Asian Economic and Financial Review

THE FISHER EFFECT IN THE SPANISH CASE: A PRELIMINARY STUDY

Francisco Jareño[1]
Marta Tolentino[2]

ABSTRACT

We revise previous literature about Fisher Effect, in order to check if the majority of nominal interest rates movements are caused by inflation rate fluctuations, remaining constant the real interest rate. Finally, we analyse the Fisher Effect in the Spanish case with a preliminary analysis in order to validate future studies.

INTRODUCTION

The Fisher hypothesis is one of the most debated topics in financial economics literature. According to Fisher (1930), the nominal interest rate in any period is equal to the sum of the real interest rate and the expected rate of inflation.

The existence of the *Fisher Effect* has a lot of implications in other kinds of researches related with the flow-through capability, that is, has implications on the sensitivity of the stock prices when nominal interest rates change due to variations in the expected inflation rate (Jareño, 2005, and Jareño and Navarro, 2010).

Thus, the main purpose of this research consists in revising previous literature about Fisher Effect, in order to check if the majority of nominal interest rates movements are caused by inflation rate

---

[1] Universidad de Castilla-La ManchaFacultad de Ciencias Económicas y Empresariales Plaza de la Universidad, 1, 02071, Albacete (Spain)

[2] Universidad de Castilla-La Mancha Facultad de Derecho y Ciencias Sociales Ronda de Toledo, s/n, 13071, Ciudad Real (Spain)

fluctuations, remaining constant the real interest rate. Second, we analyse the Fisher Effect in the Spanish case with a preliminary analysis, using a very easy proposal. Our final aim lies in validating another kind of researches related with the flow-through capability (Jareño, 2005; Jareño and Navarro, 2010; and Díaz and Jareño, 2012), that is, the ability of the firm to pass on an inflation shock to the firm's output prices. Finally, this paper points out the main implications of the Fisher Effect, and our concluding remarks.

The Fisher Effect

The percentage in which the nominal interest rates contain inflation expectations keeping constant the real interest rate is named the Fisher Effect.

Thus, when expected inflation rate rises in a percentage point (π_t^e), the nominal interest rate (i_t) also increases in the same percentage and the real interest rate (r_t^e) keeps constant.

$$i_t \approx r_t^e + \pi_t^e \qquad\qquad [1]$$

This section of our paper focuses on looking through part of the present literature and trying to achieve a conclusion about if the Fisher Effect comes true totally or partly or does not come true.

LITERATURE REVIEW

There is a lot of literature that analyze the Fisher Effect in different countries and periods.

Alonso and Ayuso (1996), Crowder and Hoffman (1996), Hawtrey (1997), Perez and Siegler (2003), Tillmann (2004), Panopoulou (2005), Kaliva (2007) and Westerlund (2008) confirm the existence of a significant Fisher Effect.

For Fisher (1930), Froyen and Davidson (1978), Fama and Gibson (1982), Kolluri and Ganti (1982), Makin (1982), Kuroda (1983), Wilcox (1983), Huizinga and Mishkin (1986), Findlay (1991), Gupta (1992), Mishkin and Simon (1995), Peláez (1995), Esteve and Tamarit (1996), Kandel *et al*. (1996), Alonso *et al*. (1997), Bajo and Esteve (1998), Laurian (1998), Ferrer (2000), Atkins and Coe (2002), Johnson (2005), Mitchell-Innes (2006), Lee (2007), Mitchell-Itness *et al*. (2008) and Beyer *et al*. (2009) the Fisher Effect exists partly and in the long term. Nevertheless, for other researchers like Fama (1975), Mishkin (1992), Chen and Shrestha (1998) and Fahmy and Kandil (2003) Fisher Effect existence can be assumed totally and in the long term. For Darby (1975) and Rico (2000) this long term effect arises but must be adjusted by the tax effect on interest income.

Finally, Mauleón (1987), Aznar and Nievas (1995), Dutt and Ghosh (1995), Weidmann (1997), Evans (1998), Junttila (2001), Copock and Poitras (2000), state that there is not a significant Fisher Effect

The Fisher Effect – according to the most of literature- will take place only partly and in the long-term, so that we cannot suppose that a shock in the inflationist expectations – happened at a certain moment - moves to the nominal interest rates of the economy at that same moment and totally.

Table-1. Fisher Effect checked for different countries and periods

Panel A: Not significant *Fisher Effect*

Papers	Conclusion about *Fisher Effect*
Dutt and Ghosh (1995)	
Weidmann (1997)	
Evans (1998)	
Junttila (2001)	
Copock and Poitras (2000)	Different countries
Mauleón (1987)	
Aznar and Nievas (1995)	Spanish case

Panel B: *Fisher Effect* adjusted by taxes in the long term

Papers	Conclusion about *Fisher Effect*
Darby (1975)	
Rico (2000)	Spanish case

Table-1. Fisher Effect checked for different countries and periods (cont.)

Panel C: Partial *Fisher Effect* in the long-term

Papers	Conclusion about *Fisher Effect*
Fisher (1930)	
Froyen and Davidson (1978)	
Fama and Gibson (1982)	
Kolluri and Ganti (1982)	
Makin (1982)	
Kuroda (1983)	
Wilcox (1983)	
Huizinga and Mishkin (1986)	
Findlay (1991)	
Gupta (1992)	
Mishkin and Simon (1995)	
Kandel et al. (1996)	
Laurian (1998)	
Atkins and Coe (2002)	
Johnson (2005)	
Mitchell-Innes (2006)	
Lee (2007)	
Mitchell-Itness et al. (2008)	
Beyer et al (2009)	Different countries
Peláez (1995)	
Esteve and Tamarit (1996)	
Alonso et al. (1997)	
Bajo and Esteve (1998)	
Ferrer (2000)	Spanish case

Table-1. Fisher Effect checked for different countries and periods (cont.)

