Strategic Trade Policy and Exchange Rate Uncertainty

Fernando MESA PARRA
Strategic Trade Policy and Exchange Rate Uncertainty

Fernando Mesa*

This paper examines the systematic effect of the exchange rate volatility, when a local government has to evaluate linear and quadratic strategic trade policies. The exercise is realised for both Cournot and Bertrand markets fashions. In the Cournot market setting, when the domestic government offers subsidies to local firms, the international rent shifts toward domestic firms. In the Bertrand market setting, when the domestic government imposes export taxes on local firms, the trade policy improves firm’s profits and obviously hurts consumer surplus. The model proofs that the linear or quadratic scheme have the same effect on the countries’ social welfare, and the volatility of the domestic exchange rate leads the governments to reduce export subsidies or to cut export taxes, according to the strategic variable chosen by firms.

Classification JEL: D43, D81, F13, L13

Key Words: Trade, Market Structure and Pricing, Firm Strategy, and Information and Uncertainty.

*This model was constructed when the author was a research student in the University of Essex, and under the supervision of Professor Sajal Sahiri.
1 Introduction

This paper focuses on the strategic aspects of trade policy, that are present when the policy operates in an environment of uncertainty. Different models have shown that this type of policy raises the social welfare and has a deterrent effect on foreign competition. The chapter restricts its domain to international competition, by assuming that domestic and foreign firms compete in a third market for a differentiated good, for which there are not demands in the countries where the firms produce.

The artificial assumption, of neglecting the effects of trade policy on the domestic consumer, allows the model to focus its analysis on the competition between firms and to isolate the international trade effects as an important criterion in the formulation of an economic policy. Under specific conditions, a public policy of taxing or subsidising exports can act as a strategic move which tilts the international competition in favour of domestic firms, and increases the national welfare.

In contrast to the few models where the uncertainty is introduced through external shocks (such as those of Cooper and Riezman (1989), Caglayan (2000), and Qiu (1995)), this model systematically adds the uncertainty directly to the exchange rate. Thus it contains an important factor which better captures the reality, since the firms in the international market have to take this variable into account when making their decisions.

The setting of the model is as follows. There are three countries, the home country, a foreign country, and a third country. There is one differentiated product, which is produced in the domestic and foreign countries, and consumed solely in the third country. In addition, there is only one firm in the domestic country and one in the foreign country. The level of welfare in domestic and foreign countries is determined from profits earned by the respective firms, net of any government subsidy or tax. The focus of our analysis is the domestic country’s welfare.

The goal is to characterise the Nash equilibrium for a two stage game and to derive the optimum public policy with respect to export tax or subsidy in the domestic country. We consider a two-stage sequential game. In the first stage, the domestic government sets trade policy (S). In the second stage, the domestic and the foreign firms simultaneously choose their output level for the third market, given the level of trade policy intervention.
At the end of the period, the uncertainty in the exchange rates is resolved. Using backward induction to analyze the rational Nash-equilibrium for the entire game, we consider the second stage of the game first, and then we consider the first stage. The domestic government then acts as a Stackelberg leader vis-à-vis both domestic and foreign firms in setting the subsidy or tax rates. Thus the firms set outputs or prices, taking the subsidy or tax rates as given.

Brander and Spencer (1985) were the first to point out that export subsidies provide a commitment device for domestic firms to improve their outcomes when they export more than the equilibrium outputs obtained in a market without any policy instrument. The subsidy raises the firm’s profits, which include the subsidy. As a consequence the domestic firms act as if they were a Stackelberg leader by choosing its maximising point from the rival’s reaction curve.

Later Eaton and Grossman (1986) provided an integrative treatment of the effects of trade policy under imperfect competition on welfare. They showed that the results are sensitive to the character of the competition. Whereas export subsidies are desirable in a Cournot market, they are never desirable in a Bertrand market. The setting of Bertrand competition implies the existence of an export tax rather than a subsidy.

These two models have been re-examined in the theoretical literature in relation to different economic situations. One important approach describes the strategic trade policy as an endogenous instrument, where the firms identify the best type of competition (Klemperer and Méyer model, 1986). Their framework is constructed under uncertainty conditions, where the uncertainty is explained through an external shock in demand.

Klemperer-Meyer’s main finding is that firms play a Cournot game if the total cost function is convex, but they prefer to play a Bertrand game if the total cost function is concave.

Qiu (1995) extends the Brander-Spencer model by embodying the main results derived in the Klemperer-Meyer model. As an addition to the features

---

1 In this model uncertainty is resolved by certainty equivalence approach, whose foundations were formulated in the work on portfolio selection by Markowitz. This approach deals mainly with the special case in which investor preferences are assumed to be defined over mean and variance (or standard deviations). The foundations is presented in Jensen, 1972.
Klemperer-Meyer model, Qiu's model introduces a linear-quadratic trade policy, and shows that a linear export subsidy is strictly dominated by a non-linear subsidy scheme.

In contrast to the above studies, in the present chapter uncertainty is introduced via the exchange rates and is used by the firms and the government. The main finding of the model is that the export tax or the export subsidy decreases if the domestic exchange rate uncertainty increases. However, if the uncertainty is related to the foreign exchange rate, the export subsidy or the export tax levels could be set higher.

These results contribute to the clarification of the debate as to whether public trade policy should be orientated towards subsidising or taxing exports. The answer depends on the type of competition, the level of efficiency and the uncertainty condition that the firms face. Whenever the competition is in quantities, efficiency is high, and uncertainty is low, the government should offer subsidies to exporters. On the other hand, whenever the competition is in prices, efficiency is high, and uncertainty is low, then the government should impose taxes on exports.

This chapter is organized in four sections and they are as follows. The model framework under uncertainty conditions is constructed in the first section. The international trade policy for the Cournot and the Bertrand market settings, respectively, are examined in the following two sections. The relations between the export tax or export subsidy, and changes in the variance of the exchange rate currencies are derived for each type of market. Concluding remarks are presented in the last section.

2 Model

In the subsequent sections we characterise the optimal public policy in the presence of oligopolistic competition, where the domestic firm and the foreign firm are both incumbents and sell all of their products on the international market.

To simplify notation, we refer to the firm in the home country as the domestic firm and in the foreign country as the foreign firm. Variables relating to the domestic firm and the foreign firm are identified by subscripts $d$ and $f$, respectively. Variables associated with the third country are identified by an
The domestic firm produces the quantity $X_d$ and the foreign firm produces the quantity $X_f$.

The linear inverse demand function for differentiated products in the third country is written as:

$$ P_i^* = \alpha - \beta X_i - \zeta X_j, \quad (1) $$

where $i, j = d, f$; and $0 < \zeta < \beta$, and $P_i^*$ is measured in terms of the kind country's currency.

The symbol $\zeta$ measures the degree of product differentiation. If $\zeta = 0$, varieties are completely differentiated, and each producer is then a monopolist with respect to its own brand. If $\zeta = \beta$, products are completely homogeneous or standardised. Hence the values of $\zeta$ between 0 and $\beta$ describe all cases in which the goods are imperfect substitutes (Martin, 1993).

We assume that the firms have the following cost structures:

$$ C_i (X_i) = C_{i1} X_i + \frac{1}{2} C_{i2} X_i^2, \quad (2) $$

$C_{i1}$ and $C_{i2}$ being parameters. When $C_{i2} > 0$ the firms produce under decreasing returns, and if $C_{i2} = 0$ the firms produce under constant returns.

The domestic export subsidy is a function of export quantity. In particular, the trade policy has the same mathematical expression used by Qiu (1995), in that is a linear-quadratic scheme. This equation is:

$$ S (X_d) = S_1 X_d + \frac{1}{2} S_2 X_d^2, \quad (3) $$

where $S_1$ and $S_2$ are parameters. If $S_1 \neq 0$ and $S_2 = 0$ the domestic government pre-commit to a linear scheme, but if $S_1 = 0$ and $S_2 \neq 0$ the government pre-commit to a non-linear scheme. To simplify the model, the assumption is made that the foreign government is passive, i.e. it does not apply any policy against the domestic government.

