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THE HARBERGER-LAURSEN-METZLER EFFECT REVISITED: AN INDIRECT-UTILITY-FUNCTION APPROACH

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Resumen

Para estudiar el efecto de un shock de términos de intercambio en la cuenta corriente, Ostry y Reinhart (1992) y Cashin y McDermott (1998) estiman las elasticidades de sustitución intertemporal e intratemporal, para un grupo de países, construyendo series de consumo de bienes importables y no transables. Desafortunadamente, estas series no están disponibles en muchos países en desarrollo. Este trabajo presenta un marco teórico dinámico y estocástico, similar al de Ostry y Reinhart, en el que se maximiza la función de utilidad indirecta de un agente representativo. Las condiciones de Euler derivadas del problema de optimización no dependen de variables tales como el consumo de transables y no transables, evitándose así la necesidad de construirlas y adoptar fuertes supuestos. Usando el Método Generalizado de Momentos y datos trimestrales de Chile entre 1986 y el 2002, concluyo que existen efectos moderadamente bajos de sustitución inter e intratemporales. La elasticidad intertemporal estimada está entre 0.46 y 0.56, mientras que la intertemporal alrededor de 1.

Abstract

To study the effect of a terms-of-trade shock on the current account, Ostry and Reinhart (1992) and Cashin and McDermott (1998) estimate the intertemporal and intratemporal elasticities of substitution, for a set of countries, constructing importable and non-tradable consumption series. Unfortunately, these series are not available for most developing countries. This paper presents a dynamic stochastic framework, similar to Ostry and Reinhart's, that maximizes a representative agent's indirect utility function. The Euler conditions derived from the optimization problem do not depend on variables such as tradable and non-tradable consumption, avoiding the need for constructing them and adopting strong assumptions. Using GMM and Chilean quarterly data for the 1986-2002 period, I conclude that moderately low intertemporal and intratemporal substitution effects exist. The first estimated elasticity lies in the range of 0.46 to 0.56 and the latter is around 1.

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1. Introduction

Economic theory states that the relationship between terms of trade and current account is ambiguous. More than fifty years ago, Laursen and Metzler (1950) and Harberger (1950) proposed that a positive change of the terms of trade would increase real income –given a constant marginal propensity to consume of less than one. Accordingly, this would cause a rise in private savings and an improvement of the current account. The so-called Harberger-Laursen-Metzler effect (HLME) was not challenged until the early eighties, when Sachs (1981), in a dynamic framework, contended that the HLME depends on the duration of the shock. Only if the shock is temporary does the HLME appear. If it is permanent, the final result is ambiguous.

Over the past decade, other studies stated that the link between these variables depends on intertemporal and intratemporal substitution effects. Thus, the works by Ostry and Reinhart (1992) and Cashin and McDermott (1998) have proposed that the intratemporal and intertemporal substitution effects can be assessed by estimating first-order conditions derived from a dynamic stochastic model. However, the estimation of these conditions depends on the availability of importable and non-tradable consumption series. Unfortunately, these series are not available in all developing and most developed countries, forcing researchers to make certain assumptions to construct them. Evidently, these assumptions could potentially affect the final estimates.

This paper proposes an alternative to avoid the need for these assumptions. Its approach follows the one by Ostry and Reinhart (1988) but with an indirect-utility maximization function to avoid using and constructing non-tradable and importable consumption series. This approach implies first order conditions (FOC) that depend on total private consumption (the sum of non-tradable and importable consumption), and can be easily estimated by the Generalized Method of Moments (GMM). These FOC are estimated for the Chilean economy using quarterly data for the 1986-2002 period. Our estimates show an intertemporal elasticity of substitution between 0.46 and 0.56 and an intratemporal elasticity of substitution slightly over 1. Accordingly, no important substitution effects exist that might reverse the final result of an income effect.

The structure of the paper is as follows. Section 2 provides an overview of the theoretical and empirical literature related to the HLME. In section 3, a simple optimizing three-good framework is formulated to examine the income and substitution effects of a terms-of-trade shock on external trade. Section 4 briefly presents data issues and the results of estimating the model with GMM. Concluding remarks and next steps for future research are provided in the last section.

2. Terms of Trade and Current Account: A Brief Review

2.1 The Theoretical Viewpoint

Economic theory states that the relationship between terms of trade and current account is ambiguous. Table 1 illustrates this idea. The sign of the effect of a terms-of-trade shock on the current account depends, to a certain extent, on the duration of the shock (transitory or permanent) and agents' expectations about it, that is, if the shock was anticipated or unanticipated by consumers. Besides, there are other determinants that affect the sign of the HLME such as the type and significance of the transmission channel.

In fact, the literature on the HLME might be divided into three transmission channels (see Appendix 1). First, a saving channel can be distinguished in most theoretical studies. That is, a terms-of-trade shock causes a positive or negative effect[1] on aggregate saving and, therefore, on the current account (Laursen and Metzler, 1950; Harberger, 1950; Sachs, 1981; Obstfeld, 1982; Svensson and Razin, 1983; Gavin, 1990; Ostry and Reinhart, 1992; among others).

Second, also a saving-investment channel exists. Through this, a terms-of-trade shock has not only a positive or negative effect on saving, but also a positive or negative effect on

[1] The final effect will depend, as mentioned before, on the type of shock and the features of the economy.

investment,[2] and therefore an ambiguous result on the current account (Persson and Svensson, 1985; Matsuyama, 1988; Sen and Turnovsky, 1989; Kent, 1997; Servén, 1999).

