TO: File

FROM: Division of Risk, Strategy, and Financial Innovation

DATE: November 6, 2012

RE: Proposed Rule Changes by NYSE Arca, Inc. to List and Trade Shares of the JPM XF Physical Copper Trust (SR-NYSEArca-2012-28) and the iShares Copper Trust (SR-NYSEArca-2012-66)

This memorandum provides an empirical analysis conducted by the Staff of the Division of Risk, Strategy, and Financial Innovation ("Staff") related to the potential effects of NYSE Arca, Inc. proposed rule changes to list and trade shares of the JPM XF Physical Copper Trust ("JPM Copper Trust") and the iShares Copper Trust.

On April 2, 2012, NYSE Arca filed with the Commission, pursuant to Section 19(b)(1) of the Securities Exchange Act of 1934 ("Act") and Rule 19b-4 thereunder, a proposed rule change to list and trade shares of the JPM Copper Trust pursuant to NYSE Arca Equities Rule 8.201. The proposed rule change was published for comment in the Federal Register on April 20, 2012.[1] On July 19, 2012, the Commission initiated proceedings to determine whether to approve or disapprove the proposed rule change.[2]

On June 19, 2012, NYSE Arca filed with the Commission, pursuant to Section 19(b)(1) of the Act and Rule 19b-4 thereunder, a related proposed rule change to list and trade shares of the iShares Copper Trust pursuant to NYSE Arca Equities Rule 8.201. That proposed rule change was published for comment in the Federal Register on June 27, 2012.[3] On August 8, 2012, the Commission initiated proceedings to determine whether to approve or disapprove the proposed rule change.[4]

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[1] Securities Exchange Act Release No. 66816 (April 16, 2012), 77 FR 23772 (File number SR-NYSEArca-2012-28).

[2] See Securities Exchange Act Release No. 67470, 77 FR 43620 (July 25, 2012) ("JPM Order").

[3] Securities Exchange Act Release No. 67237 (June 22, 2012), 77 FR 38351 (File number SR-NYSEArca-2012-66).

[4] See Securities Exchange Act Release No. 67616, 77 FR 48181 (August 13, 2012) ("iShares Order").

In the Commission's July 19, 2012, order instituting proceedings related to the JPM Copper Trust filing, the Commission sought from commenters "any empirical evidence that the listing of CB–ETPs backed by gold, silver, platinum, or palladium impacted prices in these markets."[5] The Commission also sought information regarding how "a change in the supply of copper impact[s] the price of copper," and "[t]o what extent . . . the LME Settlement Price [is] affected by the amount of copper on LME warrant."[6] The Commission posed similar questions in its August 8, 2012, order instituting proceedings related to the iShares Copper Trust.[7] Commenters responded to these and other questions included in the Commission's orders.[8]

The Staff performed the analysis described below. The Staff's findings are summarized as follows:

- The Staff found no clear evidence of statistical causality between the historical flow of assets to physical metals ETPs and underlying commodity prices of those metals.
- The Staff found that there is not a strong statistical relationship between copper inventories and copper prices.

Historical Relationship Between the Flow of ETP Assets and Underlying Commodity Prices

As noted above, the Commission requested comment on whether there is any empirical evidence that the listing of CB–ETPs backed by gold, silver, platinum, or palladium impacted prices in these markets. The Staff has statistically tested the causal effect that commodity ETP holdings have historically had on the underlying price of the commodity by performing Granger causality

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[5]   See JPM Order, supra note 2, at 43628.

[6]   See JPM Order, supra note 2, at 43627.

[7]   See iShares Order, supra note 4, at 48187 ("Is there any empirical evidence that the listing of CB–ETPs backed by gold, silver, platinum, or palladium impacted prices in these markets?"); id. at 48186 ("How does a change in the supply of copper impact the price of copper?"); id. ("To what extent is the LME Bid Price affected by the amount of copper on LME warrant?").

[8]   Comment letters regarding the proposed rule change related to the JPM XF Physical Copper Trust (SR-NYSEArca-2012-28) are available at http://www.sec.gov/ comments/sr-nysearca-2012-28/nysearca201228.shtml. Comment letters regarding the proposed rule change related to the iShares Copper Trust (SR-NYSEArca-2012-66) are available at http://www.sec.gov/comments/sr-nysearca-2012-66/nysearca201266.shtml.

