Original Article

Exchange-Traded Products investing and Precious Metal prices

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Athanasios P. Fassas

is a Research Assistant in the Department of Applied Informatics at the University of Macedonia, Greece, and an adjunct lecturer in the Business Administration and Economics Department at City College, International Faculty of University of Sheffield. He also works as an investment advisor in a brokerage house, which is member of the Athens Exchange. He holds a PhD in Finance from the University of Patras, Greece, and an MBA from New York University, Stern School of Business.

Correspondence: Athanasios P. Fassas, Department of Applied Informatics, University of Macedonia, 540 06 Thessaloniki, Greece
E-mail: afassas@uom.gr

ABSTRACT The recent increase in precious metal prices has been partly attributed to the strong flows into related Exchange-Traded Products (ETPs), and thus there are growing concerns that ETPs' flows are distorting prices away from their fundamentals. Literature on the relationship between commodity investing and commodity prices is fast growing, but the current study is the first academic attempt to examine directly the impact of ETPs on the underlying metal returns. This article attempts to empirically investigate whether the introduction of precious metal ETPs affects the respective spot prices. In particular, the impact of the investment flows in 28 products on the prices of gold, silver, platinum and palladium is tested. The empirical findings of this study suggest that there is a strong statistical significant positive contemporaneous relationship between the inflows and outflows in the precious metal ETPs and the returns of the underlying metals. This interdependence raises the risk of potential severe redemption pressures on certain types of ETPs in cases of market turmoil, which could in turn hurt the large asset managers and banks active in this market.

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INTRODUCTION

This article examines the recent trend in commodity investing, the commodity-linked Exchange-Traded Products¹ (ETPs), and their potential impact on the spot market prices. The empirical investigation focuses on four precious

metals (gold, silver, platinum and palladium) and includes 28 relevant ETPs. The econometric results lend support to the hypothesis that flows into ETPs have a direct effect on the spot prices of gold, silver and platinum, but rule out the case of causality.

The particular study is motivated by two main drivers: first, by similar academic attempts concerning commodity futures markets (for example, Chatrath *et al*, 2010; Stoll and Whaley, 2010), which test the hypothesis that buying by index funds in commodity futures and over-the-counter (OTC) derivatives markets has led to artificially high commodity prices, which far exceeded the respective fundamental 'fair' values. Second, by two separate, but concurrent (April 2011), reports by two respected world organizations – the International Monetary Fund (IMF) and the Financial Stability Board (FSB) – which raise concerns regarding the meteoric rise of the Exchange-Traded Fund (ETF) industry and its potential impact on the financial system and the real economy.

ETPs are collateralized or uncollateralized open-ended securities that trade and settle like listed equity shares; their investment objective is to track the performance of an underlying asset. In 1990, the first ETF was launched in Canada based on the TSE 35 index, whereas the first US ETF was created in 1993 (SPDR S&P 500 ETF). The first ETF in Asia was launched in November 1999 (Tracker Fund of Hong Kong) and in Europe in April 2000 (an index-tracker on European blue chips). However, it was during the next decade that ETPs became an extremely important segment of the equity markets. By the end of 2010, according to the IMF 2011 Global Financial Stability Report, global ETPs have nearly US\$1.2 trillion in assets under management.

ETPs can also be credited with providing an easy and cost-effective way for investors to access alternative assets, like commodities, which had previously been inaccessible or prohibitively expensive. Commodity products have been one of the fastest growing segments of the ETPs

industry over the past few years. The first commodity exchange-traded product, tracking gold, was created in 2003, but over the next few years products covering all major commodity groups have been made available to investors. According to JP Morgan's 2011 Global ETF Handbook, at the beginning of 2011, global Assets Under Management (AUM) of commodity-tracking ETPs exceeded \$160 billion. In particular, there were 100 commodity ETPs in the United States (with \$107 billion AUM), 533 ETPs in Europe (with \$51 billion AUM), whereas 29 products traded on Asian markets (with \$2 billion AUM) and 28 commodity-related ETPs are listed in Canada and Latin America (with \$4 billion AUM). The SPDR Gold Trust – with \$55 billion in assets – is the second largest US ETP, following the SPDR S&P 500.