Table 1. Effect of a Terms-of-trade Shock on the Current Account According to the Theoretical Literature[/a]

Type of Shock	Transitory Shock		Permanent Shock	
	Author	**Sign**	**Author**	**Sign**
Unanticipated	Sachs (1981)	(+)	Laursen and Metzler (1950)	(+)
	Svensson and Razin (1983)	(+)	Harberger (1950)	(+)
	Persson and Svensson (1985)	(-, 0)	Sachs (1981)	(+/-)
	Edwards (1988)	(+/-)	Obstfeld (1982)	(-)
	Matsuyama (1988)	(-, +)	Svensson and Razin (1983)	(+/-)
	Ostry (1988)	(+/-)	Persson and Svensson (1985)	(-,+,-, 0)
	Sen and Turnovsky (1989)	(+/-)	Edwards (1988)	(+/-)
	Gavin (1990)	(+/-)	Ostry (1988)	(+/-)
	Ostry and Reinhart (1992)	(+/-)	Sen and Turnovsky (1989)	(+/-)
	Kent (1997)	(+/-)	Gavin (1990)	(+/-)
	Servén (1999)	(+/-)	Ostry and Reinhart (1992)	(+/-)
	De Holanda (2000)	(+, 0)	Kent (1997)	(-)
			Servén (1999)	(-)
			De Holanda (2000)	(-)
Anticipated	Persson and Svensson (1985)	(+, -,+, -, 0)	Persson and Svensson (1985)	(+, -,+, 0)
	Bean (1986)	(-, +, -, 0)	Bean (1986)	(-, +, 0)
	Matsuyama (1988)	(+/-)	Sen and Turnovsky (1989)	(+/-)
	De Holanda (2000)	(-, +, 0)	De Holanda (2000)	(-)

a. The "+" sign denotes a positive effect on the current account; "-" denotes a negative effect on the current account; "+/-" denotes an ambiguous effect on the current account; "0" denotes the absence of any effect on current account.

Finally, a less stressed channel in the literature on the HLME is the government-spending channel. In this case, a terms-of-trade shock causes a positive or negative effect on public spending, generates a public deficit or surplus, and worsens or improves the current account. The study that proposes this mechanism is Tornell and Lane (1994).

[2] The effect on investment is explained as follows. A terms-of-trade shock increases the value of marginal capital productivity, which in turn generates an increase in capital stock and investment and, as a result, deteriorates the current account.

2.2 The Empirical Viewpoint

Surprisingly, unlike the theoretical literature, the empirical works on the HLME are—to a certain extent—relatively scarce and less ambiguous in their results (see Appendix 1B). For instance, Mendoza (1995) calculated simple serial correlations between terms of trade and the trade balance and found positive correlations in most Latin American countries.

a) Estimating Reduced-form Models

Using panel data regressions for 96 countries including Chile, Kent (1997) found that countries that face less persistent terms-of-trade shocks show a positive and permanent effect on the current account. In contrast, those countries that face more persistent terms-of-trade shocks show a positive impact but a negative effect from the fourth period on. The elasticity that relates current account and terms of trade changes is 0.078 for the impact period and 0.036 in the long run.

Calderón, Chong, and Loayza (1999) used GMM to assess dynamic panel estimates for 44 developing countries—including Chile—and found that a positive transitory terms-of-trade shock caused an improvement in the current account (elasticities between 0.04 and 0.067), but that permanent shocks do not have significant effects. Finally, based on VAR-type impulse response functions for 15 OECD and 40 developing countries, Otto (2001) concluded that a positive transitory terms-of-trade shock causes an improvement on the trade balance in both small OECD and developing countries.

b) Estimation of Dynamic Stochastic Models

The paper by Ostry and Reinhart (1992) was the first to test not only the income effect but also the substitution effect. The authors estimated the intertemporal and intratemporal elasticities for a set of developing countries using GMM. They found that the intertemporal substitution elasticities were in the 0.37-0.43 range for Latin America,[3] around 0.8 for Asia, and about 0.44 for Africa (see Appendix 1B). Their estimates also showed that the

[3] Chile is not included in the panel of countries.

intratemporal substitution elasticities were in the 0.76-1.1 range for Latin America, 0.66-1.15 for Asia, and 1.27-1.44 for Africa.

Cashin and McDermott (1998) used the two-step cointegration GMM technique by Cooley and Ogaki (1996) to estimate Ostry and Reinhart's (1992) model. They used annual data for five OECD countries over the 1970-1995 period. Their findings can be summarized as follows: significant intertemporal substitution effects (elasticities between 0.72 and 2.65), and considerable intratemporal substitution effects (0.7-5.6).

It is worth mentioning that the model by Ostry and Reinhart (1992) implies that non-tradable and importable consumption series are available, which is not always the case for developing and for most developed countries.

On the other hand, the Cashin and McDermott's (1998) approach, which followed the model by Ostry and Reinhart (1992), implies the presence of unit roots in the ratio of non-tradable to importable consumption and in the ratio of terms of trade to real exchange rate. That is, the optimization problem gives, among others, the following first-order, non-stochastic condition:

$$w\left(\frac{n}{m}\right)^{\frac{1}{e}} = \frac{p}{q}$$

where n denotes the non-tradable good, m is the importable good, p is the reciprocal of the terms of trade, and q is the reciprocal of the real exchange rate. Despite the non-stochastic nature of the equation, the authors follow Cooley and Ogaki (1996) and estimate the parameters ε and ω using an error correction model. Aside from that, they find that both the ratio of consumption (n/m) and the ratio of prices (p/q) are integrated of order one. However, this finding implies that each series, namely non-tradable consumption, importable consumption, terms of trade, and real exchange rate, are not only non-stationary but also integrated of order two, which is difficult to find in actual data. In fact, this assumption is

empirically rejected in the case of the real exchange rate in Chile and other Latin American countries.[4]

In summary, economic theory states that the relationship between terms of trade and current account is ambiguous. On one hand, the effect of terms-of-trade shocks on the current account in Chile has been studied only as part of panel-data studies using reduced-form linear regressions. This kind of methodology allows only the estimation of the final effect; that is, it does not permit to analyze the presence of substitution effects, intertemporal or intratemporal. On the other hand, even though the empirical approach by Ostry and Reinhart (1992) overcomes this problem, it raises the need to have non-tradable and tradable consumption series that, more often than not, are unavailable especially for developing countries like Chile.

