Relationship Between US Economic Indicator

and Its Impact on Gold Price

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This article is written to enhance the understanding of relationships between US monthly economic data and as a groundwork for my currency trade. The main goal is to find if difference in timing of the economic data release could be exploited to profit from the currency market, in this case using gold price (XAUUSD). This short study is not comprehensive, in terms of the economic data used and the analysis. Here, the study uses leading, concurrent and lagging indicators such as consumer confidence, Non-Farm Payroll and Consumer Price Index to study the relationships among them and their impact to the gold price. The method used in this study is a bivariate pearson correlation and linear regression procedure on the year-on-year and month-on-month change in economic data. Very strong relationship (99% confidence limit) is signified by **, strong relationship (95% confidence limit) is signified by * and weak or no relationship is not marked.

Correlations

	Total Vehicle Sales	Housing Starts	Consumer Confidence	ADP	NFP	CPI	PPI	XAUUSD
Total Vehicle Sales	1							
Housing Starts	.688**	1						
Consumer Confidence	.428**	.395**	1					
ADP	.528**	.541**	0.058	1				
NFP	.485**	.499**	0.005	.991**	1			
CPI	0.054	0.007	-.461**	.294**	.320**	1		
PPI	.154*	0.04	-.390**	.216**	.233**	.911**	1	
XAUUSD	-0.041	-.279**	-.284**	-.199**	-.207**	.492**	.507**	1

First, I will analyze the relationships between indicators in the same category, and then between leading, concurrent and lagging indicators. Among the three leading indicators, total vehicle sales, housing starts and consumer confidence, all of them have strong positive correlation. This means that those three indicators move in sync with each other across economic cycle. When the

economy is getting better, consumer feels optimistic about the future and increase their current spending. The increased in consumer spending is partly reflected by vehicle sales (families upgrading their car and other durable goods) and housing starts (home builder becomes more optimistic about the future and young new family buy a house instead of renting). On the other hand, when the economy is slowing down or is in recession, people tend to delay durable goods purchase such as car and postpone their decision to buy a house, which also reduce the incentive for home builders to start a new residential project.

ADP Private Non-Farm Payroll and Non-Farm Payroll data, two of the concurrent indicators I use, have a very high correlation (99.1%). This is because they are essentially measuring almost the same economic data point, the increase in employment related to the non-farm sector. As the economy is expanding, corporation and SME need to hire more employee in order to increase their production and service capacity. Although it seems redundant to include two similar indicators, it is important due to the different release time of ADP (first Wednesday of the month) and NFP (first Friday of the month), which relates to the trading idea later.

At the graph below, regression on % MoM change in ADP and NFP data was done. Then a trendline was added to see the relationship and R-squared of the fitted line. Unsurprisingly, it was found that MoM change in ADP data explained 82.88% of the change in NFP data. Therefore, we could be confident that if on the first Wednesday of the month the ADP data has a positive surprise, then probably the next Friday's NFP data will have positive surprise as well. NFP data is deemed to be more important than ADP for investor, as it capture both government and private job instead of private job alone (ADP). It would be interesting to find out if the volatility of currency related to USD is higher during ADP announcement and much lower during NFP announcement, as trader already priced-in the expected result after ADP announcement. Had trader not fully priced-in the expected NFP data during ADP announcement, then a potentially profitable trade exist; buying USD if ADP data has positive surprise but the USD did not jump after the announcement and vice versa.
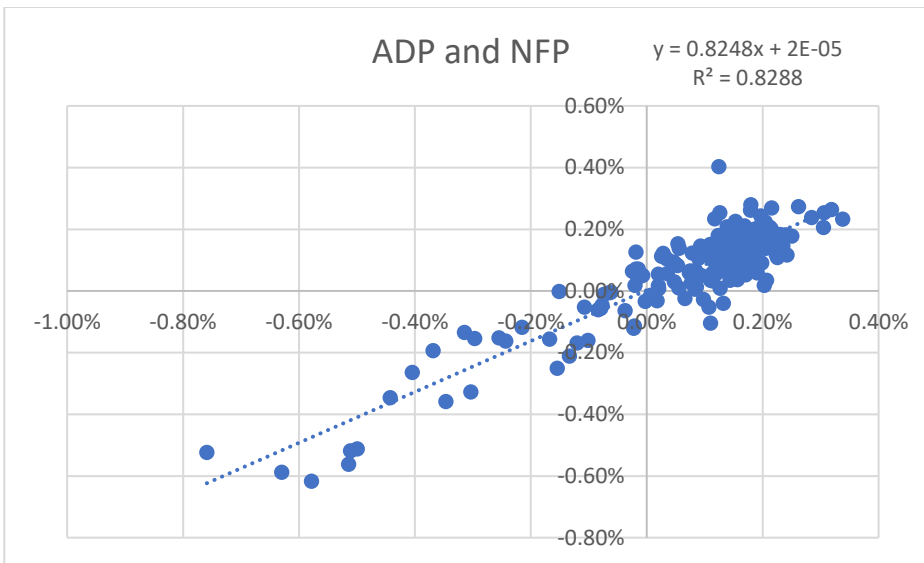
Figure 1 Regression on MoM change in ADP and change in NFP data

