Utilization and Precision of The U.S. Current Quarter Model (CQM)

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Professor Lawrence R. Klein originally developed the Current Quarter Model (CQM) in the late 1980's as a complement to the traditional quarterly macroeconomic model. Although the traditional quarterly macroeconomic model is useful for policymakers and economists when it comes to putting together economic forecasts and simulation studies for short- and medium- term (1~3 years), it is not adequate for grasping current economic conditions. Understanding what is happening *now* in the economy is very important not only for policymakers and economists but also investors and business managers at any time. For example, they all want to know what the economy is doing in the current quarter--how quickly the economy is recovering; how fast it is slowing down; and when it is bottoming out.

For example, Advance real GDP growth rate for 2013Q4 was announced to be 3.2%. However, it is not true that the economy was growing at an annual rate of 3.2% every day for that quarter. It is more realistic to understand that the economy repeatedly moved up and down, and created an upward or downward trend (Graph 1).

It is important for economic policymakers (monetary policymakers in particular) as well as investors and company managers to grasp the speed of the current economy (the economic growth rate), the strength of its trend and a turning point for the economy as quickly as possible. However, that is extremely difficult as the Fed economists judge the current economy by saying, as they often do in FOMC statement, that "economic activity is expanding at a 'moderate' (or modest) pace". CQM was constructed to fill this knowledge-gap.

CQM focuses on economic forecasts for the current and next quarters only. CQM is comprised of the statistical relationships between about 90 monthly economic and financial indicators and the main entries in the quarterly National Income Product Accounts (NIPA). The CQM is a purely econometric system with no personal data adjustment. Therefore, CQM is often referred to as a "Go by the Numbers" forecast. Whenever high frequency indicators are available, partial information about the economy can be updated, revising the current and next quarter forecasts. Since there is no personal adjustment in the CQM, on a forward rolling basis CQM forecasts are able to identify continuous changes in the economy. We can therefore repeat CQM forecasts of the main entries in NIPA every week and discern trends in the economy or the turning points.

How to Make a CQM Forecast

We can explain how CQM works by the performance of forecasting real GDP for 2013Q4. CQM uses about 90 monthly economic indicators (table 1) and estimates 11 components in the personal consumption expenditure sector, 10 components in the fixed investment sector, 7 components in the inventories sector, 7 components in the international trade sector and 11 components in the government sector on the expenditure side of NIPA. Each component on the expenditure side consists of nominal and real figures and a price deflator. CQM also estimates 39 nominal components on the income side of NIPA. CQM estimates bridge equations between the monthly economic indicators and NIPA components because the monthly economic indicators are basic statistics composing the NIPA components.

Just as employment statistics such as employment, average hourly earnings and average workweek in each industry are usually released on the first Friday of each month, so are most of the other monthly economic indicators also announced on a similar schedule every month. For example, the releases of main economic indicators in January 2014 are illustrated in Table

1. Most of the monthly economic indicators in Table 1 are the figures of the previous month (i.e. December), but construction expenditure, factory order (shipments of manufactured goods), the trade balance, business inventories, and consumer credit have a two-month lag (i.e. November). Only agricultural prices reflect the figures for the current month (i.e. January).

Table 1: Main Monthly Indicators released in January 2014

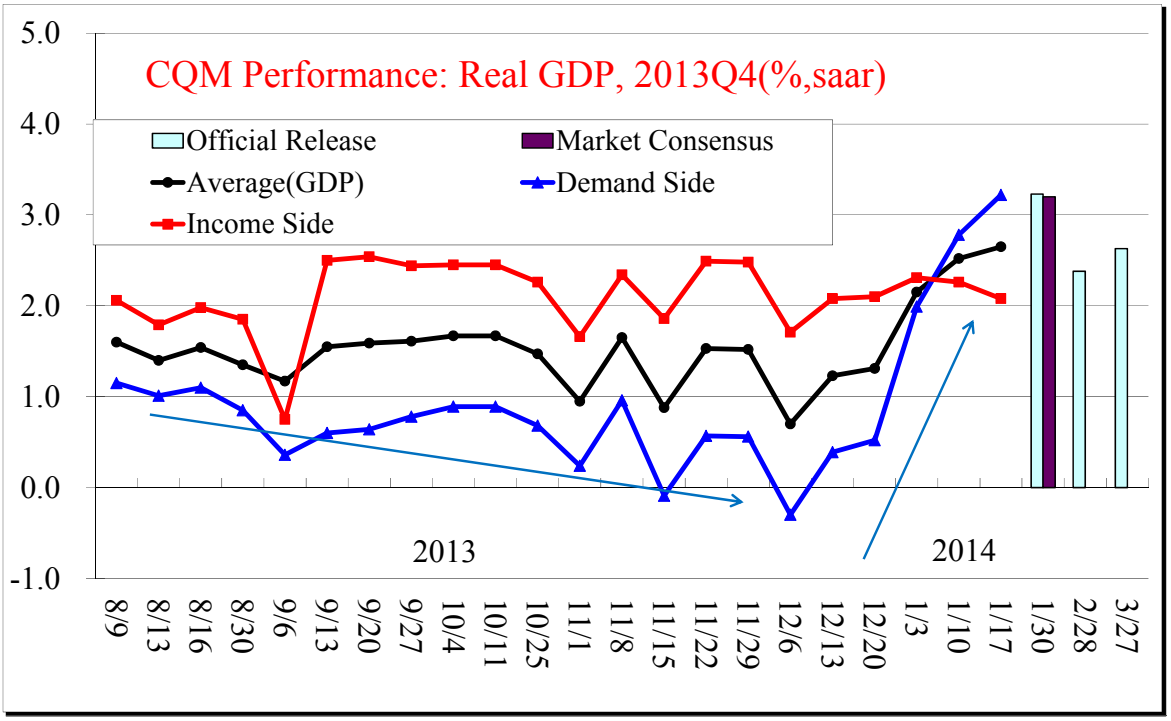
Date	Monthly Indicators	Date	Monthly Indicators
2	Construction spending (2)	15	Producer price indexes (1)
3	Automobile sales (1)		Consumer price indexes (1)
6	Factory orders (2)	17	Housing starts (1)
7	International trade (2)		Industrial production index (1)
8	Consumer credit (2)	28	Durable goods orders（Advance) (1)
9	Employment (1)	30	GDP（2013Q4, Advance）
13	Treasury budget (1)	31	Personal income/consumption expenditure (1)
14	Import/export prices (1)		
	Retail sales (1)		Agricultural prices (0)
	Business inventories (2)		

