

Public Information Arrival and Gold Market Returns in Emerging Markets: Evidence from the Istanbul Gold Exchange

by

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Abstract :

Using daily data, we examine the impact of consumer price index (CPI) releases on gold market returns and volatility in an emerging, high-inflation economy, Turkey. We find that the Istanbul Gold Exchange (IGE) does not respond significantly to the release of the CPI news, indicating that the market is not a good hedge against inflation. We also examine the response of the gold market to other public information arrival critical to Turkish economy, such as GNP, balance of trade and tourism. The gold market reacts to public information arrival about GNP and balance of trade, suggesting that real sector news has important effects on the market. Implications of these findings for market participants are discussed.

Keywords: Fisher effect, public information arrival, emerging markets, gold market, volatility, GARCH models.

JEL classification: E6; F3; G2.

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I. Introduction

A surprising finding in the financial economics literature is that financial returns

and inflation have a negative relationship, implying that the financial market is not a true hedge against inflation and the Fisher effect, which implies a one-to-one direct relationship between asset returns and expected inflation, may not hold. Many studies have offered reasons for this commonly finding.¹ Some have argued that the Fisher effect should hold better for risky assets in high inflation countries because the response of asset prices to inflation news would be relatively larger in these countries. Choudhry (2001) examines this issue for four high inflation Latin and Central American economies and reports a positive relationship between stock market returns and inflation, suggesting that the Fisher effect may indeed hold better for high inflation countries.

In this paper, we provide evidence from the Istanbul gold market to provide further evidence about the effect of inflation and other public information arrival on asset returns. We focus on the gold market, because there is limited evidence on the impact of public information arrival on gold market returns.² We contribute to the literature in several ways. First, we provide evidence from a high-inflation, emerging market like Turkey. In the last decade, inflation rate in Turkey has ranged between 50 and 100 percent and nominal interest rates have fluctuated between 50 and 136 percent. At the same time, the dollarization of the economy has steadily increased reaching about to 20 percent in 2000. Despite a great deal of work on this issue for industrial countries (Sellin, 2001), scant evidence exists on the Fisher effect from high-inflation countries (Choudhry, 2001). To our best knowledge, this

¹ Sellin (2001) provides a review of the literature.

² Frankel and Hardouvelis (1985) and Cornell and French (1986) examine the impact of U.S. data releases on commodity prices.

is the first study that examines the validity of the Fisher effect for the Turkish gold market.³

Second, we employ a lead-lag model within a GARCH framework, allowing us to better capture the observed time-varying volatility of asset returns in emerging markets (Beakert and Harvey, 1997).

Third, besides inflation, we investigate the impact of all key public announcements on gold returns, including news about the balance of trade, GNP, industrial production, tourism, and construction sectors, in addition to the CPI. These sectors are of critical importance to the Turkish economy. Although many studies from developed financial markets report that macroeconomic announcements are major determinants of short-term volatility (Jones et al., 1994 and Fleming and Remolona, 1999), there is limited evidence on this issue from emerging market economies. Public information arrival through such announcements may affect volatility by bringing about frequent revisions about investors' expectations about future inflation trend. Such revisions may cause investors to adjust their risk and return expectations, inducing portfolio revisions and price volatility.

Finally, including public announcements in empirical models of asset returns can act as control variables in studying the impact of inflation on asset returns. A better understanding the impact of such public information on market activity in emerging markets thus permits us to make further inferences about the usefulness of public information on price determination in such markets.⁴

The majority of earlier studies indicate that public information arrival does not appear to be significantly linked to changes in asset returns. Public information is typically measured by the publicly

³ Empirical studies on Turkish stock market are scant. Basci et al. (1996) examine the link between stock prices and trading volume dynamics while Muradoglu and Metin(1996) investigate efficiency issues.

⁴ Evidence on the impact of public information on market activity in emerging markets is quite limited. Majority of studies focuses on industrial countries. For recent studies, see Cai et al. (2001) and Edmonds and Kutan (2001).

released economic and financial data. Partly as a reaction to this finding, researchers have developed new models that emphasize the role of private information. For example, microstructure theories emphasize the role of private information revealed through order flows in affecting asset prices.⁵ As a result, the recent debate has focused on the usefulness of public versus private information and produced evidence from industrial countries. Ito et al. (1998) provide evidence about the significance private information in the Tokyo foreign exchange market. Melvin and Yin (2000) report significant public announcement effects in the yen/dollar market. Thus, our results have important implications for this line of debate as well.⁶

The rest of the paper is organized as follows. In the next section, we develop our empirical model and Section III describes our data sources, provides descriptive statistics, and reports our empirical findings. A discussion of the policy implications of our findings is provided in the concluding section.