Academic literature has shown over the last decade an increased interest in the behavior and performance of ETPs. A very good overview is provided in Deville (2008). Several studies examine the characteristics of ETPs and the benefits they offer to market participants (for example, Gastineau, 2001), whereas others investigate the divergences between ETP prices and their net asset value (for example, Engle and Sarkar, 2006; Rompotis, 2010). Another class of literature compares ETPs with their mutual fund counterparts (Kostovetsky, 2003; Rompotis, 2009). Finally, the effect of ETP introduction on the underlying markets regarding several trading characteristics has been the subject of a number of studies (for example, Tse and Erenburg, 2003; Hegde and McDermott, 2004).

This article extends the ETP-related literature by testing the impact of ETPs on commodity prices. This article is also related to the growing

academic analysis of the drivers of the recent commodities price surge and the potential effect of speculative futures positions in the determination of commodities prices. Indicatively, Stoll and Whaley (2010) investigate the commodity futures market in general (focusing more on the wheat futures market) and conclude that commodity index investing is not speculation and that inflows and outflows from commodity index investment do not cause futures price changes. Chatrath *et al* (2010) examine the roles of speculative trading and crude oil fundamentals in oil price movements from 1993 to 2008 and conclude that the fundamentals of supply and demand are the key drivers of oil price variations, whereas other factors – including speculative futures positions – generally explain less than 2 per cent of the remaining price variations. Sanders and Irwin (2010) investigate the cross-sectional market returns and the relative levels of long-only index funds in 12 commodity futures markets and conclude that index fund positions across futures markets have no impact on relative price changes across those specific markets. Finally, Irwin *et al* (2009) cite several studies that cast considerable doubt on the proposition that positions for any group of investors in commodity futures markets consistently lead futures price changes (indicatively, Bryant *et al*, 2006; Gorton *et al*, 2007; Sanders *et al*, 2009).

In contrast with the above-mentioned research, the evidence in this article is based on the ETP market instead of the futures markets. There is no similar attempt in the academic literature, at least to my knowledge, which examines the effect of the ETP market on underlying spot prices. In addition, the focus of this article is the precious metal market,

which receives disproportional low attention in the related literature compared with its importance and size.

The rest of the article proceeds as follows: the next section includes a discussion of the motivation and the ways of investing in precious metals, as well as a general analysis of the ETPs. The subsequent section includes the econometric analysis, which examines, first, whether the flows into precious metal ETPs ‘causes’ spot prices to rise and vice versa and, second, whether there is a significant contemporaneous relation between weekly pot returns and the flows into commodity ETPs is tested. Finally, the last section includes the concluding remarks.

INVESTING IN PRECIOUS METALS

Precious metals offer a significant diversification effect for traditional investment portfolios, as their returns are not correlated with the returns of stocks and bonds. Furthermore, investors consider them as safe havens that offer protection against inflation and/or geopolitical risk. This article focuses on four metals, namely, gold, silver, platinum and palladium, which are attracting the overwhelming size of the investment flows. Primarily gold and secondarily silver are viewed as monetary assets, while platinum and palladium are most well known as industrial metals. The investment market for gold has an impressive history of more than 2500 years, being one of the oldest forms of investment.

Gold also has industrial uses, as it has been sought after for thousands of years as jewelry and is also used in certain manufacturing applications (for example, electronics).

Currently, silver's demand is relatively evenly divided between investment and industrial uses, whereas platinum and palladium have a far stronger industrial profile; more than half of platinum and palladium mineral goes into the making of automotive catalytic converters, whereas the two metals are also used in the manufacturing of dental applications, electronic components and jewelry. Platinum is the rarest of the precious metals and its price reflects this; it is also tougher to produce, as it requires about ten tons of ore and six months of mining in order to produce a single ounce of platinum. Palladium has the highest melting point and is the lightest of the precious metals, which explains the allure for industrial use. Palladium is quite often used in the manufacturing of many products as a cheaper substitute for platinum.

Investors can gain exposure to commodities in general and precious metals in particular through a number of investment vehicles: through physically owning the commodity, by buying shares of companies that their operations are related with the particular commodity (for example, gold miners), by entering into a position in the derivatives market (futures, options or OTC swap agreements) or by buying an ETF, a mutual fund or other structured products. The focus of this study is the several ETPs that track precious metals.

Description of ETPs

Many investors have an incomplete appreciation of the differences between the various investment vehicles used to gain exposure to commodities. It is worth elucidating some of the conceptual issues here. ETPs are best defined as open-ended securities listed on a stock exchange

that aim to replicate the performance of an underlying asset.