Number in ( ) indicates the months lagged for the release of each actual monthly economic indicators.

CQM makes statistical bridge equations between monthly economic indicators and their corresponding components in NIPA. Whenever new monthly economic indicators are released, CQM estimates their bridge equations and forecasts their corresponding NIPA components. For example, retail sale statistics are released in the middle of every month. CQM estimates the bridge equation between each category in retail sales and its corresponding component of the nominal consumer spending (PCE) in NIPA. For example, when November retail sales of automobiles and parts dealers are released in the middle of December in 2013, CQM estimates the bridge equation between retail sales of automobiles and parts dealers and nominal PCE of automobiles for the sample period of 1960m1(January) – 2013m11(November). In addition, CQM forecasts, using ARIMA, retail sales of automobiles and parts for the period of 2013m12 (December) – 2014m3 (March). Therefore, CQM can forecast the nominal PCE of automobiles for the period 2013m12 – 2014m3. In this case, the actual figures for October and November retail sales of automobiles and parts dealers were used to forecast the nominal PCE of automobiles for 2013Q4 (m10 – m12). When December retail sales are released January in 2014, CQM can forecast the nominal PCE of automobiles for 2013Q4 from the bridge equation which uses all the actual figures for retail sales of automobiles and parts dealers for 2013m10 – 2013m12. Likewise, CQM applies total retail sales to the bridge equations for proprietors' income and corporate profits on the income side of NIPA.

Graph 1 illustrates the changes of real GDP forecasts calculated on both the expenditure and income sides by CQM when economic indicators were released every week for the period of 9 August 2013 – 17 January 2014. GDP is aggregated by its NIPA components forecasted by CQM.

Graph 1: Real GDP Forecasts on both the expenditure and income sides for 2014Q3 by CQM (%, saar)



Graph 1 shows the changes in the growth rates of the real GDPs that CQM forecasted every week from the week of 9 August 2013 to the week of 17 January 2014. The triangular symbol ▲ and square symbol ■ show the real GDPs on the expenditure and income sides respectively which were forecasted every week by CQM. The circular symbol ● gives the average of the forecasts of the real GDPs on both the expenditure and income sides. Although economic theory tells us that GDPs on the expenditure, income and production sides must be equal to on, they are different in practice because the basic data series that compose NIPA statistics are not perfect. That is why the Bureau of Economic Analysis (BEA) creates a statistical discrepancy (SD) on the income side and calculates the SD to make the GDP on the income side equal to the GDP on the expenditure side. This does not necessarily mean that GDP calculated from the expenditure side is more correct than GDP calculated on the income side. It is reasonable to assume that true GDP is somewhere between the two. Since SD is not a random data series but a serially correlated time series data, CQM forecasts SD using ARIMA. Therefore, CQM produces GDPs on both the expenditure and income sides independently.

It is one of the characteristics of CQM forecasts to always judge the economy from both the expenditure and income sides. The more actual figures of monthly economic indicators are used in the current quarter CQM updates, the closer GDP forecasts on both the expenditure and income sides tend to be. This is seen in most cases for CQM forecasts, which is reasonable based on the economic theory.

We can show in detail how we could judge the current economic conditions based on Graph 1:

- Employment statistics are usually updated at the beginning of the month. CQM forecasts updated employment statistics as follows: July employment in the August 9 CQM forecast, August employment in the September 6 CQM forecast, September employment in the October 25 CQM forecast, October employment in the November 8 CQM forecast, November employment in the December 6 CQM forecast, December employment in the January 10 CQM forecast. The release of the September employment statistics was delayed until October 25 due to the federal government shutdown. Actual figures of monthly economic indicators for 2013Q4 (October – December) began to