The profit functions under uncertainty for the domestic and foreign firm are:

$$ \pi^d = e_1 P_d^* X_d - C (X_d) + S (X_d) +, \quad (4) $$

$$ \pi^f = e_2 P_f^* X_f - C (X_f), \quad (5) $$
where the tilde above the domestic and foreign exchange rates ($\tilde{\epsilon}_1, \tilde{\epsilon}_2$) refers to uncertain conditions. The same conditions are applied to the profit outcomes ($\pi^d_i, \pi^f_i$). The firms maximise the certainty equivalence of these profits which is a linear combination of the expected value and the standard deviation of profits. The last term was previously defined as the product of the relative measure of risk preference ($\gamma_i$) and the standard deviation of profits. Thus the equation is:

$$\pi^i_c = E[\pi^i] - \gamma_i SD[\pi^i].$$ (6)

In a Cournot oligopoly market, if firm $i$ conjectures that $j$ is setting its quantity at $X_j$, then firm $i$’s residual inverse demand is

$$P^*_i = \alpha - \beta X_i - \zeta \bar{X}_j.$$

In the context of the Bertrand oligopoly market, if firm $i$ conjectures that $j$ is setting its price at $\bar{P}_j$, then firm $i$’s demand is

$$X^*_i = A - BP_i - \theta \bar{P}_j,$$

where a bar over a variable indicates that it takes a constant value. The last equation is derived by solving (1) for $X_j$ in terms of $P_j$ and substituting this result into a similar equation, for $X_i$. Thus, given the conjecture about $j$’s choice of strategic variable, firm $i$ knows its demand schedule exactly, and being a monopolist with respect to its demand, $i$ identifies its profit maximising output or price. The certainty equivalence device guarantees that firm $i$ can solve its profit maximization problem by setting the price or the quantity. Therefore firms choose the optimal export quantity or export price when they maximise the certainty equivalence of their profits, depending on the conjecture that each firm makes on the others choice. The certainty equivalence of the domestic or foreign firms’ profits are:

$$Max_{X_d(\bar{X}_f) \text{ or } P_d(\bar{P}_f)} \pi^d = a_d P^* X_d - C(X_d) + S(X_d)$$ (7)

$^2$The certainty equivalence of profits in this approach is a linear combination of the expected and the standard deviation of profits.

$^3$This demand function equation and the relation between the parameters with respect to the inverse demand function are derived in Section 4, in the Bertrand model.
where \( a_d \) and \( a_f \) are the certainty equivalence of the domestic and foreign exchange rates, and they are defined in terms of the expected value \( \mu_e \) and the standard deviation \( \sigma_e \) of the respective exchange rates. It is also important to notice that firms only export if \( a_i > 0 \). In particular,

\[
\begin{align*}
    a_d &= \mu_{e_1} - \gamma_d \sigma_{e_1} > 0, \\
    a_f &= \mu_{e_2} - \gamma_f \sigma_{e_2} > 0.
\end{align*}
\]

(9)  
(10) 

The distributions of the random variables are log-normal such that

\[
\begin{align*}
    \mu_{e_i} &= e^{\mu_i + \frac{1}{2} \sigma^2_i}, \\
    \sigma^2_{e_i} &= e^{2\mu_i + \sigma^2_i} \left(e^{\sigma^2_i} - 1\right),
\end{align*}
\]

where \( i = 1, 2 \).

We assume that all production is exported and the domestic government wishes to maximise the local value added, which is defined as the sum of the profit of the domestic country’s firm, excluding any cost from the trade policy. Then the social welfare function is written as:

\[
\tilde{W} = \pi^d \left(\bar{e}_1\right) - S(X_d),
\]

which is simplified as:

\[
\tilde{W} = \bar{e}_1 P^*_d X_d - C(X_d).
\]

(11)

The certainty equivalence of the social welfare expression is:

\[
W_c = a_g P^*_d X_d - C(X_d),
\]

(12)

here \( a_g \) denotes the exchange rate certainty equivalence evaluated by the government according to the following equation

\[
a_g = \mu_{e_1} - \gamma_g \sigma_{e_1} > 0.
\]

(13)

Given different relative risk preferences between the government and the domestic firm it becomes cumbersome to obtain any clear cut results. We therefore simplify the model making both relative risk preferences equal. That is \( \gamma_d = \gamma_g \), and consequently \( a_d = a_g \).
3 The Cournot Duopoly Market

This case is defined when the domestic firm conjectures that the foreign firm chooses quantities as its strategic variable. As usual, under Cournot conditions each firm takes as given its rival’s sales and finds its best response by equating marginal revenue to marginal cost.

This section is subdivided into three parts. Firstly, the basic features of the model are explained. Next, the two international trade policy schemes are introduced. Finally, the relation between trade policy and exchange rate volatility is assessed for each policy scheme.

3.1 Basic Results

We start with an analysis of the second stage of the game, when the firms set their outputs to maximise their profits. The first order conditions for each firms are:

\[
\frac{d (\pi^d)}{dX_d} = a_d P_d^* + S_1 - C_{d1} - (a_d \beta + C_{d2} - S_2) X_d = 0, \tag{14}
\]

\[
\frac{d (\pi^f)}{dX_f} = a_f P_f^* - C_{f1} - (a_f \beta + C_{f2}) X_f = 0, \tag{15}
\]

and the associated second order conditions are:

\[
\frac{d^2 (\pi^d)}{dX_d^2} = - (a_d \beta + C_{d2} - S_2) < 0, \tag{16}
\]

\[
\frac{d^2 (\pi^f)}{dX_f^2} = - (a_f \beta + C_{f2}) < 0. \tag{17}
\]

By solving for the profit-maximizing exports as a function of the competitive rival sales, the following reaction functions are obtained:

\[
X_d = \frac{\alpha - \frac{C_{d1}}{a_d} - \zeta X_f + \frac{S_1}{a_d}}{2 \beta + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d}}, \tag{18}
\]
Within the relevant range, the reaction functions are downward sloping. The equilibrium output levels can be solved for the above reaction functions as:

\[
X_d^* = \frac{\alpha - \frac{C_{f1}}{a_f} - \zeta X_d}{2\beta + \frac{C_{f2}}{a_f}}
\]

\[
X_f^* = \frac{\alpha \left(2\beta + \frac{C_{f2}}{a_f} - \zeta\right) - \frac{C_{d1}}{a_d} \left(2\beta + \frac{C_{d2}}{a_d} + \frac{S_1}{a_d}\left(2\beta + \frac{C_{f2}}{a_f}\right)\right)}{\left(2\beta + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d}\right) - \zeta^2},
\]

\[
X_f^* = \frac{\alpha \left(\alpha - \frac{C_{d1}}{a_d}\right) \left(2\beta + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d}\right) - \zeta \left(\alpha - \frac{C_{d1}}{a_d} + \frac{S_1}{a_d}\right)}{\left(2\beta + \frac{C_{f2}}{a_f}\right) \left(2\beta + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d}\right) - \zeta^2}.
\]

The domestic firm’s output is positively related to the market size \((\alpha)\); and negatively related to its respective marginal costs \((C_{d1} / a_d, C_{d2} / a_d)\). The foreign firm’s output is positively related to the market size \((\alpha)\), and the domestic firm’s marginal cost, \((C_{d1} / a_d, C_{d2} / a_d)\); and negatively related to the foreign firm’s marginal cost \((C_{f1} / a_d, C_{f2} / a_f)\).

Linear or quadratic scheme subsides positively affect the domestic firm’ equilibrium output, while the foreign firm receives a clear negative effect.

### 3.2 Optimal Public Policy

We shall now focus on the first stage of the game, when the domestic government determines optimal public policy. The aim of this subsection is to compare the optimal linear scheme to the optimal quadratic subsidy schemes. The relation between the optimum trade policy level and the volatility of the exchange rate currencies is analysed as well.

#### 3.2.1 CASE 1: Linear Subsidy Scheme

In this case the government pre-commits to offer a linear subsidy scheme, i.e. \(S_2 = 0\), and \(S_1 \neq 0\). The reduced form social welfare is found by substituting the Nash equilibrium outputs (20) and (21) into (12). In order to identify the sign of the optimal instrument, the derivative of the optimum social welfare
function with respect to $S_1$ is obtained and then it is evaluated at $S_1 = 0$. It follows that

$$
\frac{dW_{c1}}{dS_1} \bigg|_{S_1=0} = \zeta^2 \left[ \frac{\left(2\beta + \frac{C_{r2}}{a_f}\right)\left(\alpha - \frac{C_{d1}}{a_d}\right) - \zeta \left(\alpha - \frac{C_{r1}}{a_f}\right)}{\left(2\beta + \frac{C_{r2}}{a_f}\right)\left(2\beta + \frac{C_{d2}}{a_d}\right) - 2\zeta^2} \right],
$$

(22)

Right hand side of equation (22) is positive and the optimal subsidy is positive\(^4\).

The optimum public trade policy is obtained by setting $\frac{dW_{c1}}{dS_1} = 0$. The process yields:

$$
S^*_{1} = a_d\sigma^2 \left[ \frac{\left(2\beta + \frac{C_{r2}}{a_f}\right)\left(\alpha - \frac{C_{d1}}{a_d}\right) - \zeta \left(\alpha - \frac{C_{r1}}{a_f}\right)}{\left(2\beta + \frac{C_{r2}}{a_f}\right)\left(2\beta + \frac{C_{d2}}{a_d}\right) - 2\zeta^2} \right],
$$

(23)

1. Relation between optimal linear subsidy ($S^*_1$), and changes in the variance of the domestic exchange rate ($\sigma^2_1$).

