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Stochastic discount factor for Mexico and Chile, a continuous updating estimation approach

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Factor de descuento estocástico para México y Chile, un enfoque de estimación continuamente actualizada.

Resumen

Se propone utilizar el estimador calculado por el método de momentos generalizado continuamente actualizado para caracterizar el factor de descuento estocástico de una economía. El estimador se aplica a los mercados accionarios de México y Chile en el período 2007-2012, que incluye el período de la crisis financiera internacional, en el cual en ambas economías el factor de descuento estocástico muestra años en los cuales fue menor que uno y la volatilidad del mercado fue alta. Se compara y discuten los resultados del método generalizado de momentos de dos etapas y los del iterativo, y se muestra la superioridad del estimador continuamente actualizado sobre estas dos técnicas de estimación tan usadas.

Clasificación JEL: C52, C61, G15

Palabras clave: factor de descuento estocástico, Mexico, Chile, método generalizado de momentos

Abstract

This paper proposes the use of an estimator calculated using the generalized method of moments continuously updated to characterize a linear stochastic discount factor for a given economy. The estimator is applied to the Mexican and Chilean stock markets for 2007-2012, this period includes the international financial crisis. The stochastic discount factor, for both economies, took values of less than one and presented high market volatility values during several years. A comparison with the results from the two stages generalized methods of moments and the iterative one is also discussed, showing the superiority of the continuous updating estimator over these two frequently used estimation techniques.

JEL Classification: C52, C61, G15

***Key words**: Stochastic Discount Factor, Mexico, Chile, Generalized Method of Moments*

Introduction

The stochastic discount factor is extensively quoted in financial literature when referring to risk adjustments. This article proposes the use of the continuously updated estimator to identify the linear stochastic discount factor. The estimator is applied to assess the changes in the stochastic discount factor in the Mexican and Chilean economies during the period 2007-2012, which includes the period of the international economic credit crisis 2008-2009.

The main applications of the stochastic factor are in asset pricing theory, in valuations and in the assessment of market efficiency. Lucas (1978), (Rubinstein 1976), Breeden (1979) and Cox, Ingersoll, *et al*. (1985) proposed and analyzed inter-temporal asset pricing models. Market efficiency is studied using different approaches, most frequently through asset pricing models. Valencia-Herrera (2012) uses the three and the four linear factor model for analyzing returns of the Mexican sustainable index. Márquez de la Cruz, (2006) uses the Consumption Based Asset Pricing Model (CCAPM) for analyzing the permanent and non-permanent consumption in the Spanish Economy. Previously, Márquez de la Cruz, (2005) estimated the inter-temporal rate of substitution for the Spanish Economy. Nieto and Rodríguez (2005) showed how to apply the CCAPM and the Fama and French (1996) three factor linear model to the Spanish and American Economies. Other analyses are, for example, Hansen and Jagannathan (1991), which estimated a lower bound on the volatility of the stochastic discount factor. Among its applications, it has been used, for example, to measure the performance of fund managers, see Farnsworth, *et al*., (2002). They found that the use of the method results in a small bias toward lower returns.

The paper is divided in four sections: Section one, which introduces the moment conditions starting from a simple representative consumer-investor problem, section two, which gives an overview of the Mexican and Chilean economies during the period studied, section three, which includes the analysis and discussion of the empirical results. Finally, the conclusions section follows.

1. An analysis of equilibrium conditions

Considering that a consumer can freely trade assets i, and that the expected value of a discounted time-separable utility is maximized,

$$Max\mathrm{E}_{\mathrm{t}}[\sum_{\mathrm{j=0}}^{\infty}\delta^{\mathrm{j}}\mathrm{U}(\mathrm{C}_{\mathrm{t+j}})] \tag{1}$$

where the subjetive discount factor δ measures the personal time preference, $0<\delta<1$, C_{t+j} is the investor´s consumption in period $t+j$, and $U(C_{t+j})$ is the period utility of consumption at $t+j$. Wealth W_t at t satisfies relation (2)

$$W_{t+1}=\sum_{i=1}^{I}((R_{i,t}-R_{f,t})w_{i,t}+R_{f,t})(W_t-C_t) \tag{2}$$

where $w_{i,t}$ is the proportion invested in risky asset i of the total wealth in period t, $R_{i,t}$ is the return of risky asset i in period t and $R_{f,t}$ is the return of the risk free asset in period t.

