Hedging stock market, inflation and exchange rate risks by precious metals

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Introduction

- This paper investigates the hedging ability and safe haven properties of precious metals i.e. gold, silver and platinum against the adverse movement of stock prices, exchange rate and inflation.
- It also investigates whether this hedging ability is limited to normal conditions of the precious metal markets or they could be used to hedge risks in extreme conditions as well.

Contributions

- This study explore the investment implications of precious metals by extending the work of Baur and Lucey (2010) and Baur and McDermott (2010) in numerous ways;

1) We investigate the hedging potential of gold, silver and platinum with respect to financial asset prices and commodities price inflation for the US, UK and China markets.

2) The analysis extends to investigate whether hedging potential of precious metals investment differs in different bullish and bearish conditions of metal markets.

- The regression approach of Baur and Lucey (2010) and Baur and McDermott (2010) consider only extreme conditions of the markets against which gold is to serve as hedge

We incorporate the hedging potential of various bearish and bullish conditions of gold, silver and platinum markets themselves by adopting the framework of quantile regression proposed by Iqbal (2016)

Countries

- In this study we consider the mature markets of the US and UK along with emerging market of China
- The US holds the largest over the ground reserve in the form of central banking reserve.
- China has recently replaced India as the largest consumer of gold as reported by the World Gold Council.
- London is the largest market for gold in the world.
- New York is the main exchange-traded future market for gold.

Data and their sources

- We used daily data on metal prices, stock market indexes and consumer price indexes for the US, the UK and China.
- We collected data on gold, silver and platinum prices expressed in US dollar obtained from DataStream. To determine metal prices in the UK and China we multiplied dollar designated metal prices by their local currencies at the exchange rate prevailing on close of that day.
- Daily stock prices and exchange rate for the US, the UK and China along with the metal prices are taken from January 19, 1990 to January 19, 2015. Monthly inflation rate extends from January 1990 to Dec 2014.
- We used S&P500 Index, FTSE Index and Shanghai A-share Index to represent the US, the UK and China stock markets respectively.
- Monthly consumer price index and daily exchange rate data obtained from International Financial Statistics (IFS, IMF, and Washington DC), and stock index data were obtained from DataStream/Yahoo Finance

Econometric Methodology

- To investigate the hedge and safe haven property of precious metals we extend the econometric model of Baur and Lucey (2010) by specifying the models for stock, inflation and exchange rate.
- The following model is estimated to study the role of gold, silver and platinum in times of stress or extreme stock market decline of three selected countries.

$$R_p = c + \beta_t R_{stock} + \mu_t, \mu_t \sim (o, h_t)$$

$$\beta_t = \pi_0 + \pi_1 D(R_{stockq10}) + \pi_2 D(R_{stockq5}) + \pi_3 D(R_{stockq1})$$

$$\log(h_t) = \rho_0 + \rho_1 \log(h_{t-1}) + \rho_2 \left| \frac{\mu_{t-1}}{\sqrt{h_{t-1}}} \right| + \rho_3 \frac{\mu_{t-1}}{\sqrt{h_{t-1}}}$$

Hypotheses to be tested

If π_0 is negative and significant than precious metals behaves as a hedge against stock market.

To access the safe haven characteristic of gold, silver and platinum against stock the sum of parameters π_1, π_2 and π_3 at the 1%, 5 % and 10% quantileshave analyzed through standard Wald F-Statistics.

Metals can be viewed as a safe haven against the stock if the sum of π_0, π_1, π_2 and π_3 is less than or equal to zero i.e. when the market returns are in the lowest 1% and the three metals possess negative relation with the stock market returns.

Similarly the sum of π_0 and π_2 point out the haven property at 5% quantile while the sum of π_0 and π_1 shows that precious metals keep safe haven property at 10% quantile respectively.

Continued

- To identify that whether three precious metals under studied can act as hedge or safe haven against the exchange rate risk we estimate the following econometrics model.

$$R_p = c + \beta_t R_{exhange\ rate} + \mu_t$$

$$\beta_t = \varphi_0 + \varphi_1 D(R_{exhange\ rate,q90}) + \varphi_2 D(R_{exhange\ rate,q95}) + \varphi_3 D(R_{exhange\ rate,q99})$$

$$\log(h_t) = \delta_0 + \delta_1 \log(h_{t-1}) + \delta_2 \left|\frac{\mu_{t-1}}{\sqrt{h_{t-1}}}\right| + \delta_3 \frac{\mu_{t-1}}{\sqrt{h_{t-1}}}$$

If φ_0 is positive and significant. If sum of φ_0 , φ_1 , φ_2 and φ_3 is greater than or equal to zero than the three precious metals act as a safe haven asset against extreme movement of currency i.e. at 99% quantile.