Let us find the relation between the changes in the domestic exchange rate ($\sigma^2_1$) and the linear scheme subsidy ($S_1$), when the firm has the opportunity to produce under constant or decreasing returns.

a) Constant returns ($\frac{C_{d2}}{a_d}$, and $\frac{C_{r2}}{a_f} = 0$):

$$
\frac{dS^*_1}{d\sigma^2_1} = \zeta^2 \left[ \frac{(2\beta - \zeta)\alpha + \zeta \frac{C_{r1}}{a_f}}{4\beta \left(2\beta^2 - \zeta^2\right)} \right] a_{d\sigma^2_1} < 0.
$$

(24)

Since the derivative of the certainty equivalence of the domestic exchange rate $a_{d\sigma^2_1}$ is negative, equation (24) is negative. That is, the level of optimal intervention decreases as the variance in the domestic exchange rate increases.

b) Decreasing returns ($\frac{C_{d2}}{a_d}$, and $\frac{C_{r2}}{a_f} > 0$):

$$
\frac{dS_1}{d\sigma^2_1} = \zeta^2 \left[ \frac{\Omega_1}{\left(2\beta + \frac{C_{d2}}{a_d}\right)\left(2\beta + \frac{C_{r2}}{a_f}\right) - 2\zeta^2} \right] a_{d\sigma^2_1},
$$

(25)

\(^4\)This result can be show clearly with equation (20).
where

\[
\Omega_1 = \left(2\alpha - \frac{C_{d1}}{a_d} \right) \frac{C_{d2}}{a_d} \left(2\beta + \frac{C_{f2}}{a_f} \right)^2 + 2\zeta^3 \alpha
\]

\[
+ 2\alpha \left(2\beta + \frac{C_{f2}}{a_f} \right) \left[ \beta \left(2\beta + \frac{C_{f2}}{a_f} \right) - \zeta \left(\beta + \zeta + \frac{C_{d2}}{a_d} \right) \right]
\]

\[
+ 2\zeta \frac{C_{f1}}{a_f} \left[ \left(\beta + \frac{C_{d2}}{a_d} \right) \left(2\beta + \frac{C_{f2}}{a_f} \right) - \zeta^2 \right].
\]

(26)

Since \(\Omega_1 > 0\) and \(\frac{a_{d2}}{a_1} < 0\), therefore \(\frac{d\sigma_{S_1^*}}{d\sigma_2} < 0\).

Thus, under either constant or decreasing returns, optimal export subsidy is decreasing in \(\sigma_1^2\). This result is similar to that in De Meza (1986) who concluded that countries with the low costs will set the high subsidies. Here a higher variance effectively increased unit costs and therefore reduces the optimal level of subsidy. If the variance is sufficiently high, it plausibilities that the optimal policy would be to tax rather than subsidise the domestic firm.

II.- Relation between the linear subsidy \((S_1^*)\), and changes in the variance of the foreign exchange rate \((\sigma_2^2)\).

a) Constant returns \((\frac{C_{f1}}{a_d}, \text{ and } \frac{C_{f2}}{a_f} = 0)\):

\[
\frac{dS_1^*}{d\sigma_2} = -\frac{\zeta^3 \frac{C_{f1}}{a_f} a_d}{4\beta \left(2\beta^2 - \zeta^2 \right) a_f} \frac{a_{f\sigma_2^2}}{a_f} > 0.
\]

(27)

Since \(a_{f\sigma_2^2} < 0\), \(\frac{dS_1^*}{d\sigma_2} \) is positive. That is, higher variance of the foreign exchange rate increases optimal subsidy. This is because a higher \(\sigma_2^2\) effectively raises foreign costs and therefore reduces the relative costs of the domestic firm.

b) Decreasing returns:

The derivative of the export subsidy with respect to \(\sigma_2^2\) has an ambiguous sign. Here we shall examine if \(\frac{dw_{S_1^*}}{dS_1^*}\) increases or decreases with \(\sigma_2^2\). If this derivative is positive, the optimal value of \(S_1^*\) increases with \(\sigma_2^2\) as well.
derivative is:

\[
\frac{dW_{c1}}{d\sigma_2^2} = \begin{cases} 
-\zeta^2 \left( \frac{C_{r1}}{a_f} \left( \alpha + \zeta \frac{C_{r1}}{a_f} \right) + \frac{C_{r1}}{a_f} \right) \\
\left( (2\beta + \frac{C_{r2}}{a_d})(2\beta + \frac{C_{r2}}{a_f}) - \zeta^2 \right)^2 \\
+ \frac{S_1}{a_d} \left( 2\frac{C_{r2}}{a_f} \right) \left( 2\beta + \frac{C_{r2}}{a_f} \right) - \zeta^2 \right) \right] a_f \sigma_2^2 \\
\end{cases}
\]

(28)

The right-hand side of equation (28) has two terms with different signs. Since \( a_f \sigma_2^2 \) is negative, the first term is positive and the second term is negative. The positive term will dominate if the market size (\( \alpha \)) and the level of the foreign firm’s marginal costs (\( \frac{C_{r1}}{a_f} \)) are high enough. Otherwise the subsidy could decrease.

The intuition behind the results under decreasing returns could be understood as follows. If the values of \( \alpha \) and \( \frac{C_{r1}}{a_f} \) are small, the domestic government does not need to offer the same subsidy level to the domestic firm when \( \sigma_2^2 \) is large, since the trade policy becomes costly for the economy in terms of welfare. Conversely, if \( \alpha \) and \( \frac{C_{r1}}{a_f} \) are high enough, it is optimal for the government to increase the subsidy, since this subsidy allows the domestic firm to raise its market share in the third market and as well to increase the welfare in the economy.

As a general rule, high volatility of the foreign exchange rate raises the domestic profit both under constant, and under decreasing returns if \( \alpha \) is large and \( \frac{C_{r1}}{a_f} \) is high.

3.2.2 CASE 2: Quadratic Subsidy Scheme

This case is derived when the government pre-commits to offer a quadratic subsidy, i.e. \( S_1 = 0 \), and \( S_2 \neq 0 \). To establish the sign of the optimal value of \( S_2 \), we take the derivative of the social welfare function with respect to \( S_2 \) and then evaluate it when the policy is zero. That is,

\[
\frac{dW_{c2}}{dS_2} \bigg|_{[S_2=0]} = \zeta^2 \left( \left( \frac{C_{r2}}{a_f} \right) \left( \alpha - \frac{C_{r1}}{a_d} \right) - \zeta \left( \frac{C_{r1}}{a_f} \right) \right)^2 \\
\left( (2\beta + \frac{C_{r2}}{a_d})(2\beta + \frac{C_{r2}}{a_f}) - \zeta^2 \right)^3 ,
\]

(29)
which is always positive, and this means that the government should offer a positive subsidy to the domestic firm. The optimum export subsidy is

\[ S_2^* = \frac{a_d \zeta^2}{2\beta + \frac{C_{r2}}{a_f}} > 0. \]  

(30)

**I. Relation between the quadratic subsidy scheme \((S_2^*)\), and changes in the variance of the domestic exchange rate \((\sigma_1^2)\).**

The effect of an infinitesimal change in \(\sigma_1^2\) on the export subsidy in the quadratic scheme is analysed when the firms produce under constant or decreasing returns:

a) Constant returns:

\[ \frac{dS_2^*}{d\sigma_1^2} = \frac{\zeta^2}{2\beta a_{d\sigma_1^2}} < 0. \]  

(31)

Since \(a_{d\sigma_1^2}\) is negative, there is always a negative relation between the optimal quadratic scheme subsidy and \(\sigma_1^2\).

b) Decreasing returns:

\[ \frac{dS_2^*}{d\sigma_1^2} = \frac{\zeta^2}{2\beta + \frac{C_{r2}}{a_f} a_{d\sigma_1^2}} < 0. \]  

(32)

So, for both constant and decreasing returns the derivatives of the quadratic subsidy scheme in respect to \(\sigma_1^2\) are negative. The volatility of the domestic exchange rate makes the incumbent domestic firm less competitive in the international market, therefore the domestic government should cut the export subsidy in order to maximise the national welfare.

**II. Relation between the quadratic subsidy scheme \((S_2^*)\), and changes in the variance of the foreign exchange rate \((\sigma_2^2)\).**

a) Constant returns:

\[ \frac{dS_2^*}{d\sigma_2^2} = 0. \]  

(33)

When the government offers a quadratic scheme, the domestic trade policy is not affected by \(\sigma_2^2\).
b) Decreasing returns:

$$\frac{dS_2^*}{d\sigma_2^2} = \frac{a_d\sigma^2 \frac{C_{f2}}{a_f}}{(2\beta + \frac{C_{f2}}{a_f})^2} a_f < 0. \quad (34)$$

Note that the comparative static affect of a change in the foreign exchange rate variance gives quite different results for $S_1^*$ than for $S_2^*$.

The main theoretical results in this section could be summarised in the following proposition:

If firms play a Cournot game, the optimum public policy is to offer an export subsidy.

1) When $\sigma_1^2$ increases, the optimum export subsidy should be reduced under any scheme subsidy.

2) When $\sigma_2^2$ increases, we have the following situations:

a) under a linear scheme, the subsidy will increase if the firms produce under constant returns, and under decreasing returns it will increase only if the $\alpha$ is large and $\frac{C_{f1}}{a_f}$ is high.

b) under a quadratic scheme and constant returns the trade policy is not affected, but under scale decreasing returns the export subsidy always decreases.

4 The Bertrand Duopoly Market

As in the case of the Cournot Duopoly setting, the basic feature of the model are explained first. The two international trade policy schemes are then introduced, and the relation between the optimum trade policy and the different variance levels are studied for each type of scheme.