The optimal consumption and portfolio plan must be such that satisfies that the marginal utility of consumption today is equal to the expected marginal utility benefit from investing one monetary unit in asset i at time t, selling it at time $t+1$ for $R_{i,t+1}$ and consuming the proceeds, conditional on Ψ_t, which is a subset of the available information at t, A_t,

$$U'(C_t)=\delta E_t(R_{i,t+1}U'(C_{t+1})\big|\Psi_t) \tag{3}$$

If both sides are divided by U´(Ct), then

$$1=E_t(R_{i,t+1}m_{t+1}\mid\Psi_t) \tag{4}$$

where the stochastic discount factor m_{t+1} is equal to the stochastic intertemporal rate of substitution $\delta U'(C_{t+1})/U'(C_t)$.

Notice that if the returns of the n risky assets in the economy are the vector R_t, and $\overline{1}$ is a vector of ones, relationship (4) can be written as

$$\overline{1} = E\left(R_t m_t \mid \Psi_{t-1}\right), \tag{5}$$

where R_t has an unconditional non-singular variance-covariance matrix Σ.

An implication of this model and other inter-temporal asset pricing ones is that

$$E(R_{t+1} \mid \Psi_t) - R_t^f = \frac{Cov(R_{t+1}, m_{t+1} \mid \Psi_t)}{E(m_{t+1} \mid \Psi_t)}, \tag{6}$$

where the return on one period riskless bond is $R_t^f = 1 / E(m_{t+1} \mid \mathrm{A}_t)$ and $R_t^f \in \Psi_t$.

For example, in the case of power utility, $U(C_t) = (C_t^{1-\eta} - 1)/(1-\eta)$, where η is the risk aversion coefficient. A limitation of the power utility is that the elasticity of inter-temporal substitution, Φ, is the reciprocal of the relative risk aversion coefficient η, which Hall (1988) argues that is inappropriate because Φ is related to the willingness to substitute consumption today with a future one, whereas η refers to the willingness of the investor to move consumption between possible future states of the world. Epstein and Zin (1989) and Weil (1989) break out the dichotomy. They propose a more general utility specification, which preserves the scale-invariance of the power utility, but breaks the equivalence between coefficient of relative risk aversion and elasticity of inter-temporal substitution.

If the information set is normal, any payoff satisfies

$$1 = E(m_{t+1} R_{t+1} \mid \Psi_t) = exp[E(log(m_{t+1} r_{t+1}) \mid \Psi_t);$$
$$+ \frac{1}{2} Var(log(m_{t+1} r_{t+1}) \mid \Psi_t)] \tag{7}$$

which can be written as:

$$E(log(r_{t+1}) \mid \Psi_t) = E(log(m_{t+1}) \mid \Psi_t) - \frac{1}{2} Var(log(m_{t+1} r_{t+1}) \mid \Psi_t) . \quad (8)$$

If the One Factor Capital Asset Pricing Model is satisfied,

$$E(R_{it}) = R_t^f + \beta_i \gamma = R_t^f + \beta_i (E(R_t^m) - E(R_t^f)) \quad (9)$$

where γ is a benchmark´s risk premium, in equilibrium, the market return minus the risk free return.

Assume that the stochastic discount factor m_t has the form $a + bR_t^m$, relation (4) can be written for R_t^f and R_t^m as

$$1 = E(m_t R_{it}) = E(m_t R_t^m) = E(m_t) R_t^f \quad (10)$$

1.1 Estimation of Euler Equation of Consumption

In equilibrium, the conditional moment condition the stochastic discount factor m_t must satisfy, conditioned to previous information Ψ_{t-1} is that the expected product of any return R_t considering the discount factor must be equal to one,

$$E(m_t R_t \mid \Psi_{t-1}) = 1 \quad (11)$$

In particular, deviations in the moment condition can be interpreted as return´s alpha for the investor, as in Chen and Knez (1996), or selection of an inappropriate discount factor. That is

$$\alpha = E(m_t R_t \mid \Psi_{t-1}) - 1 . \quad (12)$$

The Euler equation of consumption (14) shows the expected rate of return on the assets as well as relative expected consumption stream which is negatively related to the risk aversion parameter.