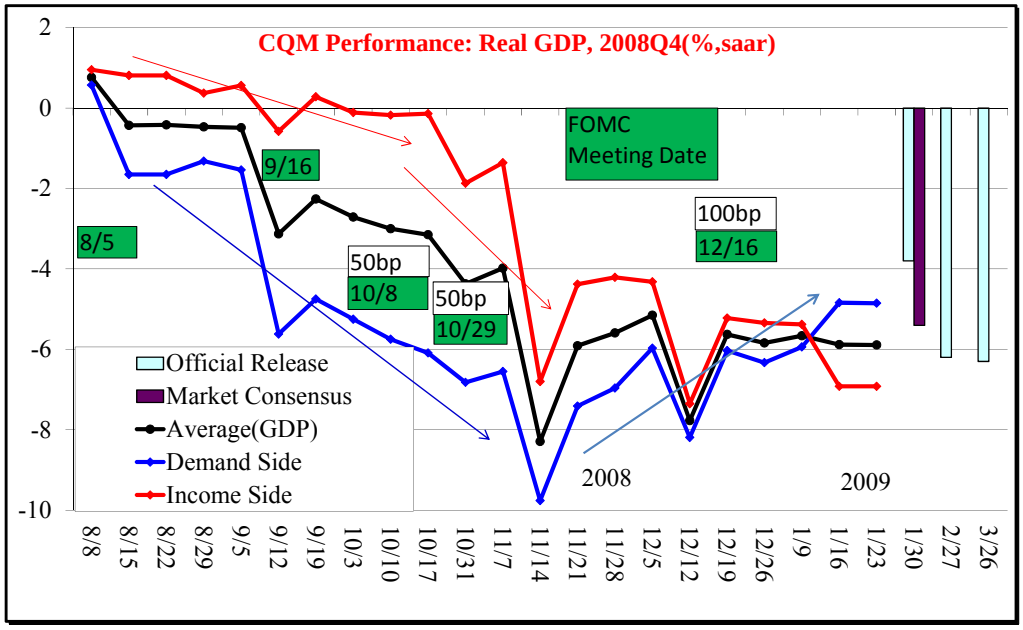
be updated by CQM forecasts after November 8.

- The actual figures for construction spending, international trade, business inventories, shipments of manufactured goods and consumer credit were updated in the December CQM forecasts because these monthly economic indicators have a two-month lag before the actual figures are released.
- In the CQM forecasts from August 9 to December 6 the growth rate of real GDP on the expenditure side was forecasted very low, in the range 0%-1.0% with a slightly downward trend. This is because monthly economic indicators released during the period of August 9 – December 6 in 2013 that affect components of the NIPA expenditure side gradually deteriorated. The Fed postponed reducing its asset purchases of $85 billion per month at the September 18 FOMC meeting because the economy was not recovering as the Fed had expected. Indeed, CQM forecasts of 2013Q4 GDP in Graph 1 show explicitly the economic slowdown until December 16.
- On the other hand, the growth rate of real GDP on the income side was forecasted to be 2%-2.5% for 2013Q4 during the period September 13-January 17 because monthly economic indicators that affect components of the NIPA income side released during the period September 12- January 17 did not show the economic slowdown.
- In this way, if the economy is slowing down on the expenditure side without any sign of the economic slowdown on the income side, we can judge that the economic slowdown seen from the expenditure side will be temporary or not be so serious.
- CQM forecasts after December 13 started to use more actual figures of monthly economic indicators for 2013Q4 such as construction spending, international trade, business inventories, shipments of manufactured goods and consumer credit. As CQM updated more actual figures of the monthly economic indicators for 2013Q4, real GDP on the expenditure side was revised upward sharply. The CQM forecast on January 17 showed the growth rate of real GDP on the expenditure side to be 3.2%, which was equal to the Advance GDP released on January 30.
- On the other hand, there were no significant revisions in the growth rates of real GDP on the income side, which was in a range of 2%-2.5%. This suggests that Preliminary or Final 2013Q4 GDP will be lower than the Advance GDP. This is because true economic growth rate is reasonably assumed to be somewhere between the real GDPs on both the expenditure and income sides. More of the basic data that compose NIPA components are available in the Preliminary and Final GDP figures than for the Advance GDP. BEA released the Preliminary real GDP figure of 2.4% on February 28 and the Final GDP figure of 2.6% on March 27, which was close the average growth rate of real GDPs on both the expenditure and income sides on January 17.

CQM Forecast Performance for the Worst Period of 2008Q4 after Lehman Shock

It was in 2008Q4 that the worst effects of the Lehman shock were felt by the U.S. economy. We can better understand the characteristics of CQM forecast by looking at the CQM forecast performance for 2008Q4.

Graph 2: CQM Forecast Performance of Real GDP for 2008Q4 (%, saar)



Graph 2 shows the CQM forecasts every week from August 8 in 2008 to January 23 in 2009. As seen in Graph 2 the growth rate of real GDP on the expenditure side declined to about -2% in the August 15 CQM forecast and it was revised downward sharply after the September CQM forecasts, reaching -10% in the November 14 CQM forecast. Also, real GDP on the income side began to show a negative growth rate in September and followed quickly the sharp economic slowdown on the expenditure side. In the event, the growth rate of real GDP on the income side reached -7% in the November 14 CQM forecast. We see that CQM was able to show how serious the current economic slowdown in 2008Q4 was. After late November CQM forecasts CQM started to revise upward real GDPs on both the expenditure and income sides. In the January 23 CQM forecast before the release of Advance 2008Q4 GDP, the growth rates of real GDP were forecasted to be -4.9% on the expenditure side and -6.9% on the income side. The average growth rate of real GDPs on both sides was -5.9%. As the bar graphs display in Graph 2, the Advance real GDP growth rate was -3.8%, but it was revised downward to -6.2% in the Preliminary real GDP and to -6.3% in the Final real GDP, very close to the average growth rate of real GDPs calculated from CQM forecast. Based on the July 2013 comprehensive revision of NIPA, the economic growth rate for 2008Q4 became -8.9%, which justifies the severe CQM forecast on November 14. By observing the CQM forecasts for 2008Q4, one could expect substantial monetary easing would be undertaken in September- November 2008.