3. A Simple Model of Saving and Current Account

Consider an agent that lives infinitely in a small open economy with three goods (non-tradable, exportable, and importable goods) as in Ostry and Reinhart (1992).[5] The agent maximizes an expected CES utility function given by (1), which depends directly on the real consumption of a non-tradable good *n*, and another imported good *m.* The representative agent's maximization function is subject to equation (2), the law of movement of the net foreign assets, *b*.

$$E_t\left\{\sum_{t=0}^{\infty} b^t u(m_t, n_t)\right\} = E_t\left\{\sum_{t=0}^{\infty} b^t \left(\frac{s}{s-1}\right)\left(w m_t^{1-\frac{1}{e}} + n_t^{1-\frac{1}{e}}\right)^{\frac{1-\frac{1}{s}}{1-\frac{1}{e}}}\right\}, \quad b, s, w, e > 0; b < 1, \tag{1}$$

[4] For instance, Calderón and Duncan (2003) found that the real exchange rate is covariance stationary in Chile using long-span data. Taylor (2002) also finds that real exchange rates are stationary in Argentina, Brazil and Mexico.

[5] Probably the only difference with Ostry and Reinhart's model is the expression of real variables in terms of the importable good instead of the exportable good.

$$\Delta b_{t+1} = r_t\, b_t + p_t\, y_t + \left(m_0 - m_t\right) + \frac{p_t}{s_t}\left(n_0 - n_t\right) \qquad (2)$$

In this framework, *E{.}* is the expectations operator; β denotes the subjective discount factor; σ is the intertemporal elasticity of substitution; ε is the intratemporal elasticity of substitution; r_t is the exogenous international real interest rate in period t; *b* is the stock of net foreign assets; *p* stands for the exogenous relative price of exportable good in terms of importable goods (the terms of trade); *y* is the exogenous production of the exportable good, totally sold out the country; *s* is the real exchange rate (relative price of the exportable good in terms of the non-tradable good); n_0 is the exogenous endowment of non-tradable goods; and m_0 is the exogenous endowment of importable goods. Besides, it is supposed that the utility function is strictly increasing and concave in the consumption of the goods.

When does the HLME surge? As explained by Ostry and Reinhart (1992) and Cashin and McDermott (1998), the intertemporal and intratemporal elasticities of substitution affects the extent of the HLME. On one hand, the intertemporal elasticity of substitution σ measures the extent to which agents defer current consumption in response to a higher expected real return. Larger values of this coefficient imply larger reactions to movements in intertemporal relative prices (consumption rates of interest). A unit value corresponds to the log utility case. On the other hand, the intratemporal elasticity of substitution ε measures the extent to which agents alter their consumption of importables in response to a change in their price relative to that of non-tradables. Values above (below) unity imply gross substitutability (complementarity), while a unit value implies that the CES collapses to a Cobb-Douglas function.

In this economy, the representative agent maximizes (1) subject to equation (2) and the respective transversality condition.

However, as aforementioned, there are no available and reliable data on importable and non-tradable consumption, even for most developed economies. To overcome this inconvenience, I formulate a dual maximization problem through the agent's indirect utility function. The use of dual maximization to solve the model in a simple way comes from

Obstfeld (1982). The difference between his work and ours is that Obstfeld did not use it to simplify the empirical methodology since his paper was basically theoretical (see Appendix 1A).

Then, the problem consists of maximizing the intratemporal utility function:

$$u = u(m_t, n_t) = \left(w m_t^{1-\frac{1}{e}} + n_t^{1-\frac{1}{e}} \right)^{\frac{1}{1-\frac{1}{e}}} \tag{3}$$

subject to the equation of aggregate consumption:

$$d_t = m_t + \left(\frac{p_t}{s_t} \right) n_t \tag{4}$$

where now d_t is the real expenditure on the importable and the non-tradable goods (in terms of the prices of importables). If the representative consumer optimizes (3) subject to (4), he will obtain the demand functions for each good. If these functions are substituted in the (direct) utility function (3), the indirect utility function results (see Appendix 2 for the derivation of the dual intratemporal problem):

$$V = V(d_t, p_t, s_t) = d_t^{1-\frac{1}{s}} \left(\frac{s}{s-1} \right) \left[\left(\frac{1}{1 + p_t^{1-e} s_t^{e-1}} \right)^{1-\frac{1}{e}} + \left(\frac{1}{1 + p_t^{e} s_t^{-e}} \right)^{1-\frac{1}{e}} \right]^{\frac{1-\frac{1}{s}}{1-\frac{1}{e}}} \tag{5}$$

Now, this function depends only on d_t, p_t and s_t.[6] Fortunately, expression (5) does not depend on importable and non-tradable consumption series as does (1), so we can use available aggregate consumption series to estimate it. Then, the consumer problem is translated into an intertemporal maximization of his expected indirect utility:

[6] For simplicity, and because it is not a parameter of interest, I assume ω=1.

$$E_t\left\{\sum_{t=0}^{\infty} b^t V\left(d_t, p_t, s_t\right)\right\} \tag{6}$$

subject to the net foreign assets constraint formulated as follows:

$$\Delta b_{t+1} = r_t\, b_t + p_t\, y_t + \frac{p_t}{s_t} n_0 + m_0 - d_t\ , \tag{7}$$

and the corresponding transversality condition. The first-order conditions with respect to real expenditure and net foreign assets are:

$$V_{d,t} = l_t \tag{8}$$

$$l_t = b\ E_t\left\{l_{t+1}\left(1+r_{t+1}\right)\right\} \tag{9}$$

where:

$$V_{d,t} = \frac{\partial V(d, p, s)}{\partial d_t}$$

Using expressions (8) and (9) we can obtain:

$$V_{d,t} = b\, E_t\left(\left(1+r_{t+1}\right)V_{d,t+1}\right) \tag{10}$$

This expression can be finally rearranged to estimate the parameters, basically those of interest (ε and σ), in the following form:

$$E_t\left(\frac{b\left(1+r_{t+1}\right)V_{d,t+1}}{V_{d,t}} - 1\right) = 0 \tag{11}$$

See Appendix 2 for the specific form that equation (11) takes if the CES utility function is used.