Take an example of announcement in December 2017. On Wednesday, ADP employment change has a positive surprise (190k, consensus 185k), this is in favor for USD rally. On that day, gold was opening at 1265.76 and closed at 1262.96 (-0.22%). However, the next day, gold drop from 1262.58 to 1246.80 (-1.25%). This means that trader are pricing in the expectation that NFP data announced on the next day is going to have positive surprise as well, causing a huge downward movement on gold price. On the NFP announcement the next day, it turn out to be correct, NFP shows 228k hiring (consensus 200k, hence positive surprise). However, on that day, gold price actually increase slightly from 1247.27 to 1248.20 (+0.07%). In conclusion from this single data point (you might want to have larger sample, e.g. 30 or more), we could see that 1) Trader react to positive or negative surprise of ADP data, 2) They build an expectation of NFP results between ADP and NFP announcement, 3) When the NFP data is released and they found the expected result, price may revert against the surprise effect.

For the lagging indicators, Consumer Price Index (CPI) and Producer Price Index (PPI) also have a very high correlation (99.1%). PPI is known to be a precedent indicator to CPI, where increase in commodity price will increase the cost to manufacture goods, which will eventually be passed to the consumer. Therefore, an increase in CPI could be predicted from a prior increase in PPI. In the graph below, regression on % MoM change in CPI and PPI was done. The result shows that change in PPI (announced on Tuesday the second week) explained 60.81% of change in CPI (announced on Wednesday the second week). Again, because CPI number is deemed to be more important for policy makers (for example, to raise or lower short-term interest rate),

predicting CPI data from previously announced PPI data could give an edge for trader to set a position based on previous surprise in PPI announcement.