4.1 Basic Results

In the second stage-game the incumbent firms compete in a Bertrand fashion i.e. when a firm chooses a price, it assumes that its choice will not affect the prices set by its competitors.

To derive optimum subsidy in the Bertrand duopoly fashion, the same types of functions introduced in the Cournot case are used, namely, the market demand functions, the quadratic cost structure, and the linear-quadratic trade policy scheme.
As mentioned previously, the external linear demand functions for the differentiated competing products from each firm are defined as follows:

\[ X_d = A + \theta P_f^* - B P_d^* \quad (35) \]
\[ X_f = A + \theta P_d^* - B P_f^* \quad (36) \]

Equations (35) and (36) are derived by solving (1) in terms of \( P_d^* \) and \( P_f^* \). The parameters of the direct demand functions link with those of inverse demand functions used in equation (1) as:

\[ A = \frac{\alpha}{\beta + \varsigma}, \quad \theta = \frac{\varsigma}{\beta^2 - \varsigma^2}; \quad B = \frac{\beta}{\beta^2 - \varsigma^2}. \quad (37) \]

The first order conditions for the two firms in a Bertrand-Nash equilibrium is obtained by differentiating the profit functions (7) and (8) with respect to their own prices and equality those to zeros. That is,

\[ \frac{d}{dP_d^*} \left( \frac{\pi_c^d}{d} \right) = a_d \left( A + \theta P_f^* - 2BP_d^* \right) + B \left[ C_d1 - S1 \right] \\
+ \left( C_d2 - S2 \right) \left( A + \theta P_f^* - B P_d^* \right) = 0, \quad (38) \]
\[ \frac{d}{dP_f^*} \left( \frac{\pi_c^f}{d} \right) = a_f \left( A + \theta P_d^* - 2BP_f^* \right) + B \left[ C_f1 \right] \\
+ C_f2 \left( A + \theta P_d^* - B P_f^* \right) = 0. \quad (39) \]

The associated second order conditions are given by:

\[ \frac{d^2}{dP_d^*} \left( \frac{\pi_c^d}{d} \right) = -B \left( 2a_d + B \left( C_d2 - S2 \right) \right) < 0, \quad (40) \]
\[ \frac{d^2}{dP_f^*} \left( \frac{\pi_c^f}{d} \right) = -B \left( 2a_f + BC_f2 \right) < 0. \quad (41) \]

It may be interesting to relate these results to the Bertrand Paradox. According to this paradox if two or more identical firms produce a homogeneous good with constant returns, in equilibrium they sell at marginal cost and do
not make profit. We do not encounter this paradox in the model proposed in this section since we assume differentiated products.

From the first order condition, the reaction functions are derived as:

\[
P_d = \frac{(A + \theta P_f) \left( \frac{1}{B} + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d} \right) + \frac{C_{d1}}{a_d} - \frac{S_1}{a_d}}{2 + B \left( \frac{C_{d2}}{a_d} - \frac{S_2}{a_d} \right)},
\]

\[
P_f = \frac{(A + \theta P_d) \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) + \frac{C_{f1}}{a_f}}{2 + B \frac{C_{f2}}{a_f}}.
\]

The Bertrand-Nash equilibrium prices are solved as:

\[
P^*_d = \frac{\Theta + B \left( \frac{2}{B} + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d} \right) \left( \frac{C_{d1}}{a_d} - \frac{S_1}{a_d} \right)}{G \left( \frac{2}{B} + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d} \right) + \theta^2 \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right)},
\]

\[
P^*_f = \frac{D \left( \frac{2}{B} + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d} \right) - \theta \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) \left( \frac{A}{B} - \frac{C_{d1}}{a_d} + \frac{S_1}{a_d} \right)}{G \left( \frac{2}{B} + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d} \right) + \theta^2 \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right)},
\]

where

\[
\Theta = \left[ \left( \theta + B \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) + 1 \right) A + \theta \frac{C_{f1}}{a_f} \right] \left( \frac{1}{B} + \frac{C_{d2}}{a_d} - \frac{S_2}{a_d} \right) > 0,
\]

\[
D = (\theta + B) \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) A + B \frac{C_{f1}}{a_f} > 0,
\]

\[
G = \left( B^2 - \theta^2 \right) \left( \frac{2}{B} + \frac{C_{f2}}{a_f} \right) + \frac{\theta^2}{B} > 0.
\]

### 4.2 Optimal Public Policy

We now consider the first stage game where the domestic government decides the optimal level of trade policy. In a procedure similar to the one used in Cournot setting, first we analyse the linear trade policy scheme and then the quadratic one. The relations between the trade policy and changes in the variance of the exchange rate currencies are also considered for each type of scheme.
4.2.1 CASE 1: Linear Tax Scheme

The first case is where the government pre-commit to a public trade policy according to a linear scheme, i.e. \( S_2 = 0 \) and \( S_1 \neq 0 \). The social welfare function is differentiated after substituting (44) and (45) into (12). The sign of optimal subsidy is found by applying the derivative of the social welfare function with respect to the policy, and then evaluating it at zero. The result is

\[
\frac{dW^*_b}{dS_1} \bigg|_{S_1=0} = -\frac{\theta^2 \left( BG \left( \frac{A}{B} + \frac{C_{d0}}{a_d} \right) + \theta D \right) \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right)}{\left[ BG \left( \frac{2}{B} + \frac{C_{d0}}{a_d} \right) + 2\theta^2 \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) \right]^2}.
\]

(48)

The sign of \( \frac{dW^*_b}{dS_1} \) is unambiguously negative when the policy instrument is set at zero. This result means that the government should tax domestic exports when the competition is realised through prices. The intuitive explanation of this result is as follows. Unilateral intervention by the domestic government could raise both firms’ profits by softening competition instead of shifting profits from the foreign firm towards the domestic one. An export tax reduces the intensity of the domestic firm’s competition, consequently both of the incumbent firms raise their profits. For this reason, when both firms compete by prices they are competitive complements. If one firm raises its price, the other one gains.

The optimum tax rate, in terms of the domestic currency, is obtained by setting \( \frac{dW^*_b}{dS_1} = 0 \), and then isolating the instrument policy from the resulting equation. The optimum public trade policy \( S^*_1 \) becomes:

\[
S^*_1 = -\frac{a_d \theta^2 \left( BG \left( \frac{A}{B} - \frac{C_{d0}}{a_d} \right) + \theta D \right) \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right)}{BG \left( BG \left( \frac{2}{B} + \frac{C_{d0}}{a_d} \right) + 2\theta^2 \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) \right)}.
\]

(49)

(49) confirms our earlier assertion that \( S^*_1 < 0 \).

In fact, an export tax allows the domestic firm to have a credibility commitment to be less aggressive in the external market and to maintain a relative high price which allows both firms to increase their profits. Notice that this is as much a strategic policy as the export subsidy considered before. In this case it works to the advantage rather than the disadvantage of the target of the strategic move. Actually, both exporters gain at the expense of the consumers.
I. Relation between the linear tax scheme \((S^*_1)\), and changes in the variance of the domestic exchange rate \((\sigma^*_1)^2\).

This relation is examined under constant and decreasing returns. The results are as follows.

a) Constant returns:

\[
\frac{dS^*_1}{d\sigma^*_1} = -\theta^2 (2B - \theta) A + B \theta \frac{C_{f1}}{a_f} \sigma^*_1 > 0. \tag{50}
\]

Since \(a_{d\sigma^*_1} < 0\), then equation (50) is positive.

b) Decreasing returns:

\[
\frac{dS^*_1}{d\sigma^*_1} = \left\{ 2 \left( \frac{1}{B} + \frac{C_{d2}}{a_d} \right) + \theta^2 \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) \right\} \left( A + \theta \frac{D}{G} + B \frac{C_{d1}}{a_d} \right) - B^2 G \frac{C_{d1}}{a_d} \frac{C_{d2}}{a_d} \theta^2 \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) a_{d\sigma^*_1}^2 / \]

\[
B \left[ BG \left( \frac{2}{B} + \frac{C_{d2}}{a_d} \right) + 2\theta^2 \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) \right]^2 > 0. \tag{51}
\]

Since \(a_{d\sigma^*_1} < 0\), it can be shown that the right hand side of equation (51) is positive. Thus the domestic government should reduce export tax when \(\sigma^*_1\) changes (note that \(S^*_1 < 0\), in both cases.

When \(\sigma^*_1\) increases, the incumbent domestic firm is softened and it reduces its capacity to compete in the external market. The primary aim of the government is to permit the domestic firm to be more aggressive in the international market, raise its profits, and subsequently the country’s welfare.

II. Relation between the linear tax scheme \((S^*_1)\), and changes in the variance of the foreign exchange rate \((\sigma^*_2)^2\).

This relation is analysed for the same types of returns.

a) Constant returns:

\[
\frac{dS^*_1}{d\sigma^*_2} = a_d \frac{C_{f1}}{a_f} \theta^3 \left\{ 2\theta^2 + 2G \left( \left( B^2 - \theta^2 \right) \frac{C_{f1}}{a_f} + B \right) \right\} a_{f\sigma^*_2} / AB^2 \left( 2B^2 - \theta^2 \right). \tag{52}
\]
The algebraic expression inside the bracket is positive. Since \( a_{f\sigma_2^2} < 0 \), therefore the derivative in (52) is negative as well. If the variance of the foreign currency increases, the domestic government should raise the tax rate.