Panel D: Total *Fisher Effect* in the long term

Papers	Conclusion about *Fisher Effect*
Fama (1975)	
Choudry et al. (1991)	
Mishkin (1992)	
Chen and Shrestha (1998)†	
Fahmy and Kandil (2003)	Different countries

†The authors confirmed a short-run Fisher Effect for UK and Japan

Panel E: Significant *Fisher Effect*

Papers	Conclusion about *Fisher Effect*
Crowder and Hoffman (1996)	
Hawtrey (1997)	
Perez and Siegler (2003)	
Tillmann (2004)	
Panpoulou (2005)	
Kaliva (2007)	
Westerlund (2008)	Different countries
Alonso and Ayuso (1996)	Spanish case

By supposing that this *Fisher Effect* takes place in the long-term, although partly, this result is very important, and has a lot of implications in other kind of researches related with the flow-through capability.

Thus, our result has implications on the sensitivity of the stock prices when nominal interest rates change due to variations in the expected inflation rate. The future research will focus on analysing the repercussion of the Fisher Effect on the company ability to pass inflationist shocks on to product prices.

Implications of the Fisher Equation

The Fisher equation has some interesting implications:

If $\pi_t^e = 0$, then $i_t = r_t^e$. In this case money is not loosing or gaining any value. Thus, the cost of holding money is equal to its opportunity cost, the real return on assets.

Under this condition r_t^e cannot be negative, as $i_t \geq 0$.

If $\pi_t^e > 0$, then $i_t > r_t^e$. For a positive inflation rate, nominal interest rates will always exceed real interest rates.

If $\pi_t^e < 0$, then $i_t < r_t^e$. For a negative inflation rate (= an expected deflation), real interest rates will always exceed nominal interest rates.

For a given i, the higher π_t^e, the lower r: $\partial r_t^e / \partial \pi_t^e = -1$

This case is particularly relevant if an economy is in a liquidity trap where i_t cannot be influenced by the central bank anymore.

Mathematical Derivation of the Fisher Equation

Mathematically the intuitive notion of the Fisher equation can be decomposed as follows (without arbitrage opportunities):

$$(1 + i_t) = (1 + r_t^e) \cdot (1 + \pi_t^e) \qquad [2]$$

Expanding the brackets on the right side of the equation:

$$1 + i_t = 1 + r_t^e + \pi_t^e + (r_t^e \cdot \pi_t^e) \qquad [3]$$

Thus, we obtain the following Fisher equation:

$$i_t = r_t^e + \pi_t^e + (r_t^e \cdot \pi_t^e) \qquad [4]$$

The term $(r_t^e \cdot \pi_t^e)$ is usually very small and can therefore be neglected in most cases.

So, we achieve this approximation of the Fisher Equation:

$$i_t \approx r_t^e + \pi_t^e \qquad [5]$$

$$r_t^e \approx i_t - \pi_t^e \qquad [6]$$

Intuition of the Fisher Effect

Now, after understanding Fisher equation, we finally get to the Fisher Effect: $\Delta i_t = \Delta \pi_t^e$.

It proposes a 1 : 1 relationship between i_t and π_t^e. That is, an increase in expected inflation leads to a proportional increase in the nominal interest rate.

MATERIALS AND METHODS

In this section our research describes the way to obtain estimates of inflation expectations and nominal interest rates.

Inflation Expectations

This research uses a sample of monthly data of Spanish consumer price index (IPC) released by "Instituto Nacional de Estadística" (INE) from February 1993 to December 2004.

To remove the seasonal component of the IPC series, we use a year-to year inflation rate. Thus, we smooth the IPC series without disturbances and we work out each piece of data like this:

$$\pi_t = \frac{IPC_t - IPC_{t-12}}{IPC_{t-12}} \qquad [7]$$

being IPC_t the consumer price index at time t, obtaining an unseasoned inflation rate (π_t) each month.

A problem that arises when testing for the Fisher Effect is the lack of any direct measure of inflation expectations. So we include this debate in this section of the paper.

Thus, there are several methodologies for measuring the expected component of inflation rate. On one hand, a body of literature uses *autoregressive integrated moving average* (ARIMA) models (Pearce and Roley, 1988, Schwert, 1981, Fraser et al., 2002, and Browne and Doran, 2005). On the

other hand, a group of researchers uses periodical surveys of forecasts as *proxies* of the expected inflation rate (Berk, 1999, Andersen *et al.*, 2003, and Adams *et al.*, 2004).

Schwert (1981), Asikoglu and Ercan (1992) and Moosa and Kwiecien (1999) use short-term interest rates as predictors of inflation rate, and Hu and Willett (2000) and Boyd *et al.* (2005) present certain expressions which depend on multiple variables for estimating the inflation rate. Other authors use VAR models (autoregressive vectors) to obtain the inflation rate, as Hagmann and Lenz (2004) and Anari and Kolari (2001), and even other methods such as the simple Kalman filter (Lee, 1992, and Cassola and Luís, 2003), the Hodrick − Prescott filter (Kramer, 1998, and Pérez de Gracia and Cuñado, 2001) and government inflation-indexed bonds (Sack, 2000, Alonso *et al.*, 2001, Tessaromatis, 2003, and Gapen, 2003). Finally, authors such as Ariño and Canela (2002) exhibit the *naïve* model as an easy way to estimate the expected inflation rate. This model assumes that the better forecast at time t is the last known data (t -1, generally).

