestic price fluctuations. The price regulation is based on a formula, i.e., the correction factor mechanism, which works as follows. At the end of each quarter, the government evaluates the international price changes⁵ that have occurred during that quarter and determines a new local price for oil products. Once set, the price remains fixed for the next three months. Therefore, in the short term, domestic oil prices remain stable, which is beneficial for domestic households, the local business sector, and the island's investment climate.

3.2. Price structure of oil products in Curaçao

The prices of oil derivatives in Curaçao consist of several components:

1. Curoil's purchase price⁶
2. Margin for Curoil
3. Excise tax on oil products
4. Sales tax (O.B.)
5. Correction factor
6. Profit margin for retail seller

Some of these components are a fixed amount while others are variable (see Table 1 in the appendix). The fixed components are the profit margin for Curoil, the excise tax, and the profit margin for retail sellers/gas stations. These components are a fixed amount per unit and do not fluctuate with the purchase price paid to PDVSA (the cost price of oil products). The variable components are the sales tax (O.B.), the correction factor, and the purchase

⁴ For further reading on consumer risk-management instruments, see Federico et al. (2001).

⁵ The changes in the prices that the local distributor of oil derivatives, Curoil, pays to Petroleos de Venezuela, S.A (PDVSA) for oil products.

⁶ The price Curoil pays to the distributor of oil, PDVSA, for oil products.

price paid to PDVSA. These components do change when the purchase price change. The purchase price paid to PDVSA and the correction factor play a crucial role in determining the oil product prices in Curaçao. Worth mentioning is the substantial government⁷ share in the price of oil, which includes the margin of Curoil, the excise tax on oil products, and the sales tax.

3.3. Determination of the purchase price and the correction factor

Curoil buys oil products from PDVSA based on Platts Oilgram's published prices of refined products for the Gulf Coast. Platts bases its prices for crude oil and oil derivatives on international developments. These prices change on a daily basis. If Curoil's purchase price is immediately passed on to the consumer, the domestic oil product prices would also fluctuate on a daily basis. However, in Curaçao, oil derivatives prices remain fixed during a quarter. To set the consumer price for oil products for a three-month period, the government estimates the purchase price that Curoil has to pay PDVSA during that period. That estimate is equal to the actual price Curoil has paid PDVSA on a reference date in the previous quarter. To keep the consumer price fixed, Curoil absorbs all the purchase price changes during that three-month period. At the end of the three-month period, Curoil compares the actual amount it paid PDVSA for oil products with the amount that it charged the consumer for the oil products, using the reference date. The difference between these two variables is what Curoil has absorbed during the past quarter. This amount divided by the volume sold during the three-month period is the correction factor per liter or per unit, which will be included in the consumer price for the upcoming three months. The formula for calculating the correction factor is as follows:

$$CF_{(t)} = (PP_{(t-1)} - PC_{(t-1)}) / V_{(t-1)}$$

Where:

$CF_{(t)}$ = correction factor in period (t)

$PP_{(t-1)}$ = actual amount paid to PDVSA at a reference date in period ($t-1$)

$PC_{(t-1)}$ = amount charged to consumer in period ($t-1$)

$V_{(t-1)}$ = volume sold in period ($t-1$)

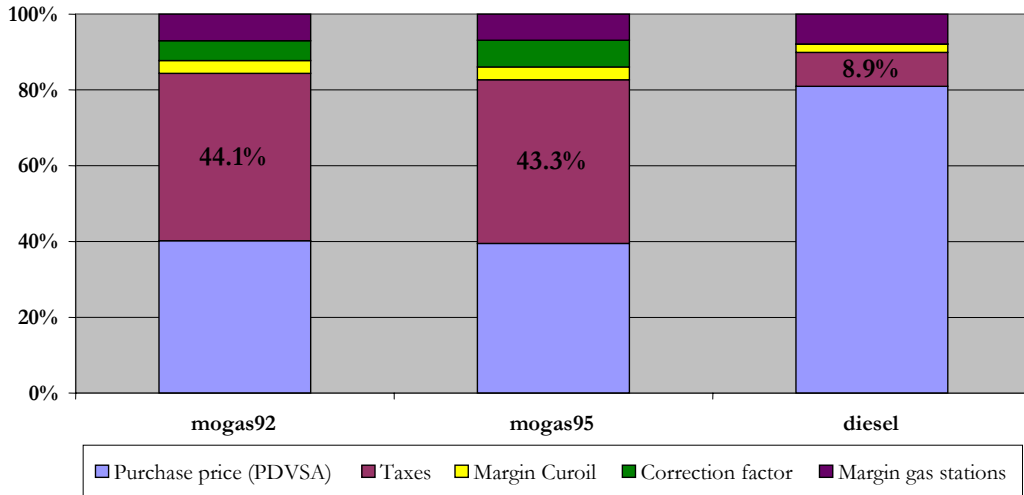
Table 1 in the appendix shows the price structure of selected oil derivatives in Curaçao as of June 3, 2005.

⁷ Government and government-owned companies.

3.4. Taxation of oil products

The government levies excises on gasoline and sales tax on the wholesale and retail prices of gasoline, gas oil, and kerosene. Noteworthy is that the sales tax is levied twice on these oil products. As shown in Figure 3, more than 40 % of the consumer price of gasoline is tax revenues.