$$1 = E\left(R_t \delta_t \frac{c_{t+1}^{\gamma-1}}{c_t^{\gamma-1}} \right) = E\left(R_t m_t \right) . \tag{13}$$

This shows whether consumers prefer to trade-off their current consumption for higher consumption levels in the future. In order to estimate preference parameters of the Euler equation, the constant relative risk aversion coefficient (CRRA) γ and discount factor δ, the GMM technique is used. The necessary condition for the GMM method to estimate the structural parameters is that the moment must hold.

To get the moment condition from equation (1) it is necessary to rearrange this equation as:

$$E\left(R_t \delta_t \frac{c_{t+1}^{\gamma-1}}{c_t^{\gamma-1}} \right) - 1 = E\left(R_t m_t \right) - 1 = 0 \tag{14}$$

According to Hansen and Singleton (1982) the discrete-time models of the optimization behavior of economic agents often lead to first-order conditions of the form:

$$E_t\left(h(x_t, \beta_o) \right) = 0, \tag{15}$$

where x_t is a vector of variables observed by agents at time t and β_o is a p dimensional parameter vector to be estimated. Therefore:

$$E\left(h_t\left(x_t, \beta_o \right) \right) = E\left(R_t \delta_t \frac{c_{t+1}^{\gamma-1}}{c_t^{\gamma-1}} \right) - 1 = E\left(R_t m_t \right) - 1 = 0 \cdot \tag{16}$$

In general, let us construct an objective function that depends only on the available information of the agents and unknown parameters β. Let $g_0(\beta) = E[f(x_t; z_t; \beta_o)]$ according to Hansen and Singleton (1982), if the model in (16) is true then the method of moment estimator of the function g is:

$$g_T(\beta) = \frac{1}{T}\sum_{t=1}^{T} f(x_t, z_t, \beta). \tag{17}$$

The value of $g_T(\beta)$ at $\beta = \beta_0$ should be close to zero for large values of T. This paper, follows Hansen and Singleton (1982) and choose β to minimize the function J_T,

$$J_T(\beta) = g'_T(\beta) W_T g_T(\beta) \tag{18}$$

where W_T is a symmetric, positive definite weighting matrix. W_T can be estimated minimizing

$$W_T = \frac{1}{T}\sum_{t=1}^{T}(f(x_t; z_t; \beta) f(x_t; z_t; \beta)) \tag{19}$$

The weighting matrix W_T is chosen so that g_T is close to zero, taking into account possible heteroscedasticity and autocorrelation (HAC) behavior.

Hansen and Singleton (1982) mention two advantages of estimating the non-linear Euler equation under GMM:

(a) The GMM estimator does not require the specification of the joint distribution of the observed variables, unlike the maximum likelihood (ML) estimator.

(b) The instrument vector needs to be predetermined in the period when the agent forms his expectations. Both past and present values of the variables in the model can be used as instruments. The model estimator is consistent even when the instruments are not exogenous or when the disturbances are serially correlated.

The iterated generalized method of moments estimator is calculated as follows: To compute W_T a consistent estimator of β_o is needed. This can be obtained by initially using $W_T = I_{r \times r}$ (identity matrix) and suboptimal choice of β in minimizing $J_T(\beta)$ (18) and obtaining, therefore, the values of β_T. By using this value of β in (19), W_T is obtained. Again, by using the new values of W_T, β_T can be obtained by minimizing equation (18). This process is repeated until the estimates converge. According to Pozzi (2003) this iterative GMM process is more efficient in a small sample than the simple standard two-step procedure given by Hansen and Singleton (1982).