II. Methodological Issues

To examine the effect of the CPI and other public announcements on gold market returns and volatility, following previous studies [e.g., Cai et al (2001) and Melvin and Yin (2000)] we propose to use the Generalized Autoregressive Conditional Heteroskedasticity or GARCH (1,1) model. Using such a modeling strategy allows us to capture the observed time-varying properties of daily financial returns and to account for potential asymmetric shocks to the volatility of the returns. A general standard GARCH (1,1) specification can be written as follows:

⁵ O' Hara (1995) provides a review of microstructure theories.

⁶ Other studies attempt to provide reasons for the reported lack of explanatory power of public information. Cai et al. (2001) emphasize the importance of accounting for calendar and time-varying volatility effects observed in asset returns. They argue that distorted estimates are likely to arise if these effects are left out in estimations. In this paper, we account for all these effects.

$$(1) \quad R_t = \alpha_0 + \varepsilon_t$$

$$(2) \quad \varepsilon_t \sim N(0, h_t)$$

$$(3) \quad h_t = \beta_0 + \beta_1 * \varepsilon_{t-1}^2 + \beta_2 * h_{t-1}$$

R_t is gold returns. Equation (1) is the mean equation. Equation 2 states that variance of returns is time varying. Equation (3) is the conditional variance equation. The conditional variance equation consists of three terms. β_0 in the model represents a long-run average. The ARCH term (ε_{t-1}^2), which is the lag of the squared residuals from the mean equation, represents news about volatility from the previous period. The GARCH term (h_{t-1}) is the last period's forecast variance.

We include public information arrival data in both the mean and variance equations. Macroeconomic news are divided into two parts to examine potential different effects of negative (bad) and positive (good) news on asset returns. Releases indicating a decrease in BOT deficit, and an increase in GNP, industrial production (IP), and the number of tourists visiting Turkey (TOUR) are treated as good news while the opposite is viewed as bad news.

During our sample period, a high and volatile inflation environment existed in Turkey and the realized inflation rate was always below a target level desired by policymakers. Therefore, we treat all CPI announcements as negative news in this study. Similarly, the released announcements on the construction sector (CONS) indicated that such activities had been declining throughout our sample period. Therefore, construction news are also treated as bad news. Data for each particular news are constructed as (0,1) dummy variables, taking the value of 1 when there is an announcement, 0 otherwise.

Finally, we incorporate potential impacts of several recent financial and supply shocks on the Istanbul gold market. They include the Asian and Russian crises, the U.S. market crash of October 1997, the recent banking crisis in Turkey as well as the devastating earthquake in August 1999.⁷ In addition, we allow for the day-of-the-week effects in our estimations.

Assuming a standard GARCH (1,1), our final model can be specified as follows:

Mean Equation:

$$\begin{aligned} RETURN_t = & \alpha_0 + \cdot_i \sum_{i=-1}^1 CPI_t + \cdot_i \sum_{i=-1}^1 BOT_G_t + \cdot_i \sum_{i=-1}^1 BOT_B_t + \cdot_i \sum_{i=-1}^1 GNP_G_t + \\ & \varphi_i \sum_{i=-1}^1 GNP_B_t + \cdot_i \sum_{i=-1}^1 IP_G_t + \cdot_i \sum_{i=-1}^1 IP_B_t + \cdot_i \sum_{i=-1}^1 CONST_t + \cdot_i \sum_{i=-1}^1 TOUR_G_t + \\ & \cdot_i \sum_{i=-1}^1 TOUR_B_t + \alpha_1 AsiaCrisis + \alpha_2 USCrash + \alpha_3 RussiaCrisis + \alpha_4 Earthquake + \\ & \alpha_5 BankCrisis + \alpha_6 Monday + \alpha_7 Tuesday + \alpha_8 Thursday + \alpha_9 Friday + \varepsilon_t \end{aligned}$$

where RETURN refers to gold market returns, G represents good news while B refers to bad news. Returns are constructed as the logarithmic difference of gold prices, multiplied by 100. The constant term reflects the impact of “Wednesday” effects. We do not include world gold prices in estimations, because arbitrage opportunities would make returns in both local and world markets equal.⁸

⁷ These are included as (0, 1) dummy variables as follows: The South-Asian crisis (from August 1 through September 1, 1997), the U.S. financial market crash (October 27, 1997), Russian economic crisis (from August 3 through September 1, 1998), and the banking crisis (from November 20 through November 21, 2000). The first trading day (August 26, 1999) following the earthquake is used to account for the impact of the August 17th earthquake.