This research uses the most popular approximation to estimate the expected inflation rate: ARIMA models.[3] Thus, ARIMA (1, 0, 0) process provides the best results, and we use this process (shortsightedness expectations, according to Leiser and Drori, 2005) to predict the month-to-month inflation rate:[4]

$$E_t\left(\pi_{t,t+12}\right) = \pi_{t-12,t} \qquad [8]$$

A standard test of unbiasedness of inflation considered measure involves to regressing the total inflation rate (actual inflation rate in the economy) on the proposed measure:[5]

$$\pi_{t-12,t} = \alpha + \beta \cdot E_{t-12}\left(\pi_{t-12,t}\right) + u_t \qquad [9]$$

If these estimations are unbiased forecasts of the actual inflation rate, then it is expected that $\alpha = 0$ and $\beta = 1$ and u_t will be serially uncorrelated. The estimation is reported in Table 2. The regressions demonstrates that the joint hypothesis ($\alpha = 0$ and $\beta = 1$) cannot be rejected. Besides, α is not significantly different from zero and β is significantly close to one.

Table 2.- Unbiasedness test

OLS regression with the yearly data (from Feb. 1964 to Jan. 2005):

$$\pi_{t-12,t} = \alpha + \beta \cdot E_{t-12}\left(\pi_{t-12,t}\right) + u_t$$

---

[3] Likewise, Joyce and Read (2002) and Browne and Doran (2005) observe similar results using ARIMA and other alternative procedures.

[4] Unit root tests confirm that inflation rate is a I(1) series, so this result is consistent with shortsightedness expectations.

[5] We have conducted an historical unbiasedness test, because of the limited yearly sample.

where $\pi_{t-12,\,t}$ shows the total inflation rate, $E_{t-12}(\pi_{t-12,\,t})$ the expected inflation rate and u_t the error term # *Wald* test allows to check the joint hypothesis: $\alpha = 0$ and $\beta = 1$ (*F-statistic* value is showed)

	Intercept	Beta	Adj R^2	*Wald* test #
ARIMA (1,0,0)	0.008656	0.891894 ^{c}	0.781025	1.086506
	(1.171342)	(12.13410)		

* p < 0.10, ** p < 0.05, *** p < 0.01 (t-statistics in parentheses)

We can accept the joint hypothesis ($\alpha = 0$ and $\beta = 1$), so, this measure of expected inflation rate can be considered as an unbiased estimator of ex – post inflation rate.

Expected Changes in Nominal Interest Rates

An important point in this analysis is concerned to the choice of the adequate interest rate to employ. Most of the literature uses long-term interest rates because they incorporate the future expectations of economic agents and they determine the corporate borrowing cost, so they have a lot of influence on the investment decisions of firms and, consequently, they affect the value of companies. Besides, we have used the total variations in long-term interest rates to capture unanticipated changes in interest rates (Sweeney and Warga, 1986, Kane and Unal, 1988, Bartram, 2002 and Oertmann *et al.*, 2000).

Some researchers use alternative procedures such as forecast error of the ARIMA process to model the unexpected interest rate (Flannery and James, 1984). Mishkin (1982) approach the unanticipated changes in interest rates with the spread between spot interest rate of the three month treasury bills in period *t* and *forward* rate of the three month treasury bills in yield curve during period *t* -1. On the other hand, Fendel (2005) develop a Taylor rule expression for the interest rate dynamics and he concludes that interest rates can be sufficiently explained by expected variations in inflation and output plus an additional unobservable factor.

An interesting alternative for the use of ARIMA model forecasts are survey forecasts of interest rates they are intrinsically "forward looking". They have been studied and applied in the literature, comparing with time series approach, getting the conclusion that each approach has their own advantages and drawbacks (Froot, 1989 and Benink and Wolff, 2000).

In this study we use first differences of the long-term interest rates as a good approach of the unexpected changes in the nominal interest rates. The body of literature, mainly in the US market, has relied on 1, 3, 5 and 10-year Treasury bond yields and three-month Treasury bill yields as interest rate *proxy* variable.

The returns of the Treasury securities in different maturities are usually used as the risk-free interest rate *proxies*. It is supposed that these securities have not default risk.

In the Spanish case, we have decided to use returns series of the one-year Treasury debt securities. This risk-free interest rate approximation allow us to obtain changes in real interest rates, Δr_t, as the difference between variations in nominal interest rates, Δi_t, and year-to year inflation rate, $\Delta E_t(\pi_{t,t+12})$:

$$\Delta i_t = \Delta r_t + \Delta E_t\left(\pi_{t,t+12}\right)$$

[10]

We show the evolution of the variables included in our research (expected changes in nominal interest rates and inflation expectations) in figure 1.