The Fed had five FOMC meetings during the period of CQM forecasting 2008Q4 GDP (Graph 2), and at the first of these, gave the following economic outlook:

- FOMC statement on August 5, 2013

"*Over time, the substantial easing of monetary policy, combined with ongoing measures to foster market liquidity, should help to promote moderate economic growth.*" "*Inflation has been high, spurred by the earlier increases in the prices of energy and some other commodities, and some indicators of inflation expectations have been elevated.*"

As of August 5, the Fed remained optimistic for promoting moderate economic growth, but was concerned about inflation.

- FOMC statement on September 16, 2013

"*Economic growth appears to have slowed recently, partly reflecting a softening of household spending. …. Over time, the substantial easing of monetary policy, combined with ongoing measures to foster market liquidity, should help to promote*

moderate economic growth."

As of September 16, although the Fed recognized the recent economic slowdown, they were still optimistic for the economy with moderate growth. CQM indicated that the growth rate of real GDP on the expenditure side was declining significantly to about -6%.

- FOMC statement on October 8, 2013

"*Incoming economic data suggest that the pace of economic activity has slowed markedly in recent months*." "*The Federal Open Market Committee has decided to lower its target for the federal funds rate 50 basis points to 1-1/2 percent. The Committee took this action in light of evidence pointing to a weakening of economic activity and a reduction in inflationary pressures*."

As of October 8, the Fed admitted that the economy had recently slowed down. For this reason, the Fed cut the federal funds rate 50 basis points to 1.5%. Even so, it would have been unlikely for the Fed to recognize that the economy would be plunging to -10% growth rate. Rather the Fed joined the Bank of Canada, the Bank of England, the European Central Bank, the Federal Reserve, Sveriges Riksbank and the Swiss National Bank in a policy of reducing interest rates.

- FOMC statement on October 29, 2013

"*The pace of economic activity appears to have slowed markedly, owing importantly to a decline in consumer expenditures*." "*The Federal Open Market Committee decided today to lower its target for the federal funds rate 50 basis points to 1 percent*."

As of October 29, the Fed recognized the sharp economic slowdown as being due mainly to weakening consumer spending. However, the CQM forecast on October 31 showed that the economic slowdown was due to deterioration in net exports. The CQM forecast on November 14 suggested that the economy had plunged further because not only net exports but also personal consumption expenditure had deteriorated. The CQM forecasted on November 11 that the growth rate of real personal consumption expenditure would be -5.5% for 2008Q4.

- FOMC statement on December 16, 2013

"*Overall, the outlook for economic activity has weakened further*." "*The Federal Open Market Committee decided today to establish a target range for the federal funds rate of 0 to 1/4 percent.*"

As of December 16, the Fed cut federal funds rate by 100 basis points to 0% - 0.5% because they thought that the economy had weakened further. Indeed the CQM shows large negative growth rates of real GDPs on both the expenditure and income sides, but it suggested that the economy had bottomed out since November 14 (Graph 2). Namely, the Fed missed that the economy was bottoming out. It is reasonable to think that the Fed should have cut federal funds rate by 100 basis points at the FOMC meeting on September 16 or October 8.

Comparing CQM forecasts with FOMC statements CQM has the following advantages:

1: CQM can always determine the current economic situation from the numbers and trends by making CQM forecasts weekly on a forward rolling basis.

2: CQM is able to reveal the turning points of the economy at least one month earlier than the Fed economists (and the market) recognize.

3: Since CQM is a purely econometric system with no personal data adjustment, we can judge the current economic condition objectively. There is no bias for or against certain monthly economic indicators because CQM is referred to as a "Go by the Numbers" forecast.

4: CQM always considers the economy from both the expenditure and income (or production) sides.

CQM is better than Forward Guidance for Fed's Monetary Policy

Fed economists always say that "Monetary policy is (incoming) data-dependent" and that "Monetary policy depends on how the economy is evolving." No Fed economists disagree that monetary policy should depend on the current economic conditions.

They judge, however, the current economic conditions in most FOMC statements by saying that "economic activity has been expanding at a moderate pace." They have never shown the current economic condition by figures and trends. Therefore, they have introduced Forward Guidance on which monetary policy depend.

Table 2 shows how the Fed economists have changed their forward guidance. Federal Reserve Bank of Dallas President Richard W. Fisher classified forward guidance by two types, "Odysseus" or "Apollo" (Richard W. Fisher 2014).

Table 2: Changes in Forward Guidance (FG) shown in FOMC Statements

Date of FOMC Statements	Forward Guidance （FG）	Classification by Richard Fisher
2009 Jan. 28	FFR=0% - 0.25%: **For some time**	
2009 Mar.18	FFR=0% - 0.25%: **For an extended period**	
2011 Aug.9	FFR=0% - 0.25%: **at least through mid-2013**	Odysseus Type (Calendar-base FG)
2012 Jan. 25	FFR=0% - 0.25%: **at least through late 2014**	
2012 Sep. 13	FFR=0% - 0.25%: **at least through mid-2013**	
2012 Dec. 12	**Unemployment Rate=6.5% (**as threshold**)**	Apollo Type （FG Dependent on the Oracle of Apollo at Delphi）
	A highly accommodative stance of monetary policy will remain appropriate "**Considerable time**"	
	after QE3 ends and	
	the economic recovery strengthes	
2014 July 30	From the threshold of 6.5% unemplyment rate to a **labor market condition index.**	
	Keep FFR below levels as normal in the longer run, even after employment rate and inflation are near mandate-consistent level.	
2014 Dec. 17	the Committee judges that it can be "**patient**" in beginning to normalize the stance of monetary policy.	
	it likely will be appropriate to maintain the 0 to 1/4 percent target range for the federal funds rate **for a considerable time** following the end of its asset purchase program in October.	