4. Data, Estimation, and Results

Like Ostry y Reinhart (1992) and Cashin and McDermott (1998), I estimate the parameters β, ε, and σ from equation (11), using Hansen's (1982) GMM technique. For that purpose, I use Chilean quarterly data that covers the 1986.1-2002.4 period. The data used in the estimation are the following: real interest rate (*r*), constructed as the difference between the nominal banking interest rate and CPI inflation; private (non-durable) consumption (*d*); terms-of-trade index (*p*); and multilateral real exchange rates (*s*).[7] For details of definitions and sources see Appendix 3.

An analysis of the series was performed to assess the degree of seasonality. As a result, I only removed the seasonal component from the consumption series through an ARIMA-X12 technique. As in previous literature, I used a constant and lags of the variables included in equation (11) as instrumental variables. Estimations were performed using bandwidth by Andrews (1991) and the kernel quadratic spectral.

Table 2 reports the parameter estimates, their standard errors, the J-statistic, and the p-value related to that. In the GMM technique, the J-statistic is based on the minimized value of the objective function and is distributed as χ^2 with k degrees of freedom, which corresponds to the number of overidentifying restrictions. The latter is given by the difference between the number of instruments and that number of the parameters to be estimated. The p-value is associated to the null hypothesis of validity of overidentifying restrictions. I find that all the parameter estimators are statistically significant and have the *a-priori* expected signs, and the overidentifying restrictions cannot be rejected by the data.

It is likely that the relevant real interest rate for consumption is the lending interest rate; however, to test robustness of the model, I also estimate the parameters using banking deposit interest rates. Besides, I also use different instrument set lags (see table 2).

Although the discount factor β is not a parameter of immediate interest, the result is well-defined and relatively consistent with previous estimates at domestic and international

levels. The point estimate is around 0.99, which implies a real subjective discount rate about 4% annually. This estimate falls in the range of the values commonly used in RBC literature for Chile, which show an interval between 2% and 8.9%.[8]

Table 2. GMM Parameter Estimates of the Euler Equation

Sample: Chile, quarterly data, 1986.I-2002.IV
Method: Generalized Method of Moments (GMM) [a]

Instruments set lags	Parameters						J-statistic
	ß		s		e		
	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error	
Using Lending Interest Rates							
1 to 2	0.982***	0.0017	0.456***	0.1546	1.009***	0.0057	0.0800 (0.1577)
2 to 3	0.990***	0.0049	0.514***	0.1421	1.008***	0.0045	0.0737 (0.3625)
3 to 4	0.989***	0.0052	0.558**	0.2627	1.007***	0.0078	0.0841 (0.1513)
Using Deposit Interest Rates							
1 to 2	0.993***	0.0030	0.226**	0.1030	1.015***	0.0091	0.0661 (0.1559)
2 to 3	0.991***	0.0021	0.301**	0.1315	1.013***	0.0080	0.0817 (0.2314)
3 to 4	0.992***	0.0019	0.331**	0.1472	1.012***	0.0078	0.1199 (0.0562)

a. Estimations were performed using bandwidth by Andrews (1991) and the kernel quadratic spectral. Instrumental variables are a constant and lags of the real interest rate, of the terms of trade, of the real exchange rate, and of consumption growth. The symbols *, ** and *** denote statistical significance at the 1%, 5%, and 10% level, respectively. P-values are in parentheses.

The intertemporal elasticity of substitution is statistically significant at the 1% level and its range estimate is between 0.46 and 0.56, denoting a low intertemporal substitution effect. This range is above the upper limit of the range of estimates for Latin American countries (0.373-0.430) by Ostry and Reinhart (1992), and below the lower limit found for

[7] Results are quite similar using bilateral real exchange rates.
[8] See, for instance, Acuña and Oyarzún (2001), Bergoeing and Soto (2002), and Chumacero and Fuentes (2002).

OECD economies by Cashin and McDermott (0.72-2.65).[9] It is worth mentioning that the empirical evidence for this coefficient is far ranging. Estimates fall from (close to) zero in the seminal work by Hall (1988) to near 1.4 by Amano et al. (1998).[10] This estimate implies a coefficient of relative risk aversion γ, the reciprocal of σ, in the 1.79-2.17 interval.

With regard to the intratemporal elasticity of substitution, its GMM estimator is slightly above 1. This suggests that there is a statistically significant—but not so high—intratemporal substitution effect between importables and non-tradables. This value lies in both the estimated range by Ostry and Reinhart, between 0.76 and 1.1, and the one by Cashin and McDermott, between 0.7 and 5.6.[11]

Finally, it should be mentioned that the same estimations were performed using the deposit (real) interest rate. Results are very similar in terms of the estimates of β and ε, but relatively lower in terms of σ. In this latter case, this elasticity is statiscally significant only at 5% and lies within the 0.27-0.33 interval.

5. Concluding Remarks

Economic theory states that the relationship between terms of trade and the current account is ambiguous. Consequently, the assessment of the HLME is essentially an empirical matter. Although there is empirical evidence in favor of the HLME in the Chilean case, its analysis has been done only as part of panel-data studies using reduced-form linear regressions. This kind of methodology allows only the estimation of the final effect; that is, it does not permit to analyze the presence of substitution effects, intertemporal or intratemporal. Despite that other methodologies and international estimates overcome this problem, as Ostry and

[9] Using Chilean data, Schmidt-Hebbel (1988) found a unitary intertemporal elasticity of substitution for the 1976.I-1982.IV period; Arrau (1990) found values between 1.4 and 1.8 for the 1976.I-1981.I period; and recently, Chumacero (2001) found non-statistically-significant values between 0.256 and 0.314 for the 1986.1- 2000.12 period.