This is a memorandum prepared by the Staff of the Division of Risk, Strategy, and Financial Innovation. The Commission has expressed no view regarding the analysis, findings, or conclusions herein.

analysis.[9] Specifically, the Staff examined the relationship between asset flows for existing physically-backed metal ETFs—including funds holding silver (iShares Silver Trust), gold (SPDR Gold Trust), platinum (ETFS Platinum Trust), palladium (ETFS Physical Palladium Shares), and the UK-listed ETFS copper fund (ETFS Physical Copper)—and subsequent changes in spot prices for the underlying metals.[10] These five ETFs were chosen because they were the first physical ETFs to be listed in their respective markets and have since become the largest in terms of assets under management. For this analysis, the Staff used data from Bloomberg.

In an effort to evaluate whether the introduction of other funds that hold physical metals had an impact on the return of the metals underlying those funds, the Staff examined flows into these funds and subsequent changes in underlying prices over time. As described below, the analysis revealed no evidence that fund flows are statistically related to subsequent changes in the underlying metal prices.

The Staff first collected monthly data for the physical metals funds listed above from their inception until September 2012. The Staff then used the autoregressive specification of a bivariate vector autoregression to test for causality in the Granger sense. As shown in Table 1 below, the Staff found no evidence of Granger causality for these funds, i.e., that changes in assets are related statistically to subsequent changes in underlying metals prices. None of the p-values from these tests are at a statistically significant level of below 5%,[11] i.e., the chance of observing these patterns given no Granger causality between fund flows and prices is greater than 5%. The Staff repeated this analysis on a daily frequency for those funds for which daily

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9   Granger causality is a statistical concept of causality that is based on prediction. If a signal X "Granger-causes" a signal Y, past values of X should contain information that helps predict Y above and beyond the information contained in past values of Y alone.

10   The gold, silver, platinum, and palladium prices used in this memo were the London PM fixings while the copper, nickel, and tin prices used were the LME settlement prices.

11   It is common in scientific research to consider p-values of 10%, 5%, or 1% as thresholds that are used to assess whether the null hypothesis is true. In our regression specifications, we test the null hypothesis that there is no statistical relation between changes in fund flows and changes in the underlying metals prices. When a finding is made that a test statistic (e.g., a regression coefficient) has a p-value below a particular threshold, the chance of observing this association by chance when, in fact, it is false is less than the p-value. For purposes of our analysis, we will consider p-values that are not significant at the 5%-level to be statistically insignificant. We will refer to the 5% level as a "conventional" significance level throughout the remainder of the document.

assets data was available, i.e., the platinum, palladium, copper, and silver funds.[12] As seen in Table 2, none of the p-values from these tests are statistically significant at "conventional" levels.

Table 1: Granger causality tests of monthly flows to physical metals ETFs to monthly changes in spot futures prices

Metal	Copper	Palladium	Platinum	Silver	Gold
Data range	Dec. 2010-Sep. 2012	Jan. 2010-Sep. 2012	Jan. 2010-Sep. 2012	Apr. 2006-Sep. 2012	Nov. 2004-Sep. 2012
T-statistic	0.33	0.28	1.22	1.24	-1.04
P-value	74.6.%	78.0%	23.3%	22.0%	30.0%

Source: Bloomberg

Table 2: Granger causality tests of daily flows to physical metals ETFs to daily changes in spot futures prices

Metal	Copper	Palladium	Platinum	Silver
Data range	Dec. 2010-Sep. 2012	Jan. 2010-Jun. 2010	Jan. 2010-Jun. 2010	Jul. 2012-Sep. 2012
T-statistic	-0.34	1.60	0.078	-1.08
P-value	73.1%	11.2%	93.8%	28.5%

Source: Bloomberg

Graphs of asset growth for these ETFs and spot futures contract prices for the underlying metals are shown in Figures 1 through 5. Consistent with our regression analysis, these graphs illustrate that there is no observable relation between the flow of assets and subsequent price changes of the underlying commodities.