There are, broadly speaking, two ways that ETPs track the performance of the underlying asset: the plain-vanilla or physic ETPs and the synthetic ETPs. The first method involves physically holding the underlying asset(s), for example, bullions of gold, or the 500 stocks of S&P 500 index with their appropriate weights. This is the dominant form of ETPs in the United States because of regulatory restrictions. The second way is synthetically replicating the underlying returns by entering in swaps and other derivatives positions with a counterparty. Synthetic ETPs have exhibited phenomenal growth in European markets (accounting for nearly half of all ETPs), as investment companies prefer them because of their lower costs and the potential synergies within the company (as very often the derivative trading desk of the company acts as the swap counterparty to the asset management division, which offers the ETP). Further support on the synthetic products is given by the relevant European regulations, which are more liberal concerning the use of derivatives by investment companies and funds. A newer breed of ETPs that gains popularity and flows includes leveraged and inverse products, which, by using mainly derivatives, attempt to offer magnified and inverse returns on the performance of the underlying assets.

Regarding commodity ETPs, the majority of the related products uses the synthetic approach and thus holds futures or swap contracts rather than the physical asset. The reasons include, among others, the costs associated with the physical delivery and storage and the perishable nature of certain commodities. These practical complexities are less observable in the precious metals markets. For example, the costs of

storing, managing and securing \$1 million worth of gold is significantly lower than the respective costs of \$1 million worth of a base metal. This is one of the fundamental reasons that explain why precious metal ETPs have successfully been introduced before physically backed base metal ETPs. It should be noted, however, that the use of futures eliminates a lot of the practical issues of physically owning the commodity, but could create a tracking error in the ETP's performance because of basis and rollover risks.

The term Exchange-Traded Products includes diverse investment vehicles such as Exchange-Traded Funds (ETFs), Exchange-Traded Commodities (ETCs), Exchange-Traded Notes (ETNs) and US Grantor and other statutory trusts. The term Exchange-Traded Funds describe the exchange-traded products that are structured and regulated as mutual funds (or collective investment schemes). ETFs are registered under the Investment Company Act of 1940. In order to achieve their investment objectives, ETFs employ physical delivery of the underlying assets through the creation and redemption process. Exchange-Traded Commodities are similar to ETFs (they trade and settle like ETFs), but are structured as debt instruments. They track the performance of commodities markets, using either a physical approach (by holding the underlying commodity) or a synthetic exposure (by opening positions in the futures and swaps markets). ETCs are fully collateralized, which means that there is no counterparty risk. ETNs are generally senior, unsecured, unsubordinated debt listed on a stock exchange. They are similar to ETCs, but are not collateralized, which means that an ETN investor has full exposure to issuer credit risk. Finally, US Grantor and Statutory

Trusts are frequently referred to as ETFs, but differ in that they are registered under the Security Act of 1933 and not the Investment Company Act of 1940.² A Grantor trust may hold a defined set of assets plus a small amount of cash, whereas Statutory trusts may hold a wider range of commodities and may have derivative positions.

The first commodity ETP was Gold Bullion Securities, which was listed on 28 March 2003 on the Australian Stock Exchange and the largest one is SPDR Gold Shares, which was the first such product to be made available to US investors and was launched in November 2004. Its primary listing is on the New York Stock Exchange, but it is also cross-listed on the Singapore Stock Exchange, the Hong Kong Stock Exchange and the Tokyo Stock Exchange. ETPs are very often cross-listed on different stock exchanges in order to attract investment flows from within the respective markets. However, different regulatory requirements and market directives make cross-border marketability a rather challenging task. ETPs are regulated separately in the United States and Europe and also have a rather different investor base in each region. The institutional investors are dominant in European ETPs, whereas the investor base for US ETPs is evenly balanced between retail and institutional investors. It is due to different regulatory requirements that investment companies have multiple investment products for different markets.

Although ETPs bring a number of benefits to investors, including cost efficiency, diversification and easier access to alternative asset classes and risk exposures, their rapid growth and innovation is an event that the FSB believes requires increased attention both by regulators and industry professionals (FSB, 2011).