Furthermore, the continuous updating estimator (CUE), proposed by Hansen, Heaton and Yaron (1996) and implemented here, performs better if the instruments are weak and has better small sample properties than the two-step General Method of Moments and instrumental variables estimators (Hahn, Hausman, and Kuersteiner 2004), although it requires intensive numerical optimization because the betas and the estimate of the variance-covariance matrix, *S*, which depends on the betas are calculated simultaneously (Baum, Schaffer and Stillman, 2007).

$$\beta_{cue} = \text{argmin}_{\beta} J\left(\beta\right) = \text{argmin}_{\beta} Tg(\beta)'[S(\beta)]^{-1} g(\beta)$$

2. The Mexican and Chilean economies

2.1 The Mexican economy

In the period of study five sup-periods can be identified: a slowdown of the economy, during 2007 and 2008, the crisis in Mexico, at the end of 2008 and beginning of 2009, the recovery period, 2009, 2010 and 2011 and a slowdown of the economy, at the end of 2012. During 2007, the economy slowed down because of the credit crises in the United States weakened its economy, Mexican exports moderated their growth and commodity prices increased: oil, food and metallic supplies. In august of 2008, the international banking market crises aggravated. With the bankruptcy of Lehman Brothers in September, uncertainty in the international market grew. The international markets lacked liquidity. The crises expanded to other financial markets, including the Mexican one. By the second quarter of 2008, the crisis effects began to subside. The actions that Mexican and international authorities had implemented started to give results. Progressively, market liquidity increased, the uncertainty diminished and the growth returned to the Mexican economy. During 2012, the uncertainty derived from the European Crisis affected the American Economy. Mexican exports slowed down and the manufacturing activity in some regions of the country, contracted. These were signs of a possible deterioration of the economic activity prospects in México.

2.2 The Chilean economy

The Chilean government conducts a rule-based countercyclical fiscal policy, accumulating surpluses in sovereign wealth funds during periods of high copper prices and economic growth, and allowing deficit spending only during periods of low copper prices and growth.

As a result, Chile had a mild economic crisis as a consequence of the world wide credit crises. Chile benefited from a governmental rule-based countercyclical fiscal policy. The economics went from a recovery period in 2006 and 2007 a to slowdown period in 2008. Chile only suffered the world wide crises consequences in 2009. By 2010, the Chilean economy was fully recovered. During the period of 2010 to 2012, it grew 6%, each year. In 2012, in spite of the European crises, the Chilean economy kept growing.

Inflation decreased gradually during 2006 to 2008, from being 13% in 2006 to 5% and 1% 2007 and 2008, respectively. In 2009 and 2010, as a consequence of the international economic crisis and the contra cyclical expansionary measures, inflation rebounded to 4% and 7%, respectively. For 2011 and 2012, prices stabilized, inflation grew only 3% and 2%, respectively.

3. Discussion and Analysis

This study analyses the performance of the Mexican Stock Market and the Chilean Stock Market. In each one a market index is selected as benchmark. The index used in the Mexican Market was the Total Return Index "Índice de Rendimiento Total (IRT)" and for the Chilean Market, the Santiago Stock Exchange Index "Índice de la Bolsa de Santiago "IPSA", both indexes are cash dividends adjusted. The mean and standard deviation of these indexes during the period under study are shown in Table 1. Notice also that 2008 had negative returns measured by IPSA and IRT. The same happened in 2011, when the prospects of the Mexican and Chilean economies weakened. The recovery was stronger during 2009 and 2010. The growth in 2012 was small, compared with those of 2009 and 2010. Volatility increased in 2008, decreased in the following two years, and it increased again in 2011, then decreased again in 2012, for both the IPC and the IRT.

Table 2 shows the average and standard deviation of the asset returns each year of the study in the Mexican and Chilean economies. The pattern is very similar to the one observed in Table 1. Chilean returns became negative in 2008 and 2011, as did the IPSA index. Mexico only shows a negative yearly return in the period of study: 2008, even though the 2011 IRT return was negative. Volatility is higher in all years for the asset returns than for the index returns, in both, the Mexican and Chilean economies.