Continued

- The assessment of inflation hedging potential of gold, silver and platinum is carried out by estimating the following extended version of Baur and Lucey (2010) model.

$$R_p = c + \beta_t R_{inflation\,rate} + \mu_t$$

$$\beta_t = \alpha_0 + \alpha_1 D\left(R_{inflation\,rate,q90}\right) + \alpha_2 D\left(R_{inflation\,rate,q95}\right) + \alpha_3 D\left(R_{inflation\,rate,q99}\right)$$

$$\log(h_t) = \gamma_0 + \gamma_1 \log(h_{t-1}) + \gamma_2 \left|\frac{\mu_{t-1}}{\sqrt{h_{t-1}}}\right| + \gamma_3 \frac{\mu_{t-1}}{\sqrt{h_{t-1}}}$$

The metals can serve as hedge against inflation rate if α_0 is positive and significant.

If sum of α_0, α_1 , α_2 and α_3 is greater than or equal to zero than precious metals act as a safe haven asset against high inflation.

Quantile Regression

- To assess sensitivity of the hedging potential of three selected precious metals to various quantiles of the distribution of the precious metal distributions we employ the quantile regression approach proposed by Iqbal (2016).

- Fin et al. (2009) reported that the usual regression analysis cannot capture the upper and lower quantiles of distributions adequately. Thus the semi parametric quantile regression approach is very suitable in testing the hedging ability of gold, silver and platinum and whether this ability of gold, silver and platinum is limited to their average conditions or they serve hedging in extreme conditions of these markets as well. Quantile regression is an extension of classical least squares estimation formally introduced by Koenker and Basset (1978) and is especially relevant for modeling dependent variables that are fat tailed.

Continued

- Under various bearish and bullish conditions of precious metals we assess their hedge and safe haven property against the extreme movements of equity markets, against the depreciation of currency risk and inflation-hedging ability. For this purpose we formulate the following models;

$$Q_\rho(Y|x) = \beta_{0(\rho)} + \beta_{1(\rho)}R_{stock} + \beta_{2(\rho)}R_{stock}D\left(R_{stockq10}\right) + \beta_{3(\rho)}R_{stock}D\left(R_{stockq5}\right) + \beta_{4(\rho)}R_{stock}D\left(R_{stockq1}\right) + \mu_t \quad (13)$$

$$Q_\rho(Y|x) = \beta_{0(\rho)} + \beta_{1(\rho)}R_{exchange\ rate} + \beta_{2(\rho)}R_{exchange\ rate}D\left(R_{exchange\ rateq90}\right) + \beta_{3(\rho)}R_{exchange\ rate}D\left(R_{exchange\ rateq95}\right) + \beta_{4(\rho)}R_{exchange\ rate}D\left(R_{exchange\ rateq99}\right) + \mu_t \quad (14)$$

$$Q_\rho(Y|x) = \beta_{0(\rho)} + \beta_{1(\rho)}R_{inflation\ rate} + \beta_{2(\rho)}R_{inflation\ rate}\,D\left(R_{inflation\ rateq90}\right) + \beta_{3(\rho)}R_{inflation\ rate}\,D\left(R_{inflation\ rateq95}\right) + \beta_{4(\rho)}R_{inflation\ rate}D\left(R_{inflation\ rateq99}\right) + \mu_t \quad (15)$$

Empirical results of Baur and Lucey model

Table 5.1: Estimates of relationship between gold returns (%) and stock market (%) for the US, the UK and China

Gold Return	US			UK			China		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
π_0(hedge)	-0.043	0.010	-4.261** 0.000	-0.115	0.014	-7.829** 0.000	-0.001	0.004	-0.416 0.677
$\sum \pi_1$(10%)	-0.019	0.025	-0.776 0.218	-0.120	0.036	-3.332** 0.000	0.042	0.014	2.974 0.998
$\sum \pi_2$(5%)	-0.023	0.018	-1.271 0.101	-0.067	0.025	-2.625** 0.004	0.009	0.008	1.144 0.873
$\sum \pi_3$(1%)	-0.064	0.023	-2.696** 0.003	-0.062	0.031	-1.949** 0.025	0.002	0.007	0.391 0.652

Gold acting as a hedge for the USA and UK but not for China

For USA gold act as a safe haven asset only when the stock return falls below 1% quantile of stock market

In case of the UK the sum of coefficients are negative and significant for 10%, 5% and 1% quantile of stock returns which shows that when the stock market of the UK falls below of the specified quantile gold acts as safe haven to safeguard investors.