[10] Other estimated or calibrated values are 0.38 by Mendoza (1995), 0.4 by Ogaki and Reinhart (1999), 0.05-1 by Epstein and Zin (1991), and near 1 by Beaudry and van Wincoop (1995).

[11] Calibrating a dynamic stochastic model, Mendoza (1995) found an intratemporal elasticity of substitution around 1.28 for a set of developing countries and—perhaps surprisingly—a lower value, 0.74, for industrialized countries.

Reinhart (1992) do, these imply the need to have non-tradable and tradable consumption series which most of the time are not available, especially in developing countries like Chile.

This paper provides estimates of intertemporal and intratemporal elasticities of substitution, avoiding the need for disaggregated consumption data. Using Chilean quarterly data for the 1986-2002 period, I found that all the parameter estimators of a simple model of saving and current account are statistically significant, have the *a priori* expected signs, are relatively consistent with previous findings, and the overidentifying restrictions cannot be rejected by the data. Using lending real interest rates, the intertemporal elasticity of substitution falls in the 0.46-0.56 range, while the intratemporal elasticity of substitution is slightly greater than 1. This suggests that a small intratemporal substitution effect exists between importables and non-tradables, together with an even smaller intertemporal substitution effect. Regarding the empirical evidence found before, and our results of relatively mild substitution effects, the HLME could still be a valid stylized fact in the Chilean economy.

The future line of research includes, first, capital goods or capital accumulation in the model in order to analyze the investment channel. Second, the expansion of the data to consider other emerging market economies and compared results at the international level. Finally, the estimation of non-tradable and importable consumption series, which can easily be achieved by applying Roy's identity to the indirect utility function and using the estimated parameters.

Appendix 1A
Theoretical Studies on the Relationship between Terms of Trade and the Current Account

Authors (Year)	**Analytical Framework** (Main Features and Assumptions)	**Theoretical Predictions** (Effects on Current Account of a Positive Term-of-Trade Shock)	**Analyzed Channels and Effects**
Laursen and Metzler (1950)	Based on traditional static Keynesian framework.	A permanent unanticipated shock: +	Saving channel: Income effect (positive) ***
Harberger (1950)	Based on traditional static Keynesian framework.	A permanent unanticipated shock: +	Saving channel: income effect (positive)***
Sachs (1981)	DEM (2 periods). one-good, small open economy, with investment. Based on a life-cycle-saving model.	A transitory shock: +. A permanent shock: ambiguous.	Saving channel: Income effect: (positive or zero depending on expected duration of shock)***.
Obstfeld (1982)	DEM (infinitely-lived agent), 2-good, small open economy. Uzawa (1968)-type utility function: rate of time preference is an increasing function of utility. Indirect utility function is maximized.	A permanent unanticipated shock: –	Saving channel: Income effect ***
Svensson and Razin (1983)	DEM (infinitely-lived agent), n-good, small open economy. Based on Razin (1980) and Svensson and Razin (1981).	A transitory unanticipated shock: + A permanent unanticipated shock: + (if rate of time preference decreases with welfare level), – (if rate of time preference increases with welfare level). A transitory anticipated shock: –	Saving channel: Income effect: direct and wealth effect (positive/negative depends on if shock is unanticipated or anticipated). Substitution effect: **
Persson and Svensson (1985)	OGM (2 generations), 2-good, small open economy with investment.. Based on Diamond (1965) and Svensson and Razin (1983)	A transitory unanticipated shock: +, –, +, 0. A permanent anticipated shock: –, +, –, +, 0 (the effects are greater if the shock is transitory) A permanent unanticipated shock: +, 0.	Saving channel: Income effect * Investment channel (negative)
Bean (1986)	DEM (infinitely-lived agent), n-good, small open economy. Based on Salop (1979). Terms of trade = price of value added good in terms of price of consumption good.	A transitory anticipated shock: –, +, –, 0 A permanent anticipated shock: –, +, 0	Saving channel: Income effect **

Appendix 1A
Theoretical Studies on the Relationship between Terms of Trade and the Current Account (continued)

Authors (Year)	**Analytical Framework** (Main Features and Assumptions)	**Theoretical Predictions** (Effects on Current Account of a Positive Term-of-Trade Shock)	**Analyzed Channels and Effects**
Edwards (1988)	DEM (2 periods), 3-good, small open economy. Based on Edwards (1987), Svensson and Razin (1983), Edwards and van Wijnbergen (1986).	A transitory shock: ambiguous (depends on change of real exchange rate) A permanent shock: ambiguous (opposite sign of transitory shock).	Saving channel: Income effect Substitution effect (ambiguous, depends on real exchange rate appreciation or depreciation)**.
Matsuyama (1988)	OGM (2 generations), 2-good, small open economy with investment. Based on Kareken and Wallace (1977) and Fried(1980).	A permanent anticipated shock: + (if export sector is more labor intensive), – (if import sector is more labor intensive) A permanent unanticipated shock: –, +.	Saving channel: Income effect Stopper-Samuelson effect (ambiguous) Investment channel (negative)*
Ostry (1988)	DEM (2 periods), 3-good, small open economy. Based on Svensson and Razin (1985) and Frenkel and Razin (1987).	Results depend critically on intertemporal and intratemporal elasticities of substitution, and ratio of imports to consumption of importables.	Saving channel: Income effect Substitution effect**.
Sen and Turnovsky (1989)	DEM (infinitely-lived agent), 2-good, small open economy. The two goods are Edgeworth complementary. Based on Abel and Blanchard (1983) and Hayashi (1982) q-theoretic investment function. The inclusion of endogenized labor and capital has a crucial role.	A permanent unanticipated shock: ambiguous, – (if substitution effect dominates), + (if income effect dominates) A transitory unanticipated shock: similar but smaller effect than a permanent shock. A permanent anticipated shock: similar but smaller effect than a unanticipated shock.	Saving channel: Income effect: (ambiguous). Substitution effect. Investment channel (implicit, negative). Effects depend on the response of capital stock to terms-of-trade shock.
Gavin (1990)	DEM (infinitely-lived agent), 3-good, small open economy with investment.	Effects depend on degree of substitution between imported and non-traded goods. If they are poor substitutes the HLM is confirmed.	Saving channel: Income effect Substitution effect:**.
Ostry and Reinhart (1992)	DEM (infinitely-lived agent), 3-good, small open economy. Based on Ostry (1988).	A transitory shock: ambiguous (positive consumption-smoothing effect and a negative inter and intratemporal substitution effect). Depends on elasticities of intertemporal and intratemporal substitution.	Saving channel: Income effect Substitution effect**.