Figure 3. Tax as shares (%) of oil derivatives price in Curaçao

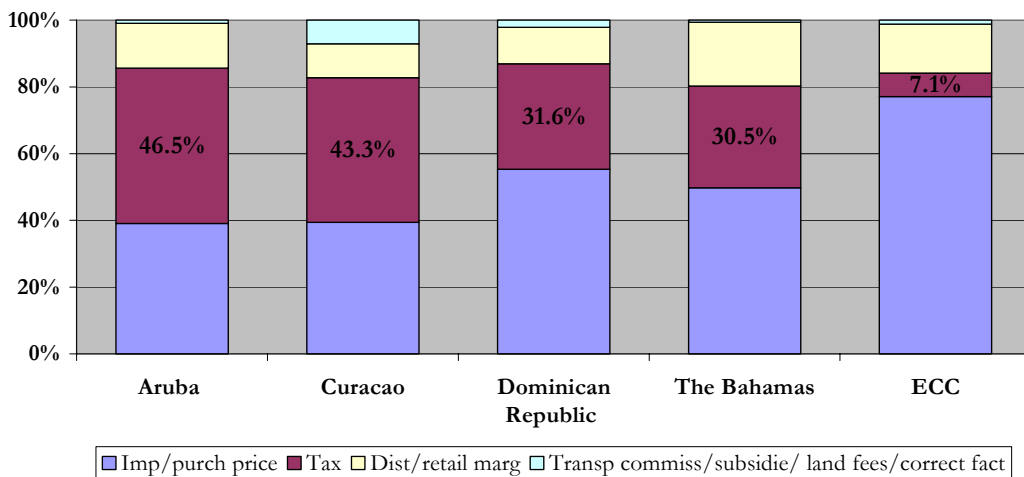


Source: Curoil News

Excises on gasoline comprise 36% of the final consumer price of gasoline (see Table 2 in the appendix). The excise is the fourth most revenue-generating tax for the government of the Netherlands Antilles; it accounts for 6.4% of all tax revenues (see Table 3 in the appendix).

Figure 4 compares the share of gasoline tax in Curaçao to that of selected countries in the region.

Figure 4. Tax as share (%) of the gasoline price of selected countries



Source: Curoil News; Central Bank of Aruba; La Secretaria de Estado de Industria y Comercio, the Dominican Republic; Ministry of Trade & Industry, the Bahamas, and Eastern Caribbean Central Bank.

In countries, such as Aruba, the Dominican Republic, and Jamaica, the gasoline, petroleum, or energy tax is an important source of income for the government. This tax accounts for about 10% of all tax revenues (see Table 3 in the appendix). Compared to the other countries included in Figure 4, Curaçao's share of taxation from gasoline is the second highest.

Taxes alter relative prices and, as a consequence, affect an individual's decisions and behavior. In other words, taxes bring about an excess burden or efficiency cost. This excess burden is referred to as deadweight loss. Less competition on the market means a greater deadweight loss of taxation. Furthermore, the efficiency cost of a tax is smaller when applied to goods and services characterized by inelastic demand, such as oil derivatives, than when applied to items whose demand is elastic. The literature on optimal taxation suggests that government should raise its revenues by using tax instruments that result in the smallest deadweight loss (for further reading on efficiency costs of taxation and optimal taxation, see H.S. Rosen, 1999, and, de Miguel and Manzano, 2002).

In Curaçao, the market for oil derivatives is monopolistic (one distributor, no price competition). As mentioned, compared to some countries in the region, the share of gasoline taxation in Curaçao is the second highest. Therefore, we can conclude that Curaçao has one of the highest efficiency costs of gasoline taxation in the region. This excess burden affects Curaçao's regional competitiveness on the macroeconomic level.

Compared to the selected islands in the region, the retail price of gasoline in Curaçao is also the second highest, showing that Curaçao is the least competitive in terms of gasoline prices, except for the Bahamas.

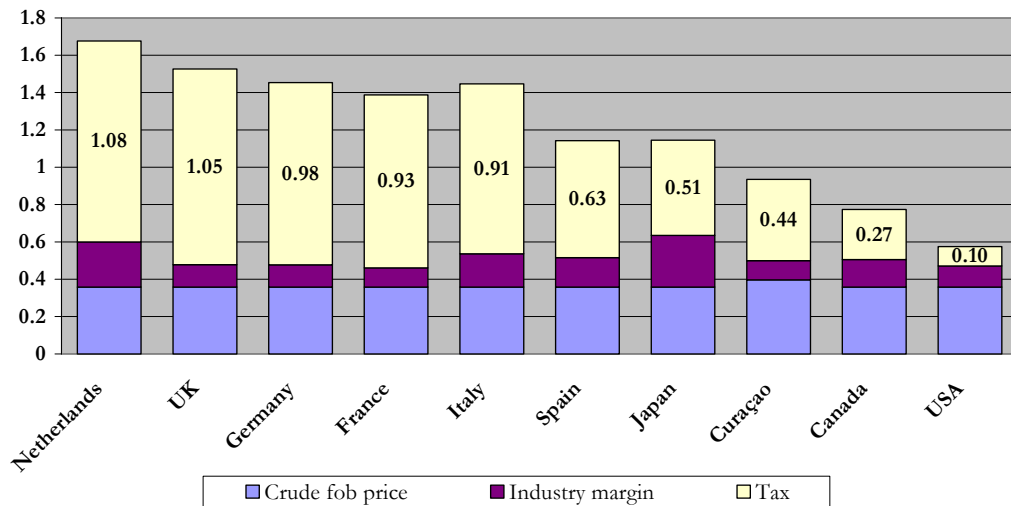
Table 1. Retail price of gasoline of selected countries

	Retail price
	US\$/liter
The Bahamas	1.06
Curaçao	1.01
Dominican Republic	0.99
ECC	0.96
Aruba	0.86

Source: Curoil News; Central Bank of Aruba; Banco Central de la Republica Dominicana; Central Bank of the Bahamas; and the Eastern Caribbean Central Bank

In selected OECD countries, the U.S. has the lowest retail price of gasoline, due largely to the lower tax on gasoline (see Figures 5 and 6).