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Table 5.2: Estimates of relationship between silver returns (%) and stock market (%) for the US, the UK and China

Silver Return	US			UK			China		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
π_0(hedge)	-0.048	0.017	-2.712** 0.006	-0.081	0.021	-3.737** 0.000	-0.000	0.009	-0.033 0.973
$\sum\pi_1$(10%)	0.014	0.041	0.349 0.636	-0.068	0.052	-1.303* 0.096	0.048	0.029	1.636 0.949
$\sum\pi_2$(5%)	0.024	0.029	0.851 0.802	0.055	0.037	1.468 0.929	0.010	0.017	0.580 0.719
$\sum\pi_3$(1%)	0.075	0.036	2.070 0.980	0.056	0.044	1.287 0.901	0.012	0.014	0.922 0.821

Silver appears to act as hedge for the USA and the UK

Safe haven property of Silver is only observed for the UK when its stock market falls below 10% quantile

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Table 5.3: Estimates of relationship between platinum returns (%) and stock market (%) for the US, the UK and China

Platinum Return	US			UK			China		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
π_0(hedge)	0.048	0.015	3.066** 0.002	-0.017	0.018	-0.949 0.342	0.007	0.005	1.306 0.191
$\sum \pi_1$(10%)	0.034	0.037	0.907 0.817	0.032	0.045	0.707 0.760	0.061	0.023	2.656 0.996
$\sum \pi_2$(5%)	-0.006	0.029	-0.216 0.414	0.037	0.033	1.119 0.868	0.001	0.013	0.080 0.532
$\sum \pi_3$(1%)	0.078	0.032	2.420 0.992	0.078	0.039	1.970 0.975	0.010	0.012	0.879 0.810

Platinum hedges the stock market risk of the USA

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Table 5.4: Estimates of relationship between gold returns (%) and inflation rate (%) for the US, the UK and China

gold return	US			UK			China		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
α_0(hedge)	1.385	0.748	1.851* 0.0642	-0.607	0.894	-0.678 0.497	0.772	0.417	1.849 0.064
$\sum \alpha_1$(90%)	-0.141	1.760	-0.080 0.532	-0.379	1.775	-0.213 0.584	0.086	0.923	0.093 0.462
$\sum \alpha_2$(95%)	3.783	1.772	2.1348** 0.016	0.876	1.742	0.503 0.3074	-1.194	0.752	-1.588 0.9433
$\sum \alpha_3$(99%)	2.423	2.915	0.8313 0.203	-1.762	1.869	-0.943 0.827	-0.550	1.482	-0.371 0.6447

USA has significantly positive hedge coefficient and gold appears to be a safe haven asset against inflation in the USA as gold market progresses in high inflationary circumstances particularly when inflation rate is more than 90% quantile.

The insignificant coefficients for the UK show the negligible relationship between gold and inflation.

For China gold does not appear to play the role of hedge and safe haven against inflation.

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Table 5.5: Estimates of relationship between silver returns (%) and inflation rate (%) for the US, the UK and China

silver return	US			UK			China		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
α_0(hedge)	1.788	1.358	1.315 0.188	-1.734	1.467	-1.181 0.237	0.643	0.643	1.000 0.317
$\sum \alpha_1$(90%)	-3.753	2.276	-1.648 0.949	1.699	2.868	0.592 0.276	0.523	1.801	0.290 0.385
$\sum \alpha_2$(95%)	-2.180	2.580	-0.844 0.800	-0.149	1.718	-0.086 0.534	0.541	1.189	0.455 0.324
$\sum \alpha_3$(99%)	6.514	6.259	1.0408 0.149	0.070	2.919	0.024 0.490	4.568	2.025	2.254 0.012

Silver neither hedge nor safe haven the USA and the UK while for china platinum shines when the inflation in china is more than its 95% quantile.