FFR: Target of Federal Funds Rate

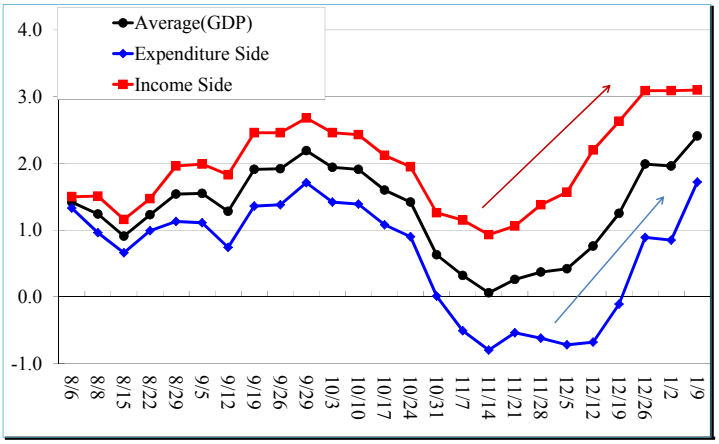
The changes in forward guidance show the fact that the Fed could not start increasing interest rates by forward guidance. Nonetheless the Fed added the sentence "the Committee judges that it can be patient in beginning to normalize the stance of

monetary policy" in the FOMC at December 17 in 2014. At a news conference after the FOMC meeting Fed Chair Janet Yellen told that "patient" meant the policy-setting Federal Open Market Committee was unlikely to hike rates for "at least a couple of meetings," meaning April of next year at the earliest. Namely, monetary policy is dependent on calendar, instead of incoming data.

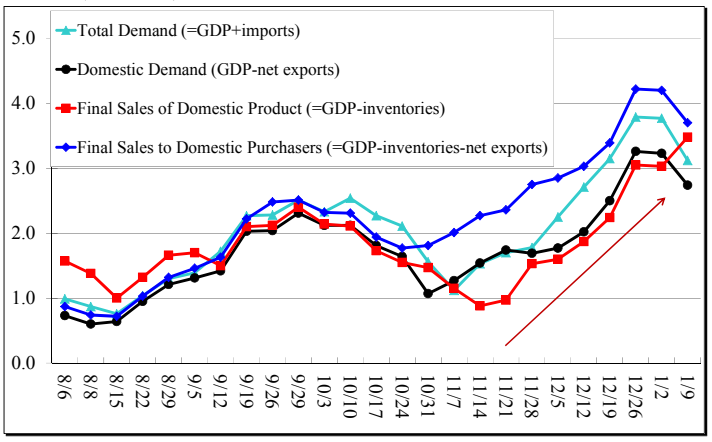
Although the U.S. economy grew at 4.6% and 5.0% respectively for 2014Q2 and Q3, the Fed did not increase interest rates in 2014Q4 because monetary policy actually depended on forward guidance. If monetary policy were incoming data-dependent like CQM forecasts, the Fed could increase interest rates immediately. As of January 2, 2015 there were only two Fed economists who recommended raising interest rates immediately. Philadelphia Fed President Charles Plosser said "A forecasting tool developed by the Federal Reserve recommends that U.S. interest rates should be hiked immediately to keep pace with the improving economy (Michael Dotsey, Charles I. Plosser, and Keith Sill, 2014)." Cleveland Fed President Loretta Mester said on the Fox Business Network television channel on January 2 "I do believe that inflation will gradually move back to our target, so I could imagine interest rates going up in the first half of the year."

The 9 January 2015 CQM forecast relying on incoming data can tell that the Fed should raise interest rates immediately. Graphs 3-6 show the CQM forecasts of real GDPs and real aggregated indexes for 2014Q4 and 2015Q1 until January 9 in 2015.

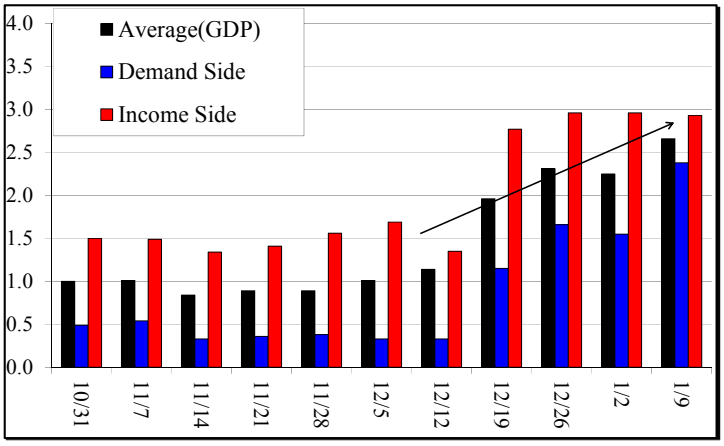
Graph 3: CQM Forecast of Real GDPs for 2014, (%, saar)