In particular, the first main concern of the board is the potential counterparty and collateral risks that are associated with the increased popularity of synthetic products – which use derivatives – and the extensive engagement in securities lending by plain-vanilla physical ETFs. The second potential financial stability risk, according to the FSB report, arises from the expectation of on-demand liquidity, which may create severe redemption pressures on certain types of ETFs in cases of market turmoil, which could in turn hurt the large asset managers and banks active in this market. The latter potential risk is the main focus of the following empirical research.

THE IMPACT OF THE ETP INCEPTION ON THE RETURNS OF UNDERLYING PRECIOUS METALS

Data

The empirical study includes all the ETPs that physically hold the four underlying precious metals.³ Specifically, the data set includes 28 precious metal ETPs (the complete list can be found in Table 1), with AUM exceeding \$86 billion (as of February 2011). These products come by various ETF providers – including State Street, ETF Securities and iShares – that are listed on multiple exchanges worldwide and have different legal structures. From the universe under review, 12 ETPs are tracking gold (~\$73 billion AUM), five follow silver (\$12 billion AUM), three track platinum (~\$500 million AUM) and three track palladium (\$800 million AUM), while the remaining five products own a combination of the four precious metals.

The data set of the current analysis consists of the weekly spot returns of the four precious metals under review and the weekly percentage changes in the metal holdings of the respective ETPs for the period from 1 May 2007 to 28 February 2011. Flows into commodity ETPs could come in ‘waves’ that build slowly – potentially pushing prices higher – and then fade slowly – pushing prices lower – therefore, the econometric analysis uses weekly non-overlapping observations in order to capture the predictive component of the flows. The metal holdings for the gold-related products were retrieved from the website of the World Gold Council and for the remaining three precious metals from the website of the respective ETF providers, whereas the metal spot prices were retrieved from Bloomberg.

The econometric analysis consists of two sub-sections. In the first section, I examine whether the flows into precious metal ETPs (measured by changes in respective metal holdings) ‘cause’ spot prices to rise and vice versa. In order to test for causality, I investigate whether weekly price returns are related to lagged flows into ETPs. In the second section, the contemporaneous relation between weekly spot returns and the flows into commodity ETPs is tested.

Correlation and causation tests

During the period 2007–2011, it is readily observable (Figure 1) that both the level of the four precious metal prices and the metal holdings of the respective ETPs surged, and thus someone could conclude that ETPs’ flows partly caused the spot prices’ increase. Furthermore, the ordinary correlations between the weekly precious metals’ returns and the

Table 1: Precious metals-related Exchange-Traded Products (ETPs)

<i>Product name</i>	<i>Commodity</i>	<i>Stock Exchange (SE)</i>	<i>Structure</i>	<i>Inception date</i>
SPDR Gold Shares	Gold	NYSE Arca, Singapore Exchange, Tokyo SE, Hong Kong SE	Trust	November 2004
Gold Bullion Securities	Gold	London SE, NYSE Euronext Paris, Borsa Italiana, Deutsche Börse	Secured, undated, zero-coupon note	March 2004
ETFS Physical Gold	Gold	London SE, NYSE Euronext Paris & Amsterdam, Borsa Italiana, Deutsche Börse	Secured, undated, zero-coupon note	April 2007
ETFS Physical Gold	Gold	Australian Stock Exchange	Redeemable preference share	March 2003
ETFS Physical Gold	Gold	Tokyo Stock Exchange	Redeemable preference share	August 2009
iShares Gold Trust	Gold	NYSE Arca	Trust	January 2005
NewGold ETF	Gold	Johannesburg Securities Exchange	Secured, undated, zero-coupon note	November 2004
Dubai Gold Securities	Gold	NASDAQ Dubai	Equity security	March 2009
iShares Gold Trust	Gold	NYSE Arca	Trust	January 2005
ETFS Physical Asian Gold	Gold	NYSE Arca	Trust	January 2011
ETFS Physical Swiss Gold	Gold	London Stock Exchange	Secured, undated, zero-coupon note	December 2009
ETFS Physical Swiss Gold	Gold	NYSE Arca	Trust	September 2009
iShares Silver Trust	Silver	NYSE Arca	Trust	April 2006
ETFS Physical Silver	Silver	NYSE Arca	Trust	July 2009
ETFS Physical Silver	Silver	London SE, NYSE Euronext Paris & Amsterdam, Borsa Italiana, Deutsche Börse	Secured, undated, zero-coupon note	April 2007
ETFS Physical Silver	Silver	Australian Securities Exchange	Redeemable preference share	January 2009
ETFS Physical Silver	Silver	Tokyo Stock Exchange	Redeemable preference share	August 2009