Appendix 1A
Theoretical Studies on the Relationship between Terms of Trade and the Current Account (continued)

Authors (Year)	**Analytical Framework** (Main Features and Assumptions)	**Theoretical Predictions** (Effects on Current Account of a Positive Term-of-Trade Shock)	**Analyzed Channels and Effects**
Tornell and Lane (1994)	DEM (n infinitely-lived groups), 2 sectors (public and private), small open economy. Terms of trade = price of export good in terms of price of consumption good.	A transitory unanticipated shock: + (if there is unitary fiscal structure) A transitory/permanent unanticipated shock: - (if there is divided control on fiscal process, "voracity effect")	Saving channel: Income effect (positive) Government expenditure channel (negative)****
Kent (1997)	DEM (infinitely-lived agent), 2-good, small open economy with investment.	A permanent unanticipated shock: – A purely transitory unanticipated shock: + A unanticipated transitory but persistent shock: ambiguous (depends on the degree of persistence)	Saving channel: Income effect Investment channel (negative)*
Servén (1999)	DEM (infinitely-lived agent), 2-consumption-good, small open economy with imported and domestic capital goods. Based on Sen and Turnovsky (1989), Servén (1995).	A transitory unanticipated shock: –, +, 0 (if import content of capital is high/ shock is long lasting/ low marginal installation cost); +, –, 0 (otherwise) A permanent unanticipated shock: –	Saving channel: Income effect (positive/zero). Substitution effect (positive/negative, depends on intertemporal elasticity of substitution) Investment channel (negative)
De Holanda (2000)	DEM (infinitely–lived agent), 2-good, small open economy. Interest rate depends on risk premium that is a negative function of terms of trade. Indirect utility function is maximized. Based on Obstfeld (1982).	A transitory unanticipated shock: +, 0 A permanent unanticipated shock: – A transitory anticipated shock: –, +, 0 A permanent anticipated shock: –	Saving channel: Income effect ***

NOTES: DEM denotes Dynamic Equilibrium Model
OGM denotes Overlapping Generation Model
* Substitution effect and government expenditure channel are not analyzed
** Investment channel and government expenditure channel are not analyzed
*** Investment and government expenditure channel and substitution effect are not analyzed.
**** Investment channel and substitution effect are not analyzed.

Appendix 1B
Empirical Studies on the Relationship between Terms of Trade and the Current Account

Authors (Year)	**Empirical Method**	**Countries**	**Data**	**Empirical Findings/Estimation Results**
Ostry and Reinhart (1992)	Method: GMM Variables: consumption of non-traded goods and importables, terms of trade, real exchange rate, real interest rate	13 developing countries including Brazil, Colombia, Costa Rica, and Mexico (Chile is not included).	Annual data. 1968-87	Pooled data: Intertemporal elasticity of substitution: 0.38-0.50 Intratemporal elasticity of substitution: 1.22-1.27 Panel Data-Latin America: Intertemporal elasticity of substitution: 0.373-0.43 Intratemporal elasticity of substitution: 0.76-1.107
Kent (1997)	Method: panel data regression Variables: terms of trade, current account, output, fiscal balance.	128 countries (Chile is included).	Annual data. 1960-94.	Least-persistent-TOT countries: permanent + significant effect Full set of countries: + significant effect (every period) Most-persistent-TOT countries: + significant effect (some periods) A 10%-transitory terms-of-trade shock causes an improvement in the current account of 0.78% during then impact period, and 0.36% in the long run.
Cashin and McDermott (1998)	Method: Cointegration and GMM Variables: consumption of non-traded goods and importables, terms of trade, real exchange rate, and real interest rate	Australia, Canada, New Zealand, United Kingdom and United States.	Annual data. 1970-97	Intertemporal elasticity of substitution: 0.72-2.65 Intratemporal elasticity of substitution: 0.69-5.63
Calderón, Chang, and Loayza (1999)	Method: GMM dynamic panel data Variables: terms of trade, current account, output growth, balance of payment controls, black market premium, among others.	44 developing countries (Chile is included)	Annual data. 1966-95	A 10%-transitory terms-of-trade shock causes an improvement in the current account between 0.4% and 0.67%. Permanent shocks do not have significant effects.
Otto (2001)	Method: Structural VARs. Variables: terms of trade, current account, output	15 OECD small countries and 40 developing countries (Brazil, Mexico, Peru, Colombia, etc.; Chile is not included).	Annual data. 1960-97	A positive transitory terms-of-trade shock causes an improvement in the balance of trade from both small OECD and developing countries.

NOTES: GMM denotes General Method of Moments.