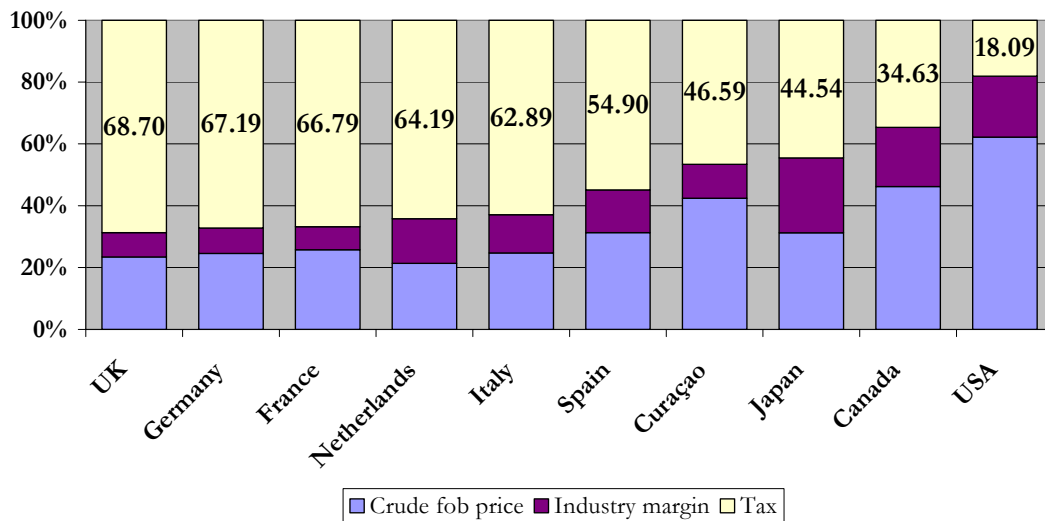
Figure 5. Breakdown of the gasoline price in Curaçao and selected countries of the OECD (US\$/ liter)



Source: IEA, OPEC, and Ministry of Finance Netherlands

In some of the selected OECD countries, taxes are a substantial part of end user prices of oil products (see Figure 6). This higher share of taxes in gasoline prices often reflects government policy on environmental issues and efforts toward more efficient energy usage.

Figure 6. Comparison of taxes as share (%) of the gasoline price between Curaçao and selected OECD countries



Source: IEA, OPEC, and Ministry of Finance Netherlands

Compared to the selected OECD countries, Curaçao's share of taxation is considered relatively modest. Worth mentioning is that, contrary to most of the OECD countries, the

share of the tax on gasoline in Curaçao is not related to any environmental policy or efforts to promote energy sustainability and efficiency.

4. Impact of global oil prices on domestic oil prices

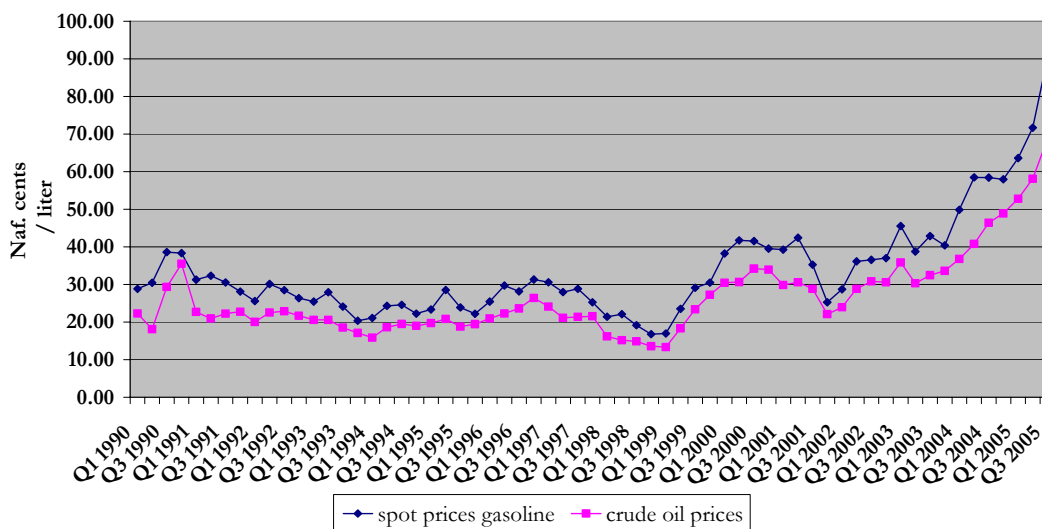
The correction factor mechanism is an instrument for a complete pass-through: Changes in the international oil prices are passed on to the consumer with a lag of one quarter. In this paragraph, we will review the functioning of this mechanism in the period 1990 to 2005. To review, data on the reference price paid to PDVSA are needed. As the reference price paid to PDVSA is not available, we will use the indicators discussed below.

4.1. An indicator for the price of gasoline

In this section, we are comparing developments in domestic gasoline prices with developments in international oil prices. We are using two different indicators for international prices: the crude oil price (in this case, WTI crude oil price) and the refined product price (in this case, the US Gulf Coast spot price for conventional gasoline).

It can be argued that crude oil prices are not the most optimal indicator for comparing fluctuations between domestic prices of oil derivatives and international oil prices, because Curoil purchases refined products not crude oil from PDVSA. The refined product market differs from the crude market because such factors as refinery capacity, inventory levels, and driving seasons influence the refined product prices. Since crude oil is the most important component of refined products, the price of refined products usually follows the same trend as crude oil. This pattern is apparent especially during periods of drastic and/or persistent changes in crude oil prices (see Figure 7).