Figure-1. Evolution of the variables included in the analysis
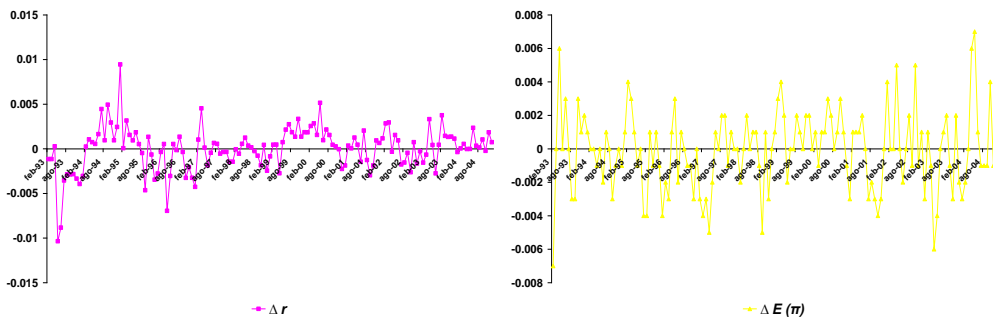
EXISTENCE OF THE FISHER EFFECT IN THE SPANISH CASE

In this paper we propose a very direct and easy way to check the Fisher Effect in the Spanish case. This analysis is very important, because the existence of the Fisher Effect has a lot of implications in other kind of researches related with the flow-through capability.

One way to show if the expected inflation rate (current and delayed) influences nominal interest rates in the medium term, that is, to analyze the existence of the Fisher Effect in this term consists in carrying out the following test:

$$\Delta i_t = \alpha_1 \cdot \Delta E_t\left(\pi_{t,t+12}\right) + \alpha_2 \cdot \Delta E_{t-1}\left(\pi_{t-1,t+11}\right) + \varepsilon_t$$

[11]

where Δi_t is the variation in nominal interest rates, $\Delta E_t(\pi_{t,t+12})$ the variation in expected inflation rate, $\Delta E_{t-1}(\pi_{t-1,t+11})$ the variation in expected inflation rate one period delayed and ε_t the variation in real interest rates.

Table-3. A proposed test about the existence of the Fisher Effect

OLS regression with robust standar errors, that is, to correct errors of autocorrelation and heteroskcedasticity we apply the Newey-West procedure. This regression allows us to test if variations in the expected inflation rate influence nominal interest rates.

$$\Delta i_t = \alpha_1 \cdot \Delta E_t\left(\pi_{t,t+12}\right) + \alpha_2 \cdot \Delta E_{t-1}\left(\pi_{t-1,t+11}\right) + \varepsilon_t$$

where Δi_t is the variation in nominal interest rates, $\Delta E_t(\pi_{t,t+12})$ the variation in expected inflation rate, $\Delta E_{t-1}(\pi_{t-1,t+11})$ the variation in expected inflation rate one period delayed and ε_t is the variation in real interest rates

	Intercept	$\Delta E_t(\pi_{t,t+12})$	$\Delta E_{t-1}(\pi_{t-1,t+11})$	Adj R^2
Coeficients	-0.000751 [b]	0.195619 [c]	0.134754	0.036498
(t-statistics)	(-2.289430)	(2.721731)	(1.234583)	

[a] $p < 0.10$, [b] $p < 0.05$, [c] $p < 0.01$

We use OLS regression with robust standard errors to estimate our proposal [11]. Thus, we apply the Newey-West procedure in order to correct errors of autocorrelation and heteroskcedasticity. This regression allows us to test if variations in the expected inflation rate influence nominal interest rates.

Figure-2. Evolution of real interest rates and residuals of the Fisher Effect equation
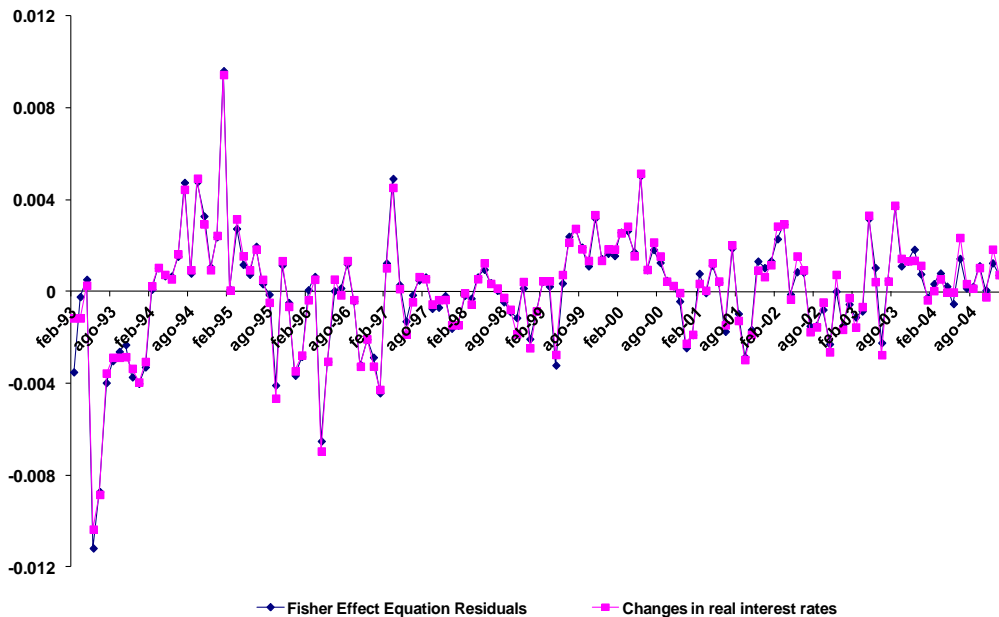
According to results showed in table 3, a positive and significant relationship exists between variations in the current expected inflation rate and variations in nominal interest rates. Namely, an increment of 100% in the inflation rate gets a nominal interest rates increment around 20%, relying on the past inflation rate too.