When \( \sigma_2^2 \) increases, the foreign firm loses its capacity to compete in the international market. This implies the government should increase the export tax on the domestic firm so that this firm becomes less aggressive. Hence both firms raise their profits and the society its welfare.

b) Decreasing returns:

The derivative of the export tax with respect to \( \sigma_2^2 \) is ambiguous. In particular this mathematical technique does not specify in which direction the tax should move when the foreign currency volatility rises. Then we shall examine how \( \frac{d\tilde{w}_1}{d\sigma_2^2} \) changes with \( \sigma_2^2 \). If this derivative increases with \( \sigma_2^2 \) the export tax should decreases. The result is

\[
\frac{d\tilde{w}_1}{d\sigma_2^2} = \left\{ \theta^2 \Omega_2 + 2 \frac{S_1}{a_d} \frac{C_{f_2}}{a_f} G \left( B \left( B^2 - \theta^2 \right) \left( \frac{1}{B} + \frac{C_{d_2}}{a_d} \right) + \theta^2 \right) \right. \\
\left. + \theta^2 \left( B^2 - \theta^2 \right) \left( \frac{1}{B} + \frac{C_{f_2}}{a_f} \right) \right\} B \frac{a_{f\sigma_2^2}}{a_f} \\
\left/ \left[ B G \left( \frac{2}{B} + \frac{C_{d_2}}{a_d} \right) + \theta^2 \left( \frac{1}{B} + \frac{C_{f_2}}{a_f} \right) \right]^2 \right.,
\]

where

\[
\Omega_2 = \left( \frac{1}{B} + \frac{C_{f_2}}{a_f} \right) \left[ \frac{C_{f_2}}{a_f} \left( B^2 - \theta^2 \right) \left( \frac{A}{B} - \frac{C_{d_1}}{a_d} \right) + \theta \left( B + \theta \right) \frac{A}{B} \right] + \theta \frac{C_{f_1}}{a_f} + \frac{C_{f_2}}{a_f} \left[ G \left( \frac{A}{B} - \frac{C_{d_1}}{a_d} \right) + \frac{\theta}{B} D \right].
\]

The numerator in equation (??) has two terms: the first is negative and the second is positive. If \( A \) and \( \frac{C_{f_1}}{a_f} \) are large, and \( \frac{C_{d_1}}{a_d} \) is small, then negative term will dominate the positive term and the domestic government increases the tax.

If the market size is large, and the foreign firm’s marginal cost is much larger than the domestic firm’s marginal cost, the domestic firm becomes more aggressive and the competition between them lowers the market profits.
Therefore the government should raise the domestic tax rate in order to soften
the intensity of the domestic firms’ competition in the external market, and
to increase the producers’ surplus.

4.2.2 CASE 2: Quadratic Tax Scheme

We now return to the case where the government pre-commits to a quadratic
trade policy scheme \((S_1 = 0, \text{ and } S_2 \neq 0)\). The derivative of the social welfare
function with respect to the commercial policy is calculated in the Bertrand
market setting, and then set equal to zero. This determines the sign of the
optimal level of public instrument for trade intervention.

\[
\frac{dW_{b2}}{dS_2} \bigg|_{S_2=0} = - \frac{\left[ BG \left( \frac{A}{B} - \frac{C_{d2}}{a_d} \right) + \theta D \right]^2 \theta^2 \left( \frac{1}{B} + \frac{C_{r2}}{a_f} \right)}{\left( BG \left( \frac{2}{B} + \frac{C_{d2}}{a_d} \right) + \theta^2 \left( \frac{1}{B} + \frac{C_{r2}}{a_f} \right) \right)^3},
\]

which is unambiguously negative. That is, the optimal policy once again is
to tax the domestic firm.

The optimal trade policy is obtained by setting \(\frac{dW_{b2}}{dS_2} = 0\), and this gives:

\[
S^*_2 = - \frac{a_d \theta^2 \left( \frac{1}{B} + \frac{C_{r2}}{a_f} \right)}{BG} < 0.
\] (56)

In this case, the tax provides firms with an efficient device which allows
them to act as if they were in collusion. So firms gain higher profits, rather
than shifting profits towards the domestic firm as it is the usual situation in
a Cournot market setting.

I.- Relation between the quadratic tax scheme \((S^*_2)\), and changes in the
variance of the domestic exchange rate \((\sigma^2_1)\).

Let us find this relation for both constant and decreasing returns.

a) Constant returns:

\[
\frac{dS^*_2}{d\sigma^2_1} = - \frac{a_{d2\sigma^2_2}}{B \left( \frac{B}{\theta} \right)^2 - 1} + 1 > 0.
\] (57)

Since \(a_{d2\sigma^2_2} < 0\), the derivative is clearly positive. Therefore the domestic
government should reduce the tax when \(\sigma^2_1\) increases.
b) Decreasing returns:

\[
\frac{dS_2^*}{d\sigma_1^2} = \frac{\theta^2 \left( \frac{1}{B} + \frac{C_{f2}}{a_f} \right) a_{d_2^2}}{BG} > 0.
\] (58)

The derivative of the export tax with respect to \( \sigma_1^2 \) is again positive, and therefore the tax is reduced (note \( S_2^* < 0 \)). These results are similar to those found for the linear export tax scheme. The domestic firm's lowered capacity to compete in the external market is caused by a higher level of \( \sigma_1^2 \) which leads the domestic government to cut the export tax rate.

II. Relation between the quadratic tax scheme \( (S_2^*) \), and changes in the variance of the foreign exchange rate currency \( (\sigma_2^2) \).

a) Constant returns:

\[
\frac{dS_2^*}{d\sigma_2^2} = 0.
\] (59)

Any change in the variance of the foreign exchange rate does not effect the public trade policy.

b) Decreasing returns:

\[
\frac{dS_2^*}{d\sigma_2^2} = \frac{\theta^4 a_d C_{f2} a_{f_2}^2}{B^3 G^2 a_f a_f} < 0.
\] (60)

Under decreasing returns the derivative of the quadratic tax scheme with respect to \( \sigma_2^2 \) is negative. When \( \sigma_2^2 \) increases, the foreign firm is affected negatively and consequently reduces its capacity for competing in the international market. Therefore the domestic government should raise the export tax imposed on the domestic firm.

The theoretical results obtained in this section can be synthesised into the following proposition:

If the firms play a Bertrand game, the optimum public policy is to tax exports.

1) When \( \sigma_1^2 \) increases, then the tax rate decreases under any subsidy scheme.

2) When \( \sigma_2^2 \) increases, we have a variety of situations:
a) under a linear scheme the optimum export tax increases if firms produce under constant returns or under scale decreasing returns only if $A$ and $\frac{C_{d1}}{a_f}$ are large, and $\frac{C_{d1}}{a_d}$ is small.

b) under a quadratic scheme the optimum export tax should not be changed under constant returns, but this tax should be raised when firm produce under decreasing returns.

5 Conclusions

We set up model with differentiated product in an international Duopoly market setting to analyse how strategic trade policy is affected when exchange rate uncertainty is introduced into the analysis. In order to achieve this, the analysis compared both the linear and the quadratic trade policy schemes. The two schemes produce the identical results in terms of the social welfare, however for the quadratic scheme the type of returns that the domestic firm faces is important for the results.

The model demonstrates that the domestic government has a special incentive to introduce a policy action to alter the initial strategic interaction between firms. If the differentiated products are strategic substitutes, then the optimal policy is to subsidise exports, even if the subsidy itself is merely a transfer. The important point is that the domestic firm’s gross profit rises by more than the amount of the subsidy.

One significant result is related to the variance of the domestic exchange rate. When the variance or the uncertainty increases, the best policy is to reduce the subsidy. The intuition argument is the following. Increase variance effectively makes the domestic firm relatively less efficient and therefore it commands less subsidy.

If the differentiated products are strategic complements, the optimal policy is to tax the exports. Whenever the variance of the domestic exchange rate increases, the domestic firm becomes less aggressive and the government must reduce the tax. The direct effect of this action is to assist the domestic firm vis-à-vis its foreign rival. If the firms produce under constant or decreasing returns, and the volatility of the domestic exchange rate is high, then the best policy is to reduce the tax rate. In general this policy variation allow the domestic firm to increase its international market share. When the volatility of the foreign exchange rate is high, the export tax should be raised.
if the market size is not sufficiently small and the scale of the foreign firm’s decreasing returns is not sufficiently low.