The question is, what is the effect of positive surprise of CPI and PPI to gold price? Does higher inflation suggest that the USD should weaken, as Purchasing Power Parity and Interest Rate Parity suggest? Or should it suggest that since inflation is higher, then the central bank will raise interest rate and attract money inflow to USD, hence driving USD higher? Look at the correlation figure to find the answer. The positive correlation between CPI/PPI and XAUUSD shows that increase in inflation drives XAUUSD higher, or USD lower. This means that higher inflation drives the local currency to weaken.
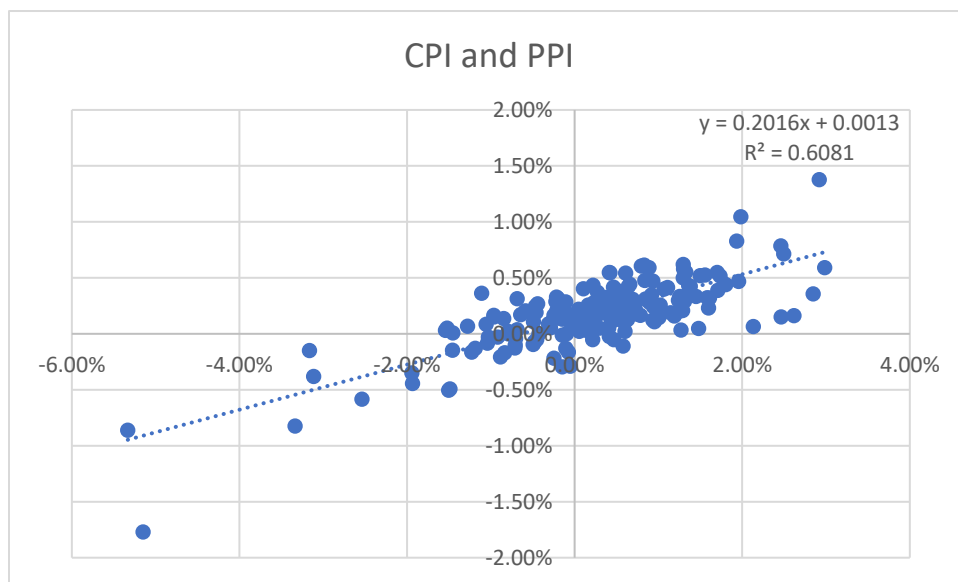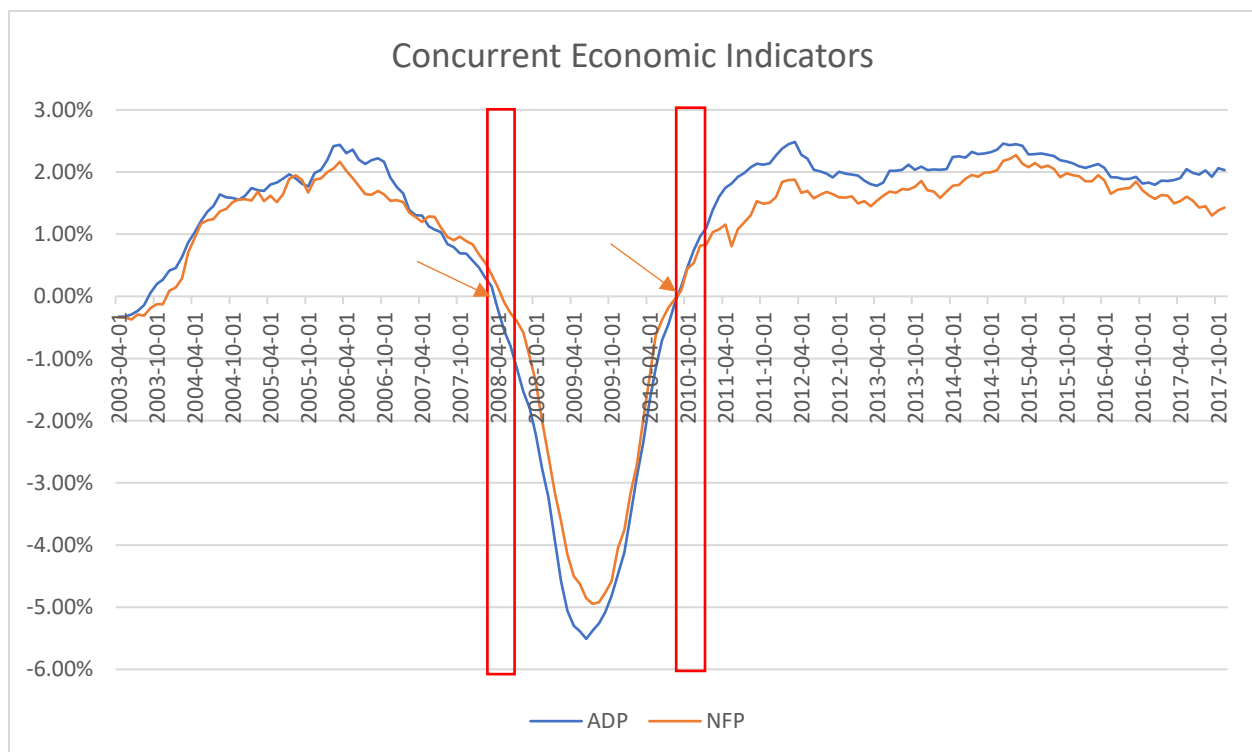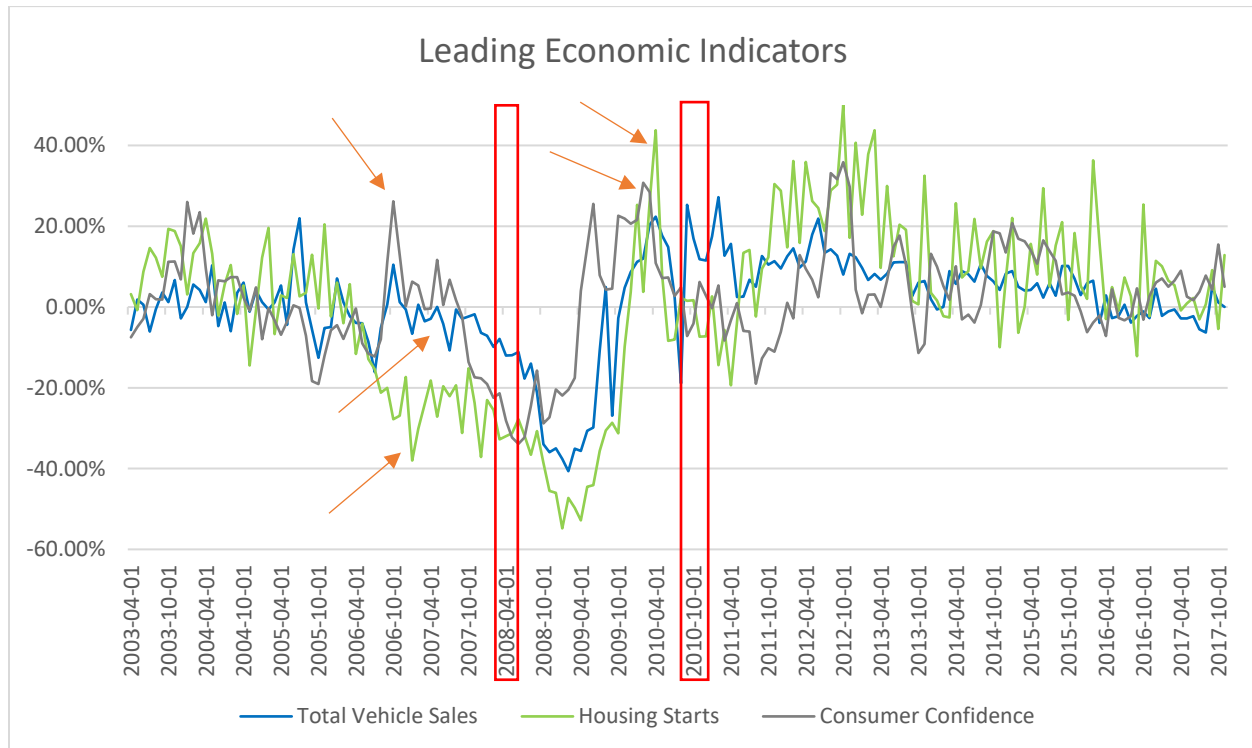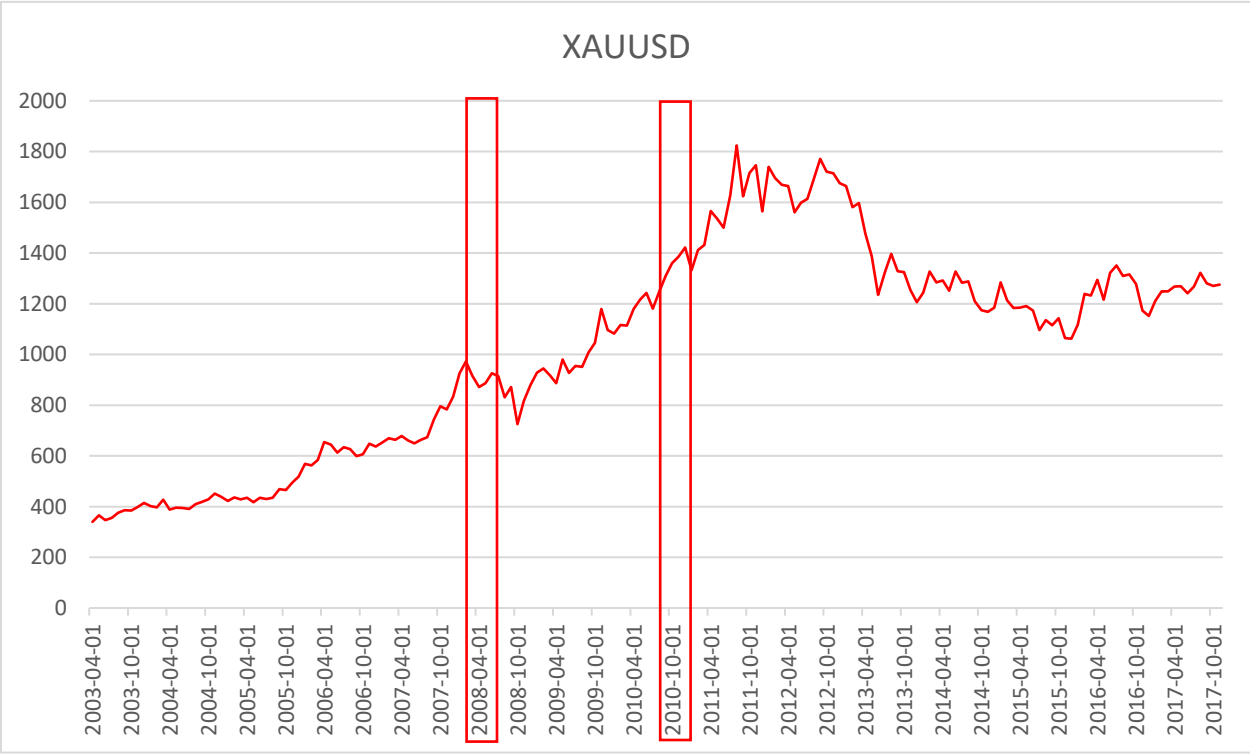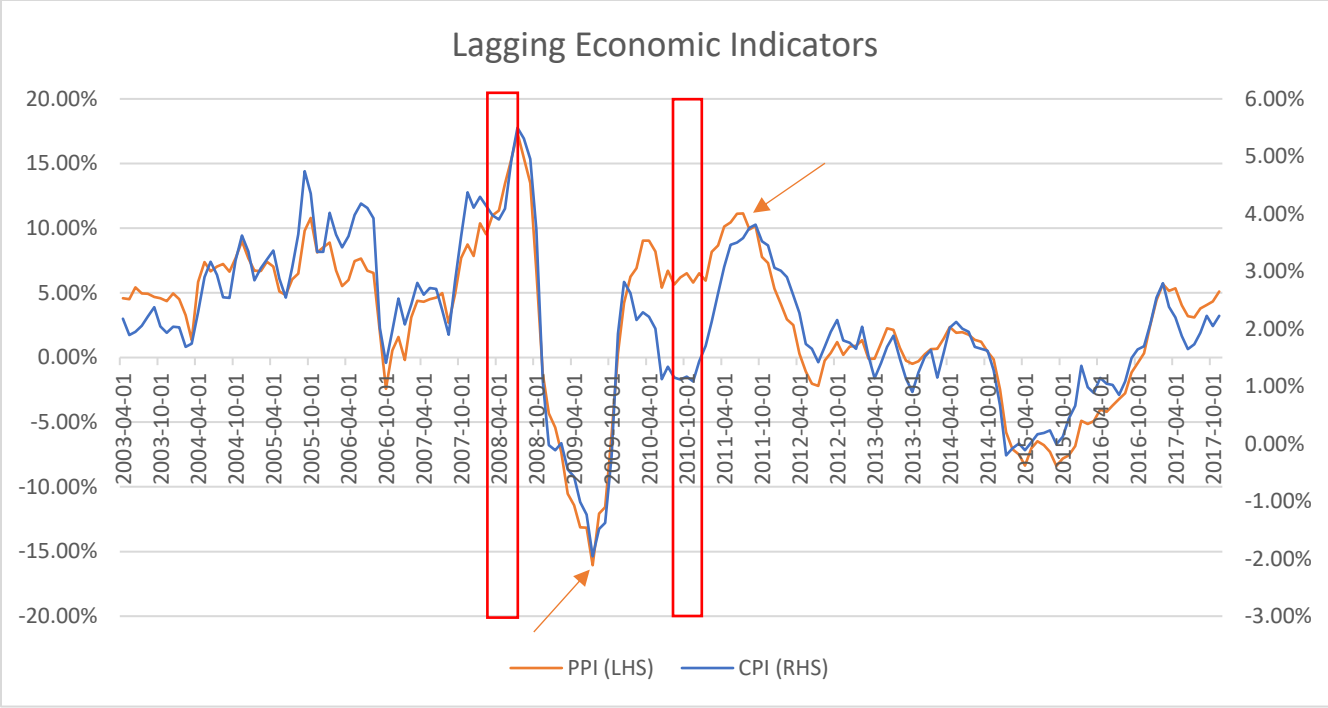