Table 1 continued

<i>Product name</i>	<i>Commodity</i>	<i>Stock Exchange (SE)</i>	<i>Structure</i>	<i>Inception date</i>
ETFS Physical Platinum	Platinum	London SE, NYSE Euronext Paris & Amsterdam, Borsa Italiana, Deutsche Börse	Secured, undated, zero-coupon note	April 2007
ETFS Physical Platinum	Platinum	Australian Securities Exchange	Redeemable preference share	January 2009
ETFS Physical Platinum	Platinum	Tokyo Stock Exchange	Redeemable preference share	August 2009
ETFS Physical Palladium	Palladium	London SE, NYSE Euronext Paris & Amsterdam, Borsa Italiana, Deutsche Börse	Secured, undated, zero-coupon note	April 2007
ETFS Physical Palladium	Palladium	Australian Securities Exchange	Redeemable preference share	January 2009
ETFS Physical Palladium	Palladium	Tokyo Stock Exchange	Redeemable preference share	August 2009
ETFS Physical PM Basket	Gold, Platinum, Silver, Palladium	London SE, NYSE Euronext Paris & Amsterdam, Borsa Italiana, Deutsche Börse	Secured, undated, zero-coupon note	April 2007
ETFS Physical PM Basket Shares	Gold, Platinum, Silver, Palladium	NYSE Arca	Trust	October 2010
ETFS Physical PM Basket	Gold, Platinum, Silver, Palladium	Australian Securities Exchange	Redeemable preference share	January 2009
ETFS Physical PM Basket	Gold, Platinum, Silver, Palladium	Tokyo Stock Exchange	Redeemable preference share	August 2009
ETFS Physical White Metals Basket Shares	Silver, Platinum, Palladium	NYSE Arca	Trust	December 2010

Figure 1: Total metal holdings (in ounces) of precious metal ETPs and precious metal spot prices by week during the period from May 2007 through February 2011.

Table 2: Ordinary correlation of weekly spot returns and ETPs flows during the period from May 2007 through February 2011

Commodity	Correlation	t-statistic	Probability
Gold	0.491	7.9354	0.0000
Silver	0.189	2.7031	0.0075
Palladium	-0.0168	-0.2358	0.8138
Platinum	0.1709	2.4403	0.0156

respective flows into the ETPs reported in Table 2 are statistically significant for the three out of the four metals under review (only the palladium coefficient is not significant). The gold returns are more strongly correlated with the flows into gold products as gold is by far the most important and popular precious metal and experiences larger inflows from investors

looking to hedge against inflationary pressures and/or systematic risk.

However, we should not draw the fallacious logical conclusion that correlation proves causation. Correlation is only a requirement for causation. According to the Granger causality test, a time series y is said to cause another time series x , if past values of y improve the prediction of the current value of x . The concept of 'causality' is much more limited than that of the common everyday use of the term.

In order to test the hypothesis that money flows from ETPs contributed in the recent boom in precious metal prices, standard Granger causality tests between weekly spot price returns and metal holdings' weekly changes in ETPs are conducted. This is also a rather common approach in testing the effect of futures investing in commodity prices.⁴ However, in the specific case, it is appropriate to assume

Table 3: Granger causality tests of commodity ETPs investing and spot returns using weekly percentage changes in ETPs holdings during the period from May 2007 through February 2011

Commodity	Flows into precious metals ETPs 'Granger-cause' metal returns		Metal returns 'Granger-cause' flows into precious metals ETPs	
	F-statistic	Probability	F-statistic	Probability
Gold	0.01565	0.9006	0.30510	0.5813
Silver	0.01866	0.8915	1.88233	0.1716
Palladium	0.04197	0.8379	7.39297	0.0071
Platinum	2.11517	0.1474	4.49413	0.0353

The lag lengths for the tests are determined by the Schwarz's criterion. One lag is found to minimize the particular criterion (within a range up to eight lags) for all four cases. Furthermore, the adequacy of the lag length is confirmed by the fact that there is no autocorrelation in the residual terms.

that money flows into ETPs potentially affect spot prices – as they directly intervene with the actual supply and demand of the underlying metal – while it is conceptually wrong to equate money flows into derivatives markets with demand, at least with the typical economic definition of the term.