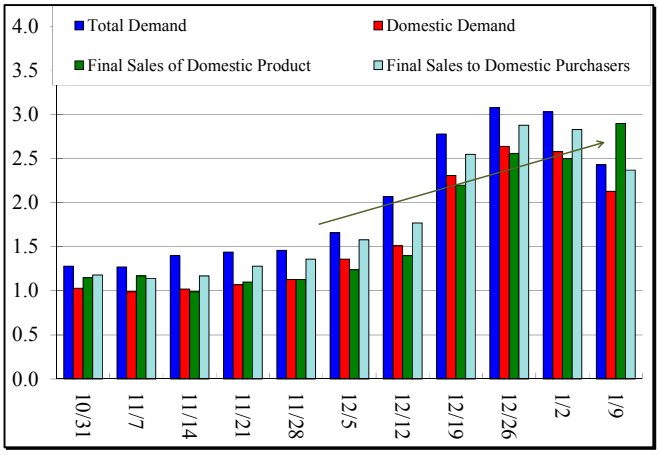
Graph 4: CQM Forecast of Real Aggregated Indexes for 2014, (%, saar)



Graph 5: CQM Forecast of Real GDPs for 2015, (%, saar)



Graph 6: CQM Forecast of Real Aggregated Indexes for 2015, (%, saar)



Graph 3 shows that real GDP on the expenditure side has been sharply improving since the January 19 CQM forecast as had been expected by the upward trend in real GDP on the income side since the November 14 CQM forecast. The average growth rate of real GDPs on both the sides reached 2.4% on January 9 CQM forecast. CQM forecasts of real aggregated indexes also illustrate the steady economic expansion since late-October or mid-November (Graph 4). As of January 9, the growth rates of real aggregated indexes are forecasted to be in a range of 2.7% - 3.7%. These growth rates of real GDPs and real aggregated indexes as well as their upward trends suggest that there is no need for the Fed to keep its zero interest rate policy.

As seen in Graphs 5 and 6 not only CQM forecasts for 2014Q4 but also those for 2015Q1 suggest that the Fed should start to normalize its monetary policy.

Graph 7: CQM Forecasts of Headline Inflation and Core Inflation for 2014Q4 and 2015Q1 (% from a year ago, saar)

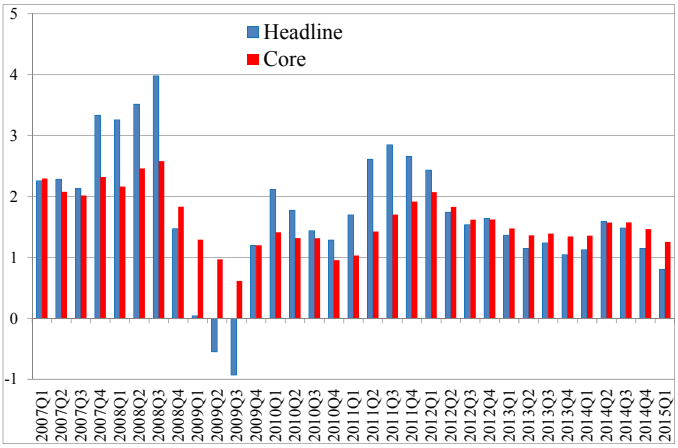


Table 3: Personal Interest Income and Payment ($Billion, saar)

	2008	2009	2010	2011	2012	2013
Income	1362	1264	1195	1232	1256	1255
Payments	290	274	251	241	242	247
Net	1072	990	944	990	1014	1008
2008 - Year Income		97	167	130	106	106
2008 - Year Payments		16	39	48	48	43
2008 - Year Net		82	128	82	58	64

The Fed has two main targets of maximize employment and price stability. The minutes of the 16-17 December 2014 FOMC meeting released on 7 January 2015 say the following:

- *Most participants agreed that it would be useful to state that the Committee judges that it can be patient in beginning to normalize the stance of monetary policy; they noted that such language would provide more flexibility to adjust policy in response to incoming information than the previous language, which had tied the beginning of normalization to the end of the asset purchase program.*
- *With lower energy prices and the stronger dollar likely to keep inflation below target for some time, it was noted that the Committee might begin normalization at a time when core inflation was near current levels, although in that circumstance participants would want to be reasonably confident that inflation will move back toward 2 percent over time.*

Since CQM forecasts the current economy by using incoming information (economic indicators), CQM can conclude that the real economy has been steadily expanding for 2014Q4 and will grow steadily for 2015Q1, which leads to the conclusion that the Fed should normalize its monetary policy. Since the U.S. economy grew at annual rate of 4.6% and 5.0% respectively for 2014Q2 and Q3, the Fed economists must recognize the recent steady economic expansion. Indeed the economy has been growing much faster than the "moderate growth" Fed economists had forecasted.

The main reason why the Fed does not start to raise interest rates seems to be that the current inflation rate is "well below" the Fed's target of 2%. Indeed, inflation has not exceeded 2% since 2012Q3 – 2014Q3. The January 9 CQM forecast suggests

the growth rate of headline inflation to be 1.2% and 0.8% for 2014Q4 and 2015Q1 respectively (Graph 7). Although Plosser and Dallas Fed President Richard Fisher, who have been skeptics of the Fed's easy-money policies, often expressed concern that the Fed might wait too long to raise rates, dove Fed economists including Minneapolis Fed President Narayana Kocherlakota and Chicago Fed President Charles Evans, who are the strongest supporters of aggressive efforts to spur growth, worried that the central bank was preparing to increase rates too soon. Evans was reporting as saying on January 7 that he was very concerned that, by his forecast, inflation won't return to the Fed's 2% goals in 2018, even if the Fed does not begin to raise rates until next year. But he also suggested that he would be open to raising rates this year, should data come in stronger than expected, or if the rates rises are shallow enough they would not keep inflation from returning to more healthy levels (Reuters, January 7, 2015)."