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[12] Bloomberg only had daily assets data for these four physical metals ETFs (and not for the physical gold ETF) and for the date ranges provided in table 2.
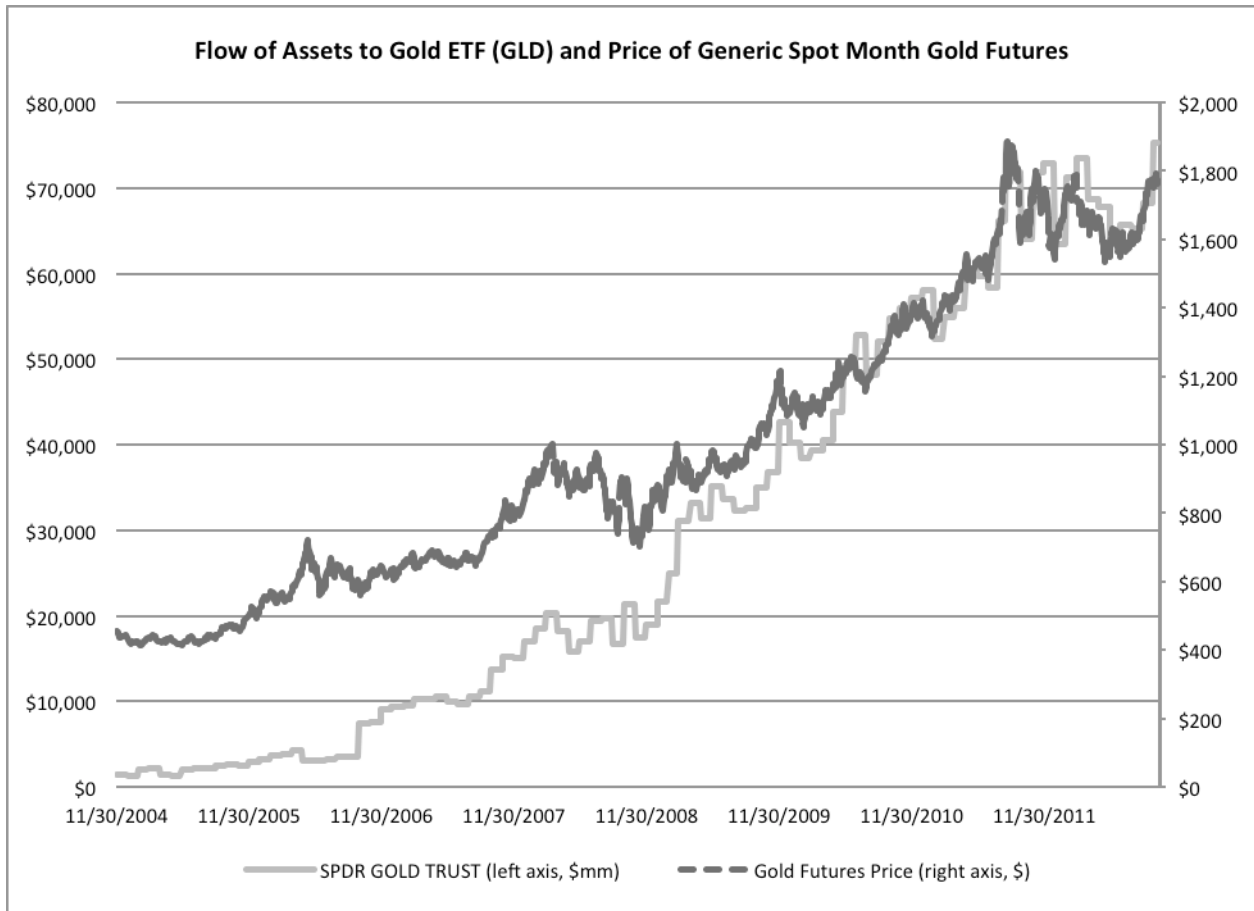
Figure 1: Silver Spot Month Futures Prices and ETF Assets

Source: Bloomberg

Figure 2: Gold Spot Month Futures Prices and ETF Assets

Source: Bloomberg

Figure 3: Platinum Spot Month Futures Prices and ETF Assets

Source: Bloomberg

Figure 4: Palladium Spot Month Futures Prices and ETF Assets

Flow of Assets to Palladium ETF (PALL) and Price of Generic Spot Month Palladium Futures

Legend: ETFS PHYSICAL PALLADIUM (left axis, $mm) — PALLADIUM FUTURES (right axis, $)

Source: Bloomberg

Figure 5: Copper Spot Month Futures Prices and ETF Assets

Flow of Assets to Copper ETF (PHCU) and Price of Generic Spot Month Copper Futures

ETFS PHYSICAL COPPER (left axis, $mm)   COPPER FUTURE (right axis, $)

Source: Bloomberg

The Relation Between Inventory Levels of Copper and Copper Prices

As noted above, the Commission also requested comment regarding the impact of changes in the supply of copper on the price of copper, and to what extent LME Settlement Prices are affected by the amount of copper on LME warrant. The Staff performed a series of regressions to test whether LME inventory levels were related statistically to copper prices. This analysis revealed no evidence of such a relation.