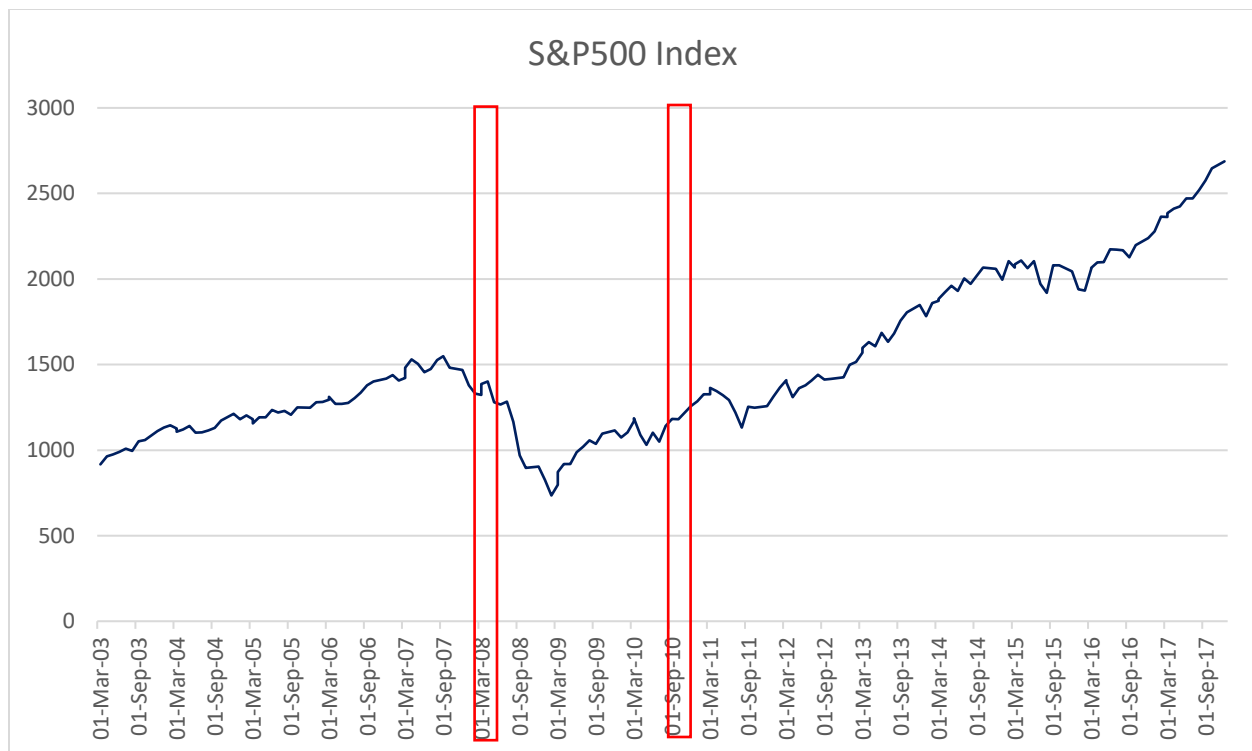Figure 2 Regression on MoM change in CPI and change in PPI data