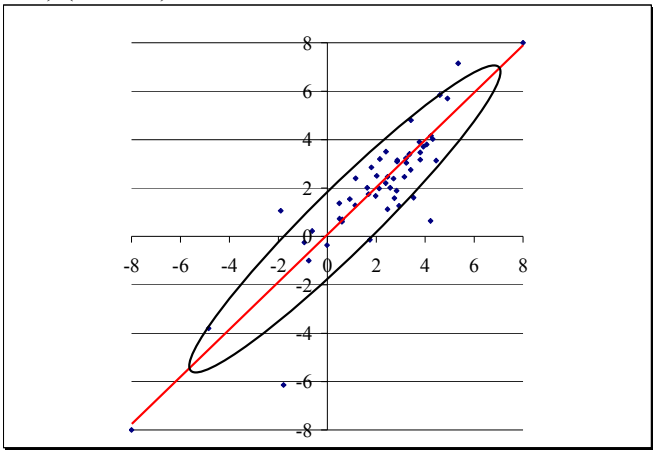
"Price Stability", one of Fed's targets, has come to mean achieving a 2% inflation rate, though the monetary policy used to prevent inflation or deflation from accelerating from a certain range of 0% - 2%. In the real world there is no creeping inflation that will gradually increase from 1% to 2% for the next two years. Once inflation starts increasing, it will instantly exceed the Fed's 2% target by far. Also, if the Fed keeps a zero interest rate policy too long, its cost will exceed its' benefits. For example, Table 3 displays how seriously zero interest rate policy has been affecting personal interest income more than personal interest payments. Since nominal residential investment was about $570 billion in 2014, it is understand that the negative effect of zero interest rate policy on household is very serious.

Accuracy of CQM Forecast

It is Advance GDP figures that markets pay attention most. In order to calculate Preliminary GDP, the BEA must assume the figures of the last month in the quarter for each of the trade balance (the import and export), business inventories, construction spending, shipments of manufactured goods. On the other hand, CQM forecasts these figures by using ARIMA. If the BEA's assumptions of the figures are close to the CQM's forecasts, the Advance GDP tends to be close to CQM's forecast of the GDP.

We can check CQM performance by comparing CQM forecasts of real GDP with the BEA's Advance GDP for 53 quarters during the period of 2000Q4 - 2013Q4. Since we compare the CQM forecasts of GDP with Advance GDP, the GDP forecasts on the expenditure side are used.

Scatter Diagram 0: Last CQM Forecasts of Real GDP before the Release of Advance GDP (X axis) vs. Advance Real GDP (Y axis) (%, saar)



Scatter diagram 0 illustrates the last CQM forecasts of real GDP on the expenditure side for each quarter with Advance

real GDP in terms of annual growth rate from the previous quarter. That is to say, if the CQM forecast is equal to the Advance real GDP, then the plot is on the line of 45 degree from the origin. If CQM overestimates (underestimates) Advance real GDP, then the plot locates to the right (left) area of the 45 degree line.

In the last CQM forecasts actual figures for three months in the forecasting quarter were updated for most of the monthly economic indicators while actual figures for only two months were updated for international trade, business inventories, shipments of manufactured goods, construction spending and consumer credit. As seen in scatter diagram 0 the plots were scattered very close to the 45 degree line, suggesting that CQM forecasts were quite accurate.

In order to understand the accuracy of CQM forecasts statistically we can make a regression analysis of the Advance real GDP on the last CQM forecasts of GDP as follows:

Y: Advance real GDP （%, saar）

X: Last CQM forecast of real GDP on the expenditure side (%, saar)

Y = 0.939801 * X …… (eq.1)

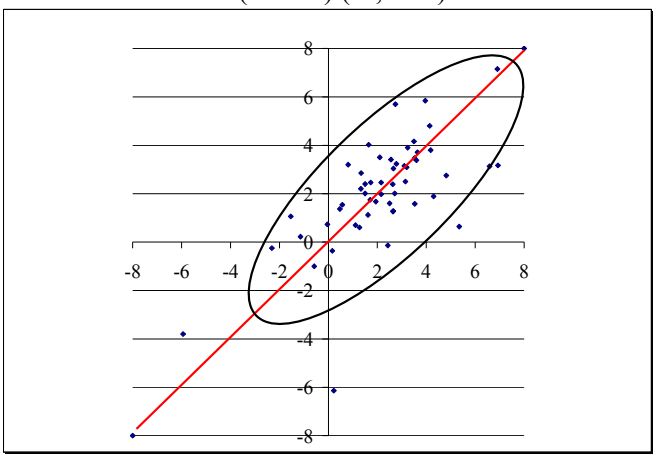
(t-value =16.9)

Sample period: 2000Q4~2013Q4, R2_: 0.69, D-W: 2.05

Eq.1 without constant term shows 0.69 for the adjusted R-squared, which is quite good relationship for Y and X variables in terms of growth rates. That the last CQM forecast of real GDP is close to the Advance real GDP is a necessary condition for understanding that weekly CQM forecasts up to the last forecast are right to represent the economic conditions.

Scatter Diagram 1 compares the Advance real GDP with CQM forecast of real GDP on the expenditure side about one month before the release of the Advance GDP. Then, the only economic monthly indicators in the CQM forecast that have actual figures for all three months of the forecasting quarter are employment statistics and agricultural prices. Plots in scatter diagram 1 spread wider than those in scatter diagram 0. This is because most of the economic indicators in the CQM forecast have actual figures for only two months of the forecasting quarter. Construction spending, international trade, business inventories, shipments of manufactured goods and consumer credit have actual figures for only one month.