If equation (13) is estimated for each return and the return for the risk free rate is subtracted for each of the returns, the following moment condition must be satisfied:

$$E\left(m_t\left(R_{it}-R_t^f\right)\right)=E\left(m_tR_{i,t}^e\right)=0, \tag{20}$$

where $R_{i,t}^e$ is the excess return of asset i. Considering that m_t can be written as $a+bR_{i,t}^e$, and standardizing the coefficient a as 1, as in Kosi (2006), we get the one parameter model

$$E\left(m_tR_{i,t}^e\right)=E\left(\left(1+bR_{m,t}^e\right)R_{i,t}^e\right)=E\left(R_{i,t}^e\right)+bE\left(R_{i,t}^eR_{m,t}^e\right)=0 \tag{21}$$

The two parameter model follows from equation (15), where α can be different from zero, in this case the moment condition becomes

$$E\left(m_tR_{i,t}^e\right)-a_0=E\left(\left(1+bR_{m,t}^e\right)R_{i,t}^e-a_0\right)=$$

$$E\left(R_{i,t}^e\right)-a_0+bE\left(R_{i,t}^eR_{m,t}^e\right)=0 \tag{22}$$

Table 3 shows the coefficients obtained using the continuous updating (CUE) estimator for Mexico and Chile in the two parameter model. Notice that the alpha is positive and statistically significant, which indicates a possible premium over the one market factor model, albeit small. The only exception is in 2009, for Mexico, year in which alpha becomes negative and large, -0.082. The negative alpha reflects a persistent negative trend on the performance of stocks, despite the recovery of IRT. The beta coefficients are negative, except for 2007 and 2012, which reflect a negative discount proportional to the return on the IRT. The higher the return on the IRT, the smaller the expected discount factor. During 2010 and 2012, the absolute value of the beta factor was larger than in 2007 and 2008, which reflects a higher discount during the recovery period and during a time period of a year when the Mexican economy slowed down due to the European crisis.

The anomalous results in 2009 for Mexico are associated with overidentification in the model. The probability that the Chi square value of the Hansen overidentification test be equal to zero is 0.02, see Table 4. In all other periods, the null hypothesis of lack of overidentification of the Hansen tests cannot be rejected.

For the Chilean economy, in the two parameter model, the discount factor is proportional to the market index and negative, and it is possible an alpha excess return over the one market factor model. Alphas are positive in all periods and statistically significant. The slope coefficients of the return are negative and statistically significant. There is no observable sign change in the discount factor model for the period under study.

However, the increase in the sensibility of the discount factor to the market index during 2009 (the recovery period) and 2012 (the European crisis period), this contrasts with the small beta coefficient in 2008 (the international credit crisis) is noticiable, this contrasts with, see Table 4. These observations can be consequences of the implemented countercyclical measures in the Chilean economy, which decreased the sensitivity of the asset returns to the index stock market. The Hansen hypothesis of non-overidentification is not accepted from 2009 to 2011, see Table 5.

In the restricted one coefficient model, similar results are observed. In the Mexican model, all beta coefficients are negative, except for 2009, for which the Hansen non-overidentification hypothesis cannot be accepted. In 2010 and 2012, there is an augmented sensitivity of the stochastic discount factor to the market index. However, during 2012 the Hansen non-overidentification hypothesis is rejected. In the Chilean model, the results are similar to those observed in the Mexican model. However, the beta coefficient has a positive sign for the year 2009, which can be due to overidentification, see Table 6 and Figure 1. The Hansen non-overidentification hypothesis cannot be accepted from 2009 to 2011, see Table 6. The beta coefficients to the market index are large and negative for 2010 (the recovery period) and 2012 (the European crisis), see Table 5.

The analysis using the two step GMM and IGMM methods shows less reliable estimates than the CUE estimator, see Table 7. For Mexico, 2009 and 2012, the beta coefficients of the market factor are positive according to the two steps GMM and IGMM methods, see Table 7. With the CUE estimator only in 2009 the beta coefficient is positive, see Table 5. In addition, only in 2008, 2009 and 2012 the beta coefficients are statistically different from zero with 95 percent confidence with the two steps GMM method. With the CUE estimator, only 2010 did not show a beta coefficient statistically different from zero. For Chile, in 2008, the beta coefficient is negative in the two steps GMM and the IGMM. Overidentification and weak instruments can be affecting results in the two steps GMM and IGMM.