The Granger test assumes that variables are generated by a stationary process, which is true for all the time series in this case, as the properties of all series are not affected by their time origin. In order to define appropriate lag lengths for the tests, the Schwarz's criterion is used. Furthermore, the adequacy of the lag length is confirmed by the fact that there is no autocorrelation in the residual terms. The results of the Granger causality test are reported in Table 3 and lend no support to the hypothesis that precious metal-related ETPs flows cause the returns of the underlying metal. However, it is observed that the returns of platinum and palladium 'Granger cause' the flows into the

respective ETPs (which have lower AUM compared with the other two metals).

Analysis of the contemporaneous relation between returns and flows

With 'causality' ruled out, the next step in the analysis includes the examination of the contemporaneous relation between weekly spot returns and flows. Although investigating the contemporaneous relation between variables cannot establish causality, it does facilitate the comprehension of the dynamics between precious metal spot returns and the investment flows into ETPs.

Flows into ETPs, especially if they are not large, do not necessarily affect the spot price of a commodity. In theory, prices will change if new information leads market participants to alter their estimates of physical supply and demand. A possible explanation for the existence of contemporaneous correlation between ETP

Table 4: Regressions of weekly spot returns on ETPs flows during the period from May 2007 through February 2011

Dependent variable: Spot commodity weekly returns (R_t)					
Independent variables			Adj. R^2 (%)	F-statistic	DW
Intercept	Flows $_t$	Dummy $_t$			
Panel 1: Gold					
−0.000349 (0.001944)	0.857872*** (0.108106)	— —	23.75 —	62.97 —	2.11 —
−0.006016* (0.003069)	0.686338*** (0.129100)	0.010836** (0.004575)	25.48 —	35.02 —	2.15 —
Panel 2: Silver					
0.000280 (0.004196)	0.823223*** (0.304544)	— —	3.07 —	7.31 —	2.24 —
0.003091 (0.006647)	0.948457** (0.381742)	−0.005513 (0.010101)	2.72 —	3.79 —	2.24 —
Panel 3: Palladium					
0.067415 (0.048370)	−0.215042 (0.911949)	— —	0.00 —	0.05 —	1.01 —
−0.003259 (0.005514)	−0.002446 (0.005545)	0.013365* (0.007554)	0.00 —	1.59 —	1.96 —
Panel 4: Platinum					
−0.000248 (0.003109)	0.080608** (0.033033)	— —	2.43 —	5.95 —	2.16 —
−0.001042 (0.005672)	0.076593** (0.030548)	0.001552 (0.006843)	1.95 —	2.99 —	2.17 —

Regressions are performed by precious metal, using 200 non-overlapping weekly observations. The two regression specifications are:

$$R_t = \alpha + \beta \text{flows}_t + \varepsilon_t \quad \text{and}$$

$$R_t = \alpha + \beta \text{flows}_t + \gamma d_t + \varepsilon_t$$

where R_t represents percentage weekly returns in the precious metal, flows_t are the weekly percentage changes of the metal holding of the respective ETPs and the dummy variable d_t has the value of 1 when $\text{flows}_t > 0$ and is 0 otherwise.

Standard errors in parentheses.

***Identifies coefficient significant at the 1 per cent level; **identifies coefficient significant at the 5 per cent level; *identifies coefficient significant at the 10 per cent level.

flows and price changes could be if information on fundamentals is changing at the same time. In practice, though, the precious metal-related ETPs (especially those that track gold and silver) are becoming so large that they cannot be ignored; with almost \$100 billion under management, their direct buying and selling of the physical metal could affect the supply and demand forces and thus the spot prices. Gold and silver tend to see larger inflows from investors looking to hedge against inflation or macro-event risk, whereas platinum and palladium are considered more as industrial metals.

In order to test the hypothesis that flows into precious metal-related exchange-traded product impact the returns of the underlying metal, the following regression is performed:

$$R_t = \alpha + \beta \text{flows}_t + \varepsilon_t \quad (1)$$

where R_t represents percentage weekly returns in the precious metal and flows_t are the weekly percentage changes of the metal holding of the respective ETPs. If my proposition is correct, spot returns should be positively correlated with both ETPs' inflows and outflows. Table 4 contains the results of the regression for the four precious metals under examination, which generally support the tested hypothesis. In particular, the findings suggest that there is a statistical significant positive relationship between the flows into gold-, silver- and platinum-related ETPs and the returns of the underlying metal. In the case of gold, the R^2 is considerably higher (almost 24 per cent) compared with the other two metals.