Figure 7. Crude oil prices and Gulf Coast spot prices of gasoline



Source crude oil prices: IFS

Source US spot prices gasoline for Gulf Coast: US Energy Information Administration

4.2. A review of the correction factor mechanism as applied in Curaçao

According to the correction factor mechanism, any oil price increase on the international market during a quarter should result in a rise in local gasoline prices in the following quarter. If the opposite occurs, local gasoline prices should decrease in the following three months.⁸

Table 4 in the appendix shows the total, the average, and the standard deviation of price changes in crude oil⁹ and domestic gasoline over the period 1990 – 2005.¹⁰ During this period, both international oil prices and domestic gasoline prices increased. However, in the period under review, the net total gain in the domestic gasoline price was more than twice (73 cents) the international price increase of 31.4 cents. Similarly, on average, the quarterly rise of oil prices reveals that the domestic price increase (1.2 cents) was also more than twice the international price increase (0.5 cents). In addition, the standard deviation of the domestic price change was greater than that of the international price. In other words, the quarterly fluctuations in domestic prices were higher than the quarterly fluctuations in international oil prices.

It can be argued that the sharper increases in domestic oil prices were related to the introduction of the sales tax in 1996. Therefore, we also analyzed the developments in international oil prices and domestic gasoline prices before the introduction of the sales tax. As mentioned, the sales tax is levied twice on gasoline. Since the sales tax was introduced in July 1996, we examined the changes in international oil prices and domestic gasoline prices in the period before the introduction of the sales tax, i.e., January 1990 – June 1996. Table 5 in the appendix shows the total, the average, and the standard deviation of price changes in crude oil¹¹ and domestic gasoline over the period January 1990 – June 1996. During this period, the net total gasoline price increases were higher than the international price increases. Similarly, the average quarterly price increases were also higher in Curaçao than internationally. Last, on a quarterly basis, the gasoline price in Curaçao fluctuated much more than the international prices.

Hence, the sharper increase in domestic gasoline prices compared to international oil prices was related to the implementation of the correction factor mechanism. Table 6 in the appendix offers a more detailed analysis of how the correction factor mechanism was applied in the period 1990 to 2005 on a quarterly basis. This table reveals the quarterly changes in the international oil prices and domestic gasoline prices during the period January 1990 – March 2005. It shows that during this period, the government did not always adjust domestic gasoline prices in accordance with world market conditions. The result was a considerable rise in domestic gasoline prices in the subsequent quarters, because domestic prices were not raised at a similar magnitude as the international oil prices. In other words, the correction factor mechanism was not used correctly. As a result, consumers were confronted with nontransparent price setting.

⁸ Changes in the prices of oil products in Curaçao are usually caused by changes in the correction factor and/or a change in the price PDVSA charges Curoil for oil derivatives. PDVSA charges Curoil according to the oil and refined products prices published by Platts Oilgram. Platts Oilgram bases its prices for crude oil and oil derivatives on international developments.

⁹ The results of using gasoline Gulf Coast price changes are similar to using crude oil price changes (see Tables 7 and 8).

¹⁰ For the year 2005, only data of the first quarter are presented.

¹¹ The results of using gasoline Gulf Coast price changes are similar to using crude oil price changes (see Tables 7 and 8).

We can draw similar conclusions when comparing the Gulf Coast gasoline prices as an indicator for international oil prices with gasoline prices in Curaçao:

- The correction factor mechanism has not been applied accordingly, creating a mismatch between expected domestic gasoline prices and international oil price developments.
- Applying the correction mechanism incorrectly resulted in consumers being charged a higher price for gasoline than warranted by the change in international oil prices.

4.3. Impact of international oil price changes on the domestic economy: A simulation

The Moneda¹² model provides answers concerning the macroeconomic impact of an international price shock on the economy of the Netherlands Antilles.¹³ As any other non-oil-producing economy, the Netherlands Antilles is vulnerable to crude oil price increases. The correction factor mechanism, when implemented correctly, will pass the changes in international oil prices to domestic oil derivatives.

Table 9 in the appendix shows the effects of a 13% increase in domestic gasoline price on the economy of the Netherlands Antilles. Higher gasoline prices will have a negative impact on our economic activities. Higher gasoline prices will raise inflation, lowering both the aggregate supply and aggregate demand. Producers will experience pressures on their profit margins if they cannot pass the price increases on to consumers. Depending on how strong the unions are, they can demand higher nominal wages for their workers to compensate for the loss in purchasing power, pushing up the prices of goods. However, if these higher oil prices are not passed on to consumers in the form of higher domestic prices, producers will hold back on investments and be forced to lay off workers to survive, leading to a higher unemployment rate. As a result, household income as well as real wages drops, owing to a loss of employment and higher inflation. The lower purchasing power leads to a drop in domestic demand. On the government side, weaker economic activities reduce the tax base. As a result, the government receives less tax revenues, worsening the public deficit. In addition, if the domestic gasoline price rises at a faster pace than the regional price increase, the competitive position of Curaçao in the region will decline, leading to a drop in total exports. Also, the value of imports increases because of higher international oil prices, which ultimately would worsen the current account balance of the Netherlands Antilles.

5. Reduction of gasoline taxes

In this section, we discuss the impact of a gasoline tax reduction. Depending on the optimal taxation on gasoline, Curaçao's taxation level is too low or too high. One can argue that its gasoline taxes are high when compared to the region, which can hamper competitiveness in terms of pricing. Especially in times of persistent oil price shocks, the government could reduce the tax component of the oil prices, slowing inflation.

Table 10 in the appendix shows the impact of a decrease of 29% in the excises on the consumer price of gasoline (Mogas 95). As shown in this table, a 29% reduction in the gasoline excises would reduce the gasoline price by 11%. This reduction would increase the

¹² Moneda is the macroeconomic model of the central bank of the Netherlands Antilles.

¹³ Curaçao has the largest share in the economy of the Netherlands Antilles. We assume that the impact of the simulation will approximate the impact on Curaçao.

fiscal deficit of the general government by NAF.21.6 million. However, (not shown in this table) inflation would decline, increasing our competitive position and production.