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Table 5.6: Estimates of relationship between platinum returns (%) and inflation rate (%) for the US, the UK and China

platinum returns	US			UK			China		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
α_0(hedge)	3.452	1.210	2.852** 0.004	1.254	1.028	1.219 0.222	1.492	0.589	2.529 0.011
$\sum \alpha_1$(90%)	1.568	1.883	0.832 0.202	6.688	2.282	2.929 0.001	0.760	1.168	0.650 0.257
$\sum \alpha_2$(95%)	4.141	1.650	2.508** 0.006	-1.667	1.846	-0.902 0.816	0.238	0.988	0.241 0.404
$\sum \alpha_3$(99%)	0.907	5.356	0.169 0.432	-1.981	2.180	-0.908 0.818	0.304	4.333	0.070 0.472

The safe haven property holds when inflation is increasing at its 90% and 95% quantile for the USA and the UK economy, while for China platinum don't save the investors in high inflation period

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Table 5.7: Estimates of relationship between gold returns (%) and exchange rate (%) for the UK and China

gold Return	UK			CHINA		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
φ_0(hedge)	1.208	0.016	73.190** 0.000	0.606	0.134	4.511** 0.000
$\sum \varphi_1$(90%)	1.288	0.042	30.084** 0.000	0.775	0.293	2.642** 0.004
$\sum \varphi_2$(95%)	1.277	0.032	39.522** 0.000	0.773	0.34	2.222** 0.013
$\sum \varphi_3$(99%)	1.213	0.034	34.746** 0.000	1.016	0.039	25.563** 0.000

Table 5.8 Estimates of relationship between silver returns (%) and exchange rate (%) for the UK and China

silver Return	UK			CHINA		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
φ_0(hedge)	1.375	0.030	44.781** 0.000	0.521	0.267	1.949* 0.051
$\sum \varphi_1$(90%)	1.417	0.081	17.410** 0.000	1.223	0.530	2.304** 0.010
$\sum \varphi_2$(95%)	1.439	0.061	23.317** 0.000	1.290	0.623	2.071** 0.019
$\sum \varphi_3$(99%)	1.130	0.075	14.951** 0.000	1.009	0.052	19.247** 0.000

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Table 5.9Estimates of relationship between platinum returns (%) and exchange rate (%) for the UK and China

platinum Return	UK			CHINA		
	Coef	SE	t-stat pvalue	Coef	SE	t-stat pvalue
φ_0(hedge)	1.224	0.026	45.928** 0.000	0.235	0.077	3.039** 0.002
$\sum \varphi_1$(90%)	1.212	0.068	17.597** 0.000	-0.568	0.363	-1.562 0.940
$\sum \varphi_2$(95%)	1.230	0.056	21.782** 0.000	-0.645	0.447	-1.441 0.925
$\sum \varphi_3$(99%)	1.253	0.065	19.188** 0.000	0.995	0.147	6.766** 0.000

Gold, silver and platinum hedge UK and China in depreciation of their local currency

For UK three metals shine and acts as safe haven, for China except platinum both metals possess the property of safe haven in all conditions of exchange rate of Chinese Yuan

Empirical results of Quantile Regression

Table 5.10: Quantile regression of gold vs stock for the US

Gold	Baur& Lucey		Quantile Regression									
			10th		25th		50th		75th		90th	
	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue
β_1(hedge)	-0.043	-4.261** 0.000	-0.142	-4.237** 0.000	-0.084	-5.086** 0.000	-0.014	-1.272 0.203	-0.006	-0.306 0.759	0.100	3.852** 0.000
$\sum \beta_2$(10%)	-0.019	-0.776 0.218	0.271	2.820 0.997	0.083	1.218 0.888	-0.041	-1.335 0.090	-0.135	-3.306** 0.000	-0.139	-1.951** 0.025
$\sum \beta_3$(5%)	-0.023	-1.271 0.101	0.131	2.303 0.989	0.043	0.909 0.818	-0.040	-1.871 0.031	-0.114	-2.903** 0.001	-0.139	-2.245 0.012
$\sum \beta_4$(1%)	-0.064	-2.696** 0.003	0.384	7.101 1.000	0.176	8.982 1.000	-0.095	-3.443** 0.000	-0.198	-3.903** 0.000	-0.385	-11.472* 0.000