In investigating this relation, however, it is important to recognize that both precious metal prices and flows into commodities-related ETPs

have surged over the period under review (Figure 1). For that reason, a dummy variable is included in order to capture a potential asymmetry effect between inflows and outflows into ETPs. As a result, the testing of the contemporaneous relationship between precious metals spot weekly returns and ETPs flows is now conducted using the following specification:

$$R_t = \alpha + \beta \text{flows}_t + \gamma d_t + \varepsilon_t \quad (2)$$

where, as with the previous specification, R_t represents the weekly returns of the precious metal and flows_t are the weekly changes of metal holdings and the additional variable is the dummy variable, d_t , which has the value of 1 when $\text{flows}_t > 0$ and is 0 otherwise.

The empirical findings (shown in Table 4) for the three metals (again the regression concerning palladium turns out to be insignificant) confirm the impact of the ETPs investing on the spot prices. The fact that the coefficient γ is either statistically insignificant (in the cases of silver and platinum) or very close to 0 and considerably smaller than coefficient β (in the case of gold) suggests that both inflows and outflows into ETPs are an important driver of the spot prices.

CONCLUSION

ETPs are investment vehicles that track an underlying asset and trade continuously on stock exchanges, in contrast with traditional mutual funds that are valued only once at the end of the business day. ETPs have become increasingly popular over the past few years as they give easy and cost-effective access to investors to several asset classes and regions on a real-time basis. However, both the IMF and FSB, with separate

reports in April 2011, have raised concerns regarding the ETPs' dynamics, which could potentially increase market volatility and influence the fundamentals of related industry sectors.

Furthermore, some market participants argue that the growing popularity of ETPs may have contributed to commodities price appreciation. The objective of this article is to examine how the inception of precious metal-related ETPs impacts the returns of the four metals (gold, silver, platinum and palladium). In contrast with previous research, the evidence is based on the ETP market instead of the commonly used futures markets. It is conceptually more appropriate to test the effect of ETPs, rather than derivatives instruments, as these products involve direct buying and selling of the physical commodity and thus affect the supply and demand forces. Derivatives on the other hand are financial contracts that do not involve exchange of physical quantities until the expiration of the commodity futures products. On top of that, future contracts rarely involve the actual delivery of the physical commodity.

Very often, terms like Exchange-Traded Funds (ETFs), Exchange-Traded Commodities (ETCs), Exchange-Traded Notes (ETNs) are used interchangeably. They can all be characterized as Exchange-Traded Products (ETPs). The main difference between ETFs and ETCs is that the former are funds, whereas the latter are debt securities. Traditionally, ETPs have physically held underlying assets; however, a physical approach is not possible for every single commodity (for example, several agricultural products cannot be stored for an extended period of time). Furthermore, in some cases, where storage is feasible, its costs

have to be compared with the futures rollover costs. Therefore, but a new structure of ETPs has recently emerged (especially in Europe), which uses synthetic replication through derivatives.

The physical-backed commodity ETPs, which are examined in this article, are simple structures. The investment company holds the physical metal in a trust, and based on that it issues shares that are listed and traded in a stock exchange in local currency, with no minimum investment. The metal holdings are fully allocated; therefore, there is no counterparty risk. As a result, commodity ETPs are extremely accessible and simple investments that offer exposure to the metals' performance, without the costs associated with actually holding the underlying (transaction, transport, storage and insurance). Furthermore, investors nowadays have the ability to invest in precious metals (primarily gold bullions) stored in a number of physical locations (including the United States, Canada, the United Kingdom, Singapore and Switzerland) and across numerous custodians. For large investors, diversification across custodians and geographies may be significant topic. For this reason, ETF providers, in addition to the traditional financial centers (New York and London), now offer ETFs that store their gold holdings in Switzerland (ETFS Physical Swiss Gold), a country well known for its political neutrality and advanced banking system, and Singapore (ETFS Physical Asian Gold Shares), a country that is gaining popularity as an investor-friendly investment place.