6. Conclusion

In this paper, we examined the impact of international oil prices on the prices of gasoline in Curaçao. As a small, open and non-oil-producing economy, Curaçao is highly dependent on oil and vulnerable to developments on the international oil market. An automatic pass-through of international oil price changes in domestic oil prices will result in uncertainty and volatile domestic oil prices. We assume that oil consumers are risk-averse and face high adjustment costs in the case of oil. Hence, they prefer stable oil prices to volatile prices. The government has introduced the correction factor system as a price-setting mechanism for domestic oil products. The aim of the system is to smooth oil price fluctuations by fixing domestic oil prices on a quarterly basis. Hence, the system avoids sharp price increases or decreases during a period of three months.

Due to the correction factor mechanism, international oil price changes are not immediately reflected in domestic gasoline prices -- they will adjust with a lag of one quarter. Analysis of the correction factor system as implemented shows that this system has not always followed international oil price changes. During some periods, the system did not react to oil price changes. It is highly recommended that changes in international oil prices be passed through in domestic prices. According to the IMF, a partial or no pass-through is inefficient and exposes the government to excessive fiscal volatility.

Generally, a nonadjustment in domestic prices as a result of international price increases was followed by sharp increases in domestic gasoline prices in subsequent quarters. Moreover, the quarterly domestic gasoline prices fluctuated more than the quarterly international gasoline prices. This means that the system as applied has created a higher burden for consumers, as they were confronted with higher price changes than international oil price changes.

As discussed in this paper, international oil prices are projected to remain high and continue to rise in the near future. This means that, when the correction factor mechanism is applied correctly, domestic oil prices in Curacao will also have to increase. The correction factor mechanism is a system to cope with daily volatility in the price and to smooth out daily price fluctuations. Given the island's vulnerability to oil price increases, the government could explore alternatives to keep domestic prices moderate in the short term despite international oil price fluctuations. However, in the long term, domestic prices should reflect international price developments. We have briefly explored the alternative of reducing the excises on oil products. However, this would also reduce government revenues, resulting in an increase in the fiscal deficit. More in-depth analysis is needed to develop a more adequate and competitive price structure for oil derivatives in Curaçao.

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Appendix

Table 1. Price structure of oil derivatives and cooking gas in Curaçao (June 2005)

Description	In Naf. cents per liter				In Naf. per cylinder	
	Regular 92	Super 95	Kerosene	Gasoil	Cooking gas	
					100 lbs	20 lbs
Purchase price charged to consumers	70.98	71.02	76.84	74.48	32.51	6.50
Margin Curaçao gov't	-	-	-	-	-	-
Margin Curoil	6.00	6.00	-	2.00	-	-
Central gov't taxes (excise)	63.00	63.00	-	-	-	-
Subtotal	139.98	140.02	76.84	76.48	32.51	6.50
Sales tax 5%	7.00	7.00	3.84	3.82		
Market price	146.98	147.02	80.68	80.30	32.51	6.50
Correction factor	9.30	12.76	20.35	0.12	4.34	1.70
Wholesale price	156.28	159.78	101.03	80.42	36.85	8.20
Margin gas stations	12.35	12.35	4.70	7.20	14.85	4.50
Sales tax 5% (on market price + margin gas stations)	7.97	7.97	4.27	4.38	-	-
Consumer price	176.60	180.10	110.00	92.00	51.70	12.70

Source: Curoil website

Table 2. Government taxes as % of the consumer price (June 2005)

	Regular 92	Super 95	Kerosene	Gasoil	Cooking gas	
					100 lbs	20 lbs
Excises	35.7	35.0	0.0	0.0	0.0	0.0
Sales tax wholesale	4.0	3.9	3.5	4.2	0.0	0.0
Sales tax retail	4.5	4.4	3.9	4.8	0.0	0.0
Total	44.2	43.3	7.4	9.0	0.0	0.0

Table 3. Gasoline tax as a share of total tax revenues (%)

Countries	1996	1997	1998	1999	2000	2001	2002	2003	2004
The Netherlands Antilles	7.8	8.3	8.4	7.8	6.2	5.6	6.1	6.4	n.a.
Aruba	11.1	11.0	10.9	9.8	10.0	10.3	10.7	10.0	9.9
The Dominican Republic	12.7	15.0	16.2	9.6	5.4	12.5	12.1	10.4	n.a.
Jamaica	n.a.	n.a.	n.a.	n.a.	7.4	6.2	6.3	7.8	5.9

Source: National Accounts, Netherlands Antilles; Central Bank of Aruba; Central Bank of the Dominican Republic; and Ministry of Finance & Planning, Jamaica.

Table 4. Changes in international oil prices and domestic gasoline prices, 1990 – 2005 (in Naf. cents)

	International*	Domestic
Total changes in prices	31.40	73.00
Average changes in prices per quarter	0.50	1.20
Standard deviation of price changes	3.60	5.40

*International price refers to WTI crude oil price

Source international oil prices: IFS

Source domestic gasoline prices: Curoil

Table 5. Changes in international oil prices and domestic gasoline prices, January 1990 – June 1996 (in Naf. cents)

	International*	Domestic
Total changes in prices	1.20	19.10
Average changes in prices per quarter	0.04	0.70
Standard deviation of price changes	3.83	4.16

* International price refers to WTI Crude oil price

Source international oil prices: IFS

Source domestic gasoline prices: Curoil

Table 6. Changes in international oil price vs changes in domestic gasoline price