References


<table>
<thead>
<tr>
<th>No</th>
<th>Título</th>
<th>Autores</th>
<th>Fecha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>La coyuntura económica en Colombia y Venezuela</td>
<td>Andrés Langebaek Patricia Delgado Fernando Mesa Parra</td>
<td>Octubre 1992</td>
</tr>
<tr>
<td>2</td>
<td>La tasa de cambio y el comercio colombo-venezolano</td>
<td>Fernando Mesa Parra Andrés Langebaek</td>
<td>Noviembre 1992</td>
</tr>
<tr>
<td>3</td>
<td>¿Las mayores exportaciones colombianas de café redujeron el precio externo?</td>
<td>Carlos Esteban Posada Andrés Langebaek</td>
<td>Noviembre 1992</td>
</tr>
<tr>
<td>4</td>
<td>El déficit público: una perspectiva macroeconómica</td>
<td>Jorge Enrique Restrepo Juan Pablo Zárate Carlos Esteban Posada</td>
<td>Noviembre 1992</td>
</tr>
<tr>
<td>5</td>
<td>El costo de uso del capital en Colombia</td>
<td>Mauricio Olivera</td>
<td>Diciembre 1992</td>
</tr>
<tr>
<td>6</td>
<td>Colombia y los flujos de capital privado a América Latina</td>
<td>Andrés Langebaek</td>
<td>Febrero 1993</td>
</tr>
<tr>
<td>7</td>
<td>Infraestructura física. “Clubs de convergencia” y crecimiento económico</td>
<td>José Dario Uribe</td>
<td>Febrero 1993</td>
</tr>
<tr>
<td>8</td>
<td>El costo de uso del capital: una nueva estimación (Revisión)</td>
<td>Mauricio Olivera</td>
<td>Marzo 1993</td>
</tr>
<tr>
<td>9</td>
<td>Dos modelos de transporte de carga por carretera</td>
<td>Carlos Esteban Posada Edgar Trujillo Ciro Alvaro Concha Juan Carlos Elorza</td>
<td>Marzo 1993</td>
</tr>
<tr>
<td>10</td>
<td>La determinación del precio interno del café en un modelo de optimización intertemporal</td>
<td>Carlos Felipe Jaramillo Carlos Esteban Posada Edgar Trujillo</td>
<td>Abril 1993</td>
</tr>
<tr>
<td>11</td>
<td>El encaje óptimo</td>
<td>Edgar Trujillo Ciro Carlos Esteban Posada</td>
<td>Mayo 1993</td>
</tr>
<tr>
<td>12</td>
<td>Crecimiento económico, “Capital humano” y educación: la teoría y el caso colombiano posterior a 1945</td>
<td>Carlos Esteban Posada</td>
<td>Junio 1993</td>
</tr>
<tr>
<td>13</td>
<td>Estimación del PIB trimestral según los componentes del gasto</td>
<td>Rafael Cubillos Fanny Mercedes Valderrama</td>
<td>Junio 1993</td>
</tr>
<tr>
<td>No</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>----</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>17</td>
<td>Crecimiento económico y apertura en Chile y México y perspectivas para Colombia</td>
<td>Fernando Mesa Parra</td>
<td>Septiembre 1993</td>
</tr>
<tr>
<td>18</td>
<td>El papel del capital público en la producción, inversión y el crecimiento económico en Colombia</td>
<td>Fabio Sánchez Torres</td>
<td>Octubre 1993</td>
</tr>
<tr>
<td>19</td>
<td>Tasa de cambio real y tasa de cambio de equilibrio</td>
<td>Andrés Langebaek</td>
<td>Octubre 1993</td>
</tr>
<tr>
<td>20</td>
<td>La evolución económica reciente: dos interpretaciones alternativas</td>
<td>Carlos Esteban Posada</td>
<td>Noviembre 1993</td>
</tr>
<tr>
<td>21</td>
<td>El papel de gasto público y su financiación en la coyuntura actual: algunas implicaciones complementarias</td>
<td>Alvaro Zarta Avila</td>
<td>Diciembre 1993</td>
</tr>
<tr>
<td>22</td>
<td>Inversión extranjera y crecimiento económico</td>
<td>Alejandro Gaviria, Javier Alberto Gutiérrez</td>
<td>Diciembre 1993</td>
</tr>
<tr>
<td>23</td>
<td>Inflación y crecimiento en Colombia</td>
<td>Alejandro Gaviria, Carlos Esteban Posada</td>
<td>Febrero 1994</td>
</tr>
<tr>
<td>24</td>
<td>Exportaciones y crecimiento en Colombia</td>
<td>Fernando Mesa Parra</td>
<td>Febrero 1994</td>
</tr>
<tr>
<td>25</td>
<td>Experimento con la vieja y la nueva teoría del crecimiento económico (¿por qué crece tan rápido China?)</td>
<td>Carlos Esteban Posada</td>
<td>Febrero 1994</td>
</tr>
<tr>
<td>26</td>
<td>Modelos económicos de criminalidad y la posibilidad de una dinámica prolongada</td>
<td>Carlos Esteban Posada</td>
<td>Abril 1994</td>
</tr>
<tr>
<td>27</td>
<td>Regímenes cambiarios, política macroeconómica y flujos de capital en Colombia</td>
<td>Carlos Esteban Posada</td>
<td>Abril 1994</td>
</tr>
<tr>
<td>28</td>
<td>Comercio intraindustrial: el caso colombiano</td>
<td>Carlos Pombo</td>
<td>Abril 1994</td>
</tr>
<tr>
<td>29</td>
<td>Efectos de una bonanza petrolera a la luz de un modelo de optimización intertemporal</td>
<td>Hernando Zuleta, Juan Pablo Arango</td>
<td>Mayo 1994</td>
</tr>
<tr>
<td>31</td>
<td>Inflación o desempleo: ¿Acaso hay escogencia en Colombia?</td>
<td>Sergio Clavijo</td>
<td>Agosto 1994</td>
</tr>
<tr>
<td>No</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>32</td>
<td>La distribución del ingreso y el sistema financiero</td>
<td>Edgar Trujillo Ciro</td>
<td>Agosto 1994</td>
</tr>
<tr>
<td>33</td>
<td>La trinidad económica imposible en Colombia: estabilidad cambiaria,</td>
<td>Sergio Clavijo</td>
<td>Agosto 1994</td>
</tr>
<tr>
<td></td>
<td>independencia monetaria y flujos de capital libres</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>¿’Déjà vu?: tasa de cambio, deuda externa y esfuerza exportador en</td>
<td>Sergio Clavijo</td>
<td>Mayo 1995</td>
</tr>
<tr>
<td></td>
<td>Colombia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>La crítica de Lucas y la inversión en Colombia: nueva evidencia</td>
<td>Mauricio Cárdenas, Mauricio Olivera</td>
<td>Septiembre 1995</td>
</tr>
<tr>
<td>36</td>
<td>Tasa de Cambio y ajuste del sector externo en Colombia</td>
<td>Fernando Mesa Parra, Dairo Estrada</td>
<td>Septiembre 1995</td>
</tr>
<tr>
<td></td>
<td>composición del Sector Público</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Incidencia distributiva del IVA en un modelo del ciclo de vida</td>
<td>Juan Carlos Parra Osorio, Fabio José Sánchez T.</td>
<td>Octubre 1995</td>
</tr>
<tr>
<td>39</td>
<td>Por qué los niños pobres no van a la escuela? (Determinantes de la</td>
<td>Fabio Sánchez Torres, Jairo Augusto Núñez M.</td>
<td>Noviembre 1995</td>
</tr>
<tr>
<td></td>
<td>asistencia escolar en Colombia)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Derivados de la Matriz de Contabilidad Social</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>El ciclo de referencia de la economía colombiana</td>
<td>Martín Maurer, María Camila Uribe S.</td>
<td>Febrero 1996</td>
</tr>
<tr>
<td>43</td>
<td>Impacto de las transferencias intergubernamentales en la distribución</td>
<td>Juan Carlos Parra Osorio</td>
<td>Marzo 1996</td>
</tr>
<tr>
<td></td>
<td>interpersonal del ingreso en Colombia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Los efectos no considerados de la apertura económica en el mercado</td>
<td>Fernando Mesa Parra, Javier Alberto Gutiérrez</td>
<td>Mayo 1996</td>
</tr>
<tr>
<td></td>
<td>laboral industrial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Un modelo de Financiamiento óptimo de un aumento permanente en el</td>
<td>Alvaro Zarta Avila</td>
<td>Junio 1996</td>
</tr>
<tr>
<td></td>
<td>gasto público: Una ilustración con el caso colombiano.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>----</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>49</td>
<td>Un sistema de indicadores líderes para Colombia</td>
<td>Martín Maurer María Camila Uribe Javier Birchenall</td>
<td>Agosto 1996</td>
</tr>
<tr>
<td>50</td>
<td>Evolución y determinantes de la productividad en Colombia: Un análisis global y sectorial</td>
<td>Fabio Sánchez Torres Jorge Iván Rodríguez Jairo Núñez Méndez</td>
<td>Agosto 1996</td>
</tr>
<tr>
<td>51</td>
<td>Gobernabilidad y Finanzas Públicas en Colombia</td>
<td>César A. Caballero R</td>