Table 5.13: Quantile regression of gold vs stock for the UK

Gold	Baur& Lucey		Quantile Regression									
			10th		25th		50th		75th		90th	
	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue
β_1(hedge)	-0.115	-7.829** 0.000	-0.157	-4.595** 0.000	-0.129	-5.349** 0.000	-0.068	-3.393** 0.000	-0.018	-0.678 0.497	0.101	2.619** 0.008
$\sum \beta_2$(10%)	-0.120	-3.332** 0.000	0.235	2.248 0.987	0.033	0.551 0.709	-0.072	-1.537 0.062	-0.191	-2.642** 0.004	-0.218	-2.825** 0.002
$\sum \beta_3$(5%)	-0.067	-2.625** 0.004	0.394	5.470 1.000	0.123	2.030 0.978	-0.053	-1.277 0.100	-0.179	-4.241** 0.000	-0.365	-4.370** 0.000
$\sum \beta_4$(1%)	-0.062	-1.949** 0.025	0.511	5.311 1.000	0.114	1.368 0.914	-0.016	-0.204 0.418	-0.214	-5.055** 0.000	-0.237	-5.692** 0.000

Continued

Table 5.16: Quantile regression of gold vs stock for China

Gold	Baur& Lucey		Quantile Regression									
	Coef	t-stat pvalue	10th		25th		50th		75th		90th	
			Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue
β_1(hedge)	-0.001	-0.416 0.677	0.014	0.594 0.551	0.005	1.760 0.078	-0.001	-0.849 0.395	-0.008	-4.047** 0.000	-0.016	-10.633** 0.000
$\sum \beta_2$(10%)	0.042	2.974 0.998	0.214	4.929 0.999	0.087	4.342 0.999	0.031	1.801 0.964	0.071	2.951 0.998	0.132	2.810 0.997
$\sum \beta_3$(5%)	0.009	1.144 0.873	0.055	1.119 0.868	0.012	0.615 0.730	0.001	0.205 0.581	0.000	0.028 0.511	0.007	0.386 0.650
$\sum \beta_4$(1%)	0.002	0.391 0.652	-0.032	-4.348** 0.000	-0.007	-0.521 0.301	-0.002	-0.565 0.285	0.020	2.515 0.994	0.043	1.638 0.9493

Table 5.20: Quantile regression of silver vs inflation rate for the US

Silver	Baur& Lucey		Quantile Regression									
			10th		25th		50th		75th		90th	
	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue
β_1(hedge)	1.788	1.315 0.1882	10.146	3.757** 0.000	8.9455	2.712** 0.007	2.298	0.681 0.495	0.304	0.238 0.811	2.836	2.545** 0.011
$\sum\beta_2$(90%)	-3.753	-1.648 0.949	0.004	0.001 0.499	-1.885	-0.595 0.724	-4.657	-1.338 0.909	-1.544	0.209 0.582	8.668	0.801 0.211
$\sum\beta_3$(95%)	-2.180	-0.844 0.800	-3.853	-1.353 0.911	-4.674	-1.022 0.846	-1.160	-0.416 0.661	-6.735	-2.638 0.995	-0.749	-0.082 0.532
$\sum\beta_4$(99%)	6.514	1.0408 0.1494	11.830	3.503** 0.000	8.576	1.705** 0.044	8.838	2.818** 0.002	5.145	2.169 0.015	0.100	0.063 0.474

***, **, * indicate statistical significance at the level of 0.01, 0.05 and 0.1 respectively

Table 5.23: Quantile regression of silver vs inflation for the UK

Silver	Baur& Lucey		Quantile Regression									
			10th		25th		50th		75th		90th	
	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue
β_1(hedge)	-1.734	-1.181 0.237	-7.235	-4.465** 0.000	-4.209	-2.823** 0.005	-1.823	-1.297 0.195	-0.312	-0.154 0.877	0.977	0.357 0.721
$\sum\beta_2$(90%)	1.699	0.592 0.276	-36.66	-3.829 0.999	-9.088	-0.834 0.797	3.420	0.811 0.208	10.246	1.496 0.067	8.238	1.873** 0.030
$\sum\beta_3$(95%)	-0.149	-0.086 0.534	-2.385	-0.748 0.772	-0.953	-0.269 0.606	3.047	0.872 0.191	0.341	0.098 0.460	4.769	0.953 0.170
$\sum\beta_4$(99%)	0.070	0.024 0.490	2.107	3.261** 0.000	1.142	1.372* 0.085	-0.003	-0.003 0.501	-1.745	-2.073 0.980	-3.510	-5.098 1.000