Quarter	Difference internat'l oil prices	Difference Curoil prices	Change internat'l price	Expected gov't intervention	Gov't intervention	Mismatch expected/ actual prices
	(1)	(2)	(3)	(4)	(5)	(6)
Q1 1990	0.9	1.9	+		+	
Q2 1990	-4.2	2.4	-	+	+	
Q3 1990	11.3	2.5	+	-	+	*
Q4 1990	6.1	15.9	+	+	+	
Total	14.1	22.6				
Average 1990	3.5	5.7				
SD 1990	6.7	8.7				
Q1 1991	-12.8	-6.4	-	+	-	*
Q2 1991	-1.7	-8.8	-	-	-	
Q3 1991	1.3	0.0	+	-	=	*
Q4 1991	0.5	1.0	+	+	+	
Total	-12.7	-14.2				
Average 1991	-3.2	-3.6				
SD 1991	6.5	4.8				
Q1 1992	-2.7	-1.0	-	+	-	*
Q2 1992	2.5	0.0	+	-	=	*
Q3 1992	0.4	0.0	+	+	=	*
Q4 1992	-1.2	0.0	-	+	=	*
Total	-1.0	-1.0				
Average 1992	-0.3	-0.3				
SD 1992	2.2	0.5				
Q1 1993	-1.1	3.0	-	-	+	*
Q2 1993	0.0	0.0	=	-	=	*
Q3 1993	-2.1	0.0	-	=	=	
Q4 1993	-1.4	0.0	-	-	=	*
Total	-4.6	3.0				
Average 1993	-1.1	0.7				
SD 1993	0.9	1.5				
Q1 1994	-1.3	3.0	-	-	+	*
Q2 1994	2.7	0.0	+	-	=	*
Q3 1994	0.9	0.0	+	+	=	*
Q4 1994	-0.5	4.6	-	+	+	
Total	1.9	7.5				
Average 1994	0.5	1.9				
SD 1994	1.8	2.3				
Q1 1995	0.7	0.0	+	-	=	*
Q2 1995	1.1	0.0	+	+	=	*
Q3 1995	-2.0	0.0	-	+	=	*
Q4 1995	0.6	1.9	+	-	+	*
Total	0.4	1.9				
Average 1995	0.1	0.5				
SD 1995	1.4	1.0				
Q1 1996	1.5	5.4	+	+	+	
Q2 1996	1.3	0.0	+	+	=	*
Q3 1996	1.3	11.9	+	+	+	
Q4 1996	2.8	5.0	+	+	+	
Total	7.0	22.4				

Quarter	Difference internat'l oil prices	Difference Curoil prices	Change internat'l price	Expected gov't intervention	Gov't intervention	Mismatch expected/ actual prices
	(1)	(2)	(3)	(4)	(5)	(6)
Average 1996	1.7	5.6				
SD 1996	0.7	4.9				
Q1 1997	-2.3	0.0	-	+	=	*
Q2 1997	-3.0	0.0	-	-	=	*
Q3 1997	0.2	0.0	+	-	=	*
Q4 1997	0.2	0.0	+	+	=	*
Total	-4.8	0.0				
Average 1997	-1.2	0.0				
SD 1997	1.7	0.0				
Q1 1998	-5.4	0.0	-	+	=	*
Q2 1998	-1.0	0.0	-	-	=	*
Q3 1998	-0.3	0.0	-	-	=	*
Q4 1998	-1.3	-7.8	-	-	-	
Total	-8.0	-7.8				
Average 1998	-2.0	-1.9				
SD 1998	2.3	3.9				
Q1 1999	-0.2	-4.2	-	-	-	
Q2 1999	5.0	0.0	+	-	=	*
Q3 1999	5.1	0.0	+	+	=	*
Q4 1999	3.8	16.4	+	+	+	
Total	13.7	12.2				
Average 1999	3.4	3.1				
SD 1999	2.5	9.1				
Q1 2000	3.2	8.2	+	+	+	
Q2 2000	0.2	0.0	+	+	=	*
Q3 2000	3.6	0.0	+	+	=	*
Q4 2000	-0.2	14.6	-	+	+	
Total	6.7	22.8				
Average 2000	1.7	5.7				
SD 2000	2.0	7.1				
Q1 2001	-4.1	-5.1	-	-	-	
Q2 2001	0.8	-4.4	+	-	-	
Q3 2001	-1.7	8.6	-	+	+	
Q4 2001	-6.8	-3.6	-	-	-	
Total	-11.9	-4.4				
Average 2001	-3.0	-1.1				
SD 2001	3.2	6.5				
Q1 2002	1.8	-15.3	+	-	-	
Q2 2002	4.9	5.8	+	+	+	
Q3 2002	2.0	7.0	+	+	+	
Q4 2002	-0.2	-1.6	-	+	-	*
Total	8.5	-4.1				
Average 2002	2.1	-1.0				
SD 2002	2.1	10.2				
Q1 2003	5.3	3.1	+	-	+	*
Q2 2003	-5.6	-6.3	-	+	-	*
Q3 2003	2.2	0.0	+	-	=	*
Q4 2003	1.1	2.0	+	+	+	
Total	3.0	-1.2				

Quarter	Difference internat'l oil prices	Difference Curoil prices	Change internat'l price	Expected gov't intervention	Gov't intervention	Mismatch expected/ actual prices
	(1)	(2)	(3)	(4)	(5)	(6)
Average 2003	0.8	-0.3				
SD 2003	4.6	4.2				
Q1 2004	3.2	0.0	+	+	=	*
Q2 2004	4.0	0.0	+	+	=	*
Q3 2004	5.6	8.3	+	+	+	
Q4 2004	2.5	0.0	+	+	=	
Total	15.3	8.3				
Average 2004	3.8	2.1				
SD 2004	1.4	4.2				
Q1 2005	3.9	5.1	+	+	+	
Q2 2005						
Q3 2005						
Q4 2005						
Total	3.9	5.1				
Average 2005						
SD 2005						

Source: International Financial Statistics, IMF, and Curoil news

Table 6 shows the changes in international oil prices and domestic gasoline prices for every quarter during the period 1990 – 2005.¹⁴ Column 1 shows the change in international oil price in quarter (t). The change in oil price in quarter (t) = international oil price in quarter (t) - international oil price in quarter (t-1).

Column 2 represents the change in domestic gasoline prices in quarter (t). The change in domestic gasoline price in quarter (t) = domestic gasoline price in quarter (t) - domestic gasoline price in quarter (t-1).