⁸ During our sample period, the mean difference between London and Turkish market gold returns was less than 0.20 percent, which reflects the potential transactions costs, eliminating any arbitrage opportunities.

Variance Equation:

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \theta_1 h_{t-1} + \cdot_i \sum_{i=-1}^j CPI_t + \cdot_i \sum_{i=-1}^j BOT_t + \cdot_i \sum_{i=-1}^j GNP_t + \cdot_i \sum_{i=-1}^j IP_t + \cdot_i \sum_{i=-1}^j CONST_t + \cdot_i \sum_{i=-1}^j TOUR_t + \alpha_3 Monday + \alpha_4 Tuesday + \alpha_5 Thursday + \alpha_6 Friday + v_t$$

where h_t is the conditional variance of the gold market index at time t . Note that good and bad news for the announcement variables are not entered separately in the variance equation.⁹

We also included autoregressive terms in the mean equation to capture potential serial correlation in returns. However, the statistical tests results (not reported) indicated no significant serial correlation in gold returns.

III. Empirical Results

Data

The sample period covers data from January 2, 1996 through February 14, 2001. The daily gold market (closing) prices are obtained from the website of the Central Bank of Republic of Turkey (CBRT), www.cbirt.gov.tr. Announcement dates are available from the website of State Institute of Statistics (SIS) of Turkey (www.sis.gov.tr).¹⁰ According to the SIS, all news are generally announced in the late afternoon (between 3:00-4:00 p.m.) when market is already closed, except CPI, which tends to be announced early in the morning (9:00 or 9:30 a.m.). To account for such differences in announcement dates and possibility that some investors may receive the information with some delay due to using different media sources, we employ a lead-lag model in this study.

⁹ Volatility is driven by news, regardless of whether it is good or bad news. Therefore, good and bad news are aggregated in the variance equation.

¹⁰ All news releases are monthly, except GNP and construction, which are quarterly.

Mean Equation Results

Table 1 presents the results for the impact of announcements on gold market activity. First, the findings for the mean equations are evaluated, followed by those for the conditional volatility equations.¹¹ Starting with the mean equation first, we observe no significant impact of inflation announcements on gold returns. This finding suggests that the gold market is not a hedge against inflation during our sample period. Gold returns appear to be sensitive to only negative BOT and GNP news. Bad news reduces gold returns with a delay by about 0.27 percent. On the other hand, bad GNP news today is associated with about 0.98 percent reduction in returns. The Russian crisis has a negative impact on gold returns, while earthquake's effect is positive. The crisis reduces returns by 0.26 percent while the earthquake raises returns by 2.16 percent. The latter may reflect the relatively higher demand for gold during this panic period. The gold market does not appear to be sensitive to the Asian crises or the U.S. crash, however, suggesting that the effect of the other crises is not absorbed by the gold market. There are significant Monday and Friday effects, indicating that stock returns on these days are higher relative to Wednesday returns.

In summary, our results reveal some evidence about interesting characteristics of the gold market in Turkey. First is that gold returns are sensitive to developments only in real sector, indicating that the gold market movements in Turkey are driven by real factors. Second, the gold market is not sensitive to nominal factors as reflected in the market's response to the CPI news. Finally, the overall sensitivity of the Istanbul gold market to public information arrival is relatively weak. This evidence is consistent with Christine-David et al. (2000). They studied the futures market for T-bills and gold markets and reported that news releases has less impact on the gold futures market than interest rate futures.

¹¹ The descriptive statistics for kurtosis and skewness indicate the non-normality of gold returns. This finding is also supported by the significant Jarque-Bera probability tests. To account for the non-normality of gold returns, we employed the robust standard errors developed by Bollerslev and Wooldridge (1992).

Findings for Conditional Variance Equation

Table 1 also reports the findings for the conditional variance equation. The estimated ARCH and GARCH terms are statistically significant at the 5 percent significance level or better. The sum of the coefficients is less than 1, indicating that the shocks to the conditional variance equation is well behaved, or stationary. The only significant public information variable is the industrial production with a lead effect. The sign is negative, indicating that the conditional volatility of returns declines in response to such news. There are no significant day-of-the-week effects in the conditional variance equation, indicating that market volatility does not seem to be subject to any day-of-the-week effects.

The diagnostic tests reported in of Table 1 suggest that the estimated model does not suffer from any serial correlation up to ten lags. In addition, the estimated Q-squared tests indicate that the reported GARCH (1,1) models well capture the observed time-varying volatility behavior of gold market returns.