Appendix 2
Intratemporal Optimization Problem

$$Max \quad \left(w\, m^{1-\frac{1}{e}} + n^{1-\frac{1}{e}} \right)^{\frac{1}{1-\frac{1}{e}}} \tag{A1}$$

$s.t.$:

$$d = m + \left(\frac{p}{s} \right) n \tag{A2}$$

The Lagrange function is:

$$\Phi_t = u(m,n) + l\left(d - m - \frac{p}{s} n \right) \tag{A3}$$

The first-order conditions:

$$\left(w\, m^{1-\frac{1}{e}} + n^{1-\frac{1}{e}} \right)^{\frac{1-\frac{1}{s}}{1-\frac{1}{e}}-1} m^{-\frac{1}{e}} = l \tag{A4}$$

$$\left(w\, m^{1-\frac{1}{e}} + n^{1-\frac{1}{e}} \right)^{\frac{1-\frac{1}{s}}{1-\frac{1}{e}}-1} n^{-\frac{1}{e}} = l\, \frac{p}{s} \tag{A5}$$

Dividing (A4) by (A5) we obtain:

$$w \left(\frac{n}{m} \right)^{\frac{1}{e}} = \frac{s}{p} \tag{A6}$$

which is exactly the equation derived by Ostry and Reinhart (p. 503, 1992) and Cashin y McDermott (p.23, 1998).

Substituting (A6) in the budget constraint (A2) we can derive the demands for importable and non-tradable goods. Substituting these functions in direct utility (A1), we obtain the indirect utility (A7), which is the specific form that equation (11) takes (see section 3):

$$E_t\left\{ b\,(1+r_t)\left(\frac{d_{t-1}}{d_t}\right)^{\frac{1}{s}}\left[\frac{\left(\frac{1}{1+p_t^{1-e}s_t^{e-1}}\right)^{1-\frac{1}{e}}+\left(\frac{1}{1+p_t^{\ e}s_t^{-e}}\right)^{1-\frac{1}{e}}}{\left(\frac{1}{1+p_{t-1}^{1-e}s_{t-1}^{e-1}}\right)^{1-\frac{1}{e}}+\left(\frac{1}{1+p_{t-1}^{\ e}s_{t-1}^{-e}}\right)^{1-\frac{1}{e}}}\right]^{\frac{1-\frac{1}{s}}{1-\frac{1}{e}}}-1\right\}=0 \qquad \text{(A7)}$$

Appendix 3

Data, Sources and Definitions

Variable	Series	Source/Definition
Interest rate (i_t)	Nominal Deposit and Lending Interest Rate, 30-89 days	Central Bank of Chile
Domestic inflation (p_t)	Consumer price index growth	Central Bank of Chile
Real interest rate (r_t)	Difference between nominal interest rate and inflation rate	$r_t = \log\left(\frac{1+i_t}{1+p_t}\right)$
Consumption (d_t)	Real Consumption of Non-Durable Goods, expressed in 1996-million pesos	Contreras *et al*. (2002).
Terms of trade (p_t)	Index of Terms of Trade	1986-1999: Bennett y Valdés (2001) 2000-2002: Central Bank of Chile Chile, *Informe Económico y Financiero*
Real exchange rate (s_t)	Multilateral RER (s^M)	Central Bank of Chile
	RER5 (s^5): five main trade partners	Central Bank of Chile

a. All the series are presented in quarterly frequency.

References

[1] Acuña, A. and C. Oyarzún. 2001. "Money and Real Fluctuations: Calibrating a Cash-in-Advance Model for the Chilean Economy." Unpublished paper. Universidad de Concepción.

[2] Abel, A.B. and O. Blanchard. 1983. "An Intertemporal Model of Saving and Investment." *Econometrica* 51: 673-92.

[3] Amano, R., W-M. Ho, and T. Wirjanto. 1998. "Intraperiod and Intertemporal Substitution in Import Demand." Unpublished paper.

[4] Andrews, D. 1991. "Heteroskedasticity and Autocorrelation Consistent Covariance Matrix Estimation". *Econometrica* 59: 817-58.

[5] Arrau, P. 1990. "Un Modelo Macroeconómico Intertemporal de Dinero y Consumo para Chile (1976-81)." Colección Estudios CIEPLAN 28, June.

[6] Bean, C. 1986. "The Terms of Trade, Labor Supply, and the Current Account." Economic Journal of Supplement 96: 38-46.

[7] Beaudry, P. and E. van Wincoop. 1995. "The Intertemporal Elasticity of Substitution: An Exploration using US Panel of State Data." *Economica* 63: 495-512.

[8] Bennett, H. and R. Valdés, 2001. "Series de Términos de Intercambio de Frecuencia Mensual para la Economía Chilena: 1965-1999." Central Bank of Chile, Working Paper 98.

[9] Bergoeing, R. and R. Soto. 2002. "Testing Real Business Cycle Models in an Emerging Economy." Central Bank of Chile, Working Paper 159.

[10] Calderón, C., A. Chong, and N. Loayza. 1999. "Determinants of Current Account Deficits in Developing Countries." Working Paper 51, Central Bank of Chile.

[11] Calderón, C. and R. Duncan. 2003. "Purchasing Power Parity in Chile: A Long-span Study". Estudios de Economía 30(1). Universidad de Chile.

[12] Cashin, P. and J. McDermott, 1998. "Terms of Trade and the Current Account." IMF Working Paper 177 (December).

[13] Chumacero, R. 2001. "¿Arbitraje o segmentación?." Manuscript. Central Bank of Chile.

[14] _____ and R. Fuentes. 2002. "On the Determinants of the Chilean Economic Growth". Working Paper 134. Central Bank of Chile.

[15] Contreras, G., F. Liendo, and I. Magendzo. 2002. "Series trimestrales de consumo de bienes habituales, durables y variación de existencias." Manuscript. Central Bank of Chile.

[16] Cooley, T. and M. Ogaki. 1996. "A Time Series Analysis of Real Wages, Consumption and Asset Returns." *Journal of Applied Econometrics* 11: 119-34.

[17] De Holanda, F. 2000. "Taxa de Cambio e Poupanca: Um Ensaio sobre o Efeito Harberger-Laursen-Metzler." EconoFinance.com. http://www.econofinance.com/papers/barbosa1.htm.

[18] Diamond, P. 1965. "National Debt in a Neoclassical Growth Model." *American Economic Review* 55: 1126-50.

[19] Edwards, S. 1987. "Tariffs, Terms of Trade, and the Real Exchange Rate in an Optimizing Model of the Current Account." NBER Working Paper 2175.