In column 3, the change in international oil price in quarter (t) is depicted. A “ + ” sign represents an increase in oil price, a “ - ” sign a decrease, and a “ = ” no change. Furthermore, in column 4, the expected government intervention is depicted. The expected government intervention in quarter (t) = the international price change in quarter (t-1) (column 3). A “ + ” sign indicates that we expect the government to increase the domestic gasoline price. Moreover, a “ - ” sign indicates that we expect the government to decrease the gasoline price, whereas a “ = ” indicates that we expect no government intervention (i.e., the domestic gasoline price will remain unchanged).

In column 5, the actual government intervention is presented. A “ + ” sign means that the government increased the domestic gasoline price, a “ - ” sign represents a decrease, and “ = ” represents no change in the domestic gasoline price. If the domestic price in quarter (t) is adjusted to the developments in the international market in quarter (t-1), then the sign in column 5 for quarter (t) must be similar to the sign in column 4 for quarter (t). Column 6 indicates whether column 5 matches column 4 in a certain quarter (t). In the case of a mismatch, the correction factor mechanism was not properly used. A mismatch is shown by a “ * ” sign.

¹⁴ For the year 2005, only data for the first quarter are presented.

Table 7. Changes in US Gulf Coast gasoline prices and domestic gasoline prices, 1990 - 2005 (in Naf. cents)

	US Gulf Coast gasoline	Domestic
Total changes of prices	38.4	73.0
Average changes in prices per quarter	0.60	1.20
Standard deviation of price changes	4.20	5.40

Source US Gulf Coast gasoline prices: US Energy Information Administration
 Source domestic gasoline prices: Curoil

Table 8. Changes in international gasoline price vs changes in domestic gasoline price

Quarter	Difference internat'l gasoline prices	Difference Curoil prices	Change internat'l price	Expected gov't intervention	Gov't intervention	Mismatch expected/ actual prices
	(1)	(2)	(3)	(4)	(5)	(6)
Q1 1990	3.6	1.9	+			
Q2 1990	1.6	2.4	+	+	+	
Q3 1990	8.2	2.5	+	+	+	
Q4 1990	-0.3	15.9	-	+	+	
Total	13.1	22.6				
Average 1990	3.3	5.7				
SD 1990	3.6	8.7				
Q1 1991	-7.1	-6.4	-	-	-	
Q2 1991	1.1	-8.8	+	-	-	
Q3 1991	-1.8	0.0	-	+	=	*
Q4 1991	-2.4	1.0	-	-	+	*
Total	-10.2	-14.2				
Average 1991	-2.6	-3.6				
SD 1991	3.4	4.8				
Q1 1992	-2.6	-1.0	-	-	-	
Q2 1992	4.5	0.0	+	-	=	*
Q3 1992	-1.6	0.0	-	+	=	*
Q4 1992	-2.1	0.0	-	-	=	*
Total	-1.8	-1.0				
Average 1992	-0.4	-0.3				
SD 1992	3.3	0.5				
Q1 1993	-0.9	3.0	-	-	+	*
Q2 1993	2.5	0.0	+	-	=	*
Q3 1993	-3.8	0.0	-	+	=	*
Q4 1993	-3.8	0.0	-	-	=	*
Total	-6.0	3.0				
Average 1993	-1.5	0.7				
SD 1993	3.0	1.5				
Q1 1994	0.7	3.0	+	-	+	*
Q2 1994	3.2	0.0	+	+	=	*
Q3 1994	0.3	0.0	+	+	=	*

Quarter	Difference internat'l gasoline prices	Difference Curoil prices	Change internat'l price	Expected gov't intervention	Gov't intervention	Mismatch expected/ actual prices
	(1)	(2)	(3)	(4)	(5)	(6)
Q4 1994	-2.3	4.6	-	+	+	
Total	1.9	7.5				
Average 1994	0.5	1.9				
SD 1994	2.3	2.3				
Q1 1995	1.1	0.0	+	-	=	*
Q2 1995	5.2	0.0	+	+	=	*
Q3 1995	-4.6	0.0	-	+	=	*
Q4 1995	-1.7	1.9	-	-	+	*
Total	-0.1	1.9				
Average 1995	0.0	0.5				
SD 1995	4.2	1.0				
Q1 1996	3.3	5.4	+	-	+	*
Q2 1996	4.3	0.0	+	+	=	*
Q3 1996	-1.6	11.9	-	+	+	
Q4 1996	3.2	5.0	+	-	+	*
Total	9.1	22.4				
Average 1996	2.3	5.6				
SD 1996	2.6	4.9				
Q1 1997	-0.8	0.0	-	+	=	*
Q2 1997	-2.6	0.0	-	-	=	*
Q3 1997	0.9	0.0	+	-	=	*
Q4 1997	-3.6	0.0	-	+	=	*
Total	-6.1	0.0				
Average 1997	-1.5	0.0				
SD 1997	2.0	0.0				
Q1 1998	-3.9	0.0	-	-	=	*
Q2 1998	0.7	0.0	+	-	=	*
Q3 1998	-3.0	0.0	-	+	=	*
Q4 1998	2.4	-7.8	-	-	-	
Total	-8.5	-7.8				
Average 1998	-2.1	-1.9				
SD 1998	2.0	3.9				
Q1 1999	0.2	-4.2	+	-	-	
Q2 1999	6.6	0.0	+	+	=	*
Q3 1999	5.6	0.0	+	+	=	*
Q4 1999	1.4	16.4	+	+	+	
Total	13.7	12.2				
Average 1999	3.4	3.1				
SD 1999	3.1	9.1				
Q1 2000	7.7	8.2	+	+	+	
Q2 2000	3.5	0.0	+	+	=	*
Q3 2000	-0.2	0.0	-	+	=	*
Q4 2000	-2.0	14.6	-	-	+	*
Total	9.0	22.8				