<td>Noviembre 1996</td>
</tr>
<tr>
<td>52</td>
<td>Tasas Marginales Efectivas de Tributación en Colombia</td>
<td>Mauricio Olivera G.</td>
<td>Noviembre 1996</td>
</tr>
<tr>
<td>53</td>
<td>Un modelo keynesiano para la economía colombiana</td>
<td>Fabio José Sánchez T. Clara Elena Purra</td>
<td>Febrero 1997</td>
</tr>
<tr>
<td>54</td>
<td>Trimestralización del Producto Interno Bruto por el lado de la oferta.</td>
<td>Fanny M. Valderrama</td>
<td>Febrero 1997</td>
</tr>
<tr>
<td>55</td>
<td>Poder de mercado, economías de escala, complementariedades intersectoriales y crecimiento de la productividad en la industria colombiana.</td>
<td>Juán Mauricio Ramírez</td>
<td>Marzo 1997</td>
</tr>
<tr>
<td>56</td>
<td>Estimación y calibración de sistemas flexibles de gasto.</td>
<td>Orlando Gracia Gustavo Hernández</td>
<td>Abril 1997</td>
</tr>
<tr>
<td>59</td>
<td>Un Modelo de Equilibrio General Computable con Competencia imperfecta para Colombia</td>
<td>Juan Pablo Arango Orlando Gracia Gustavo Hernández Juan Mauricio Ramírez</td>
<td>Junio 1997</td>
</tr>
<tr>
<td>60</td>
<td>El cálculo del PIB Potencial en Colombia</td>
<td>Javier A. Birchenall J.</td>
<td>Julio 1997</td>
</tr>
<tr>
<td>No</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>----</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| 63 | Determinantes de la participación laboral de hombres y mujeres en Colombia: 1976-1995 | Rocío Ribero  
Claudia Meza  
Jorge Enrique Restrepo  
Jaime A. Jiménez Castro | Agosto 1997 |
| 64 | Inversión bajo incertidumbre en la Industria Colombiana: 1985-1995       | Javier A. Birchenall  
Claudia Meza  
Jairo A. Núñez Méndez  
Jaime A. Jiménez Castro | Agosto 1997 |
| 65 | Modelo IS-LM para Colombia. Relaciones de largo plazo y fluctuaciones económicas. | Jorge Enrique Restrepo  
Jaime A. Jiménez Castro | Agosto 1997 |
| 66 | Correcciones a los Ingresos de las Encuestas de hogares y distribución del Ingreso Urbano en Colombia. | Jairo A. Núñez Méndez  
Jaime A. Jiménez Castro | Septiembre 1997 |
| 67 | Ahorro, Inversión y Transferencias en las Entidades Territoriales Colombianas | Fabio Sánchez Torres  
Mauricio Olivera G.  
Giovanni Cortés S.  
Javier A. Birchenall  
Guillermo E. Murcia G. | Octubre 1997 |
| 68 | Efectos de la Tasa de cambio real sobre la Inversión industrial en un Modelo de transferencia de precios | Fernando Mesa Parra  
Leyla Marcela Salguero  
Fabio Sánchez Torres | Octubre 1997 |
| 69 | Convergencia Regional: Una revisión del caso Colombiano.               | Javier A. Birchenall  
Guillermo E. Murcia G.  
Jairo A. Núñez Méndez  
Jaime A. Jiménez Castro | Octubre 1997 |
| 70 | Income distribution, human capital and economic growth in Colombia.    | Javier A. Birchenall  
Guillermo E. Murcia G.  
Jairo A. Núñez Méndez  
Jaime A. Jiménez Castro | Octubre 1997 |
| 71 | Evolución y determinantes del Ahorro del Gobierno Central.              | Fabio Sánchez Torres  
Ma. Victoria Angulo  
Ma. Victoria Angulo | Noviembre 1997 |
| 72 | Macroeconomic Performance and Inequality in Colombia: 1976-1996        | Raquel Bernal  
Mauricio Cárdenas  
Jairo Núñez Méndez  
Fabio Sánchez Torres | Diciembre 1997 |
| 73 | Liberación comercial y salarios en Colombia: 1976-1994                 | Donald Robbins  
Jairo A. Núñez Méndez  
Jaime A. Jiménez Castro  
Fabio Sánchez Torres | Enero 1998 |
| 74 | Educación y salarios relativos en Colombia: 1976-1995                  | Jairo Núñez Méndez  
Fabio Sánchez Torres | Enero 1998 |
| 75 | La tasa de interés “óptima”                                           | Carlos Esteban Posada  
Edgar Trujillo Ciro  
Martha Elena Badel | Febrero 1998 |
| 76 | Los costos económicos de la criminalidad y la violencia en Colombia: 1991-1996 | Edgar Trujillo Ciro  
Martha Elena Badel | Marzo 1998 |
| 77 | Elasticidades Precio y Sustitución para la Industria Colombiana         | Juán Pablo Arango  
Orlando Gracia  
Gustavo Hernández | Marzo 1998 |
<table>
<thead>
<tr>
<th>No</th>
<th>Título</th>
<th>Autores</th>
<th>Fecha</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>Flujos Internacionales de Capital en Colombia: Un enfoque de Portafolio</td>
<td>Ricardo Rocha García Fernando Mesa Parra</td>
<td>Marzo 1998</td>
</tr>
<tr>
<td>80</td>
<td>La Curva de Salarios para Colombia. Una Estimación de las Relaciones entre el Desempleo, la Inflación y los Ingresos Laborales, 1984-1996</td>
<td>Fabio Sánchez Torres Jairo Núñez Méndez</td>
<td>Marzo 1998</td>
</tr>
<tr>
<td>81</td>
<td>Participación, Desempleo y Mercados Laborales en Colombia</td>
<td>Jaime Tenjo G. Rocio Ribero M.</td>
<td>Abril 1998</td>
</tr>
<tr>
<td>82</td>
<td>Reformas comerciales, márgenes de beneficio y productividad en la industria colombiana</td>
<td>Juán Pablo Arango Orlando Gracia Gustavo Hernández Juán Mauricio Ramírez</td>
<td>Abril 1998</td>
</tr>
<tr>
<td>83</td>
<td>Capital y Crecimiento Económico en un Modelo Dinámico: Una presentación de la dinámica Transicional para los casos de EEUU y Colombia</td>
<td>Alvaro Zarta Avila</td>
<td>Mayo 1998</td>
</tr>
<tr>
<td>84</td>
<td>Determinantes de la Inversión en Colombia: Evidencia sobre el capital humano y la violencia.</td>
<td>Clara Helena Parra</td>
<td>Junio 1998</td>
</tr>
<tr>
<td>85</td>
<td>Mujeres en sus casas: Un recuento de la población Femenina económicamente activa</td>
<td>Piedad Urdinola Contreras</td>
<td>Junio 1998</td>
</tr>
<tr>
<td>88</td>
<td>Elasticidades de sustitución de las importaciones Para la economía colombiana.</td>
<td>Gustavo Hernández</td>
<td>Junio 1998</td>
</tr>
<tr>
<td>89</td>
<td>La tasa natural de desempleo en Colombia</td>
<td>Martha Luz Henao Norberto Rojas</td>
<td>Junio 1998</td>
</tr>
<tr>
<td>90</td>
<td>The role of shocks in the colombian economy</td>
<td>Ana María Menéndez</td>
<td>Julio 1998</td>
</tr>
<tr>
<td>91</td>
<td>The determinants of Human Capital Accumulation in Colombia, with implications for Trade and Growth Theory</td>
<td>Donald J. Robbins</td>
<td>Julio 1998</td>
</tr>
<tr>
<td>93</td>
<td>Análisis de las relaciones entre violencia y equidad</td>
<td>Alfredo Sarmiento Lida Marina Becerra</td>
<td>Agosto 1998</td>
</tr>
<tr>
<td>No</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>----</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>94</td>
<td>Evaluación teórica y empírica de las exportaciones no tradicionales en Colombia</td>
<td>Fernando Mesa Parra, María Isabel Cock, Angela Patricia Jiménez</td>
<td>Agosto 1998.</td>
</tr>
<tr>
<td>102</td>
<td>La Curva de Phillips, la Crítica de Lucas y la persistencia de la inflación en Colombia</td>
<td>Javier A.Birchenall</td>
<td>Abril 1999.</td>
</tr>
<tr>
<td>103</td>
<td>Un modelo macroeconómico para la economía Colombiana</td>
<td>Javier A.Birchenall, Juan Daniel Oviedo</td>
<td>Abril 1999.</td>
</tr>
<tr>
<td>104</td>
<td>Una revisión de la literatura teórica y la experiencia Internacional en regulación</td>
<td>Marcela Eslava Mejía</td>
<td>Abril 1999.</td>
</tr>
<tr>
<td>105</td>
<td>El transporte terrestre de carga en Colombia Documento para el Taller de Regulación</td>
<td>Marcela Eslava Mejía, Eleonora Lozano Rodríguez</td>
<td>Abril 1999.</td>
</tr>
<tr>
<td>No</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>112</td>
<td>Relevancia de la dinámica transicional para el crecimiento de largo plazo: Efectos sobre las tasas de interés real, la productividad marginal y la estructura de la producción para los casos de EEUU y Colombia.</td>
<td>Alvaro Zarta</td>
<td>Junio 1999</td>
</tr>
<tr>
<td>113</td>