In conclusion, the particular effort contributes to the ongoing heated discussion regarding the contribution of innovative investment products and vehicles on the recent commodity price surge. The outcome of this debate will probably

have wide consequences for the marketing and distribution of the commodity-related investment products.

NOTES

1. Exchange-Traded Products (ETPs) is an umbrella term used to describe Exchange-Traded Funds (ETFs), Exchange-Traded Commodities (ETCs), Exchange-Traded Notes (ETNs), and US Grantor and other statutory trusts.
2. As exchange-traded commodity products are highly concentrated non-diversified products, they cannot qualify as an investment company or a unit investment trust under the limitations of the Investment Company Act of 1940.
3. iShares launched a suite of physically backed precious metals products (iShares Physical Gold ETC, iShares Physical Silver ETC, iShares Physical Platinum ETC and iShares Physical Palladium ETC) in April 2011, which of course are not included in the data set. The Sprott Physical Gold Trust is also not included due to lack of data concerning its metal holdings.
4. Irwin *et al* (2009) review several articles that employ Granger causality tests in order to examine whether commodity futures investing by various groups of investors 'causes' futures price changes.

REFERENCES

- Bryant, H., Bessler, D.A. and Haigh, M.S. (2006) Causality in futures markets. *Journal of Futures Markets* 26(11): 1039–1057.
- Chatrath, A., Christie-David, R.A., Lugli, V. and Santoso, C. (2010) Futures trading and oil price movements. *Review of Futures Markets* 18(4): 347–362.
- Deville, L. (2008) Exchange traded funds: History, trading and research. In: C. Zopounidis, M. Doumpos and P. Pardalos (eds.) *Handbook of Financial Engineering*. Berlin: Springer, pp. 67–94.
- Engle, R. and Sarkar, D. (2006) Premiums-discounts and exchange traded funds. *Journal of Derivatives* 13(4): 27–45.
- Financial Stability Board. (2011) Potential financial stability issues arising from recent trends in exchange-traded funds (ETFs). Financial Stability Board note, 12 April, http://www.financialstabilityboard.org/publications/r_110412b.pdf, accessed 24 May 2011.
- Gastineau, G.L. (2001) Exchange-traded funds: An introduction. *Journal of Portfolio Management* 27(3): 88–96.
- Gorton, G.B., Hayashi, F. and Rouwenhorst, K.G. (2007) The Fundamentals of Commodity Futures Returns. National Bureau of Economic Research (NBER) Working Paper no. 13249.
- Hegde, S.P. and McDermott, J.B. (2004) The market liquidity of DIAMONDS, Q's, and their underlying stocks. *Journal of Banking and Finance* 28(5): 1043–1067.
- International Monetary Fund. (2011) Global financial stability report. World Economic and Financial Surveys, April, <http://www.imf.org/external/pubs/ft/gfsr/2010/01/index.htm>, accessed 30 May 2011.
- Irwin, S.H., Sanders, D.R. and Merrin, R.P. (2009) Devil or angel? The role of speculation in the recent commodity price boom (and bust). *Journal of Agricultural and Applied Economics* 41(2): 377–391.
- Kostovetsky, L. (2003) Index mutual funds and exchange-traded funds. *Journal of Portfolio Management* 29(4): 80–92.
- Rompotis, G.G. (2009) Interfamily competition on index tracking: The case of the vanguard ETFs and index funds. *Journal of Asset Management* 10(4): 263–278.
- Rompotis, G.G. (2010) Does premium impact exchange-traded funds' returns: Evidence from iShares. *Journal of Asset Management* 11(4): 298–308.
- Sanders, D.R. and Irwin, S.H. (2010) A speculative bubble in commodity futures prices? Cross-sectional evidence. *Agricultural Economics* 41(1): 25–32.
- Sanders, D.R., Irwin, S.H. and Merrin, R.P. (2009) Smart money: The forecasting ability of CFTC large traders in agricultural futures markets. *Journal of Agricultural and Resource Economics* 34(2): 276–296.
- Stoll, H.R. and Whaley, R.E. (2010) Commodity index investing and commodity futures prices. *Journal of Applied Finance* 20(1): 1–40.
- Tse, Y. and Erenburg, G. (2003) Competition for order flow, market quality, and price discovery in the Nasdaq 100 index tracking stock. *Journal of Financial Research* 26(3): 301–318.