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Table 5.26: Quantile regression of silver vs inflation for China

silver	Baur& Lucey		Quantile Regression									
			10^{th}		25th		50th		75^{th}		90th	
	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue
β_1(hedge)	0.643	1.000 0.317	-0.059	-0.039 0.968	-0.282	-0.306 0.759	0.533	0.583 0.560	1.197	1.168 0.243	3.005	4.066** 0.000
$\sum\beta_2$(90%)	0.523	0.290 0.385	-0.034	-0.013 0.505	-0.284	-0.139 0.555	-1.021	-0.369 0.643	-0.732	-0.292 0.615	1.016	0.202 0.419
$\sum\beta_3$(95%)	0.541	0.455 0.324	3.375	1.799 0.036	2.811	2.071** 0.019	1.291	0.651 0.257	1.417	0.546 0.292	1.794	0.964 0.167
$\sum\beta_4$(99%)	4.568	2.254** 0.012	6.084	4.542** 0.000	3.920	2.110** 0.017	4.596	1.559* 0.059	16.554	5.887** 0.000	14.095	7.450** 0.000

***, **, * indicate statistical significance at the level of 0.01, 0.05 and 0.1 respectively

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Table 5.30: Quantile regression of platinum vs exchange rate for UK

Platinum	Baur& Lucey		Quantile Regression									
	Coef	t-stat pvalue	10th		25th		50th		75th		90th	
			Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue
β_1(hedge)	1.224	45.928** 0.000	1.523	28.449** 0.000	1.350	25.320** 0.000	1.212	34.967** 0.000	1.177	28.968** 0.000	1.065	15.540** 0.000
$\sum \beta_2$(90%)	1.212	17.597** 0.000	1.235	4.214** 0.000	1.297	10.837** 0.000	1.229	15.916** 0.000	1.418	13.884** 0.000	1.295	7.168** 0.000
$\sum \beta_3$(95%)	1.230	21.782** 0.000	1.297	12.102** 0.000	1.211	13.993** 0.000	1.346	17.047** 0.000	1.337	15.236** 0.000	1.526	9.476** 0.000
$\sum \beta_4$(99%)	1.253	19.188** 0.000	1.161	2.342** 0.009	1.157	9.579** 0.000	1.377	9.663** 0.000	1.792	23.555** 0.000	1.994	34.920** 0.000

Table 5.33: Quantile regression of platinum vs exchange rate for China

Gold	Baur& Lucey		Quantile Regression									
	Coef	t-stat pvalue	10th		25th		50th		75th		90th	
			Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue	Coef	t-stat pvalue
β_1(hedge)	0.235	3.039** 0.002	-0.288	-3.714** 0.000	0.302	0.972 0.330	0.320	2.043** 0.041	-0.691	-1.292 0.196	-1.295	-1.403 0.160
$\sum \beta_2$(90%)	-0.568	-1.562 0.940	-4.400	-4.202 0.999	-2.688	-4.618 0.999	-0.500	-0.889 0.813	-0.681	-1.322 0.906	-0.181	-0.211 0.583
$\sum \beta_3$(95%)	-0.645	-1.441 0.925	-3.345	-2.718 0.996	-2.317	-3.367 0.999	-0.664	-0.893 0.814	-0.518	-0.973 0.834	0.541	0.621 0.267
$\sum \beta_4$(99%)	0.995	6.766** 0.000	1.028	471.671** 0.000	1.009	312.046** 0.000	0.995	235.401** 0.000	0.978	303.111** 0.000	0.960	434.325** 0.000

***, **, * indicate statistical significance at the level of 0.01, 0.05 and 0.1 respectively

Conclusion

- Study found that the three metals gold, silver and platinum hedge stock market risks of the US. For the UK gold and silver can hedge while platinum holds negative but insignificant hedge coefficient against stock market. The three metals do not appear to act as hedge and safe haven for emerging economy of China. Gold, silver and platinum do not appear to act as hedge for the UK and China while gold and platinum do hedge the US inflation risk. Platinum appears to play the role of safe haven for the UK and the US in high inflation situation. Similarly the three metals can acts as hedge and also as safe haven asset for the UK and China against depreciating local currency.

Conclusion

- The results estimated by quantile regression shows that gold, silver and platinum can hedge in all bearish and bullish conditions of metal market for the UK against high inflation. Its safe haven property is evident by presence of significant coefficients in all the bearish and bullish conditions of metal market under studied against extremely high inflation measured by 90% quantile or higher. For China precious metals can neither hedge nor act as safe haven against stock market risk. Moreover only platinum can hedge against high inflation in the US.

THANK YOU