Thus, we can affirm the existence of partial Fisher Effect in the Spanish case, using a very easy and direct way to check this Spanish Fisher Effect. Also, we avoid using other sophisticated and complex econometric techniques, such as causality and co-integration techniques (Grullón, 2012, and Hossain and Saeki, 2012).

Residuals from the regression accord with variations in real interest rates (see figure 2), confirming this existence of partial Fisher Effect.

Implications of the Fisher Effect

The Spanish economy has experienced annual growth of about 3.7 % for the period 1993-2005, which is well above the European Union average (2.35 %). Although it has been claimed that this growth has been based on the building sector, the increasing role of Spanish companies in the global market, and particularly in the service sectors, is noteworthy. However, one of the main drawbacks of the Spanish economy during this period has been a persistent spread of the domestic inflation rate with respect to other EMU countries, together with very low growth of labour productivity[6] compared with other competitors. Although Spain entered the Eurozone in 1999, this difference between Spanish inflation and the European average has not disappeared.

This is an interesting topic in that members of a common monetary area should also converge in terms of inflation rates due to the loss of competitiveness that, in the medium and long term, would be caused by such a situation.

One potential explanation of these phenomena could be a lack of liberalization or competition in some sectors of the Spanish economy, in the sense that firms in those industries are able to easily transmit inflation shocks to their output prices. According to some of the hypotheses described below, these facts could also have consequences on the impact of changes of nominal interest rates on company stock prices. In short, these hypotheses suggest that when changes in interest rates are due to changes in the expected inflation and simultaneously firms are capable of passing on these inflation shocks to their output prices (and thus to nominal revenues and profits), the impact of these interest rate changes on stock prices should be minimal. A large body of literature (Estep and Hanson, 1980; Leibowitz and Kogelman, 1990 y 1993; Asikoglu and Ercan, 1992) document this phenomenon for different industries and periods. Moreover, Asikoglu and Ercan (1992) show a negative relationship between inflation and stock returns and estimate the flow-through coefficients at an industrial level, showing that companies that operate in sectors with high flow-through capability are less sensitive than those firms that operate in low flow-through capability sectors.

Following Jareño and Navarro (2010), changes in nominal interest rates may have a different impact on stock prices depending on whether the change is induced by a shift in inflation expectations or caused by changes in real interest rates. A very controversial point in the literature concerns the stability of real interest rate, i.e., whether or not the so-called Fisher Effect holds.

According to Leibowitz and Kogelman (1990), the impact on stock prices of changes in nominal interest rates due to variations in the expected inflation depends, to a large extent, on the capability

---

[6] Labour productivity in Spain has experienced an annual growth of about 1 % below the European Union average for the period 1993-2005.

of firms to absorb these inflation shocks. This argument led to the definition of the flow-through coefficient (Estep and Hanson, 1980, and Asikoglu and Ercan, 1992) as the expected inflation percentage which flows into a firm's expected nominal cash-flows and so into firm profits and dividend growth.

That is, assuming that the risk premium does not change with changing inflation, if a firm is capable of transmitting a general increase in prices entirely to the prices of its own outputs and thus to its nominal expected profits, this would leave the stock price unchanged. On the contrary, a low flow-through capability (as assumed in the traditional DDM)[7] would lead to an extremely high sensitivity of stock prices to interest rate changes. Of course this capability of transferring inflation shocks to nominal profits may depend on the industry this company operates in. A company running a business in an industry exposed to foreign competition (in this case the ability of firms to absorb inflation shocks would be close to zero) would not be the same as another one with significant market power, due to a lack of liberalization or to the presence of dominant firms in some sectors of the economy. In this case, the response of stock prices to a change in nominal interest rates caused by a variation in inflation expectations will be minimal while this effect will increase for firms operating in a competitive environment.

CONCLUDING REMARKS

This paper analyses previous literature about Fisher Effect, in order to check if the majority of nominal interest rates movements are caused by inflation rate fluctuations, remaining constant the real interest rate. According to the most of literature the Fisher Effect will take place only partly and in the long-term, so that we cannot suppose that a shock in the inflationist expectations – happened at a certain moment - moves to the nominal interest rates of the economy at that same moment and totally.

Besides we check if the Fisher Effect in the Spanish case holds with a preliminary analysis in order to validate future studies. In this study we find a positive and significant relationship between variations in the expected inflation rate and changes in nominal interest rate in the period 1993-2004. In this case, an increment of 100% in the inflation rate gets a nominal interest rates increment around 20%, so we can confirm the existence of partial Fisher Effect.

Additionally, we validate another kind of researches related with the flow-through capability that is, the ability of the firm to pass on an inflation shock to the firm's output prices. Following Jareño and Navarro (2010), changes in nominal interest rates may have a different impact on stock prices depending on whether the change is induced by a shift in inflation expectations or caused by

---

[7] DDM: Dividend Discount Model (Gordon, 1959; Gordon and Shapiro, 1956).

changes in real interest rates. Thus, if the Fisher Effect exist, a firm capable of transmitting a general increase in prices entirely to the prices of its own outputs and thus to its nominal expected profits, this would leave the stock price unchanged. On the contrary, a low flow-through capability, would lead to an extremely high sensitivity of stock prices to interest rate changes.