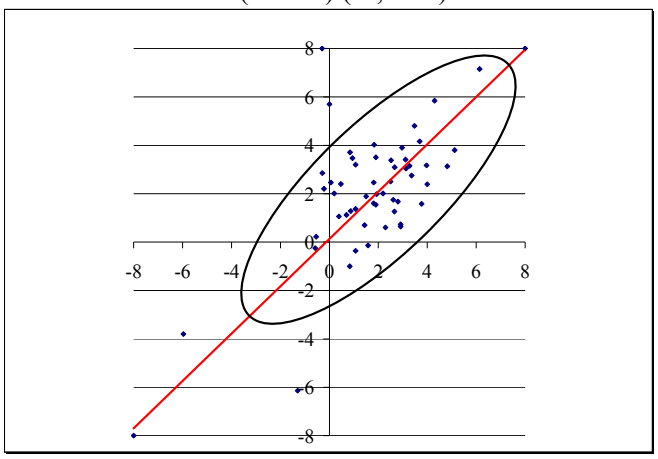
Scatter Diagram 1: CQM Forecast of Real GDP about one month before the Release of Advance Real GDP (X axis) vs. Advance Real GDP (Y axis) (%, saar)



Scatter diagram 2 compares the CQM forecast of real GDP about two months before the release of the Advance real GDP

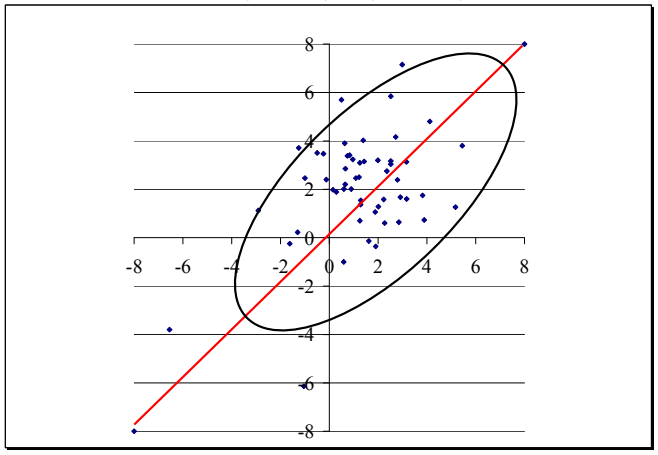
with the Advance real GDP. In the CQM forecasts only employment statistics and agricultural prices have actual figures for two months of the forecasting quarter. Most of economic indicators have actual figures for only one month. There are no actual figures for construction spending, international trade, business inventories, shipments of manufactured goods and consumer credit. There is no obvious improvement in the forecast performance in scatter diagram 1, compared with scatter diagram 2.

Scatter Diagram 2: CQM Forecast of Real GDP about two months before the Release of Advance Real GDP (X axis) vs. Advance Real GDP (Y axis) (%, saar)



Scatter diagram 3 compares the CQM forecast of real GDP about 3 months before the release of the Advance real GDP with the Advance real GDP. This shows the CQM performance when only employment statistics and agricultural prices have actual figures for one month of the forecasting quarter. Other monthly economic indicators used in the CQM forecast have no actual figures for the forecasting quarter. Plots in scatter diagram 3 spread much wider than those in scatter diagrams 1 and 2. In other words, CQM increases its forecast performance sharply once it begins to update actual figures of monthly economic indicators for the forecasting quarter.

Scatter Diagram 3: CQM Forecast of Real GDP about three months before the Release of Advance Real GDP (X axis) vs. Advance Real GDP (Y axis) (%, saar)



Conclusion

CQM is the best tool to grasp the current economic conditions because CQM produces purely data-dependent forecasts and

shows how the economy is evolving by figures and trends. Many economists often focus on the expenditure sides of NIPA only such as personal consumption expenditure, fixed investment, inventories, exports and imports, and government consumption expenditures/gross investment in order to judge the current economic conditions, whereas CQM always looks at both the expenditure and income sides.

There are ongoing debates about how monetary policy can be determined. For example, Plosser recommends a systemic approach to monetary policy, where policy rules such as Taylor rules benchmark the stance of monetary policy. On the other hand, Kocherlakota insists that the Fed is better off using its own best judgment rather than relying on a policy rule when it comes to deciding rate policy. CQM lies between the policy rules' approach and the judgment approach. CQM always proposes the current economic conditions by figures and trends, leaving it economists themselves to decide the monetary policy or investment strategy.

CQM will play an increasingly important role for policymakers and investors to make quick and accurate decisions because handling frequency data becomes much easier as the IT revolution continues to progress. When Prof. Lawrence R. Klein created Project LINK consisting of quarterly macroeconomic models in the world, he planned to make a CQM LINK system for the world. If we could make such a CQM LINK system, we could grasp the current economic conditions in the world instantly through CQM forecast in each country as soon as economic information in any country was released.

Appendix

Dotsey, Michael, Charles I. Plosser, and Keith Sill, Special Report "Monetary Policy Report: Using Rules for Benchmarking", Federal Reserve Bank of Philadelphia, December 2014

Fisher, W. Richard, "Forward Guidance" Federal Reserve Bank of Dallas, April 4 2014,

Reuters "HIGHLIGHTS- Recent remarks by U.S. Federal Reserve officials, January 7, 2015