[20] _____. 1988. "Temporary Terms-of-trade Disturbances, the Real Exchange Rate and the Current Account." *Economica* 56: 343-57.

[21] _____ and S. van Wijnbergen. 1985. "The Welfare Effects of Trade and Capital Market Liberalization." *International Economic Review* 27: 147-8.

[22] Epstein, L. and S. Zin. 1991. "Substitution, Risk Aversion, and the Transitory Behavior of Consumption and Asset Returns: A Theoretical Framework." *Econometrica* 57: 937-69.

[23] Frenkel, J. and A. Razin.1987. Fiscal Policies and the World Economy: An Intertemporal Approach. Cambridge, Mass.: MIT Press.

[24] Fried, J. 1980. "The International Distribution of Gains from Technical Change and from International Trade." *Canadian Journal of Economics* 13: 65-81.

[25] Gavin, M. 1990. "Structural Adjustment to a Terms of Trade Disturbance: The Role of Relative Prices." *Journal of International Economics* 28: 217-243.

[26] Hall, R. 1988. "Intertemporal Substitution in Consumption." *Journal of Political Economy* 96: 339-57.

[27] Harberger, A. 1950. "Currency Depreciation, Income and the Balance of Trade." *Journal of Political Economy* 58: 47-60.

[28] Hayashi, F. 1982. "Tobin´s q, Rational Expectations, and Optimal Investment Rule." *Econometrica* 50: 213-24.

[29] Kareken, J. and N. Wallace. 1977. "Portfolio Autarky: A Welfare Analysis." *Journal of International Economics* 7: 19-43.

[30] Kent, C. 1997. "The Response of the Current Account to Terms of Trade Shocks: A Panel-data Study." Reserve Bank of Australia (September).

[31] Laursen, S. and L. Metzler, 1950. "Flexible Exchange Rate and the Theory of Employment." *Review of Economics and Statistics* 32: 281-99.

[32] Matsuyama, K. 1988. "Terms of Trade, Factor Intensities and the Current Account in a Life-cycle Model." *Review of Economic Studies* 55:247-62.

[33] Mendoza, E. 1995. “The Terms of Trade, the Real Exchange Rate, and Economic Fluctuations.” *International Economic Review* 36(1): 101-37.

[34] Obstfeld, M. 1982. “Aggregate Spending and the Terms of Trade: Is There a Laursen-Metzler Effect?” *Quarterly Journal of Economics* 97: 251-70.

[35] Ogaki, M., and C.M. Reinhart. 1998. “Measuring Intertemporal Substitution: the Role of Durable Goods.” *Journal of Political Economy* 106: 1078-98.

[36] Ostry, J. 1988. “The Balance of Trade, Terms of Trade, and Real Exchange Rate: An Intertemporal Optimizing Framework.” IMF Staff Papers 35: 541-73.

[37] Ostry, J. and C. Reinhart, 1992. “Private Saving and Terms of Trade Shocks.” IMF Staff Papers 39(3): 495-517.

[38] Otto, G. 2001. "The Effect of Terms of Trade Shocks on the Trade Balance: Is There a Harberger-Laursen-Metzler Effect? Forthcoming, *Journal of International Money and Finance*.

[39] Persson, T. and L. Svensson. 1985. “Current Account Dynamics and the Terms of Trade: Harberger-Laursen-Metzler Two Generations Later.” *Journal of Political Economy* 93(1): 43-65.

[40] Razin, A. 1980. “Capital Movements, Intersectoral Resource Shifts, and the Trade Balance.” Seminar Paper 159. Stockholm: *Institute of International Economic Studies*, University of Stockholm.

[41] Sachs, J. 1981. “The Current Account and Macroeconomic Adjustment in the 1970’s.” *Brooking Papers on Economic Activity* 1: 201-68.

[42] Salop, J. 1979. “Devaluation and the Balance of Trade under Flexible Wages.” In Trade, Stability and Macroeconomics, edited by G. Horwich and P. Samuelson. New York: Academic Press.

[43] Sen, P. and S. J. Turnovsky. 1989. “Deterioration of the Terms of Trade and Capital Accumulation: A Re-examination of the Laursen-Metzler Effect.” *Journal of International Economics* 26:227-50.

[44] Servén, L. 1995. “Capital Goods Imports, the Real Exchange Rate and the Current Account.” *Journal of International Economics* 39: 79-101.

[45] _____. 1999. “Terms-of-trade Shocks and Optimal Investment: Another Look at the Laursen-Metzler effect.” *Journal of International Money and Finance* 18: 337-65.

[46] Schmidt-Hebbel, K. 1988. “Consumo e inversión en Chile (1974-1982): Una interpretación (real) del *boom.* In: “Del auge a la crisis de 1982. Ensayos sobre liberalización financiera y endeudamiento en Chile”, edited by F. Morandé and K. Schmidt-Hebbel.

[47] Soto, C., 2003. "Consumo habitual y desempleo en Chile." Manuscript. Central Bank of Chile.

[48] Svensson, L. and A. Razin. 1981. "The Terms of Trade, Spending and the Current Account: The Harberger-Laursen-Metzler Effect." Seminar Paper 170. Stockholm: Institute of International Economic Studies, University of Stockholm.

[49] _____. 1983. "The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect." *Journal of Political Economy* 91(1): 97-125.

[50] Taylor, A.M. 2002. "A Century of Purchasing Power Parity." Review of Economics and Statistics 84(1): 139-150 (February).

[51] Tornell, A. and P. Lane. 1994. "Are Windfalls a Curse? A Non-representative Agent Model of the Current Account and Fiscal Policy." NBER Working Paper 4839.

[52] Uzawa, H. 1968. "Time Preference, the Consumption Function, and Optimum Asset Holdings." In Value, Capital and Growth: Papers in Honor of Sir John Hicks, edited by J.N. Wolfe (Chicago: Aldine Publishing Company).

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