Of course this capability of transferring inflation shocks to nominal profits may depend on the industry this company operates in. A company running a business in an industry exposed to foreign competition (in this case the ability of firms to absorb inflation shocks would be close to zero) would not be the same as another one with significant market power, due to a lack of liberalization or to the presence of dominant firms in some sectors of the economy. In this case, the response of stock prices to a change in nominal interest rates caused by a variation in inflation expectations will be minimal while this effect will increase for firms operating in a competitive environment.

ACKNOWLEDGEMENTS

REFERENCES

Adams, G., McQueen, G. and R. Wood (2004) "The effects of inflation news on high frequency stock returns" Journal of Business, Vol. 77, No.3, pp. 547-574.

Alonso, F.A. and J. Ayuso (1996) "Una estimación de las primas de riesgo por inflación en el caso español" Documentos de Trabajo del Banco de España, No.9630.

Alonso, F.A., Ayuso, J. and J. Martínez (1997) "El poder predictivo de los tipos de interés sobre la tasa de inflación española" Documento de trabajo No.9722, Banco de España, Servicios de Estudios.

Alonso, F., Blanco, R. and A. del Río (2001) "Estimación de expectativas de inflación a partir de los precios del bono indiciado francés" Boletín Económico, junio, Banco de España, pp. 61-72.

Andersen, T.G., Bollerslev, T., Diebold, X. and C. Vega (2003) "Micro effects of macro announcements: real-Time price discovery in foreign exchange" The American Economic Review, Vol. 93, No.1, pp. 38-62.

Anari, A. and J. Kolari (2001) "Stock prices and inflation" The Journal of Financial Research, Vol. XXIV, No.4, pp. 587-602.

Ariño, M.A. and M.A. Canela (2002) "Evolución de la inflación en España" IESE, Centro Internacional de Investigación Financiera (CIIF), Documento de investigación No.446.

Asikoglu, Y. and M.R. Ercan (1992) "Inflation flow-through and stock prices" Journal of Portfolio Management, Vol. 18, No.3, pp. 63-68.

Atkins, F.J. and P.J. Coe (2002) "An ARDL Bounds Tests Approach to Testing the Long run Fisher Effect in the United States and Canada" Journal of Macroeconomics, Vol. 24 No. 2, pp. 255-266.

Aznar, A. and J. Nievas (1995) "Una propuesta de contraste del efecto Fisher con expectativas racionales: Aplicación al caso español" Revista Española de Economía, Vol. 12, pp. 281-305.

Bajo, O. and V. Esteve (1998) "¿Existe un efecto Fisher en el largo plazo? Evidencia para la economía española, 1962–1996" Revista Española de Economía, Vol. 15, No.2, 149–66.

Bartram, S.M. (2002) "The interest rate exposure of nonfinancial corporations" European Finance Review, Vol. 6, pp. 101-125.

Benink, H.A. and C.P. Wolff (2000) "Survey Data and the Interest Rate Sensitivity of US Bank Stock Returns" Economic Notes, Vol. 29, No.2, pp. 201-213.

Berk, J.M. (1999) "Measuring inflation expectations: a survey data approach" Applied Economics, Vol. 31, pp. 1467-1480.

Beyer, A., Haug. A.A. and W.G. Dewald (2009) "Structural Breaks, Co-integration and the Fisher Effect" ECB Working Paper Series, No.1013, February.

Boyd, J.H., Hu, J. and R. Jagannathan (2005) "The stock market's reaction to unemployment news: why bad news is usually good for stocks" The Journal of Finance, Vol. 60, No.2, pp. 649-672.

Browne, F. and D. Doran (2005) "Do equity index industry groups improve forecasts of inflation and production? A US analysis" Applied Economics, Vol. 37, No.15, pp 1801-1812.

Cassola, N. and J.B. Luís (2003) "A two-factor model of the German term structure of interest rates" Applied Financial Economics, Vol. 13, No.11, pp. 783-806.

Chen, S.-S. and K. Shrestha (1998) "Validity of the Short- and Long-run Fisher Relationships: An Empirical Analysis" Managerial Finance, Vol. 24, No.8, pp.64- 76.

Coppock L. and M. Poitras (2000) "Evaluating the Fisher Effect in long-term cross-country averages" International Review of Economics and Finance, Vol. 9, No.2, pp. 181-192.

Crowder, W.J. and D. Hoffman (1996) "The Long-Run Relationship between Nominal Interest Rates and Inflation: The Fisher Equation Revisited" Journal of Money, Credit and Banking, Vol. 28, pp. 102-118.

Darby, M.R. (1975) "The Financial and Tax Effects of Monetary Policy on Interest Rates" Economic Inquiry, Vol. 13 No.2, pp. 226-276.

Díaz, A. and F. Jareño (2012) "Inflation News and Stock Returns: Market Direction and Flow-Through Ability" Empirical Economics, DOI 10.1007/s00181-012-0555-7, forthcoming.

Dutt, S.D. and D. Ghosh (1995) "The Fisher Hypothesis: Examining the Canadian Experience" Applied Economics, Vol. 27, No.11, pp. 1025-1030.

Estep, T. and N. Hanson (1980) "*The Valuation of Financial Assets in Inflation*" New York: Salomon Brothers.

Esteve, V. and C.R. Tamarit (1996) "Déficit públicos, expectativas inflacionarias y tipos de interés nominales en la economía española" Moneda y Crédito, Vol. 203, pp. 11–41.

Evans, M.D. (1998) "Real Rates, Expected Inflation, and Inflation Risk Premia" Journal of Finance, Vol. 53, No.1, pp. 187-218.