Table 7 shows the coefficients using two-step estimation during the period under study for IPSA and IRT, as well as market indexes for Mexico and Chile. Notice that 2008 and 2010 have a negative coefficient E(R*RME) for Mexico given that the expected returns were negative. The slope coefficient for Chile was small for those years compared with other years, in which the expected index return became negative. The results suggest that a linear model with IRT can be more appropriate for Mexico than a linear one with IPSA for Chile.

Conclusions and recommendations

The applications show that the stochastic discount factor changed during the previous crisis credit period, in years 2009 and 2010, in the Mexican and Chilean economies. In 2009 the sensitivity to the index became abnormally positive. In 2010, it became abnormally large, although negative.

Using the continuous updating estimator (CUE), the alpha for Mexico and Chile is positive in all years except for 2009, when there are over identification issues. For Mexico and Chile, in all years except for Mexico in 2007 and 2012, the betas are negative, that is, the discount factor is inversely related to IRT factor.

The sizes of the betas are related to the economics and economic policies implemented in the countries. In Mexico and Chile, betas in absolute terms were higher during the recovery period from the credit crisis and during the European crisis and lower during the credit crisis.

The results suggest that using a continuous updating estimator gives more reliable estimates of the linear stochastic discount factor than the two stages or the iterated general method of moments estimators, particularly if instruments are weak.

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Table 1. Mean and standard deviation of the daily market index returns in Mexico and Chile

Country Index	Chile: IPSA		México: IRT	
Year	Mean	Std. Dev.	Mean	Std. Dev.
2007	1.000581	0.012185	1.00062	0.01352
2008	0.999169	0.01848	0.999252	0.022944
2009	1.001694	0.010248	1.00166	0.017061
2010	1.001304	0.007358	1.000819	0.009072
2011	0.999442	0.013889	0.999994	0.01233
2012	1.000136	0.005965	1.000741	0.007104

Daily returns.
Source: Own elaboration

Table 2. Mean and standard deviation of the daily returns in Mexico and Chile

	Mexico		Chile	
Year	Mean	Std. Dev.	Mean	Std. Dev.
2007	1.001546	0.0220236	1.001008	0.0209549
2008	0.9989916	0.036032	0.9987378	0.027021
2009	1.002161	0.0324366	1.002126	0.0274227
2010	1.001043	0.0196362	1.002244	0.0282331
2011	1.000147	0.0228024	0.9997626	0.036385
2012	1.001278	0.0190305	1.000299	0.026818

Based on assets with at least 60 quotes in the year.
Source: Own elaboration

Table 3. Cue estimator, two parameter model

		México			Chile		
2007	ret_me	-21.82258	-3.62	***	-33.32382	-10.12	***
	_cons	0.0031768	5.58	***	0.0031076	12.55	***
2008	ret_me	-26.54003	-6.38	***	-14.78938	-8.56	***
	_cons	0.0067242	4.6	***	0.0014661	4.73	***
2009	ret_me	490.553	2.54	**	-470.0749	-3.45	***
	_cons	-0.0825211	-2.46	**	0.0236357	3.64	***
2010	ret_me	-73.860	-2.81	***	-60.10842	-3.35	***
	_cons	0.0042448	3.43	***	0.0032123	6.57	***
2011	ret_me	-9.780145	-1.97	**	-28.54276	-8.69	***
	_cons	0.0007979	1.73	*	0.0024213	6.32	***
2012	ret_me	-71.010	-2.5	**	-229.3429	-4.87	***
	_cons	0.00293	3.96	***	0.003834	4.46	***

***, **, * statistically significant at the 99%, 95% and 90%.
Source: Own elaboration

Table 4. Hansen overidentification test of all instruments, CUE estimator, two parameter model

	Mexico		Chile	
	Hansen J statistic	Chi-sq(1) P-val	Hansen J statistic	Chi-sq(1) P-val
2007	3.502	0.0613	3.077	0.0794
2008	1.354	0.2446	3.957	0.0467
2009	5.412	0.02	11.358	0.0008
2010	0.039	0.8439	9.199	0.0024
2011	0.002	0.9683	14.465	0.0001
2012	1.63	0.2018	0.227	0.6339