Quarter	Difference internat'l gasoline prices	Difference Curoil prices	Change internat'l price	Expected gov't intervention	Gov't intervention	Mismatch expected/ actual prices
	(1)	(2)	(3)	(4)	(5)	(6)
Average 2000	2.3	5.7				
SD 2000	4.3	7.1				
Q1 2001	-0.3	-5.1	-	-	-	
Q2 2001	3.2	-4.4	+	-	-	
Q3 2001	-7.1	8.6	-	+	+	
Q4 2001	-10.0	-3.6	-	-	-	
Total	-14.3	-4.4				
Average 2001	-3.6	-1.1				
SD 2001	6.1	6.5				
Q1 2002	3.4	-15.3	+	-	-	
Q2 2002	7.4	5.8	+	+	+	
Q3 2002	0.4	7.0	+	+	+	
Q4 2002	0.5	-1.6	+	+	-	*
Total	11.7	-4.1				
Average 2002	2.9	-1.0				
SD 2002	3.3	10.2				
Q1 2003	8.5	3.1	+	+	+	
Q2 2003	-6.8	-6.3	-	+	-	*
Q3 2003	4.1	0.0	+	-	=	*
Q4 2003	-2.5	2.0	-	+	+	
Total	3.4	-1.2				
Average 2003	0.8	-0.3				
SD 2003	6.8	4.2				
Q1 2004	9.5	0.0	+	-	=	*
Q2 2004	8.6	0.0	+	+	=	*
Q3 2004	0.0	8.3	=	+	+	
Q4 2004	-0.5	0.0	-	=	=	
Total	17.6	8.3				
Average 2004	4.4	2.1				
SD 2004	5.4	4.2				
Q1 2005	5.6	5.1	+	-	+	*
Q2 2005						
Q3 2005						
Q4 2005						
Total	5.6	5.1				
Average 2005						
SD 2005						

Source: US Energy Information Administration

*In the third quarter of 1996 there was a high increase in domestic prices due to the doubling of the retail margins and the introduction of the sales tax.

Table 8 is set up similarly to Table 6. However, in this case column 3 depicts the changes in international gasoline prices. The US Gulf Coast spot prices for gasoline are used as an indicator of the international gasoline price.

Table 8 shows that in 38 of the 60 quarters analyzed, there was a mismatch between the expected and the actual government intervention. Given developments on the international oil market, domestic gasoline prices were expected to drop (rise), but instead they remained the same or even rose (dropped). In these cases, the policy of the correction factor mechanism¹⁵ was overruled.

An analysis of Tables 6 and 8 indicates that domestic gasoline prices showed large gains in the quarters following those in which the government did not amend the domestic price on the basis of international oil price increases. This happened for example in the years 1994, 1996, 2000, and 2004.

In addition, Tables 6 and 8 show the total, the average, and the standard deviation of changes in crude oil prices (Table 6), international gasoline prices (Table 8) and domestic gasoline prices (Tables 6 and 8) The total price change is defined here as the sum of the quarterly price changes during the year. An analysis of the total price change shows that in most cases when the oil price increased within a year on the international market, the domestic price followed suit, but the increase in the domestic price was greater than the international oil price increase.

The average oil price change within a year is defined as the average of the quarterly price changes within that year. When analyzing the average oil price change, in most cases, the average price rise in the domestic gasoline price reflects the average increase in the international oil price. However, the average price increase in the domestic market was higher than the average increase in the international price.

Analyzing the standard deviation of the price change shows that in most years, the standard deviation of the domestic gasoline price change was larger than the standard deviation of the international oil price change. This means that the quarterly oil price fluctuations in Curaçao were more dispersed from the average domestic oil price changes, than in the case of the international oil prices. Therefore, it can be concluded that the correction factor mechanism maintains stable (fixed) prices during a period of three months, but leads to higher quarterly domestic price fluctuations, compared to the quarterly international oil prices.

Table 9. Effects of a 13 % increase in gasoline price (in % change)

	Short term	Long term
Volume private consumption	-1.1	-1.2
Volume gross private investment	-4.2	-1.8
Volume export tourist services	-0.3	-1.5
Volume export transportation services	0.0	-0.8
Volume export financial services	-0.2	-1.2
Volume export goods and other services	0.2	-1.1
Volume imports	-0.2	0.6
Volume private sector production	-1.2	-1.5
Volume GNP	-0.9	-1.1
Consumer price level	1.7	2.3

¹⁵ We assume that domestic price changes are caused by adaptations in the correction factor mechanism and changes in the cost price paid to PDVSA. In addition, we assume that PDVSA sets its selling price according to changes in the international oil market.

	Short term	Long term
Export price level	0.3	0.9
Wage rate private sector	0.3	1.7
Real disposable income	-1.4	-0.8
Private sector employment	-0.9	-1.2
Total employment	-0.6	-0.8
Unemployment	2.3	1.7
Government financing balance a)	-0.3	-0.6
Current account balance a)	0.3	-0.5
Capital account balance a)	-0.2	0.3
Change in foreign exchange reserves a)	0.3	-0.2

a) % NNI

Table 10. Simulation: Impact of reduction gasoline tax on consumer price of “Mogas 95” gasoline

	Price without reduction (in NAf. cents)	Price with reduction (in NAf. cents)
Purchase price (PDVSA)	71.02	71.02
Margin Curaçao government		
Margin Curoil	6.00	6.00
Central government taxes (excises on gasoline)	63.00	44.77
Subtotal	140.02	121.79
Sales tax 5 %	7.00	6.09
Market price	147.02	127.88
Correction factor	12.76	12.76
Wholesale price	159.78	140.64
Margin gas stations	12.35	12.35
Sales tax 5 %	7.97	7.01
<i>Consumer price</i>	<i>180.10</i>	<i>160.00</i>
		Impact (in mln NAf.)
Impact on general government budget		21.6
Central government budget		10.8
Island government of Curaçao budget		10.8