<td>La recesión actual en Colombia: Flujos, Balances y Política anticíclica</td>
<td>Juan Carlos Echeverry</td>
<td>Junio 1999</td>
</tr>
<tr>
<td>114</td>
<td>Monetary Rules in a Small Open Economy</td>
<td>Jorge E. Restrepo L.</td>
<td>Junio 1999</td>
</tr>
<tr>
<td>116</td>
<td>Crisis y recuperación de las Finanzas Públicas. Lecciones de América Latina para el caso colombiano.</td>
<td>Marcela Eslava Mejía</td>
<td>Julio 1999</td>
</tr>
<tr>
<td>117</td>
<td>Complementariedades Factoriales y Cambio Técnico en la Industria Colombiana.</td>
<td>Gustavo Hernández, Juan Mauricio Ramírez</td>
<td>Julio 1999</td>
</tr>
<tr>
<td>118</td>
<td>¿Hay un estancamiento en la oferta de crédito?</td>
<td>Juan Carlos Echeverry, Natalia Salazar</td>
<td>Julio 1999</td>
</tr>
<tr>
<td>119</td>
<td>Income distribution and macroeconomics in Colombia.</td>
<td>Javier A. Birchenall J.</td>
<td>Julio 1999</td>
</tr>
<tr>
<td>121</td>
<td>¿Se cumplen las verdades nacionales a nivel regional? Primera aproximación a la construcción de matrices de contabilidad social regionales en Colombia.</td>
<td>Nelly, Angela Cordi Galat</td>
<td>Agosto 1999.</td>
</tr>
<tr>
<td>122</td>
<td>El capital social en Colombia. La medición nacional con el BARCAS Separata N° 1 de 5</td>
<td>John SUDARSKY</td>
<td>Octubre 1999.</td>
</tr>
<tr>
<td>123</td>
<td>El capital social en Colombia. La medición nacional con el BARCAS Separata N° 2 de 5</td>
<td>John SUDARSKY</td>
<td>Octubre 1999.</td>
</tr>
<tr>
<td>124</td>
<td>El capital social en Colombia. La medición nacional con el BARCAS Separata N° 3 de 5</td>
<td>John SUDARSKY</td>
<td>Octubre 1999.</td>
</tr>
<tr>
<td>125</td>
<td>El capital social en Colombia. La medición nacional con el BARCAS Separata N° 4 de 5</td>
<td>John SUDARSKY</td>
<td>Octubre 1999.</td>
</tr>
<tr>
<td>No.</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>126</td>
<td>El capital social en Colombia. La medición nacional con el BARCAS</td>
<td>John SUDARSKY</td>
<td>Octubre 1999.</td>
</tr>
<tr>
<td></td>
<td>Separata N° 5 de 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and justice: the case of Colombia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evidence from 1960 to 1996</td>
<td></td>
<td></td>
</tr>
<tr>
<td>133</td>
<td>Los derechos constitucionales de prestación y sus Implicaciones</td>
<td>Luis Carlos Sotelo</td>
<td>Febrero 2000.</td>
</tr>
<tr>
<td></td>
<td>económico-políticas. Los casos del derecho a la salud y de los derechos</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>de los reclusos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>134</td>
<td>La reactivación productiva del sector privado colombiano (Documento</td>
<td>Luis Alberto Zuleta</td>
<td>Marzo 2000.</td>
</tr>
<tr>
<td></td>
<td>elaborado para el BID)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Latina. Restricciones y Estrategia para su desarrollo.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>137</td>
<td>La regulación de precios del transporte de carga por Carretera en</td>
<td>Marcela Eslava Mejía</td>
<td>Abril 2000.</td>
</tr>
<tr>
<td></td>
<td>Colombia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>139</td>
<td>Determinación del consumo básico de agua potable subsidiable en</td>
<td>Juan Carlos Junca Salas</td>
<td>Noviembre 2000.</td>
</tr>
<tr>
<td></td>
<td>Colombia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>Incidencia fiscal de los incentivos tributarios</td>
<td>Juan Ricardo Ortega, Gabriel Armando Piraquive, Gustavo Adolfo</td>
<td>Noviembre 2000.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hernández, Carolina Soto Losada, Sergio Iván Prada, Juan Mauricio</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ramirez</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>141</td>
<td>Exenciones tributarias: Costo fiscal y análisis de incidencia</td>
<td>Gustavo A. Hernández Carolina Soto Losada Sergio Iván Prada Juan Mauricio Ramírez</td>
<td>Diciembre 2000</td>
</tr>
<tr>
<td>142</td>
<td>La contabilidad del crecimiento, las dinámicas transicionales y el largo plazo: Una comparación internacional de 46 países y una presentación de casos de economías tipo: EEUU, Corea del Sur y Colombia.</td>
<td>Alvaro Zarta Avila</td>
<td>Febrero 2001</td>
</tr>
<tr>
<td>145</td>
<td>La afiliación a la salud y los efectos redistributivos de los subsidios a la demanda.</td>
<td>Hernando Moreno G.</td>
<td>Abril 2001</td>
</tr>
<tr>
<td>146</td>
<td>La participación laboral: ¿qué ha pasado y qué podemos esperar?</td>
<td>Mauricio Santamaría S. Norberto Rojas Delgadillo</td>
<td>Abril 2001</td>
</tr>
<tr>
<td>147</td>
<td>Análisis de las importaciones agropecuarias en la década de los Noventa.</td>
<td>Gustavo Hernández Juan Ricardo Perilla</td>
<td>Mayo 2001</td>
</tr>
<tr>
<td>148</td>
<td>Impacto económico del programa de Desarrollo alternativo del Plan Colombia</td>
<td>Gustavo A. Hernández Sergio Iván Prada Juan Mauricio Ramírez</td>
<td>Mayo 2001</td>
</tr>
<tr>
<td>149</td>
<td>Análisis de la presupuestación de la inversión de la Nación.</td>
<td>Ulpiano Ayala Oramas</td>
<td>Mayo 2001</td>
</tr>
<tr>
<td>150</td>
<td>DNPENSION: Un modelo de simulación para estimar el costo fiscal del sistema pensial colombiano.</td>
<td>Juan Carlos Parra Osorio</td>
<td>Mayo 2001</td>
</tr>
<tr>
<td>151</td>
<td>La oferta de combustible de Venezuela en la frontera con Colombia: una aproximación a su cuantificación</td>
<td>Hernando Moreno G.</td>
<td>Junio 2001</td>
</tr>
<tr>
<td>152</td>
<td>Shocks fiscales y términos de intercambio en el caso colombiano.</td>
<td>Ómer ÖZAK MUñOZ.</td>
<td>Julio 2001</td>
</tr>
<tr>
<td>153</td>
<td>Demanda por importaciones en Colombia: Una estimación.</td>
<td>Igor Esteban Zuccardi</td>
<td>Julio 2001</td>
</tr>
<tr>
<td>154</td>
<td>Elementos para mejorar la adaptabilidad del mercado laboral colombiano.</td>
<td>Mauricio Santa María S. Norberto Rojas Delgadillo</td>
<td>Agosto 2001</td>
</tr>
<tr>
<td>155</td>
<td>¿Qué tan poderosas son las aerolíneas colombianas? Estimación de poder de mercado de las rutas colombianas.</td>
<td>Ximena Peña Parga</td>
<td>Agosto 2001</td>
</tr>
<tr>
<td>No</td>
<td>Título</td>
<td>Autores</td>
<td>Fecha</td>
</tr>
<tr>
<td>----</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>156</td>
<td>Elementos para el debate sobre una nueva reforma pensional en Colombia.</td>
<td>Juan Carlos Echeverry&lt;br&gt;Andrés Escobar Arango&lt;br&gt;César Merchán Hernández&lt;br&gt;Gabriel Piraquive Galeano&lt;br&gt;Mauricio Santa María S.</td>
<td>Septiembre 2001</td>
</tr>
<tr>
<td>157</td>
<td>Agregando votos en un sistema altamente desinstitucionalizado.</td>
<td>Francisco Gutiérrez Sanín</td>
<td>Octubre 2001</td>
</tr>
<tr>
<td>158</td>
<td>Eficiencia -X en el Sector Bancario Colombiano</td>
<td>Carlos Alberto Castro I</td>
<td>Noviembre 2001</td>
</tr>
<tr>
<td>159</td>
<td>Determinantes de la calidad de la educación en Colombia.</td>
<td>Alejandro Gaviria&lt;br&gt;Jorge Hugo Barrientos</td>
<td>Noviembre 2001</td>
</tr>
<tr>
<td>160</td>
<td>Evaluación de la descentralización municipal. Descentralización y macroeconomía</td>
<td>Fabio Sánchez Torres</td>
<td>Noviembre 2001</td>
</tr>
<tr>
<td>161</td>
<td>Impuestos a las transacciones: Implicaciones sobre el bienestar y el crecimiento.</td>
<td>Rodrigo Suescún</td>
<td>Noviembre 2001</td>
</tr>
<tr>
<td>162</td>
<td>Strategic Trade Policy and Exchange Rate Uncertainty</td>
<td>Fernando Mesa Parra</td>
<td>Noviembre 2001</td>
</tr>
</tbody>
</table>