Take an example of December 2017 announcement. On Tuesday the second week, PPI figure also has a positive surprise (3.1% YoY, consensus 2.9%), this is consistent with previous week ADP and NFP showing that the economy is expanding. On that day gold price increase from 1241.76 to 1244.18 (+0.19%), supporting the PPP and IRP theory. The next day, CPI announcement shows that the result was in-line with consensus (2.2%, consensus 2.2%) and gold price increase from 1243.62 to 1255.11 (+0.92%). This could be due to market expectation of higher future inflation despite the CPI being in-line, as PPI usually precedes CPI figure (producer passing the higher cost of production to consumer).

In the next section, we look at the historical change in leading, concurrent and lagging indicators. This may seem intuitive, but notice how the group of leading indicators precedes economic

downturn and upturn, then the lagging indicators (CPI and PPI) lags by 6-12 months from the concurrent indicators. The period on the first red box is the beginning of 2008 recession while the second red box marked the beginning of the economic recovery.

Lagging Economic Indicators
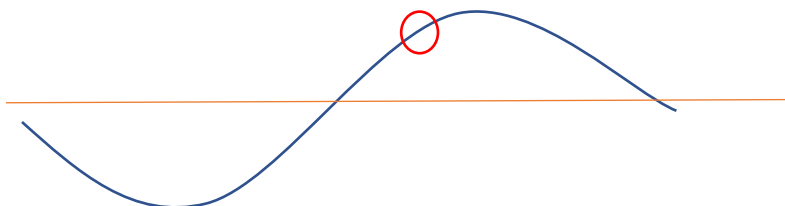
— PPI (LHS) — CPI (RHS)

XAUUSD

Current Economic Condition

As of December 2017, the economy seems to continue its expansion with the stock market breaking all-time high. However, looking at the leading indicators, we could observe the long-term downward trend of YoY change in total vehicle sales and housing starts, which usually precedes economic downturn in the long-run. This is not a concern for the near future though, as the change is oscillating above zero currently. I would be concerned when all of the three of leading indicators shows negative growth, as it does in October 2007 (it happens to be the top of stock market as well). Triangulating this with concurrent indicators, we see that it confirms our observation from the leading indicators; the economy is still expanding and hiring more, but the growth in both NFP and ADP is slowing down as the economy is running hot. I would be concerned with continuous downward trend in the next year. CPI and PPI (lagging indicators) also started to pick up in the last two years, with the CPI currently above 2%. Looking at the historical pattern and PPI data, it could be expected that the trend of higher CPI continues. In conclusion, I believe that the economy is currently at the beginning of late expansion phase, with the expansion probably lasting for another 12-24 months.

Appendix

The timing of economic indicator release:

First Week:

- Wed: ADP Employment Change
- Fri: NFP, Total Vehicle Sales

Second Week:

- Tue: PPI
- Wed: CPI

Third Week:

- Tue: Housing Starts
- Fri: Consumer Sentiment Index

All data is taken from FRED St. Louis website and analyzed by the author

Multivariate Regression of XAUUSD as dependent variable and CPI, Housing Starts, NFP, ADP and Total Vehicle Sales as independent variable.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.694[a]	.481	.466	12.65055%

a. Predictors: (Constant), CPI, Housing Starts, NFP, Total Vehicle Sales, ADP

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25247.245	5	5049.449	31.552	.000[b]
	Residual	27206.187	170	160.036		
	Total	52453.432	175			

a. Dependent Variable: XAUUSD

b. Predictors: (Constant), CPI, Housing Starts, NFP, Total Vehicle Sales, ADP

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-3.148	1.773		-1.775	.078
	Total Vehicle Sales	.412	.115	.287	3.569	.000
	Housing Starts	-.289	.065	-.359	-4.411	.000
	ADP	11.516	4.072	1.325	2.828	.005
	NFP	-17.079	4.621	-1.681	-3.696	.000
	CPI	7.981	.760	.628	10.502	.000

a. Dependent Variable: XAUUSD