Fama, E.F. (1975) "Short Term Interest Rates as Predictors of Inflation" American Economic Review, Vol. 65, No.3, pp. 269–282.

Fama, E. and M.R. Gibson (1982) "Inflation, Real Returns, and Capital Investment" Journal of Monetary Economics, Vol. 9, pp. 297-324.

Fahmy, A.F. and M. Kandil (2003) "The Fisher Effect: new evidence and implications" International Review of Economics & Finance, Elsevier, Vol. 6, No.4, pp. 451-465.

Fendel, R. (2005) "An affine three-factor model of the German term structure of interest rates with macroeconomic content" Applied Financial Economics Letters, Vol. 1, No.3, pp.151-156.

Ferrer, R. (2000) "Interrelaciones entre el mercado de acciones y la tasa de inflación en el caso español" Revista Española de Financiación y Contabilidad, Vol. XXIX, No.104, pp. 377-413.

Findlay, D.W. (1991) "Budget Deficits, Short-term Real Interest Rates and the Specification of Expected Inflation: An Empirical Investigation" Applied Economics, Vol. 23, No.7, pp. 1147-1158.

Fisher, I. (1930) The Theory of Interest. Macmillan. New York.

Flannery, M. and C. James (1984) "The Effect of Interest Rate Changes on the Common Stock Returns of Financial Institutions" Journal of Finance, Vol. 39, No.4, pp. 1141-1153.

Fraser, D., Madura, J. and R.A. Weigand (2002) "Sources of bank interest rate risk" The Financial Review, Vol. 37, No.3, pp. 351-368.

Froot, K.A. (1989) "New Hope for the Expectations Hypothesis of the Term Structure of Interest Rates" Journal of Finance, Vol. 44, No.2, pp.283-305.

Froyen, R.T. and L.S. Davidson (1978) "Estimates of the 'Fisher Effect': A Neo-Keynesian Approach" Atlantic Economic Journal, Vol. 16, No.1, pp. 1-15.

Gapen, M. (2003) "Seasonal indexation bias in US Treasury Inflation-indexed Securities" Applied Financial Economics, Vol. 13, No.7, pp. 509-516.

Gordon, M.J. (1959) "Dividends, Earnings and Stock Prices" Review of Economics and Statistics, Vol. 41, No.2, pp. 99-105.

Gordon, M.J. and E. Shapiro (1956) "Capital Equipment Analysis: The Required Rate of Profit" Management Science, October, Vol. 3, No.1, pp. 102-110.

Grullón, S. (2012) "A Co-integration Analysis of the Dominican Republic"s Aggregate Import Demand Function under a Floating Exchange Rate Regime" Asian Economic and Financial Review, Vol. 2, No. 2, pp. 282-289.

Gupta K.L. (1992) "Interest Rates, Income Taxes and Anticipated Inflation" Journal of Banking and Finance, Vol. 16, No.5, pp. 973–981.

Hagmann, M. and C. Lenz (2004) "Real asset returns and components of inflation: a structural VAR analysis" Working Paper, FAME Research Paper No.118.

Hawtrey, K.M. (1997) "The Fisher Effect and Australian interest rates" Applied Financial Economics, Vol. 7, No.4, pp. 337-346.

Hossain, M.S. and C. Saeki (2012) "A Dynamic Causality Study between Electricity Consumption and Economic Growth for Global Panel: Evidence from 76 Countries" Asian Economic and Financial Review Vol.2, No.1, pp.1-13.

Hu, X. and T.D. Willett (2000) "The variability of inflation and real stock returns" Applied Financial Economics, Vol. 10, No.6, pp. 655-665.

Huizinga, J. and F.S. Mishkin (1986) "Monetary Policy Regime Shifts and the Unusual Behavior of Real Interest Rates" NBER Working Paper No.1678.

Jareño, F. (2005) "Flow-through capability: the Spanish case" Journal of Asset Management, Vol. 6, No.3, pp. 191-205.

Jareño, F. and E. Navarro (2010) "Interest Rate Risk and Inflation Shocks" European Journal of Operational Research, Vol. 201, No.2, pp. 337-348.

Johnson P.A. (2005) "Is It Really the Fisher Effect?" Vassar College Economics Working Paper No.58.

Joyce, M.A.S. and V. Read (2002) "Asset price reactions to RPI announcements" Applied Financial Economics, Vol. 12, No. pp. 253-270.

Juntilla, J. (2001) "Testing an Augmented Fisher Hypothesis for Small Open Economy: The Case of Finland" Journal of Macroeconomics, Vol. 23 No.4, pp. 577-599.

Kaliva, K. (2007) "The Fisher Effect, Survey Data and Time-Varying Volatility" Journal Empirical Economics, Vol. 35, No.1, pp. 1-10.

Kandel, S., Ofer, A.R. and O. Sarig (1996) "Real interest rates and inflation: An ex ante empirical analysis" Journal of Finance, Vol 51, No.1, pp. 205-225.

Kane, E.J. and H. Unal (1988) "Change in Market Assessment of Deposit-Institution Riskiness" Journal of Financial Services Research, Vol. 1, pp. 207-229.

Kolluri, B.R. and S. Ganti (1982) "Empirical evidence on the natural rate hypothesis and Fisher Effect for the U.S. 1953-1978" Journal of Economics and Business, Vol. 34, No.3, pp. 241-246.

Kramer, J. (1998) "G7 Real Long-term Interest Rates" Applied Economics, Vol. 30, pp. 279-285.