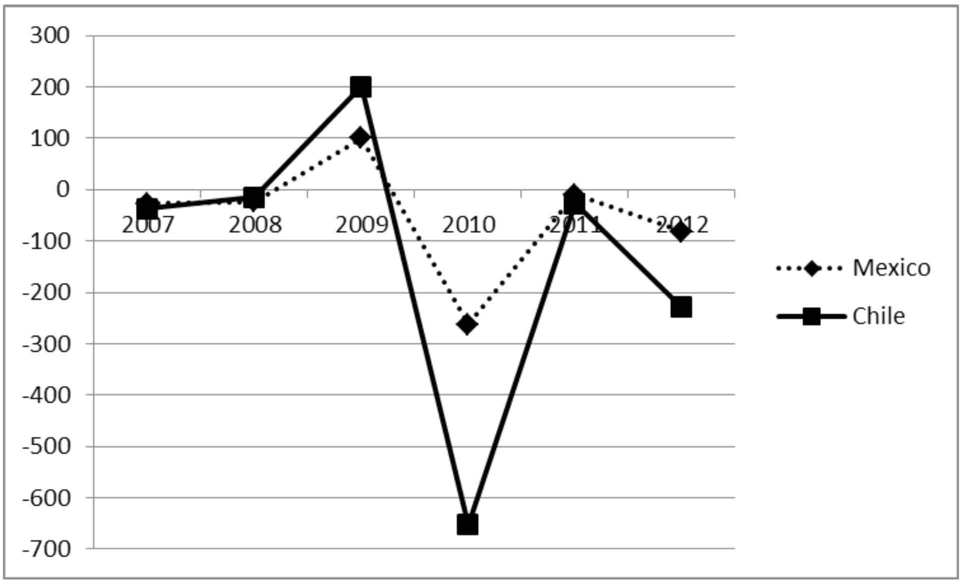
Source: Own elaboration

Table 5. Cue estimator, one parameter model

	Mexico			Chile		
ret_me	Coef.	Z		Coef.	z	
2007	-27.027	-3.8	***	-36.952	-10.24	***
2008	-23.708	-6.66	***	-14.622	-8.66	***
2009	99.838	5.96	***	200.184	7.67	***
2010	-263.009	-1.58		-652.440	-3.16	***
2011	-9.347	-1.99	**	-26.822	-9	***
2012	-82.225	-2.47	**	-229.048	-4.77	***

Source: Own elaboration

Figure 1: Stochastic discount factor for Mexico and Chile, one parameter model



Source: Own elaboration

Table 6. Hansen overidentification test of all instruments, CUE estimator, one parameter model

	Mexico Hansen J statistic	Chi-sq(1) P-va	Chile Hansen J statistic	Chi-sq(1) P-va
2007	2.587	0.1077	2.084	0.1488
2008	2.78	0.0954	3.55	0.0596
2009	16.538	0	33.819	0
2010	0.597	0.4398	8.045	0.0046
2011	0.006	0.9387	14.865	0.0001
2012	12.744	0.0004	0.6842	0.6842

Source: Own elaboration

Table 7. Two steps and IGMM estimators for Mexico and Chile, one parameter model

	México		Chile	
Two steps	**Coef.**	**Z**	**Coef.**	**z**
2007	-15.446	-1.22	117.514	6.89 ***
2008	-66.896	-3.37 ***	-78.718	-2.24 **
2009	35.871	2.74 ***	55.959	2.3 **
2010	-5.584	-0.09	187.067	2.47 **
2011	-4.412	-0.24	9.572	0.42
2012	79.108	2.56 **	106.985	0.83
Igmm	**Coef.**	**Z**	**Coef.**	**z**
2007	-15.646	-1.24	116.922	6.91 ***
2008	-65.927	-3.42 ***	-82.058	-2.28 **
2009	36.088	2.75 ***	60.324	2.42 **
2010	-42.257	-0.67	194.799	2.52 **
2011	-5.030	-0.27	13.211	0.59
2012	78.831	2.55 **	92.930	0.75

The first three lags of the excess market return were used as instruments.
*,**, *** statistically significant at 90, 95 and 99 percent.
Source: Own elaboration