To analyze the potential impact of changes in LME copper inventories on changes in daily LME settlement price changes for copper, the Staff performed a linear regression of daily copper price changes against the following explanatory variables: the change in LME copper inventory from the previous day (i.e., the lagged change in LME copper inventory), the changes in spot prices for nickel, tin, gold, silver, platinum, and palladium, and the S&P 500, VIX index, and the China

A-Shares index returns. We include the China A-Shares index in our analysis since China is the nation with the largest copper consumption in the world, as noted by commenters. The regression analysis uses five years of daily data—from 2007 to 2012—from Bloomberg. The coefficient estimates and corresponding standard errors, t-statistics, and p-values for the explanatory variables are provided in Table 3 below. The estimated coefficient for the change in the lagged LME copper inventory is not significant at conventional levels. In other words, the probability of observing an estimate of this magnitude assuming there is no relation between lagged LME copper inventory changes and subsequent spot copper price changes is 11.2% (therefore, greater than 5%). This indicates that LME copper inventories do not appear to have any independent statistical effect on prices. For the explanatory variables reported in Table 3, the change in the spot price of nickel, tin, silver, and platinum as well as the return on the China A-Shares index have a statistically significant relation with changes in copper prices.

Table 3: Linear regression of daily copper price changes versus daily changes in lagged LME copper inventory, spot futures metals prices, and securities indexes

	Coefficients	Standard Error	t Stat	P-value
Intercept	0.5263	2.2995	0.2289	81.90%
Lag LME Copper Inventory	-1.2732	0.8006	-1.5904	11.20%
Gold	0.1676	0.1851	0.9056	36.53%
Silver	22.9905	4.1671	5.5172	0.00%
Platinum	0.8243	0.1344	6.1309	0.00%
Palladium	0.9597	0.3039	3.1583	0.16%
Nickel	0.0814	0.0067	12.2013	0.00%
Tin	0.0937	0.0058	16.1803	0.00%
S&P 500	0.5829	0.2423	2.4057	1.63%
VIX	0.0234	1.7886	0.0131	98.96%
China A- Shares Index	0.2136	0.0378	5.6522	0.00%

Source: Bloomberg

The Staff also performed a similar regression analysis using monthly data from January 2000 until June 2012 to determine whether a relation between LME settlement prices for copper and LME copper inventories exists over a longer time horizon. This specification regresses monthly copper price changes on the following explanatory variables: the previous month's change in LME copper inventory, total exchange copper inventory (i.e., combined inventory from LME, COMEX, and SHFE), non-exchange copper inventory (i.e., inventory from merchants, producers, and consumers), and spot futures price changes for nickel, tin, and platinum. The copper inventory data is available on a monthly basis from the International Copper Study Group. The p-values for these explanatory variables are provided in Table 4 below.

Similar to our daily results, the change in LME copper inventory is not statistically significant at conventional levels. The statistically significant variables from this regression are the change in spot prices for nickel, tin, and platinum as well as the lagged change in total exchange inventories, i.e., these variables appear to be related statistically to changes in the price of copper. Although changes in total exchange inventories may have some effect on monthly copper prices, LME inventories specifically do not appear to have any independent statistical effect on prices.

Table 4: Linear regression of monthly copper prices versus monthly changes in lagged copper inventories and spot futures metals prices

	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.6220	1.3406	-0.4640	64.33%
Lag LME Copper Inventory	-0.0165	0.8058	-0.2052	83.77%
Lag Total Exchange Copper Inventory	237.1451	107.4723	2.2066	2.90%
Lag Total Non-Exchange Copper Inventory	40.8185	47.5309	0.8588	39.19%
Nickel	0.0412	0.0146	2.8153	0.56%
Tin	0.0994	0.0285	3.4850	0.066%
Platinum	2.2509	0.3973	5.6653	0.00%

Source: International Copper Study Group, Bloomberg

Conclusion

The Staff's analysis found that the statistical relations between the flow of assets to other commodity-based ETPs and the price of the commodities underlying those ETPs are not strong. The analysis also found no evidence of a statistical relationship between LME inventory levels and LME settlement prices for copper.