Kuroda, A. (1983) "Expected Inflation Rates and the Term Structure of Interest Rates" BOJ Monetary and Economic Studies, Vol. 1, No.1, pp. 31-68.

Laurian, L. (1998) "Is There Evidence of the Fisher Effect" A Dissertation Submitted to the Department of Economics and Accounting, University of Liverpool.

Lee, B. (1992) "Causal relations among stock returns, interest rates, real activity, and inflation" The Journal of Finance, Vol. XLVII, No.4, pp. 1591-1603.

Lee, K.F. (2007) "An Empirical Study of the Fisher Effect and the Dynamic Relation between Nominal Interest Rates and Inflation in Singapore" MPRA Paper No.12383.

Leibowitz, M.L. and S. Kogelman (1990) "Inside the P/E Ratio: The Franchise Factor" Financial Analysts Journal, Vol. 46, No.6, pp. 17-35.

Leibowitz, M.L. and S. Kogelman (1993) "Resolving the Equity Duration Paradox" Financial Analysts Journal, Vol. 49, No.1, pp. 51-64.

Leiser, D. and S. Drori (2005) "Naïve understanding of inflation" The Journal of Socio-Economics, Vol. 34, pp. 179-198.

Makin, J.H. (1982) "Anticipated Money, Inflation, Uncertainty and Real Economic Activity" Review of Economics and Statistics, Vol. 65, pp. 37-384

Mauleón, I. (1987) "Problemas prácticos en el tratamiento econométrico de datos cross-section" Investigaciones Económicas, Vol. 11, No.1, pp. 41-94.

Mishkin, F.S. (1982) "Monetary policy and short-term interest rates: An efficient markets-rational expectations approach" The Journal of Finance, Vol. 37, No.1, pp. 63-72.

Mishkin, F.S. (1992) "Is the Fisher Effect for Real? A Reexamination of the Relationship between Inflation and Interest Rates" Journal of Monetary Economics, Vol. 30, pp. 195-215.

Mishkin, F. and J. Simon (1995) "An Empirical Examination of the Fisher Effect in Australia" The Economic Record, The Economic Society of Australia, Vol. 71, No.214, pp. 217-229.

Mitchell-Innes, H.A. (2006) "The Relationship between Interest Rates and Inflation in South Africa: Revisiting the Fisher's Hypothesis" A Master Thesis Submitted to Rhodes University, South Africa.

Mitchell-Innes, H.A., Aziakpono, M.J. and A.P. Faure (2008) "Inflation Targeting and the Fisher Effect in South Africa: An Empirical Investigation" South African Journal of Economics, Vol. 75, No.4, pp. 693-707.

Moosa, I.A, and J. Kwiecien (1999) "The Nominal Exchange Rate as a Predictor of Inflation: A Re-examination of the Underlying Model" Applied Financial Economics, Vol. 9, No.4, pp. 337-341.

Oertmann, P., Rendu, C. and H. Zimmermann (2000) "Interest Rate Risk of European Financial Corporations" European Financial Management, Vol. 6, pp. 459-478.

Panopoulou, E. (2005) "A Resolution of the Fisher Effect Puzzle: A Comparison of Estimators" The Institute for International Integration Studies Discussion Paper Series iiisdp067, IIIS.

Pearce, D.K. and V. Roley (1988) "Firm characteristics, unanticipated inflation and stock returns" The Journal of Finance, Vol. XLIII, No.4, pp. 965-981.

Peláez, R.F. (1995) "The Fisher Effect: Reprise" Journal of Macroeconomics, Vol. 17, No.2, pp. 333-346.

Pérez, S.J. and M.V. Siegler (2003) "Inflationary Expectations and the Fisher Effect prior to World War I" Journal of Money, Credit and Banking, Vol. 35, No.6, pp. 947-965.

Pérez de Gracia, F. and J. Cuñado (2001) "Inflación y rendimientos bursátiles en el caso español, 1941-1999" Estudios sobre la Economía Española.

Rico, P. (2000) "Procesos estocásticos del tipo de interés a corto plazo" Revista de Economía Aplicada, Vol. 22, No.8, pp. 57-70.

Sack, B. (2000) "Deriving inflation expectations from nominal and inflation-indexed treasury bills" Journal of Business, Vol. 60, No.4, pp. 473-489.

Schwert, G.W. (1981) "The adjustment of stock prices to information about inflation" The Journal of Finance, Vol. XXXVI, No.1, pp. 15-29.

Sweeney, R.J. and A.D. Warga (1986) "The Pricing of Interest Rate Risk: Evidence from the *Stock* Market" Journal of Finance, Vol. 41, No.2, pp. 393-410.

Tessaromatis, N. (2003) "Stock market sensitivity to interest rates and inflation" Working Paper, EFMA Meeting in Helsinki.

Tillmann, P. (2004) ''Testing for Stationarity and Pre-specified Co-integration under Regime-Switching: A Note on the Fisher Effect" Working Paper Bonn.

Weidmann, J. (1997) "New Hope for the Fisher Effect?" Discussion Paper b-385, University of Bonn, Institut für Internationale Wirtschaftspolitik.

Westerlund, J. (2008) "Panel cointegration tests of the Fisher Effect" Journal of Applied Econometrics, Vol. 23, No.2, pp. 193-233.

Wilcox, J.A. (1983) "The Missing Fisher Effect on Nominal Interest Rates in the 1950's" Review of Economics and Statistics, Vol. 65, No.4, pp. 644-647.