IV. Policy Implications and Conclusions

We examine how public information arrival affects gold market returns and volatility in an emerging market with a high inflation rate. To our best knowledge, this is the initial attempt in the literature to investigate the validity of the Fisher effect and the significance of other public information arrival for gold price determination in the Turkish gold market. Our results suggest that the Istanbul gold market does not serve as a hedge against inflation. This finding indicates that the traditional role of gold as a store of value in high-inflation countries like Turkey has been disappearing with the development of alternative financial markets, such as stock market. This result has implications for the general public and investors operating in countries where gold is usually held as a monetary cushion as well as for central banks that tend to purchase gold frequently to back local currency.

We also document evidence about the importance of other public arrival information in Turkish gold market. Our results indicate that

the public information arrival about BOT and GNP variables have a significant impact on gold market returns, indicating that real sector developments have significant wealth effects. On the other hand, impact of public information arrival on gold market volatility seemed limited. It appears that public information arrival mainly affects gold returns, but not its conditional volatility. This result has important implications for risk management strategies.

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Table 1 – Response of Gold Returns and Volatility to Public Information Arrival

<u>Mean Equation</u>			<u>Conditional Variance Equation</u>		
Variable	Coefficient	Prob.	Variable	Coefficient	Equation
C	0.0955	0.1376	C	0.8741	0.0001
CPI _{LAG}	0.0142	0.9001	ARCH(1)	0.1330	0.0353
CPI	-0.1122	0.5101	GARCH(1)	0.5651	0.0000
CPI _{LEAD}	-0.0032	0.9829	CPI _{LAG}	-0.0566	0.7807
BOT _{G LAG}	0.0838	0.7070	CPI	0.0073	0.9877
BOT _G	-0.0193	0.8950	CPI _{LEAD}	-0.1306	0.7567
BOT _{G LEAD}	-0.3174	0.2378	BOT _{LAG}	-0.2543	0.2231
BOT _{B LAG}	-0.2695	0.0264	BOT	-0.1379	0.5134
BOT _B	0.2454	0.1409	BOT _{LEAD}	-0.1597	0.4597
BOT _{B LEAD}	0.1961	0.1745	GNP _{LAG}	-0.2320	0.4465
GNP _{G LAG}	0.0079	0.9676	GNP	-0.1822	0.5422
GNP _G	-0.0608	0.7303	GNP _{LEAD}	-0.0522	0.8769
GNP _{G LEAD}	0.0310	0.9094	IP _{LAG}	-0.2162	0.5262
GNP _{B LAG}	-0.1284	0.7263	IP	-0.1522	0.7167
GNP _B	-0.9747	0.0000	IP _{LEAD}	-0.7215	0.0162
GNP _{B LEAD}	0.5215	0.2461	CONST _{LAG}	-0.3267	0.1948
IP _{G LAG}	-0.1340	0.3419	CONST	-0.2487	0.5884
IP _G	0.1284	0.4778	CONST _{LEAD}	-0.2418	0.5369
IP _{G LEAD}	0.0780	0.3871	TOUR _{LAG}	-0.1590	0.4537
IP _{B LAG}	0.2531	0.2804	TOUR	-0.1189	0.6398
IP _B	-0.138	0.9641	TOUR _{LEAD}	-0.0769	0.7019
IP _{B LEAD}	-0.0061	0.9785	Monday	-0.1587	0.5381

CONST <i>LAG</i>	0.2812	0.1045	Tuesday	-0.1343	0.6844
CONST	0.0385	0.8874	Thursday	-0.1969	0.4404
CONST <i>LEAD</i>	-0.2145	0.2505	Friday	-0.3062	0.2253
TOUR_G <i>LAG</i>	-0.1024	0.4166			
TOUR_G	-0.0568	0.6876			
TOUR_G <i>LEAD</i>	-0.2303	0.0079			
TOUR_B <i>LAG</i>	-0.2339	0.3725			
TOUR_B	-0.0066	0.9822			
TOUR_B <i>LEAD</i>	-0.0773	0.7293			
Asia Crisis	-0.0277	0.8045			
US Crash	-0.0847	0.9546			
Russia Crisis	-0.2640	0.0278			
Earthquake	2.1649	0.0604			
Bank Crisis	0.1060	0.2633			
Monday	0.2078	0.0115	Diagnostic Tests		
Tuesday	0.0652	0.4413	Q(10) = 12.71 (0.24)		
Thursday	0.0487	0.5875	$Q^2(10) = 6.79 (0.74)$		
Friday	0.2569	0.0057	Log_like = -1552.8		